

A large, stylized, light gray tree graphic is positioned on the right side of the page, extending from the top to the middle. The tree has a thick, dark gray trunk and several branches that end in rounded, light gray shapes representing foliage. The background is white.

# One Amazon: A Personal Environmental History. An Interview with Susanna Hecht

Sandro Dutra e Silva<sup>1</sup>, Adrián Lerner<sup>2</sup>, José Augusto Pádua<sup>3</sup>

---

<sup>1</sup> Ph.D, History (Universidade de Brasília). Associated Professor, Universidade Estadual de Goiás. Full Professor, Universidade Evangelica de Goiás, Brazil. ORCID: <https://orcid.org/0000-0002-0001-5726>. E-mail: sandrodutr@hotmail.com

<sup>2</sup> Ph.D, History (Yale University), Philomathia Fellow at the Consortium for the Global South, University of Cambridge. E-mail: al2093@cam.ac.uk

<sup>3</sup> Ph.D, Political Science (IUPERJ). Associated Professor, Institute of History / Universidade Federal do Rio de Janeiro, Brazil. ORCID: <https://orcid.org/0000-0002-4524-5410>. E-mail: jpadua@terra.com.br

Susanna Hecht is one of the leading scholars of the Brazilian Amazon. The scope and depth of her work reflect a unique commitment to the study of that very complex region through the power of interdisciplinary research. A geographer by training, she obtained her Ph.D. from the University of California at Berkeley in 1982, with a dissertation that studied the social and environmental impacts of cattle-ranching in Brazil's eastern Amazonia. An early practitioner of the field of political ecology, she has since then authored, co-authored and edited more than 15 books and special issues of journals, more than 100 articles, book chapters, policy reports, and countless pieces of public writing. This extraordinary corpus includes single-authored publications and collaborative works, and, crucially, an extremely unusual thematic and methodological diversity that includes explicit and engaged dialogue with the approaches of soil science, physical geography, remote sensing, narrative history, literary analysis, ethnography, science and technology studies among many others. As she puts it, you cannot understand the Amazon without them.

Her best-known monograph is the synthetic history *The Fate of the Forest: Developers, Destroyers, and Defenders of the Amazon*, co-written with the journalist Alexander Cockburn, first published by Verso in 1990 and since then updated, published in different editions, five so far, and recent translation into Portuguese *Destino da Floresta*<sup>4</sup>. Widely read, it remains the essential work of reference for the modern history of the Brazilian Amazon. It is worth saying that this book, as well as her other publications, do not present just a cold academic work. It is a scientific production full of solidarity and concern for the people and nature of the region. During her years of fieldwork in the Amazon, Susanna dialogued closely with different groups of forest peoples. She got to know their problems and hopes, participating in many discussions about how to improve their living conditions and look for alternatives to the economy of forest destruction. Most recently, she published a detailed study of the deep reflections on the region's past and future elaborated by the Brazilian writer Euclides

---

<sup>4</sup> Hecht, Susanna & Cockburn, Alexander. *O Destino da Floresta: desenvolvedores, destruidores e defensores da Amazônia* (São Paulo: Editora Unesp, 2022)

Da Cunha, *The Scramble for the Amazon and the “Lost Paradise of Euclides da Cunha”*, which was awarded the Elinor Melville Prize for the best book on Latin American Environmental History by the American Historical Association. She has also published dozens of articles in the leading journals in the humanities, social sciences, development studies and scientific journals. Susanna’s multilingual publication record, with articles and chapters in English, Portuguese, and Spanish, a history of teaching and research appointments in the United States, Brazil and Switzerland, and a rich history of collaborative research and writing, reflect her commitment with building a community that includes a diversity of perspectives.

This in-depth interview is an opportunity to explore different aspects of Susanna’s career and intellectual influences, her perspectives on the past, present and future of the Amazon, and on the intellectual communities of which she is part. This interview we did with Susanna Hecht for Halac represents the engagement of collaborators who were in different geographic contexts and many under Covid lockdowns. The participants were distributed between Brazil, the United Kingdom, and the United States. And even Susanna, for example, participated while she was in California and also in Switzerland. Technology was an ally, and we had the opportunity to deal with different platforms for remote meetings. And our meetings were always showered with joy and enthusiasm. Much more than just describing trajectories, experiences, reflections, criticisms, and legacies, this interview revealed the editorial need to consider the inclusion of valuable footnotes. These inserts reflect the intellectual richness of the conversation with one of the most influential researchers on environmental issues in Latin America.

In 2023, Susanna Hecht, director of the Center for Brazilian Studies at UCLA, was the winner of the American Association of Geographers’ Stanley Brunn Award for Creativity in Geography. And recently, her book *Fate of the Forest* was translated into Portuguese, and published in Brazil by Unesp Press. We are extremely pleased to have this interview published in HALAC.

## INTERVIEW

- 1. Susanna, we would like to begin by asking you about the influence of the University of California at Berkeley in your education and in the creation of your unique perspective, which consistently reflects the inextricable links between politics and ecology. Could you tell us about the earliest and most significant influences in your training as a geographer?**

The place where this geographic integration actually begins is the University of Chicago. I was taking a course in tropical ecology with very famous tropical ecologists like Daniel Janzen and many others.<sup>5</sup> It was a big class and, of course, in February in Chicago, what would you rather do than take a class in tropical ecology? It's so pleasant to think about it being warm somewhere else, and then I would have to walk across campus to my class on Latin American history, and what I realized as the cold wind was bearing down is that they were talking about the same place, in this case Central America, but as though it had neither a human history, that was the part of the ecologists; or an ecological dynamic or an environmental history, on the part of historians. So at this moment I thought, well, I better find some discipline that throws these things together. I took a class with geographer Karl Butzer<sup>6</sup>, who was integrating

---

<sup>5</sup> Daniel Janzen (born 1939) is an American biologist. He is currently Professor of Biology and Thomas G. and Louise E. DiMaura Term Chair at the University of Pennsylvania. A specialist in the biology and conservation of tropical forests, especially in Costa Rica, he taught at the University of Chicago between 1969 and 1972. He obtained his Ph.D from the University of California at Berkeley in 1965.

<sup>6</sup>Butzer, K. W. (1992). "The Americas before and after 1492: An introduction to current geographical research." *Annals of the Association of American Geographers* **82**(3): 345-368, Butzer, K. W. and E. K. Butzer (1997). "The 'natural' vegetation of the Mexican Bajío: Archival documentation of a 16th-century savanna environment." *Quaternary International* **43-4**: 161-172, Butzer, K. W. (2012). "Collapse, environment, and society." *Proceedings of the National Academy of Sciences of the United States of America* **109**(10): 3632-3639, Butzer, K. W. and G. H. Endfield (2012). "Critical perspectives on historical collapse." *Proceedings of the National Academy of Sciences* **109**(10): 3628-3631.

human and environmental dynamics, attentive to archeology and the *longue durée* and also a specialist in precolombian Aztec cartographies. He also had wide interests in the Mediterranean. Dr Butzer thought in terms of “Archeology as human ecology” the title of his last book, and gave a great deal of emphasis on how ecological and environmental factors influence and frame societies and civilizations. This was not done in an environmental determinist way, but rather infused ecological/environmental questions into other forms of analysis. He was also, like Europeans of his generation, thoughtful about the factors of current histories, why some societies collapsed, what some trajectories looked like, and what made some systems more resilient than others. These of course are central questions for us as well. The past, after all, can talk to us.

It was he who suggested I study at Berkeley. I'm not sure, it could also have been the *zeitgeist* that suggested Berkeley. But in any case, I took a year off and worked as a waitress and played chess. I was addicted and played for hours every day. And read. Sometimes a gap year involves just playing chess all the time and reading. I don't know. It speaks to my obsessive personality, but sometimes one just needs time to think.

And then I went to Berkeley. Now, Berkeley at this time was not siloed, disciplines really interacted with each other. And particularly this Geography department, which was set up by Carl Sauer, whom you might know from *The Early Spanish Main*, and his works on plants, civilization and domestication.<sup>7</sup> He thought a lot about the deep structure of the Americas and was an early analyst of colonialism and nature, in a sense founding an early version of global environmental history. He had two *protégés*, one being James Parsons, who was a historical geographer;<sup>8</sup> and the other Hilgard O'Reilly Sternberg, who was a Brazilian geographer and fled Brazil at the beginning of the Dictatorship in 1964. Sternberg had trained in the US on the dynamics of the Mississippi river, a sort of stand in for Amazonia. While he was not part of the

---

<sup>7</sup> Carl O. Sauer (1889-1975) was an American geographer. A Professor of Geography at the University of California at Berkeley for more than four decades, Sauer focused much of his research on the Americas. He was one of the most influential geographers of his time. He is particularly recognized for his historical and cultural approaches to geography, which contrasted the deterministic frameworks that dominated the discipline in the early twentieth century. Sauer obtained his PhD from the University of Chicago in 1915. The books referenced here are Carl O. Sauer: *Agricultural Origins and Dispersals* (New York: American Geographical Society: 1952) and Carl O. Sauer: *The Early Spanish Main* (Berkeley: University of California Press, 1966).

<sup>8</sup> James J. Parsons (1915-1997) was an American geographer. He obtained his PhD from the University of California, Berkeley in 1948, and taught in Berkeley's Geography Department until 1986. A prolific scholar, pioneered the study of the pre-Columbian irrigation systems of the Americas.

radical diaspora of people like geographer Milton Santos<sup>9</sup> or economist and planner Celso Furtado, but he was someone who had lived through earlier Brazilian Dictatorships and was not all that fond of them. Sternberg was interested in the Amazon and did a lot of training of Amazonia scholars both in the US and Brazil.<sup>10</sup> He was in many ways one of these absent-minded, disorganized professors, but perhaps he was less disorganized than we thought, in the sense that perhaps what I viewed at the time as digressions, were actually a kind of verbal footnote. I find that I go back to many of his ideas. It was a time when these ideas were inchoate, and perhaps had less of a framing—and evidence—than they do now—like for example the extensive precolombian occupation of Amazonia. In this sense, I think he would just spew out ideas but didn't always follow them up. He was a geomorphologist, and thought about changing lands all the time, and viewed how these shaped the adaptation of local people to the regular flooding, and about the larger issues of land use change. Given that we will be coming into a much more watery and flooded world, this aquatic sensibility might have special relevance, now.<sup>11</sup> He liked big ideas.

This Berkeley Geography Department had a lot of relationship with the Anthropology Department and particularly people like Sherburne Cook, who worked on pre-Columbian demography.<sup>12</sup> It was this pathbreaking work that said “No, Amazonia and Latin America didn't have minuscule populations... They had huge populations that went through an epidemic that destroyed 90 to 95% of the people who lived there.” At the time, everybody just rolled their eyes, although historians were taking this very seriously because this was talked about even when I was an undergrad at the University of Chicago. Historians, working through different sets of documents,

---

<sup>9</sup> See Hecht, S. (2021). Milton Santos: Rebel of the Backlands, Insurgent Academic and Prescient Scholar, Duke University Press. **The Nature of Space:** i-xv.

<sup>10</sup> Hilgard O'Reilly Sternberg (1917-2011) was a Brazilian geographer. Sternberg was one of the foremost geographers specialized in Amazonia. He obtained a PhD from Louisiana State University with a dissertation about the Mississippi River in 1956, before turning the focus of his academic inquiries to the Amazon. He took up a chair of Geography at the University of Brazil (now the Federal University of Rio de Janeiro), as well as several administrative positions. In 1964, the year a military dictatorship took over Brazil, he joined the Department of Geography at the University of California at Berkeley, where he would spend the rest of his career.

<sup>11</sup> Sternberg, H. O. R. (1998). *A água e o homem na várzea do Careiro*. Belém, Museu Paraense Emílio Goeldi, Sternberg, H. O. R. and M. E. Goeldi (2000). "A água eo homem na várzea do Careiro." *Yearbook of the Association of Pacific Coast Geographers* 62: 152-154.

<sup>12</sup> Sherburne F. Cook (1896-1974) was an American physiologist. He obtained his PhD from Harvard University in 1925 and joined the University of California at Berkeley in 1928. He focused most of his early research on toxicity, but in the 1930s he began exploring the use of statistical models for historical geography and demography, and, in collaboration with scholars like Woodrow Borah, made crucial contributions to the history of the pre-Columbian populations of the Americas.

were saying: “Here are some documents, look at how they're described the first time, and how they're described the second time.” The first was the teeming masses, the other one, the barren Plaza. So, this idea that things can really change mightily was in the air even as what is now understood as highly incorrect, colonial ecological explanations for why Amazonian never could have developed complex civilizations—the soil limitation hypothesis—were taught in every Anthro 101 class with the idea that Amazonians were living in a timeless past.<sup>13</sup> There was also a diverse lot of good ethnographers who interacted with geographers. This was the anthropology department of Kroeber and others.<sup>14</sup> So, it—Amazonia— had been like California at the end of the 19<sup>th</sup> and at the beginning of the 20<sup>th</sup> century. It had a living ethnography in the place itself. It's hard to imagine that now, but a bit more than 100 years ago, people were going off to the tribes in Northern California and describing their lifeways and so on, and then bringing the last of a dead tribe to live the Anthropology Museum.<sup>15</sup>

So, Berkeley had a living legacy of California ethnography as well as the emergent scholarship on Amazonia. The other thing that was important was its very casual and eager relationship with what was called at the time the Forestry School or the College of Natural Resources, which was soils, agricultural, economy, and forestry. There I worked with Paul Zinke, who was a soil scientist, as well as a forester who'd worked on California soil vegetation mapping.<sup>16</sup> Remote sensing was already emerging into the mix. You could do a lot with remote sensing, and he trained many in Brazil who would eventually take part in the immense project of radar mapping of Amazonia: the Projeto Radam, the first comprehensive really modern mapping of Amazonia and

---

<sup>13</sup>Meggers, B. (1954). “Environmental limitations on the development of culture.” *American Anthropologist* 56: 801-823, Meggers, B. J. (1971). *Amazonia: man and culture in a counterfeit paradise*. Chicago., Aldine Atherton. Meggers used the Kayapo as an example even though she never had visited this fascinating group, which carried out a great deal of soil modification and produced “Terra Preta” the highly fertile anthropogenic soil of Amazonia.

<sup>14</sup> Alfred Kroeber (1876-1970) was an American anthropologist. He completed his PhD at Columbia University in 1901, where he studied with pioneer of cultural anthropology Franz Boas. He spent most of his career at the University of California at Berkeley, where he was a professor of Anthropology and directed the California Museum of Anthropology. Although he performed ethnographic and archeological research throughout the Americas, he is best known for his study of the indigenous peoples of California.

<sup>15</sup> Theodora Kroeber wrote a biography of Ishi, who seems to have died in the 1916 influenza epidemic, a rather fitting end, since so many originarios met a similar fate over the last 500 years. Kroeber, T. (2004). *Ishi in two worlds: A biography of the last wild Indian in North America*. Univ of California Press.

<sup>16</sup> Paul J. Zinke (1920-2006) was an American soil scientist. He obtained his PhD at the University of California at Berkeley in 1956, and taught at its School of Forestry. His research focused on different regions and made use of a variety of methods, from remote sensing to cultural approaches, and crucially included a collaboration with the Brazilian government to use radars to map the Amazon Basin's soil and vegetation.

resources and help lay the foundation for Brazil's exemplary remote-sensing capacity in institutions such as INPE, the Brazilian Space Institute that now regularly documents rates of deforestation and land use change. This kind of technical training was also fueled by an emergent interest in the tropics on the part of soil scientists—as part of perfecting technological packages for the green revolution as well making it, soils, a more scientized discipline. Also, the more general interest in ecological modeling and in ecological systems placed soil nutrient systems at the heart of many debates of what we might now call sustainability. As research and experience expanded for the tropics and the larger questions about soil nutrient sustainability after forests had been destroyed—an issue since the tropics were more or less targeted for post colonial development—emerged as a key question. This of course was the central theme of my dissertation, which was what happened when you converted complex tropical nutrient cycle systems into monocultural pastures? The answer: they become unstable.

With the new historical and environmental geography perspective, there the *Zeitgeist* of US and European environmentalisms, and a new, more radical environmental politics formed part of both countercultural and scientific critique of standard development. One of the people who were important at Berkeley was Dick Walker,<sup>17</sup> a student of David Harvey, who wanted to put the question of capitalism and its politics at the center of environmental debates.<sup>18</sup> So rather than what the economists were saying, which was, “Well, it's just a matter of figuring out how to deal with those externalities” or “Just a question of regulatory reform” (although that was certainly a big part of how people were talking about these questions), it was really about political economy and structural issues of power. In dictatorships like those of South America in the Cold War, the nakedness of the economic models, and their rampant destructiveness was not mediated or moderated at the time by social movements which was the case in the US. Rather, social movements in Latin America as part of the Cold

---

<sup>17</sup> Richard Averill Walker (born 1947) is an American geographer. He obtained his PhD from Johns Hopkins University in 1975, and since then he has taught at the University of California at Berkeley. His work focuses on critical approaches to industrialization, urbanization, agribusiness, and environmental politics.

<sup>18</sup> David Harvey (born 1935) is a British geographer. He obtained his PhD from the University of Cambridge in 1961, and currently teaches at the City University of New York. A critical geographer, urban scholar, and interpreter of Karl Marx's *Capital*, he is one of the most influential and widely scholars of our time. He has been crucial in popularizing critical geography and the idea of the “Right to the City”.

War, were severely repressed, and so the “natures” of development and their socioenvironmental impact were exceptionally obvious. But this also, in a dialectic way, became a deep stimulus for new forms of environmental politics, which came to fruition through the defeat of the authoritarians and the emergence of what would become socioenvironmentalism.

There were also economists like Richard Norgaard, who looked at these questions, not through: “Oh, we just get the numbers right?”.<sup>19</sup> Rather he, and others would begin to pioneer the integration of ecological and coevolutionary thought into some forms of economics, presaging what we now call analytics and valuing of environmental services. It would be hard to call him a critic of capitalism, but, on the other hand, the environmental movement in California was very strong, as were a lot of the leftist movements, the “Back to the Land” movements, the anticorporatist politics, and the “Stuart Brand” forms of ecological thinking: libertarian to be sure—but also immersed in countercultural critique. It made the idea that there was a political economy of environment relatively clearer than it might have been on the east coast, and in the Ivy Leagues which were so embedded in the dominant power relations and their ways of thinking. And then cultural ecology, a newer phase in anthropology, that showed how indigenous systems actually maintained environments through complex systems of management and knowledge systems, even as these indigenous practices were reviled more generally in favor the technological ideologies and the modernist and modernization mentality that underpinned the Green Revolution and the onslaughts into the tropics as part of national and international colonial and post-colonial exercises. The historical ecology and cultural ecology rooted in the applied sciences at Berkeley gave it the ecological background to create new forms of arguments that were empirically based and organized through a different kind of social politics.

---

<sup>19</sup> Richard B. Norgaard (born 1943) is an American economist. He obtained his PhD from the University of Chicago in 1971, and since then went on to teach at the Department of Agricultural and Resource Economics at the University of California at Berkeley. A prolific writer and participant of governmental and civil society initiatives, he studies the links between economic and environmental processes.

It was a harbinger in many ways of a new kind of ethnography, one that focused on the material natures of the societies, and their broader dynamics when cultural ecology really starts to come in in the 1970s. And that's when you see the famous shifting cultivation stories that begin to emerge: Clifford Geertz and others, and the African questions that began to interrogate the typical development and essentially colonial languages used to understand the tropics and their societies.<sup>20</sup> Berkeley embraced this unusual and generative confluence. It also involves “cherry picking” scholars from the University of Michigan at the time. There you had people like Micheal Taussig, Eric Wolf,<sup>21</sup> Barney Nietschmann, and one of their students, Michael Watts.<sup>22</sup> Micheal Watts comes to Berkeley, bringing that ethos that you see in that fabulous book by Wolf, the 1982 *Europe and the People Without History*, about indigenous history and the systems of production and how these were transformed, not just politically which is where a great deal of the colonial studies enmeshed these questions, but rather a historical ethnography that looks at the material bases of the societies and takes them seriously. These early forms of environmental history were broader in scope and scale and yet tied in to the colonial analytics as well as the politics of the day. This is also a time when you see a great deal of institutional analysis as part of the the colonial exercises and the transformations from various modes of production as either subsumed or obliterated by emergent forms of capitalism in rural zones. And then this is also when you get discussions about colonialism and decolonization and what that might mean in terms of property regimes, knowledge systems, livelihoods and the early discussion of climate change in places like the Sahel.

---

<sup>20</sup> Clifford Geertz (1926-2006) was an American anthropologist. He obtained his PhD from Harvard University in 1956, and went on to develop a distinguished career at the University of Chicago and the Princeton Institute for Advanced Study. With fieldwork primarily focused on Asia and Africa, he is widely considered one of the foremost representatives of cultural anthropology and symbolic anthropology, and a major influence of the broader “cultural turn” in the humanities and social sciences. His book *The Interpretation of Cultures* (New York: Basic Books, 1973) is one of the most influential of the twentieth century.

<sup>21</sup> Eric Wolf (1923-1999) was an Austrian-American anthropologist. After his family fled the Nazis, he studied in the United States, fought in World War II, and eventually obtained his PhD from Columbia University in 1951, having joined under the G.I. Bill. Trained as a scholar of Latin America, he became a household name in the social sciences through his book *Europe and the People Without History* (Berkeley: University of California Press, 1982), a critical perspective on eurocentrism and colonialism, and an exponent of the potential for a global history “from below.” He spent his career in American universities, including the University of Michigan.

<sup>22</sup> Michael Watts (born 1956) is a British geographer and development scholar. He obtained his PhD from the University of Michigan in 1979, and taught at the University of California at Berkeley. A scholar of Africa and a public intellectual, he has been particularly influential in the field of political ecology.

So, things start to layer on and there are some notable personalities. Barney Niestchmann comes to Berkeley and of course, he brings with him a deep understanding of the cultural geographies, but does not want to engage in the politics. At least at first. This is during the Cold War and the revolutions and rebellions in Central America, so, his first book between what is *Between Land and Water*, which is a brilliant book, but he has it all about indigenous people, which is a brilliant book, but it's about Columbus and he has it all about indigenous people. However, if you look at the pictures these are clearly Black Caribbeans (the region was famous for its pirates and maroon—run away slaves—communities), and if you look at the production system, it's an Arawak, an Amazonian system. It's a swampy, manioc based, tree based, aquatic episteme. It's not the “three sisters” in the Central American highlands of maize, beans and squash. It's manioc, tubers, trees, and fish. So, it's a completely different reality from the narrative he advances and reflective of quite a different history. Anyway, he has his own trajectory where he gets involved with the Contras against the Nicaraguan regime, because Ortega's politics were not particularly supportive of indigenous rights. In fact Ortega continues to this day to be anti-indigenous, but the Contras were quite horrible. So, this is another story of political ecology. But he was siding with Indigenous people against the Nicaraguan revolutionaries and, history has sort of shown him to have been right, given who is now in power in Nicaragua, the old leader of the revolution, and their plans for indigenous people. But that's another set of stories. And in many ways the problem of the archaic left in Latin America. It seems to start out well but then devolves into authoritarianism, as with Venezuela.

So, this was a time and place an unusual integration of natural science, science training and forestry, soil science and agricultural economics. For Latin Americanists it was also the time of an explosion in the humanities of new Latin American writing and thinking—imbued with nature sensibilities—that set conventions on their head. Galliano's “The Open Veins of Latin America,” the writings of magical realism, but also what we might think of as the early environmental humanities.<sup>23</sup> People begin reading

---

<sup>23</sup> Eduardo Galeano, *Las venas abiertas de América Latina* (Montevideo: Siglo Veintiuno, 1971) is classic essay that interprets the history of Latin America as shaped by colonial exploitation and environmental extraction. Galeano (1949-2015) was an Uruguayan writer and journalist.

Gabriel Garcia Marquez, with its incredible descriptions of nature, politics and love.<sup>24</sup> Euclides da Cunha's "Rebellion in the Backlands" (Os Sertoes) with its complex descriptions of nature, was a surprise bestseller decades after its author had been killed in a duel with his wife's younger lover. These revolutionary books become really important for thinking about Latin America in a non-folkloric way, and to feel how vibrant and interesting the cultures could be. And then there were eco-utopia books and the "Back to the Land" movement, things like the "Greening of America". So, people were thinking about organic agriculture and alternatives to the social organizations, community organizations, environmental relations, institutions and so on, versus the industrial agriculture that had increasingly shaped American Food systems, the corporatisms, conformity and suburbanism. The point, unlike the libertarians of today, was community building, not individuality. It was rooted in sociality and solidarity. It was not particularly anti state but anti corporatist and anti monopoly, and critical of capitalism unlike the rural contexts of today rooted in their individualism and guns and MAGA mania.

Environmental analytics and their social realms became more sophisticated as well. Modeling has been helped the enormous growth in computational capacity, the ability to actually move around and measure things better. The early remote sensing was so transformative. We are so used to it now. It's hard to imagine how novel it seemed at the time, how liberating. It was really a breakthrough to be able to see things not from government statistics that were often inaccurate or aspirational, but from things they had no idea about like rates of land use change in remote areas. There had been photogrammetry in Amazonia since the 1920s, but it was just taking photographs from planes, fixed wing planes and more or less one regime enterprises. But when you started to use the radar in Brazil, you could see through the canopy. You could start to see the resource dynamics in ways that you never previously could. Today we see the further transformations that come from the use of lidar, that once again permits us to

---

<sup>24</sup> Gabriel Garcia Marquez (1927-2014) was a Colombian writer, winner of the Nobel Prize for Literature in 1982. A prominent member of the Latin American literary "Boom" generation and an impulsor of the current known as "real maravilloso," his best-know work is *Cien Años de Soledad* (Buenos Aires: Editorial Sudamericana, 1967), a widely translated and read novel that uses a fictional town, Macondo, and the Buendía family, to explore key issues in the history of Latin America.

see through the forest canopy in novel and unanticipated ways but with much more technical refinement. It was revolutionized Amazonian Archeology.

The other thing that was interesting about Paul Zinke is that he was really interested in carbon. He was one of the early thinkers about carbon, and its distribution in different kinds of ecosystems. Now, it wasn't that no one had ever heard of the greenhouse effect, but it would take the Cold War and all the nuclear atmospheric monitoring and the development of all this complicated computational and monitoring capacity to develop the tools that would be adequate to really understand climate change. In a certain sense, we couldn't, or in any case not just then. There were lots of things one couldn't see, and much that was left out of the monitoring. Just as an example, most of the Cerrado of Brazil was not monitored for deforestation until very recently. While Amazonia remained a subject of intense interest in monitoring, this other vast forest system remains largely unobserved and analyzed in terms of larger scale changes until quite recently. This area, the Cerrado is now also getting much greater attention from environmental historians (such as Sandro!), and has moved from being seen as some kind of blank slate into its own complex history<sup>25</sup>. More than half of it has been transformed, but in a way that has been quite invisible though equally as catastrophic in its way as Amazonian destruction, and larger scale.

There was also Bill Denevan's work on indigenous infrastructure and production systems.<sup>26</sup> He was a Professor at Wisconsin, but he had come through Berkeley, a student and protégé of James Parsons. He had been a journalist in Peru and Bolivia, so he liked to run around and get the story. He had seen and flown on small planes and ridden horseback seeing these incredible raised field systems, with causeways and all the engineering infrastructure that now so impresses archeologists and historical ecologists as well as present day ethnographers and agroecologists, because of the extraordinary scale and extent of these earthworks. So even though he

---

<sup>25</sup> Dutra e Silva, Sandro. "Challenging the Environmental History of the Cerrado: Science, Biodiversity and Politics on the Brazilian Agricultural Frontier". *Historia Ambiental Latinoamericana Y Caribeña (HALAC) Revista De La Solcha* 10 (1), 2020, p. 82-116.

<sup>26</sup> William Denevan (born 1931) is an American geographer. He obtained his PhD from the University of California at Berkeley, and then spent most of his career at the University of Wisconsin at Madison. Some of his most influential work deals with the history of the demography and anthropogenic environmental change in the Americas before the European invasion, with a particular focus on Amazonia.

wasn't physically there in California, he was like a spiritual leader for Berkeley's Amazonian students, since he shared our departmental genealogy. He was foundational for his extensive field skills on the agroecology and production infrastructure of native systems, indigenous knowledge systems, and his work on demography all of which transformed the analytic paradigm away from the empty Amazon—and a world incapable of producing advanced civilizations, and the pristine Amazonia. His deep field engagement and empirical studies, as well as his passionate interest in archival and early naturalist description helped define the field for US Amazonists, and their relentless interest in and commitment to fieldwork.

Denevan's reconceptualization of Amazonian demography remained very controversial for a long time and still remains so. But, the archeological, historical ecological, and historical ethnography discoveries are now coming thick and fast<sup>27</sup>. The view that the upper Amazon lacked settlements is being overturned by the recent geolocation of multiple sites on the Napo, the Ucayali and other Peruvian regions.<sup>28</sup> The southern Amazon is going through an extraordinary set of archeological discoveries. A recent wonderful festschrift volume edited by Antoinette WinklerPrinz and Ken Mathewson collects and analyzes many of Denevan's key texts with commentaries.<sup>29</sup>

If one were to focus on the among the most profound disciplinary shifts, archeology, historical ecology and historical geography rewrite our sense of Amazonia. Several major developments included the implications of Terra preta or Amazonian dark earths, and long term large scale forest modifications. It seems there are new discoveries about what is going on in these areas every week. Another Berkeleyite, Nigel Smith, pointed out these weird black soils in Amazonia, and said "What's with this?"<sup>30</sup> A few earlier intrepid 19<sup>th</sup> century geologists, including the American Charles Frederico

<sup>27</sup> Neves, E. G. (2013). Was agriculture a key productive activity in pre-colonial Amazonia? The stable productive basis for social equality in the Central Amazon. *Human-Environment Interactions*, Springer: 371-388, Fausto, C. and E. G. Neves (2018). "Was there ever a Neolithic in the Neotropics? Plant familiarisation and biodiversity in the Amazon." *Antiquity* 92(366): 1604-1618, Neves, E. G. and M. J. Heckenberger (2019). "The call of the wild: rethinking food production in ancient Amazonia." *Annual Review of Anthropology* 48: 371-388.

<sup>28</sup> Coomes, O. T., C. Abizaid, Y. Takasaki and S. Rivas Panduro (2021). "The Lower Ucayali river in prehistory: Cultural chronology, archeological evidence and a recently discovered Pre-Columbian site." *Geographical Review* 111(1): 145-167, Coomes, O. T., S. Rivas Panduro, C. Abizaid and Y. Takasaki (2021). "Geolocation of unpublished archaeological sites in the Peruvian Amazon." *Scientific Data* 8(1): 1-8.

<sup>29</sup> WinklerPrinz, A. M. and K. Mathewson (2021). "Forest, Field, and Fallow." New York, Springer

<sup>30</sup> Nigel J.H. Smith obtained his PhD from the University of California at Berkeley in 1976 and is currently Emeritus Professor of Geography at the University of Florida. His oeuvre is dedicated to the Amazon rainforest.

Hartt, an American geologist and dedicated Amazonian researcher noted in his studies the widespread occurrence, as well as sophisticated ceramic manufactures, and began positing a human origin to these kinds of soils.<sup>31</sup> There were theories about them, where they were volcanic extrusions or something, but certainly not that they reflected human agency, even though these sites often had potsherds, and other artifacts. Betty Meggers' version of Amazonia (in her terms, a "Counterfeit Paradise") the environment was so powerful that complex cultures never evolved there and could never have evolved there because the soils and production systems would never permit surpluses. Human impact on the environment in Amazonia, in this view, was not particularly profound just a little shifting cultivation here and there. An empty space with inhabited mostly by primitive peoples. And mostly nomadic, semi permanent little villages<sup>32</sup>

Then the study of Amazonian black earths began to change things because you could see them in road cuts, and more and more science based researchers were doing ethnography, talking with traditional peoples of many types and thinking about the practices that produced durable and sustainable landscapes compared to the short lived pastures and failed agriculture that attended the occupation of Amazonia through its various formal and informal colonization programs. When I went with Darrell Posey into the Kayapo village of Gorotire to examine soil management, it became very clear that there was a set of techniques both in villages (urban) and rural agricultural lands that were producing these black earths, and that the model of shifting cultivation we had all learned, and that was predicated on soil nutrient decline was not exactly what was going on.<sup>33</sup> Urban systems and charcoal management in households, and the myriad of cool burns and food preparation in agricultural plots were producing a kind of stability

---

<sup>31</sup> Hartt, C. F. (1872). "On the occurrence of face urns in Brazil." *American Naturalist* 6(10): 607, Hartt, C. F. (1872). "Recent explorations in the valley of the Amazonas, with map." *Journal of the American Geographical Society of New York*: 231-252, Sanjad, N. (2004). Charles Frederick Hartt e a institucionalização das ciências naturais no Brasil, SciELO Brasil.

<sup>32</sup> Betty J. Meggers (1921-2002) was an American archaeologist. She obtained her PhD from Columbia University in 1952. A prolific and influential scholar associated with the Smithsonian Institution, she popularized the notion that Amazonia's seemingly exuberant ecosystems were in fact poorly suited to support complex human societies. Her most famous book is *Amazonia: Man and Culture in a Counterfeit Paradise* (Chicago and New York: Aldine and Atherton, 1971).

<sup>33</sup> Darrell Posey (1947-2001) was an American anthropologist. He obtained his PhD from the University of Georgia. His work combined insights from biology and ethnography to understand and recognize indigenous peoples' relationships with their environments. He collaborated with Susanna Hecht on research about soil management among the Kayapó. See their "Preliminary findings on soil management of the Kayapó Indians" in Darrell Posey & William Balée (eds.), *Resource Management in Amazônia: Indigenous and Folk Strategies* (New York: New York Botanical Garden, 1989), pp. 174-188.

in soil nutrients that supported continuity in the land uses. We had discovered how terra mulata— one form of terra preta, was made <sup>34</sup>. Anthropogenic soils basically facilitated agricultural surpluses in places of severe soil constraint. Like terraces, like irrigation, terra preta meant that significant agricultural surpluses were possible, and that complex societies—indeed civilizations—developed in Amazonia as the archeology was showing. Terra Preta provided one of the material underpinnings for these complex civilizations. There were plenty of other sources of data from archeology and ethnography that reflected civilizational complexity, but this work turned the premises of the soil limitation hypothesis on its head. Fights are still going on, of course—this is the power of colonial myth.

And the forest primeval? It too was being constructed and rethought in a myriad of ways. As one Kayapo woman farmer told me as she was calmly charring debris in her agricultural plot: “we do agriculture to get the forest we want”. The point of the roca was to create a particular set of useful woodlands. What she described was a reversal of our view that the forest is removed for agriculture itself. Her position was that the agriculture was the first step to the useful landscapes they lived in. And in the various processes of land management, biochar was created through the “cool “ fires that structured the landscape, with cool fire and char the signature of domesticated landscapes.

Whatever you learned initially about Amazonia at that time was largely wrong. The way that this landscape was managed was far more extensive, complicated, theorized, and also gendered. Like Antoinette Winklerpins, another Denevan student, and me, the Berkeley School and the Denevan Wisconsinites merged into one holistic group of scholars bent on empirically defying what had been the canon of Amazonian history.<sup>35</sup> The creation of indigenous black earths was hearths, households, as well as

---

<sup>34</sup> The Analysis of Terra Preta has become a central research topic in archeology (it has been critical in the discussions and historiography of Amazonian demography. There have been a number of Springer Science volumes that have brought researchers ranging from microbiology, soil science, ethnography, historical geography to science and technology studies together. See Lehmann, J., D. C. Kern, B. Glaser, William I. Woods . . and . Eds. (2003). *Amazonian Dark Earths: Origin, Properties and Management*. Dordrecht, Kluwer Academic Publishers, William I. Woods , W. G. Teixeira, J. Lehmann, C. Steiner, A. M. G. A. WinklerPrins and L. Rebellato, Eds. (2009). *Amazonian Dark Earths: Wim Sombroek's Vision*. New York, Springer, Woods, W. I. and W. M. Denevan (2009). *Amazonian Dark Earths: The First Century of Reports*.

<sup>35</sup> Antoinette Winklerpins is a Dutch-American geographer. She obtained her PhD in Geography from the University of Wisconsin at Madison in 1979. Most of her scholarly work focuses on soil management.

managing the agricultural fields, those circular field agriculture with different types of management dynamics within them and the constant burning—just the constant low biochar. It was quite remarkable, a convergence between a few institutions, the Natural Resource College in Michigan, what would become the Denevan outpost in Madison at the University of Wisconsin coming from Bill Denevan and his students, and Berkeley. Outlier Anthropologists like Posey also documented the widespread creation of resource islands, the planting along trails, the visiting of former settlements sites, the planting of forest islands and mounds, successional management, sub forest planting and a much more intensive engagement with various forms of resources and vegetation. Researchers in central Amazonia increasingly have documented how much Amazonia is a constructed landscape of historical ecologies and archeologies of human engagement with forests which has largely recast the thinking about Amazonian forests as “wild nature” .<sup>36</sup>

The work of Carolina Neves, Eduardo Neves, Bill Balee and Charles Clement have been so central in quantifying and recasting the paradigms. Although, Darrell had a great deal of insight because he came from a rural background, and traveled so much with the Kayapo<sup>37</sup> but as a person from the American South, deeply gay and deeply eccentric, he didn't fit the “model” of pith helmeted (although I have photos of him in pith helmets...) ethnographer, or categories of researchers at the time. He was not from the more central US Amazonian ethnographers based in Harvard or Columbia

<sup>36</sup> Levis, C., F. R. Costa, F. Bongers, M. Peña-Claros, C. R. Clement, A. B. Junqueira, E. G. Neves, E. K. Tamanaha, F. O. Figueiredo and R. P. Salomão (2017). "Persistent effects of pre-Columbian plant domestication on Amazonian forest composition." *Science* **355**(6328): 925-931, Levis, C., B. M. Flores, P. A. Moreira, B. G. Luizé, R. P. Alves, J. Franco-Moraes, J. Lins, E. Konings, M. Peña-Claros and F. Bongers (2018). "How people domesticated Amazonian forests." *Frontiers in Ecology and Evolution* **5**: 171, Clement, C. R., C. Levis, J. Franco-Moraes and A. B. Junqueira (2020). Domesticated nature: the culturally constructed niche of humanity. *Participatory biodiversity conservation*, Springer: 35-51, WinklerPrins, A. M. A. and C. Levis (2020). "Reframing Pre-European Amazonia through an Anthropocene Lens." *Annals of the American Association of Geographers* **111**(3): 858-868.

<sup>37</sup> These scholars are widely published but see Balée, W. L. and C. L. Erickson (2006). *Time and complexity in historical ecology: studies in the neotropical lowlands*. New York, Columbia University Press, Clement, C. R., W. M. Denevan, M. J. Heckenberger, A. B. Junqueira, E. G. Neves, W. G. Teixeira and W. I. Woods (2015). "The domestication of Amazonia before European conquest." *Proceedings of the Royal Society B-Biological Sciences* **282**(1812): 32-40, Levis, C., F. R. Costa, F. Bongers, M. Peña-Claros, C. R. Clement, A. B. Junqueira, E. G. Neves, E. K. Tamanaha, F. O. Figueiredo and R. P. Salomão (2017). "Persistent effects of pre-Columbian plant domestication on Amazonian forest composition." *Science* **355**(6328): 925-931, Watling, J., M. P. Shock, G. Z. Mongeló, F. O. Almeida, T. Kater, P. E. De Oliveira and E. G. Neves (2018). "Direct archaeological evidence for Southwestern Amazonia as an early plant domestication and food production centre." *Plos one* **13**(7): e0199868, Neves, E. G. and M. J. Heckenberger (2019). "The call of the wild: rethinking food production in ancient Amazonia." *Annual Review of Anthropology* **48**: 371-388.

universities, and many were deeply annoyed by him, as his field insights often usurped their abstractions.

All of those places had been agricultural universities. Berkeley was a land grant school and had the extension associated with it, and had a lot of applied departments like forestry, soils and agricultural economics. It was on that basic environmental, basic applied biology training that then one could build on by adding in more culture, more history, and critical analysis of ideologies and economic construction. It was also a weirdly permeable time among departments, –forestry to anthropology and geography, soils to anthropology, history of sciences etc. I am not giving enough credit to the University of Florida, which through its long relationships with Amazonian research initially stimulated by Charles Wagley. Again, another land grant institution. These departments later perhaps siloed themselves off from each other. To be fair, this is more the case in the US than in Europe, where complex interactions among different disciplines seems easier now than in the US. This probably sounds nostalgic, and it is certainly true that large analytic teams are being developed in the US, but interdisciplinary scholars are more rare and take more time to produce than the “widget” and industrial structure of the modern universities—especially public universities— usually allows. But those who work on Amazonia are almost forced into multidisciplinary, whether they start out that way or not.

**2. Your work combines methods often associated with scientific disciplines with those of the social sciences and humanities. What have been some of the challenges and benefits of this interdisciplinary approach? Moreover, how do you see the evolution of the field of political ecology?**

The diversity of methods that are now deployed in Amazonia is really extraordinary. At this juncture you have unusual analytics and integrations of remote-sensing, oral histories, social geographies, drones, soil science, economics, political

science, cultural history, ethnography, ethnoecology, economic botany, geography, history and a whole array of “paleo” disciplines like paleoclimatology, paleoecology, and other historical ecologies and an explosion of understanding of indigenous histories, philosophies and ontologies (see for example Micheal Heckenberger, Carlos Fausto, Eduardo Viveiros de Castro, Manuela da Cunha, Laura Zenotti, Laura Rival, Eduardo Cohn—among many others). Also, the explosive expansion of archeology with a massive array of new methods from molecular genetics to Lidar remote sensing as well as the more classic analytics of species diversity, distributions and the expansive understanding of forms of settlement and indigenous engineering. If *terra preta* studies worked from the ground up, and historical ecologies were rethought in terms of human use, ethnographies helped us understand what local people were thinking about the worlds they were inhabiting, but remote sensing gave us another useful tool and a different scale. What I think is most significant is that the remote-sensing techniques ranging from standard Landsat to Lidar made the Amazon (as well as other major settlkemenst in Latin America, like Mayan cities) much more visible and legible, but also paradoxically both much more distant and yet simultaneously extremely emotional. While Amazonian work used to be very heavily field based, for good or ill, remote sensing of multiple types and for many logics, and coupled to much better modeling techniques has moved Amazonian understanding into a powerful modeling intellectuality as well as a surprisingly deep emotional terrain—you can see even from a distance those death landscapes. Main ly because one can see the transformations moving so quickly, and even if one was just ground truthing one year, that place could be immolated the following year, even if it was a biocultural place, a place of local history or local livelihoods—incinerated into atmospheric ash.

The limitations of remote-sensing, not to mention just the way the questions may be posed and how modeling works with remote-sensing data, “the people and pixels problem,” is that what are the drivers and the logics cannot be told to you simply via satellite. You need a political economy. Remote sensing allows for rather unsophisticated, proximate understandings of the processes of land-use changeunleached from social analysis. It also avoids politics but actually likes to “look”

at policy because policy can be so reducible and correlated to land uses: Policy here, outcome there. But the real drivers sit in politics and power relations that produce the policy remain largely out of the story, and anomalous outcomes remain confusing. The policy narrative “if we just had better policy” overlooks the political ecologies rooted in power, history and inequality, and the collusional economies that unfold within Amazonia but have their origins elsewhere. The policy language also takes the “heat” out of the land use change, as does the science, and makes it seem like policy alone will solve things. Or maybe better markets... The politics also involve issues of representation—“empty” forest, racism against originarios and kilombolas (lazy, forests wasted on them, the virtues of modernity etc.), lack of initiative of locals, pyromaniac peasants, forests as obstacle to development, hidden riches, issues of sovereignty—all of which were used to justify the actions of the recent Bolsonaro regime that so actively destroyed forests, although these were far from the first time these narratives had been deployed. Policy per se obscures different ontologies, and different epistemes, and indeed myths about the world and historical trajectories. And of course who gains and who loses in the economic story. These landscapes, legible technical landscapes where you can see forest loss in its grim advance: these also embody the inscription of power relations on tropical landscapes which are rooted in symbolic as well as material, historical and economic processes. So political ecology has to deploy a wide range methods and approaches from the natural and social sciences to the humanities, including history, history of science, history of ideas, ethnographies of indigensou as well as corporate worlds to understand what is going on. This is why multiple and heterodox methods are so important in political ecology.

These remote methods can also miss a lot of sub-canopy dynamics: timber theft, illegal cultivations, sub canopy fires, invasive species, overhunting etc. etc., as well as nondestructive agroforestry systems, indigenous or traditional forest management that just don't have much of a signal that remote sensing machinery reads or may simply misread as “natural landscapes”. Remote sensing can also miss more regional dynamics, and mislabel what it sees (policy failure)—let's say new forms of capital that are driving this change that you might not be able to see, as for example new forms of money

laundering, or cheaper credits, corrupt titling, or news of a new potential road. The signature on the landscape may look like “cattle” but it could really be speculation, new hedge funds, money laundering and emergent Chinese markets. So this is a plea for multiple and syncretic methods, because remote methods, which are fabulous, cannot tell you enough. It tells you things have changed but in a muted way. In this sense political ecology and environmental history link to larger questions in science and technology studies, in issues of the mobilities of model ideologies and expertise, the realms of experts and the “irreproachable” planners, the expert handmaidens who ushered in this brutality, who have gridded out this world in the deepest reflections of high authoritarian modernism, and a complexly corrupted capitalism hell bent on ecological erasure.

Also in a fundamental way, we cannot talk about these Amazonian or tropical changes without talking about the effects on the larger biota: what is being lost, how rivers are changing, how life diminishes, and these are not just narratives about land cover or human migration. The remote sensing allows also for simple correlations and it does provide a way of starting to talk about things at larger scale and larger scope because you can start to see how some of those political ecologies actually structure the world on the land in Amazonia. Through other methods we can see what these local changes bode: more carbon to the atmosphere, more biotic death, changing river flows, colonist attrition, heightened urban migration, impoverishment for many, and wealth creation for some. We can also ask whose land was taken, how and when. Who really owns Amazonia? We can ask what history the deforested land contained, what legacies, and what futures were foregone biotically, but also culturally. Environmental history and political ecology now have to include extinctions and population collapses, and the broader teleconnections – the losses of ecological services that these changes imply and how they will come to structure our worlds, not just in Latin America and its soon to be water starved mega cities, but at planetary levels through massive climate change.<sup>38</sup>

---

<sup>38</sup>Coe, M. T., P. M. Brando, L. A. Deegan, M. N. Macedo, C. Neill and D. V. Silverio (2017). "The Forests of the Amazon and Cerrado Moderate Regional Climate and Are the Key to the Future." *Tropical Conservation Science* 10.

Again I think history here helps us a lot: we're starting to see now a lot of articles on 40 years of Amazonian history on some road; 40 years and one mining region, one *município*. These are extremely useful because what they can tell you about turnover, about the things that came in and the people that left and what was left in the end – the imperial ruins or the triumphant technology and often both at least for this moment. What these longer recent histories are doing is opening up how these places actually function and how land-use change was actually driven. I think this mix of approaches ranging from representation to political economy to global processes to various forms of regional policies and their ecological impacts, to the literatures and films on Amazonia are giving us a better sense of what has happened even as flailing states in pan-Amerozia rely increasingly on agroindustrial exports, “Saudi Amazonia” (the hydrocarbon economies), and a swath of clandestine activities and deep levels of socio-ecological destabilization in the face of nation states that cannot really control Amazonia, but do know how to profit from them, corruptly and otherwise since it is now both an economic and social safety valve to a form of modernization failure.

Political ecology is now also embracing the questions of ontology which, along with history has always been part of its approach. The comparative study of the varying consequences of land uses, institutions (like property regimes), framings, changing technologies and ideas about natures, people and economic forms are nothing new to indigenous understandings but the idea that nature has agency and that Amazonia per se is not just a flat platform on which modernist ambitions can be etched but rather is itself an actant and actor in its own history, this has always been a deep part of Amazonian thinking. The idea that one could ignore the ecological and sever most relations with nature except the instrumental economic ones, was always understood as a recipe for planetary doom, as activists and indigenous thinkers like Yanomami Leader Davi Kopenawa describes so well in his “The Falling Sky” and activist Ailton Krenak in his many writings have been at pains to point out in print and in continuous political engagement. But decades of writing on Amazonia writ large have pointed to

the failures in so many ways, from which planners and politicians averted their eyes, in favor of a form of spatial mythologies, folklores of “development” and land transformations from which they might profit.

Amazonia has been engaged in globalized activities for 500 years. The impact of these centuries in terms of planetary/globalizations is extremely important: whether these were the domesticated tubers of manioc and sweet potatoes that bolstered the diets of Asia and Africa, the pleasures of treasured chocolate and vanilla, the bitter medicines of quinine that enabled tropical imperialism, or rubber that underpinned the industrial revolutions, fueled US tropical imperialisms and our current transport systems: each, along with many others elements of Amazonian domestications and inhabitations, has something to tell us about how places and ecologies shifted, and what other ways of thinking might have meant if the great dying—the epidemiological event that killed 90% of the indigenous populations—had not unfolded. Most collapses are not total, but work out in panarchic ways, reconfiguring elements of socioecological systems in new ways, not necessarily predictable in the form the resilience takes. What we do know is that more than 330 ethnicities survived, and this is not counting the translocated African groups that also recreated themselves after their own holocaust and forced diasporas, such as the Saramaka of Surinam, and famously, in Palmares in Brazil, the better known among 1000s of fugitive settlements. It is not so well known that Surinam rivaled the US in its number of slaves, and that the North: Amazonia and Maranhao rivaled Bahia in its slave imports. These dimensions and implications in sociobiologies and political histories are still to be written, but the “Black Amazon” in spite of the many new analytics and explorations, has immensities to still be discovered.

One of the things that is useful right now in political ecology and environmental history is that you have a broader range of tools and approaches and ways of thinking about land and change and people and the way they interact than one had before. Because the scale and the scope have changed, as Chakrabarty insists, we must have a

planetary optic.<sup>39</sup> These can be embellished with colonial, post-colonial, modernist, modernization, extractivist, developmentalist, post developmental etc., labels about the political economic forms of accumulation, but the real dynamics engage the fundamental issues of how, why and which socio-ecosystems are supported or demolished. The integration of the sciences and other forms of knowledge are essential to this project and illuminate what we can and now maybe cannot know.

New concerns in political ecology are always arising. The questions of race and racism have been a central part of Brazilian history and environmental history. It's been an inescapable feature of the encountering worlds, forms of inequality, hierarchy, and escapes from inequality – *quilombos*, indigenous territories, traditional communities and the forests themselves as refuges from disease, slavery and more recent forms of human subjection and commodification, and even recently from Covid. These are also important parts of the longer history and infuse the rejection of the forms of development that obliterate the land, landscapes and histories, and the people who love them. The increasing importance of non-human nature, not just as an object of study but as an active subject in history is exceptionally important and requires paying real attention rather than lip service to other epistemes, ways of being and knowledge systems. Those indigenous and traditional ontologies and explanations engage the non-human. It's not for nothing that cadres of natural scientists, such as those that formed part of the Scientific Panel for the Amazon<sup>40</sup> emphasize the importance of indigenous understanding, not exactly as a sphere to colonize as it traditionally has been (whether from the early sciences to ayahuasca biopiracy) but as perhaps one of the few ways forward in the narrow corridor for human survival, one that can lead us into different ways of being and protect tropical nature – that of non-human nature, and the persistence of the entities of airs, waters, and places as we have known them and the people who cherish them, and can also imagine futures for them. While there is much to deride in the COP26 concern over deforestation, at least it recognized the

---

<sup>39</sup> Dipesh Chakrabarty, *The Climate of History in a Planetary Age* (Chicago: University of Chicago Press, 2021).

<sup>40</sup> "SPA" is a panel much like that of the IPCC that integrates state of the art knowledge on Amazonia. There 1300+ page report was released at the COP26 meeting in Glasgow.

significance of *originários* as protectors of our collective futures that, as it happens, reside in their terrains.

The political ecologies of various forms of collapse are also an arena that allow us to rethink declensions as well as resilience and recovery. Let me list a few, ranging from the microbially mediated mortality of European contact, indigenous and African slavery as murder mills collapsing indigenous worlds in Africa and the New World, the relentless ruin of the Atlantic Forest, the dearth and death attending the *El Niño* in the Brazilian northeast, the collapse of the rubber economy: these are earlier examples of the globalization and devastations of a simpler time. These had profound and complex impacts on the localities for sure: and deeply changed the natures where these unfolded: but had deeper planetary consequences: the little ice age reflected the impact of forest resurgence after mega death in the tropics; the social structures of Africa and their landscapes were profoundly reconfigured, the biological imperialism of animals and plants changed tropical landscapes and international economies forever, and we haven't even the measure of what the ecological costs have been. Rubber may have collapsed in Brazil, but surged throughout Asia, becoming one of the largest monocultural tree systems in the world, displacing vast swaths of south east natively managed forests and the relentless source of the key material for tires for airplanes, and foundational for cars and trucks. One might not have had the automotive revolution without rubber, and the industrial revolution, along with steel and coal, depended on it.

The current collapse of Cerrado and Amazonian ecosystems as a function of assault on forest functions, ecological services, coupled to climate change as an orgy of socio-eco-necropolitics in the name of agro industry and the myth of development: these are urgent emergent political-ecological and historical questions, and they really have to go well beyond markets and policy. They are also some of the most profound questions confronting humanity. So, to understand our world, we basically need history, ethnographies and political ecologies because they permit un-siloed approaches that remove the veils of many harsh invisibilities.

Urban political ecologies, especially in the tropics, remain extremely unstudied. Partly because they seem and are so often intractable, because they are getting overwhelmed by climate change: the heat island effect is placing tropical cities in the climates of the future: 4, 5, 6 Celsius above now, which is already insanely hot in the heat absorbing and reflecting concrete of the urban imaginary. Interestingly, in some cities, poorer residents and *bairros*, with their little *quintals* have less heat stress than the dwellers in lofty apartments in the posher neighborhoods with their reflective surfaces and paved roads.

The political ecologies of urban livelihoods in tropical cities merit much greater attention. We have a number of Amazonian studies documenting how livings are made in multi-sited contexts where households depend on rural and urban livelihoods, on national and international migration. We need to know more about the effects of remittances, of social transfers, and how peri-urban areas function in situations of urban precarity and urban ecologies. In Amazonia, urban dwellers depend on natural resources for about a third of the value of their livelihoods. The living landscapes of tropical cities, the new forms of flooding, the intersection between aquatic worlds and land worlds as they are reconfigured by climate change sits in these urbanizations that really pay homage in their inequalities, precarious infrastructure, and livelihoods to medieval cities more than the sparkling modernist towers of some inhabitants usually suggest.

**3. Could you tell us about the experience of writing a survey book like *The Fate of the Forest*? What impact do you think it has had, and what can it still contribute to discussions about conservation and economic development in the tropics? What are the main challenges for the fate of the Amazon today?**

Writing *Fate of the Forest* was a remarkable experience because it was written over the course of a summer. We had two terrific research assistants who would come

to the house every day. Juko Goto and Haripriya Rangan, who have both gone on to illustrious careers, toiled tirelessly! Mornings were spent in writing, working with the RA's in the afternoon (work on getting the texts and the reference apparatus into shape –all this before the blessed arrival of “Endnote”. The previous day's work would be corrected and revised. It was a time of special urgency because of the assassination of Chico Mendes, the enormous transformations afoot because of the new Brazilian Constitution; the exhilaration as well as dread because the situation was so unsure.<sup>41</sup> It was certainly clear that an array of ways of looking at Amazonia had to be unpacked: the romantic and pure conservationist views, the developmentalist framework, and especially how it operated. The whole set of mechanisms associated with fiscal incentives, derived in many ways from US and French planning models, growth poles, incentive zones, and the immense inequality of the model from the start were eye opening. The problems, which were usually couched in technical terms (poor soil quality, wrong grass variety, and the like.), were mere smokescreens for a plutocratic status quo. If you wanted to save the Amazon, the lure of scientific logic wouldn't really do it, because of the powerful political economic forces that were unleashed.

At the same time, for reasons of political legitimacy, the clamor for agrarian reform had to be addressed. This was one of the elements that was emphasized in the US documents pertaining to the “Alliance for Progress,” the document that would serve as the framing document for the Cold War in Latin America. This had important economic and moral appeal in societies with large unproductive land holdings and an impoverished peasantry, and was seen as a mechanism for both expanding small farm production and inducing technical change on *latifúndio*. Also, because it was going to shift people from the Northeast, (or in western Amazonia, from the Andes) which had been for centuries a perennial hotbeds for rural organization, agrarian reform etc was seen as a capitalist rather than revolutionary solution to the land question, rooted in a

---

<sup>41</sup> Chico Mendes (1944-1988) was a Brazilian rubber-tapper and union leader. In the Amazonian state of Acre he led a movement for the protection of the rights of forest workers, indigenous peoples, and the ecosystems of the rainforest in opposition to the powerful interests of local ranchers. On December 22, 1988, after several death threats, he was murdered by gunmen linked to the ranchers. The Brazilian Constitution of 1988 was the first to replace the 1967 Constitution created by the country's military dictatorship of 1965-1985. It included a whole section that dealt with environmental protection.

spatial solution and “technical” change, as ranches moved from mere status symbol and weekend retreats into animal production enterprises and small farmers would be transformed into small scale entrepreneurs. At least this was the ideology.<sup>42</sup>

Also, there was the perennial military fret about the empty lands, and the long history of questioned sovereignty in Amazonian terrains, the threat of communism that imbued the cold war period, so getting Brazilians into Amazonia was important. The motto “Men without lands for lands without men” addressed ideological as well as practical concerns.<sup>43</sup> These ideas derived from Euclides Da Cunha and earlier incarnations of thought about Amazonia.<sup>44</sup> All that of course, was based on the assumption of empty lands, on the assumption that those earlier occupants would simply step aside, that the land titles were not only convoluted but usually false (Land offices – *cartórios* – were routinely burned), and a huge speculative land rush was on. This history of the Amazonian land wars is well known and documented, and the Trans Amazon, though now no longer inscribed in blood today, is in many ways a land of ghosts. Of course, from this immense struggle—a historic struggle—emerged the Forest People’s Alliance, a highly animated set of indigenous people’s movements, the globalized conservation movements, social movements more generally, and what we now call socioenvironmentalism. What lay at its heart was the idea that flew in face of deep western received ideas of Man and Nature: that human occupation in the tropics by its own people could be a form of conservation, that full forests were not just a prelude to collapse, but the bulwark against it. At an epistemological level, many things were different as well.

---

<sup>42</sup> It is important to note here that both the Andes and northeast, and their overwhelming levels of poverty were placed in a Malthusian population framework rather than than inequality of access to land and an array of institutional resources. Amazonia was a way out of the pressure for agrarian reform, without expropriation: an “agbrarina reform without tears”.

<sup>43</sup> This was a slogan often used by the military dictator Emilio Garrastazu Médici, who ruled between 1969 and 1974, a period that coincided with some of the most aggressive Amazonian “integration” projects (and widespread political repression) including the construction of the Transamazonian Highway and the colonization of the surrounding areas.

<sup>44</sup> Euclides Da Cunha (1866-1909) was a Brazilian journalist, widely considere one of Brazil’s foremost writers. His best known work is *Os sertões* (Rio de Janeiro: Laemert, 1902), which chronicled and interpreted the popular rebellion in the Northeastern backlands town of Canudos, Bahia in 1896 and 1897. Da Cunha also spent time in Amazonia, working as a border surveyor, and produced an ambitious, unfinished manuscript with his views about the region, among other disperse writings. Susanna Hecht has studied his Amazonian adventures and writings in the award-winning book *The Scramble for the Amazon and the “Lost Paradise” of Euclides Da Cunha* (Chicago and London: The University of Chicago Press, 2013).

A more complex story had to be told, of ecologies, politics, and histories. To write the book was an immersion—the living room was books from top to bottom—frenzy of flow, and really, an outpouring of passion.

**4. Your study of Euclides da Cunha’s Amazonian adventures and writings offers a unique combination between a quasi-philological approach with biographical contextualization and interpretations. How did you conceptualize this project? What do you think is the place of Euclides da Cunha in the history of ideas about the Amazon?**

Most readers of Euclides da Cunha “stop at Canudos,” agonize over the racist ideologies that frame the first part of the reportage, and then go into whatever their academic specialty is: nation building, literary studies, Northeastern culture, peasant rebellion, culture clashes, just to name a few. And the book, Euclides book, is so rich, a palace of possibilities in his “mud-walled Troy,” not to mention his somewhat arcane, yet extremely evocative prose animated what was at the time seen as a counter-revolutionary into something profoundly revolutionary: His “bronzed titans” were what he would call, “The bedrock of our race” in the grasp of their own history. His is just a vast sensibility. No wonder the military had to flood the village of Canudos—a great irony in the Northeast.<sup>45</sup> Yet another episode in the issues of erasure.

But his Amazonian writing was so fragmentary: letters, newspaper articles, and a few essays. The prose was variable, but when it was good there was nothing like it. It flits through *Fate of the Forest* scattered, like little jewels, but what was this about really? Euclides was pedantic and so made constant reference to other writers and thinkers. I resolved to find out, basically following his bibliography. In a letter to Porchat he tells us: “I’ll write the book of vengeance.”<sup>46</sup> In the flames and bulwarks of rotting corpses that became what was left of Canudos, and in the heartbreak of his own writing, he saw

---

<sup>45</sup> Brazil’s Northeast has historically been affected by severe draughts.

<sup>46</sup> Reinaldo Porchat (1863-1957) was a Brazilian lawyer, scholar, and politician, who was one of Euclides’ close friends and correspondants.

as he would put it, the “bedrock of our race.” This was a time of enormous immigration of white Europeans, of scientific racism, of the earlier dynamics of literary modernism, and the yearning of Brazil (and Da Cunha, a ferocious nationalist) to be taken seriously as a country. Not just some hot ex-colony with dissolute and dark races, taken up with their primitive pleasures, but a modern state. Da Cunha saw in the Canudos’ people the yearning for a citizenship, what we might call “insurgent citizenship,” which has its future echoes in the socioenvironmentalism of Amazonia, and also in its way, a different social order.<sup>47</sup> The power of this prose and thinking probably had some effect on the Annals school of French history. Braudel and Claude Levi Strauss were teaching in São Paulo University (it had just been founded and was using French scholars to ramp up their curricula). Braudel himself intimates as much, and I think, if you take the first part of *Os Sertões*, or his naturalist description of Amazonia, then followed by a kind of social and historical overlays, the method seems similar.<sup>48</sup>

Da Cunha’s nomination to the border commission and his preparation and insufferably long travel was taken with a Peruvian commission which was fiendish in its machinations to discredit him and to thwart his part of the project. This was also in small steamboats with limited rations, a really arduous Amazonian trip, and with a general sense of sneering on the part of the Peruvian commission. This was about as abusive a relationship as one could imagine, but it supplied him with the material to understand the role of those little irregular titans in the making of the nation, much more than the arrogant and uniformed troops that had suppressed Canudos. Hence his discussions of the effectiveness of guerilla warfare.

But Euclides was interested in the big picture, in the flow of history, and in the future. I felt to understand him I had to follow each of his references, most of which I had never heard of. Because he focused on Latin American scholars and a long history of border disputes, it required basically doing a second Ph.D. under da Cunha as my main professor. “Read this!” He commanded. And so, I did. What emerged was a largely

---

<sup>47</sup> Cf. James Holston, *Insurgent Citizenship: Disjunctions of Democracy and Modernity in Brazil* (Princeton: Princeton University Press, 2007).

<sup>48</sup> Braudel, P. (1992). *Les origines intellectuelles de Fernand Braudel: un témoignage*. *Annales. Histoire, Sciences Sociales*, Cambridge University Press, Skidmore, T. E. (2003). “Lévi-Strauss, Braudel and Brazil: A case of mutual influence.” *Bulletin of Latin American Research* 22(3): 340-349.

unknown “Scramble for Amazonia”. For Africa’s scramble there was that 1885 meeting in Berlin. But for Amazonia, there was incessant conflict over centuries. The big interior was obscure but highly desirable to outsiders. Amazonia had all the “Usual suspects” of the time: France, Britain, Belgium and regional aspirants. But there was another power that hadn’t yet been quite understood as an imperial player.

Yes, there was some writing on the rubber period, but the large history of regional contestation was obscured. It was interesting that the writings of Reis don’t mention him.<sup>49</sup> I have wondered about this erasure, especially in light of the highly visible Scramble for Africa, where the European powers divided up Africa for their colonies. I think the historian Daniel Immerwahr, in his recent book *How to Hide an Empire* has his finger on it: the dynamic was less about territorial than commercial control in US forms of imperial capture.<sup>50</sup> The US had its territorial expansion and its own national integration, but the Upper Amazon had major key commodities (rubber among others) and was portrayed as a “New California”. It wasn’t for nothing that US warships steamed up the Amazon, and deals were made for this attractive part of Amazonia. The US thinkers on imperialism ignore this “little adventure” (in spite of multiple US survey and spy missions to the region) and this is perhaps because it failed, and the place was becoming an international mess for the US, with its railroad companies presiding over a malarial abattoir, its port system presided over by Percy Farquhar (soon to be ruined in the rubber crash), and even John Muir on his last legs in his last travels.<sup>51</sup> All give a sense of how many Americans were all over the place, and how soft sovereignty could be. This worry animated the Generals and of course Jair Bolsonaro. But the point of all this effort evaporated with the rise of rubber plantations

---

<sup>49</sup> Artur César Ferreira Reis (1906-1993) was a Brazilian historian, administrator, and politician. Reis was one of the deans of Amazonian history, with several key works about the colonial history of the region. He was also a conservative politician, and in 1964 he was the first Governor of Amazonas imposed by the military dictatorship. He gained national prominence with his book about the historical and contemporary attempts of foreign power to challenge Brazilian sovereignty over the rainforest territories: *A Amazônia e a Cobiça Internacional* (Rio de Janeiro: Editoria Nacional 1960).

<sup>50</sup> Daniel Immerwahr, *How to Hide an Empire: A History of the Greater United States* (New York: Farrar, Straus and Giroux, 2019).

<sup>51</sup> Percival Farquhar (1865-1953) was an American businessman who made massive investments in Latin America, particularly in railroads in Brazil. John Muir (1838-1914) was an Austrian-American naturalist and writer. He is one of the canonic writers about wilderness in the United States, and widely known as a promotor on conservation, especially in California. On his relationship with Amazonia, see *John Muir’s Last Journey South To The Amazon And East To Africa: Unpublished Journals And Selected Correspondence*, edited by Michael P. Branch (Washington D.C.: Island Press, 2001).

in the east, and Amazonia's reversion into a kind of tropical torper as capital fled to greener pastures.

In terms of Da Cunha's implications for Amazonian thought, I think his writing is so far the best that has ever been done on Amazonia. No one will ever outdo the idea of Amazonia as the "last unfinished page of Genesis." I think he is also very important in the idea of social erasure. As with *Os Sertões*, he brings into view, not the "forgotten" but the erased or invisibilized of national history. Putting Da Cunha in a more modern idiom: the non-human, the biota, the river is an actant, a shaper, a participant in the history, not just a platform for inscribing human triumph or failure, and not anything so vulgar as environmental determinism. It's just that in the realm of "big nature" humans are not exactly irrelevant, but more vulnerable than they think. Given the extraordinary transformations and the possible end times for reasons of climate and even Amazonian tipping points, his sense of the place constantly rewriting itself remain extremely trenchant. It's the idea of a nature still unfinished, but even so, to lift the veils of ignorance would take centuries. His ideas about the ways of apprehending Amazonia I think remain especially relevant: the importance of the "austere lexicon of science" contrasted to the emotional outpourings on Von Humboldt, the wizened savant.<sup>52</sup> It is through the austere lexicon of science that we mostly know Amazonia now, although mediated through satellites.

- 5. An important part of your research focuses on land use in Amazonia. Most recently, you published an article that denounced the way the Bolsonaro government disdained concerns about the large fires in Amazonia. How would you describe the current situation of Amazonia? Are there reasons to be optimistic? What can scholars and activist do to help?**

---

<sup>52</sup> Alexander Von Humboldt (1769-1859) was a German explorer, geographer, and naturalist. One of the most globally recognized scientific figures of his time and iconic figure in the history of science, Humboldt's expeditions and writings included parts of Amazonia.

The paper that is referenced in this question is one that came in in 2020, called “Why the Brazilian Amazon Burns.”<sup>53</sup> This question is even more trenchant now because of the statements made by Bolsonaro, his ministers and his cabinet members.<sup>54</sup> The actions that they have promoted—and the “non actions”—the blind eye to continuing human rights and environmental law violations have produced a rising dynamic of deforestation every year since he has been in power. In essence, Amazonia represents the more dynamic part of Brazil’s economy, since its industrial capacity and its manufacturing have declined participation in exports to a mere 4%. The export of raw materials has simply exploded whether these are derived from macro industry, minerals, clandestine gold, timber, drugs, and other products.

The central strategy of the Bolsonaro government has been to make illegal clearing legal, whether through amnesty, by drastically reducing enforcement, degazetting conservation areas, not recognizing earlier claims by indigenous and different traditional peoples, especially if their documentation for their claims were hung up in the bureaucracy, simply looking the other way on illegal exports of timber (his previous Minister of the environment, Ricardo Salles, has been indicted for illegal timber sales and has been removed from his remit), money laundering of gold and illegal extensive illegal extraction, starving public institutions that deal with management of natural resources, accelerating licensing systems through mechanisms such as claims of national security, or accelerated infrastructure development for export of natural resources even if the infrastructure moves through indigenous *quilombola* or other protected areas.

His policy in the Western Amazon is one of aggressively opening the region for massive road development. That would essentially link the arc of deforestation with the road that will move through the Purus River watershed and stimulate new crossroads as well as informal infrastructure and open up a huge area of relatively undamaged forest, and forest on which the forms of claim are fairly dubious, into free-for-all of land

---

<sup>53</sup> Susanna Hecht, “Why the Brazilian Amazon Burns?,” *Current History*, 119 (814), 2020, 60–65.

<sup>54</sup> Jair Bolsonaro (born 1955), president of Brazil between 2019 and 2023. A far-right wing extremist, Bolsonaro promoted deforestation in Amazonia.

grabs. In a similar manner, Amacro, now known as ZDS—a zone of sustainable development—a proposed regional development agency that encompasses southern Amazonia, Acre and Roraima, is meant to be the Western Amazon's Matopiba, with coordinated financing, infrastructure development, and land grabs.<sup>55</sup> Its aim is to link to the Peruvian transoceanic Highway to the BR364 highway for access to timber and for land grabs. As the governor of Acre put it, “we have some of the best soils and Amazonia. The only problem we have is that there is forest on top of it.”

This position more or less mimics the general “developmentalist,” forest-as-obstacle ideology and language that has prevailed during current regime.<sup>56</sup> The reality is that so much of this terrain is occupied by indigenous population's extractive reserves, *ribeirinhos* and other traditional peoples, as well as one of the largest protected areas in South America. It is a bit of *déjà vu* all over again since it's the BR 364, which was such a battleground during the 1980s and represented in many ways the emergence of forest people's movements, rural movements more generally, stronger environmental civil society and robust NGO development, as well as the creation of much broader international consciousness about Amazonia and its peoples, which came to a head with the international outcry over the assassination of Chico Mendes. While the dynamics are a bit different, the recent murders of journalist Dom Phillips and indigenous activist Bruno Pereira have certain echoes from earlier times, all though in this case, the murders really reflected killing rather than the protagonists. Its not really a frontier, since Javari has been belching resources into external coffers since the rubber boom, but had been largely invisible. The Bolsonaro regime was indifferent to the regional plunder and harassment of its local populations by clandestine and criminal actors and especially apathetic about the environmental consequences of the looting of regional resources.

The planned road is an extension of the BR 364, a 2,700-mile highway that links São Paulo with the Amazon state of Acre and that would connect the town of Cruzeiro

---

<sup>55</sup> Matopiba is an agricultural frontier region in the Cerrado, which includes parts of the states of Maranhão, Tocantins, Piauí and Bahia.

<sup>56</sup> Sandro Dutra e Silva, “Nature's Revenge: War on the Wilderness during the opening of Brazil's 'Last Western Frontier,’” *International Review of Environmental History*, Vol. 5, Issue 1, 2019, 5-21.

do Sul with the Peruvian town of Pucallpa. This would create a transport hub through which agricultural products can be shipped to Pacific ports in Peru and on to China. At least that is the argument, since many illegal commodities would certainly flow the other direction to be laundered or moved into other markets. The road would cut through about 80 miles in the Serra do Divisor National Park, one of the most diverse places on the planet. I mention this because if you look at the recent deforestation figures that came out in October 27, 2021, but were not discussed at the COP 26 by the Bolsonaro regime even as the numbers were in, what you see is the highest level of changes in deforestation exactly in the Amacro region, where the difference between 2020 and 2021 deforestation rates rose by 55%. Acre increased by 23%, Rondonia rose by 32%. These states were the ones with the highest clearing rates of all the Amazon states. I'm emphasizing this because this is not a "new frontier." The region has extensive areas of private lands and a diversity of forms of protected areas and social ecologies, but it's now a newly captured region for capital accumulation with very high climate costs, costs to environmental services (it's at the headwaters of the Jurua River, relatively high biomass forests, etc.), social costs, and planetary implications.

It is certainly true that Brazil signed on to the zero deforestation pledge by 2030. As we know from Bolsonaros' United Nations speech in September 2021, Bolsonaro said that deforestation was down by 34% . In fact, it was up by almost 22%, and this is not counting the forest degradation which is equal to or may be greater than the clear-cut levels. All planned investment in the Amacro is supposed to continue, and it's not as if road development, soy expansion, and cattle expansion will grind to a halt. Especially with no enforcement capacity, with rapid degazetting of protected areas, and amnesty. And with the destruction of Brazil's exceptional research apparatus, which has been cut by 90% things look dire. Lula has vowed to change this dynamic, but the institutions will be hard to recuperate all at once with 1000s of vacant positions, and the four years of the Bolsonaro regime solidified a range of practices in the Amazonian business as usual which will be difficult to overcome. The culture of impunity at multiple levels is more or less congealed and structured along cartel lines.

Right now, the deforestation focus internationally is emphasizing supply chains, but China, which is currently the main market, is rather indifferent to trade controls on deforestation. There is much more to be said, and this question of the Amazon now is part of my current book. But there is also plenty of deforestation that can be made legal or is in fact already legal, such as the clearing of up to 50% in other forest areas outside of Amazonia. And remember that the terms for the Brazilian pledge were to put a stop to illegal deforestation. Given what has transpired so far in the current regime, this is a significant loophole. There are many ways, in Amazonian alchemy, to make the illegal legal.

I'm not particularly optimistic at the moment, and the Brazilian deforestation pledge is probably as honest as Bolsonaro's statement about how COVID vaccines will turn you into an alligator. But Brazil is running up against the climatic limits of its agriculture as the effects of Amazonian deforestation on atmospheric rivers is starting to change rainfall regimes in the rest of the country and the Andes. The southern cone in the 2020s experienced its own dustbowl with rivers completely dried up and megacities like São Paulo are becoming ever more precarious in terms of their water supply. There will come a time, and it is probably quite soon, when the larger impacts of climate change reflected and reverberating through Amazonian land-use change will start to have much more dire political consequences. But Amazonia can always be surprising, so one never knows.

In terms of what can one do in the case of the earlier BR 364 battles, the issue settled around using international financial levers, international and multilateral organizations, national social movements within cities, as well as the Forest People's Alliance and indigenous politics, as well as local states and the federal system being aligned in slowing and eliminating deforestation. Indeed, BR 364 was an arena of extraordinary social and institutional innovation setting the framework for many of the innovations in the 1988 Constitution. Perhaps we will see something similar here, but it requires quite a bit of mobilization and the resistance to the forest question was not nearly as robust. And at the end of the day, once the glare of international interest shifted, deforestation expanded, kilombos and protected areas were degazetted by its

pro Bolosonaro governor, and it became an extension of the Mato Grosso soy and cattle frontiers.

My sense right now is that indigenous movements have very strong international visibility and certainly deserve to be supported since they provide significant alternatives to the current pattern of destruction. Lula's placement of Sonia Guajara and Joenia Wapixana in charge of the Ministry of indigenous affairs and FUNAI<sup>57</sup> are an important signal in Amazonia and internationally. I tend to put more of my hope in social movements rather than forest "green washing". The green washing may be helpful at this moment, but I wouldn't count on it. Projects like payment for environmental services have been found to be extremely leaky. While one area is being conserved another will simply be destroyed. The question about alternatives is much too large to go into deep discussion here but I'll try and broach some of these in other ways. A recent study showed that much of the forest offsets were ineffectual.

**6. The Anthropocene has become a dominant concept within the environmental humanities. At the same time, the historian Stephen Pyne has developed that of the Pyrocene, broadening the debate to include the political, economic, and environmental roles played by fire in historical processes. Do you dialogue with these concepts in your own research about development in tropical Latin America?**

Stephen Pyne's fantastic book on the Pyrocene provides a lot of food for thought about rethinking how to be on this planet.<sup>58</sup> He is right in saying that this is a planet that is often in flames. What we do know is that there are ways of being with fire. Fire is after all our oldest domesticated and it has left marks on the planet for at least the last 200,000 years as we have meandered around lands setting them on fire or controlling

---

<sup>57</sup> Fundação Nacional dos Povos Indígenas

<sup>58</sup> Stephen J. Pyne, *The Pyrocene. How We Created an Age of Fire, and What Happens Next* (Berkeley: University of California Press, 2021).

fire as far as we could. What we see now is that a lot of the policies and the ways that we have dealt with fire in the context of modernization have been absolutely terrible for the current moment since they interact with climate change and with fire suppression policies that simply produce massive and uncontrollable fires. What indigenous burning did was reduce a lot of the fire load by not letting certain systems get overgrown. It was part of the management of nutrients as well as a management for fire control. It created a lot of mosaics in the landscape that then became fantastic for shifting fire loads. There has been an extraordinary amount of research lately both in the United States on indigenous burning knowledge systems because it is not just putting a match to something, but rather a strategy within a larger set of land engagement and practices.

In my own research, which I carried out with the anthropologist Darrell Posey in the mid-1980s and early 1990s, we began with the usual mindset of swidden agriculture and the focus essentially being on the agriculture itself. In fact, as one of the women agriculturalists put it, “we have agriculture and the *roça* so that we could build the kind the forest we want—we can have the trees that we want.” Also, areas stayed in production much longer than they were “supposed to” in traditional ethnographic thinking. This, taken in the context of the many other forms of management of forest landscapes and open landscapes that the last 30 years of ethnographic and ethnoscientific research have revealed, show that the idea of the widespread anthropogenic landscape, a “domesticated landscape of Amazonia” is not so alien at all, but it does require from time to time the use of fire in order to maintain the system so that it doesn’t explode when fires occur. There are many forms of fire classification in the ethnoscience of the Kayapo and many other indigenous populations. In my research, one of the most significant elements was the use of cool fires, what we also call biochar, in the creation of Amazonian dark earths. This was instrumental in helping us understand how these soils were formed, which was through cool burning of forest biomass, weedy biomass and other forms of additions in the agricultural field. This form of burning produced biochar, which held on to the soil nutrients and maintains soil fertility for extensive periods of times. We know now from

archaeologists that Amazonian black earths actually can last for thousands of years. Some farmers in the US and Europe are beginning to use this technique for longer term soil amelioration. And you can buy bags of biochar on the internet! This is the long view of sustainability, not the deforestation free supply chain.

These highly fertile soil technologies that produce the dark earth, which rival irrigation and terraces as techniques for overcoming serious production constraints (in this case the poor Amazon soils) speak to the idea that human populations and cultural development in Amazonia were not limited by soil quality as had been widely asserted, and in fact still is asserted in some circles of Amazonian paleoecology. They also fly in the face of a declensionist narrative about human interactions with tropical forests. It may be that the capitalist or imperial developments really engender extensive environmental degradation. But other epistemes and ways of being can produce different outcomes—the anthropocene has the possibility of being a delightful, harmonious anthropocene, and given the extensive emergent literature on the “anthropogenic Amazon, a certain level of ecological equinamity was achieved. The question is one of embracing versus erasure. It’s important to contextualize exactly the systems that are in place and the way that they interact with their environment, what Marisol de Cadena calls “political ontologies.”<sup>59</sup>

Ethnographers from all over Amazonia who have been engaged with indigenous and traditional populations have argued that their understandings of natural environments and how they interact with them represent an entirely different way of interrelating with what one might call the society of nature, where the distinction, the human separation from nature doesn’t exist in the way that we understand it. What does this mean? Along with extensive new archeological findings, it means that Amazonia was not just a cradle of domestication but also of another form of durable eco-civilization. If we start to rethink the premises of human history, like the new book by David Graeber and David Wengrow, *The Dawn of Everything*, Amazonia has a great deal to teach us, and not just about what sustainable soil management would look like,

---

<sup>59</sup> Marisol de la Cadena, *Earth Beings: Ecologies of Practice across Andean Worlds* (Durham, NC: Duke University Press, 2015).

and how to be with fire on a changing planet, but what a durable relation with nature, with Gaia, might look like.<sup>60</sup> I think we have to be actively thinking about different ways of being in the world. I'm not sure that what we have understood as "development," though rich in commodities, can be termed as such, if it, as they say, costs the Earth.

One thing that's quite useful for understanding the dynamics of human impact in Amazonia and in South America more generally is that people arrived at least 14,000 years ago to South America. There are earlier indications of humans in the New World continents in 23,000 BC, with the muddy footprints in New Mexico sites as well as some island evidence from Baja California. There are also longer-running debates over human occupation not through the Bering Straits but rather along the coasts. In any case, the Anthropocene in Latin America starts much later than in Africa Asia or Europe, and we can roughly document its beginnings and effects. To go through 14,000 years in an interview would be a bit extreme and take too much time, but there are some useful ideas that we can touch upon. Let's start in the Colombian Amazon.

In the extraordinary Cerro Azul sites in the Guaviare of the Colombian Amazon, a region now largely famous as a site of drug production and of a spontaneous peasant migration, which has a long history of insurgent conflict and deforestation, there are extraordinary sets of petroglyphs, among the most extensive and glorious on the planet. What one notes about these is the magnificent landscape and biotic dimensions of these rock paintings as well as their artistic sensibilities. What we see here is an engagement and an Anthropocene that is highly accommodating of biodiversity, and very beautiful with rivers, birds, fish, insects and mammals. These are not so much the rock paintings of hunters with dogs or attentiveness to mammalian fauna but rather thronged with fish and birds, and images of rivers and plants. In a sense, this Anthropocene represents what anthropologists who work with indigenous groups throughout Amazonia have described as being in the society of nature, being in action with an actant nature and working with nature. What they describe or evoke is an idea that's advanced through multiple ethnographic studies and more recent paleo-

---

<sup>60</sup> David Graeber and David Wengrow, *The Dawn of Everything: A New History of Humanity* (London: Allen Lane, 2021).

ecological and historical-ecological studies that suggest that the Anthropocene in the New World tropics was much more interactive with, rather than dominating of nature. Rather than seeing it through the lens of ascendancy, the relationships were more companionable. This ontology is quite different from those of the Abrahamic religions that exhorted men to take dominion of the land and all the organisms that walked, flew above, or swam in its waters. In this sense, what we also have is a different relationship to fire.

The question that was posed to me here was what about the Pyrocene? What we can see is an emergent dynamic globally. I'm a big fan of Stephen Pyne's larger work on the human relationship to fire, which after all is one of the most critical tools that humans have had in terms of interacting with the biota in both the surface world and the subterranean world of what he calls the lithic fire. The primary signature of humans on the landscape in prehistory, the main ecological signature, is fire. What is proposed by Pyne is that fire is actually the inverse of the Ice Age and that we have three types of fires. The first is biotic fire that can be domesticated. He points out that you can't really have fire without biota, without life. The fire, even the subterranean sources of fire, what he calls lithic fire, are fossil fuels from dead life. What he argues is that now we're in a time where fire sculpts the world in a fire equivalent of the Ice Ages. Images of conflagration at enormous scales from the Arctic to Australia, with stops in Europe and North America, in Africa and Amazonia, give us the sense of the world – continents – on fire. So how does this play out in Amazonia?

Fire is a human signature on the landscape. Humans were using fire and Amazonia for the last many thousands of years: at least 12,500, and certainly in the last 10 to 6 thousand years, when fire becomes more associated with annual cropping and forms of plant domestication. We can discern from current ethnography in the field that the practices of traditional peoples tends to create fire mosaics, and ultimately vegetation mosaics of landscapes that act as fire breaks in a complex of vegetation configurations. There is constant burning going on, these are not “nuclear” fires (the energy equivalent of nuclear bombs when you burn a big high biomass forest of large areas), but cool fires, more likely to be a char than a total immolation. We can think of

this as friendly fire or domesticated fire. That is fire used in the same way that we use metal tools to transform landscapes but through a different ontology which is not to convert them entirely into something else but to use them as a phase in a larger process of creating biotas. The work of Charles Clement and Carolina Levis points to a vast domesticated tree legacy from indigenous populations involving agroforestry, forest manipulation, sub-canopy fires, periodic grassland burnings, the burning of household debris, and the burning and char within agriculture fields that creates Amazonian dark earths.<sup>61</sup> This engagement with fire has produced a long-term legacy of domesticated and forested landscapes, highly productive for people and for other organisms, since the idea often involved creating extras and food sources for other organisms. It has created an ecological context in which some 10% of the planet's biodiversity can survive, as well as historically very large populations – on a par with those of Europe at the time of contact.

Amazonian peoples evolved in a context of very high biodiversity and transformed it in a way that allowed its continuity. The living fires that they worked with involved biotic matrices for reshaping landscapes and created an evolutionary filter, but one which was generous and regenerative. Unlike the fossil fuels that we now rely on, which are pulled from a geologic biotic past into the present and have a simplifying future in store for us one way or the other, these friendly forms of fire created conditions of possibility within landscapes, and were dynamic rather than destructive. The idea was to create more landscape diversity. To create, as ecologist-archeologist Miguel Arroyo Kalin puts it, a human niche.<sup>62</sup>

How one thinks about fire often has a lot to do with how you think about nature according to Pyne, the deepest thinker on the fire question from the developed world. What we know is that indigenous fire remains widely used but was highly demonized in colonial periods even though it was part of agricultural history in Europe. Mediterranean areas were often and continuously burned, and taking the fire out of

---

<sup>61</sup> For example, Carolina Levis et. al. "Persistent Effects of Pre-Columbian Plant Domestication on Amazonian Forest Composition," *Science*, Vol. 35, No. 6328, 2017, 925-931.

<sup>62</sup> For example, Manuel Arroyo-Kalin et al., "Civilisation and Human Niche Construction," *Archaeology International*, No. 20, 2017, 106–109.

them has made them explode in drastic conflagrations, as each fall demonstrates now with depressing frequency. But colonial forest management and the rise of monocultural systems as central to both modernism and capitalism in the tropical world implied deep suppression of fire. The view of fire was one of the enemy. The Amazonian production systems that emerged from shifting cultivation, forest manipulations, from low intensity burning were seen as incoherent and unproductive versus the “legibility” of grid-based systems of planting whose simplicity as mostly monocultures made them intelligible to outsiders and settlers whose experience was based on far simpler ecosystems in the northern hemisphere. These were conditioned through the demands of capital accumulation, land expropriation as part of what we might call the “plantationcene”, and the more insidious genocidal dynamics of settler occupation. The landscape transformations associated with plantations and settler agriculture had little use for fire at the landscape level (although sugar plantations relied on wood for cooking down sugar to crystalize it), and worked toward more general fire suppression once settlement had been achieved. This was in contrast to the constant rotating world of fire and forest of native populations.

In an unusual form of irony, when formal conservation activities were enacted in large-scale forested landscapes in Amazonia, they involved imaging nature as biotic only, with no human history at all. This was part of bureaucratic claiming of terrain near borders, and also of the modernist view of what developed countries did, which is to politically claim areas and set them aside under the rubric of conservation and no human history, following North American fictions and practices. US parks suffered massively from what we might call the “Bambi syndrome” harkening back to the iconic Disney movie—an amazing piece of environmental propaganda viewed by millions of children over the decades—, the idea of a “balance of nature” in which humans and fire represented the incarnation of ecological disruption and destruction of natural harmony. The policies of fire suppression—in contrast to the *originarios* practices of cool burns and complex fire uses—reflected a kind of Jungian “Bambi” fear that produce

an ideology of forests as having no human history only a biotic one<sup>63</sup> and human relations with nature, whether through hunting or fire as essentially brutish and catastrophic.

Fire policy in Amazonia now remains rooted in the fire suppression model for conservation areas in spite of the widespread and careful use of fire by traditional peoples of many kinds. With colleagues such as Ludevine Eloy, Rachel Carmenta among others, the documentation of the complex fire uses within a context of domesticated landscapes presents quite a different optic on Amazonian fire.<sup>64</sup> This contrasts mightily with what we can only call ecological arson in the current large scale fire practices that we now see at play in Amazonia. This represents a confluence of large-scale climatic change, non-indigenous local practices of forest clearing at quite large scales, and increasing vulnerability of fragmented forests to sub canopy fires and their degradation, with forest remnants collapsing in the face new forms of capital accumulation, infrastructure development, land speculation, and new suites of both clandestine and formal economies.

There are several processes that underlie the now usual imagery of Amazonia in flames, including the immensely beautiful remote sensing imagery. We are now 50 years into the developmentalist assault on Amazonia that has involved extensive infrastructure development—legal and illegal (there are now more than 17,000 illegal roads and the land speculation that reliably goes with it. This development of “roads and real estate”—a kind of planners’ wet dreams—are the frameworks of engineering and speculative economics in which the climate, environmental services, and social costs are largely uncounted, and basically matters of indifference.

In this context, clearing for claiming titles has remained a durable practice with very deep historical roots in both plantation and settler occupation. The rise in land values associated with clearing and infrastructure has made this part of the new fire

---

<sup>63</sup> The author of *Bambi*, the Viennese playwright, author, theatre critic and pornographer wrote *Bambi* through a kind of moral hangover about World War I and its violence both against Man and nature. A fascinating exegesis of *Bambi* (and Felix Salter) isto be found in Cartmill, M. (1996). [A View to a Death in the Morning: Hunting and Nature through History](#), Harvard University Press.

<sup>64</sup> See Eloy, L., S. Hecht, A. Steward and J. Mistry (2019). "Firing up: Policy, politics and polemics under new and old burning regimes." [The Geographical Journal](#) **185**(1): 2-9, Eloy, L., S. B. Hecht, A. Steward and J. Mistry (2019). Firing up.

ecology particularly useful and lucrative. The use of fire and replacement of forest by pasture (and remember that pasture is the largest land use in Amazonia and actually throughout much of the New World tropics) largely precludes the use of the land for much else or by anyone else who might be forest dependent, as for obvious reasons it shatters forest livelihoods, as well as erases forest—that is socioforest—histories. About the only vegetational succession on these lands is either intensive industrial monocultural agriculture which drenches the landscape in herbicides or, alternatively, degraded lands—the *juquira* as its called, the weedy infestation of degraded soils and landscapes.

The large infrastructure also permits feeder roads into forests for extraction of timber whose trafficking remains largely clandestine (the Minister of the Environment, Ricardo Salles was accused of engaging in Amazon timber trafficking.)<sup>65</sup> The collateral damage of so-called selective logging takes down 10 or 20 other trees at the same time; there is the damage of the road itself, the logging, and local hunting of animals along those roads. The result is that the forest becomes degraded, fragmented, and more vulnerable to fire, which is now set in the sub-canopy in order to weaken local areas of forest and makes later clearing a good deal easier. Adjacent pastures and the escaped invasive African pasture grass, which are managed with fire in order to keep weedy growth down and to provide a short spurt of nutrients, generate fire that escapes into adjacent forests along the logging trails with their dried slash acting as kindling, making forests more vulnerable to multiple stressors even if they continue to stand, including vulnerabilities to wind, higher internal temperatures, and pests. This expanding type of fire frontier increasingly results in burning syndromes that become more intense each year and give the impression of a continent on fire. These are compounded by increasing intensities of El Niño years like 2010 and 2015, and a general increase in temperature in cleared areas, compared to forested ones, which make their burning more intense and volatile and thus able to enter into forests that otherwise wouldn't burn.

---

<sup>65</sup> <https://news.mongabay.com/2021/05/brazils-environment-minister-investigated-for-alleged-illegal-timber-sales/>

This combination of landscape change with human practices driven less by a desire to live on the land but rather to mainly profit from its ecological disintegration and integration into new circuits of capital accumulation form a deadly process. Fragmented forests and global climate dynamics, coupled to declining capacities of forests to generate their own hydrologies, now gives us an Amazonian Pyrocene.

There are now also feedback loops that interact and accelerate. Land policy and practices require deforestation and large fires to clear land and “manage” pastures that often escape to, or are set in, forests. The forest systems are themselves weakened through timber extraction, side roads, and other factors that fragment them. They cannot withstand the changes from human practices at local levels, especially when coupled to large-scale changes, climatic changes in winds and water. And so the burning season runs earlier and longer, and involves largely uncontrollable fires once they start. In the end only the rains stop them. In this sense, Amazonia has now entered the Pyrocene, where feedbacks between different parts of the system enhance the burning dynamics and the landscape moves from the realm of domesticated fire to feral fire and its relentless feedbacks. One could argue at this juncture that parts of Amazonia are now less shaped by human agency per se than sculpted by fire. So yes I would say we have moved from the Anthropocene to the Pyrocene.

- 7. You followed the beginning of the movement for the creation of extractive reserves in the Amazon. What is your appraisal of the meaning of that movement more than 30 years later? Did the existing extractive reserves achieve a significant part of the movement's initial objectives? Does that model of conservation unit still represent a good alternative? What challenges do you currently perceive for the future of those reserves?**

The question of extractive reserves 30 years on remains equivocal. By 2018, 76 federal and state environmental extractive reserves had been put into place and

involved some 14 million hectares. The performance and the protection have been unequal, especially in the last few years, when the protected areas of extractive reserves were often not respected by outsiders. Also, there has been a surprising shift to livestock within extractive reserves—in part because the support for non timber products was not especially forthcoming, the nature of income formation which could often engage short migrations and circular urban migrations wasn't well understood in the static conceptualizations of rubber economies and labor. The livestock itself carries a culture that has been venerated in Latin America for 500 years, is highly subsidized in numerous ways. In addition, its low labor demand, its use as a source of production and a commodity give it characteristics that are multiple, flexible and often quite lucrative. And it is a way of showing “legal effective use” in ways difficult to do for many kinds of forests. Cattle capitalism throughout latin America exists because states, markets, institutions and cultural dynamics of traditionalism and modernism agglomerate around this activity. The animals remain markers of prestige while the life of the tapper carries a residue of victimhood, in spite of the rise of the dynamics of forest citizenship, and what we could call insurgent citizenship. The logic behind extractive reserves has been contested at national and local politics. But the issue perhaps is not so much extractive reserves in their current context, which will be hashed out in the modern Amazon politics, but rather the significance of the model of extractive reserves for rethinking the history of Amazonia, the rise of socioambientalism, environmental justice and citizenship and the creation of a model for protected areas that include people. This was a central contribution to a rethinking of conservation ideologies The forest is the mantle of the poor, and has buffered them against many onslaughts. Further extractive reserves have come to take on a more ample framing in terms of protection of *quilombo* areas, the traditional holdings of many kinds of traditional peoples, and increasingly marine areas. This is a useful expansion of tenurial regimes beyond that of private property, but they run risks of being degazetted by state governors, as recently occurred in Rondonia in the Bolsonaro time.

In the context of conservation history this was an extraordinary innovation. It was innovative on a number of levels that included new forms of property regimes, the

forms of claiming lands which were largely asserted through historical occupation. Rather than a form of cadastral documentation, the long-term use and meaning of landscapes for livelihood and larger well-being became the grounds for asserting rights to territory. These were subsequently inscribed in indigenous and Afro-descendent lands. Other forms of traditional claim also followed suit. The result has been that an entirely new model of conservation was ushered in through extraordinary political pressures that reflected social movements, the dynamics of a particular historical moment when the dictatorship was drawing to a close, international pressure from multilateral lenders, as well as international and national environmental movements. All began to see that this was a viable way to produce a new form of development that might serve to both improve welfare and to maintain ecosystems, and that they had done so in some cases for centuries. It seemed in many ways to be the epitome of what sustainable development might look like in the form of a forest based bioeconomy. They reflected an inclusionary moment in Brazilian environmental history, one that went on to develop a whole broader system of protected areas in conservation, as well as a new set of institutions that were oriented to maintaining ecosystems and livelihoods and elaborating the idea of environmental crimes. The extractive reserves required new legislations at multiple scales, new forms of spatial and social organization, new state and federal institutions, and imagining a new future for forest people who had been largely left behind, and largely invisible within the national politics and certainly within the conservation world married as it was to the “empty ahistoric” forest conservation model. Prior to the explosion of this idea in conservation circles, people such as these would have been either expelled from protected areas or expelled from development frontiers, or chased off to cities or opening frontiers. This created an extraordinary condition of possibility within a highly contested development frontier. ERs now includes as marine reserves in Marajo and mangrove extractive reserves in Maranhão and areas in the Atlantic forests, and in fact in all Brazilian biomes.

These innovations came out of an extremely conflictive land situation in Amazonian frontiers and one that continues. What seems to have been key here were complex alliances that were aligned at multiple scales, but that also were strongly and

lucidly advanced by forest people's social movements. They were implemented in sites of tremendous conflict in Acre, Rondônia, and Amapá. The expansion of extractive reserves reflected not just the extraordinary richness of the idea of extractive reserves as a solution to what otherwise would have been a very intractable problem, that would have resulted in massive expulsions of forest people and the loss of incalculable biodiversity and environmental services as well as livelihood values. During the end of Fernando Henrique Cardoso's term, and the rise of the Worker's Party (PT) politics, in which many social movement activists were drawn into the government itself, extractive reserves really expanded.<sup>66</sup> The international attention to the deaths of Chico Mendes and later Dorothy Stang brought into sharp relief the structural dynamics, which to this day remain extremely violent.<sup>67</sup> The recent assassinations of journalist Dom Phillips and indigenous defender Bruno Pereira represent a continuity but a striking difference as well. In the Mendes, Stang cases (as well as those of hundred of other forest defenders) the dynamics had centered on rather traditional structures of land conflicts over contested land or territorial rights or desired rights. Phillips and Pereira represent a newer chapter in the rise of organized crime and its circuits, in this case fish and timber. These battles are not so much about place as access to and control over clandestine commodities and the rights of theft from local owners. These are conflicts that have geographical locations but are not exactly about place per se.

The extractive reserve model, with its social organizations and movements to pressure local and national states, continued as a powerful model of organization in Amazonia. It reverberated with a number of movements like those along the trans-Amazon and also along the BR 163 the road to Santarem, where land conflicts resulted in the creation during the Lula regime of a Mosaic of protected areas. Many of these areas—initially areas gazetted after the murder of Stang, and designed to “calm” areas of contestation along this deadly highway by legalizing various types of forest

---

<sup>66</sup> Fernando Henrique Cardoso (born 1933) is a Brazilian scholar and politician. A sociologist known as a key member of the generation that launched “dependency theory,” he was president of Brazil for two consecutive terms between 1995 and 2003. He is associated with the promotion of neoliberal reforms in his country.

<sup>67</sup> Dorothy Stang (1931-2005) was a Brazilian-American religious, social, and environmental activist. She was murdered by gunmen associated with livestock interests in the state of Pará.

conservation systems within hotly contested land wars—these places however were the targets of the “Day of Fire” when Agro-industrialists, land grabbers and Bolsonaro supporters engaged in a coordinated and massive burning of forests near the road.<sup>68</sup>

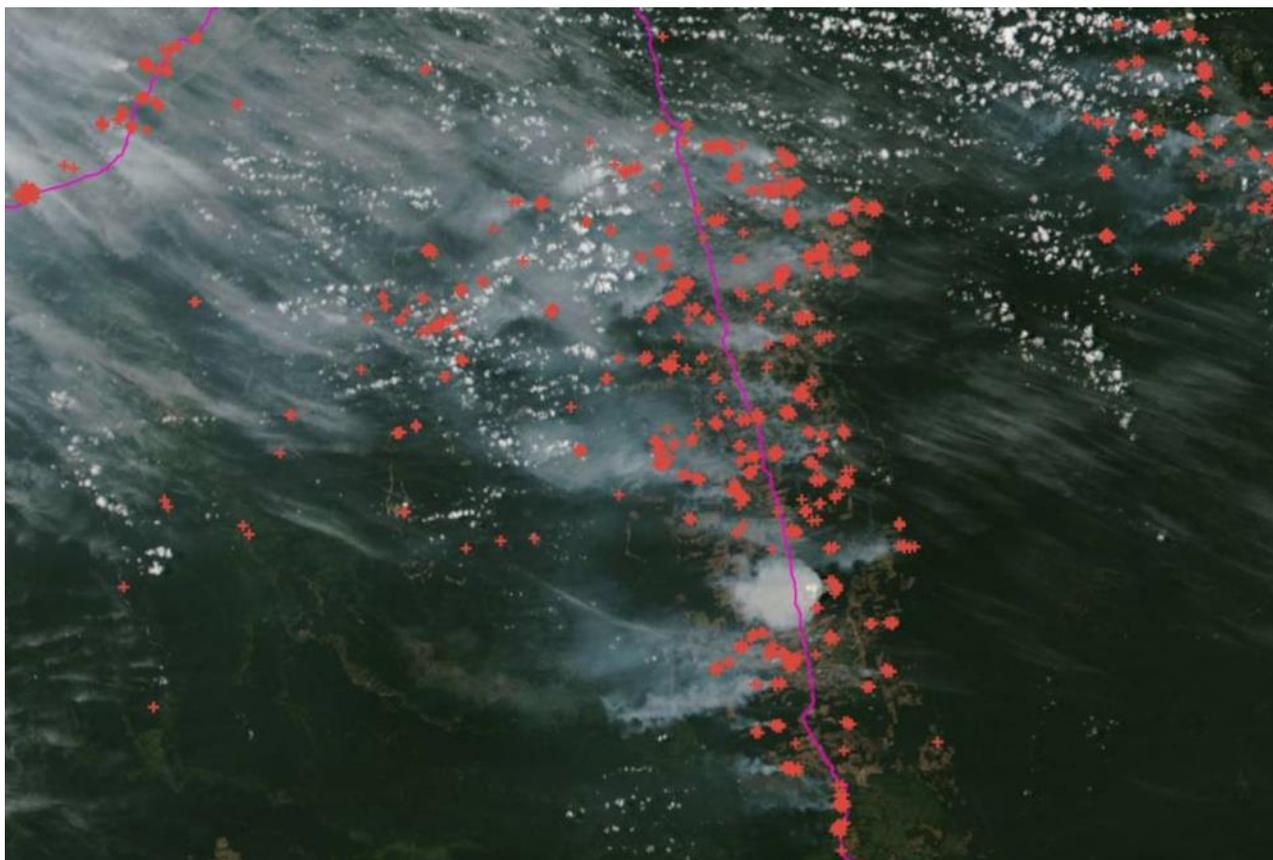
As Amazonian states have elected the Bolsonaro slate, the dynamics of land grabbing and timber theft on extractive reserves have become more apparent. In the case of the Jaci Paraná extractive reserve in Rondônia, a large proportion of its territory was degazetted and the clearing by outsiders and ranchers was legalized. The marine extractive reserve in Bahia (Baía do Iguapé) was drastically reduced in order to put in place an oil platform. Other extractive reserves, especially in Rondônia, have been regularly reduced in order to accommodate land grabbing as well as flooding by dam projects. Under the Bolsonaro regime, extractive reserves were not necessarily stable configurations. And while they are under attack from outside, they are also vulnerable to internal changes. I am thinking here of the work of David Salisbury on the Chico Mendes extractive reserve, which increasingly resulted in the transformation of forest to pasture.<sup>69</sup> This was a very complex process and partly reflects the instability of land tenure even within extractive reserves—which are still technically lands of the state—and the usual capture of land through clearing as a means of claiming titles through the deployment of cattle. But also the influence of credit policies and of a lack of a livelihood or extractive product support and other kinds of economic alternatives that made the non timber livelihood strategy precarious. Other cultural patterns also had been emerging for decades and in the case of livestock for centuries where the iconography of livestock as signals a practice of elites even as its part of small holder livelihoods.

---

<sup>68</sup><https://www1.folha.uol.com.br/ambiente/2019/08/em-dia-do-fogo-sul-do-pa-registra-disparo-no-numero-de-queimadas.shtml>

<sup>69</sup> David Salisbury and Marianna Schmink, “Cows versus Rubber: Changing Livelihoods among Amazonian Extractivists,” *Geoforum*, Vol. 38, Issue 6, 2007, 1233-1249.

**Figure 1. Fire in Amazon**



Source: Photo NASA August 2019

Rubber tapping evoked an image of semi-slavery derived from its 19<sup>th</sup> century roots, and its arduous labor regime. In contrast, the labor demands from livestock are low compared to the hard work of rubber collection and garners wide cultural approval. Rubber tappers had surged into an insurgent citizenship in the early part of this century with limited political support at the state levels, which is often the case in Amazonia, but with at least rhetorical solidarity at different scales. Particularly in Western Amazonia, this model—extractive reserves—is facing really difficult times, which is not helped by the current impunity and amnesty given to land grabbers in these areas in spite of the position vis a vis Amazonia of the new president Lula. Further the connection to the Pacific via the transoceanic highway has less to do with local development rather than the scouring out of resources to Chinese markets. This will become all the more serious as a Amacro or the new ZDS (“Sustainable Development

Zone”) the extension of BR 364 becomes more consolidated and as roadbuilding expands. The region already has some of the highest deforestation rates in spite of extensive extractive, indigenous reserves and a range of conservation areas.

Figure 2. Western Amazonia



The model itself still has tremendous validity and represents an extraordinary innovation and imagination in the conception and practice of a land use that could in principle maintain forest livelihoods and social justice, support citizenship rights for largely disenfranchised populations, could support different ontologies and epistemes of forest peoples and keep Amazonian landscapes as productive forest landscapes that are so important both for local areas and for planetary stability. So, we have to look at extractive reserves as an extremely important dynamic of innovation that has come up against a political and economic regimes that support destructive practices. The ultimate outcomes remain to be seen because all the burning and all the forest

pressures coupled to climate change are enhancing the vulnerability of these places and their capacity to recover from the damage that they are experiencing.

Extractive reserves represent not just the question forest citizenship, “Florestania”, but also what it takes to organize rural populations to change local governments and to invent new ways of being in the world, new options for people in Amazonia, to invent new institutions, craft new legislation, rethink property, think of new values of ecological and social justice. All within a framework of liberation ecology. Extractive reserves are an extremely useful ideal. Their reality in the current context falls short, but that does not mean it always will. But it is important to understand that livelihoods are complicated, and the imaginaries of only forest livelihoods in some ideal of an equal society ignores even the internal structures of the reserves, and the contexts of external situations where support for florestania was important in some contexts, but triggered nothing but resentments in others. Given the wide range of contexts and biomes in which extractive reserves, find themselves, and whiplashes of current policy, how they unfold over time remains to be seen. Their situation is precarious, however, since they are effectively largely state lands that release usufruct and occupation rights.

**8. How do you see the strong development of Environmental History in recent decades? How does your own work dialogue with this field of knowledge?**

There's a couple of things that I think are important to emphasize. First, political ecology always had and has a historical dimension. One could not understand its contested terrain without history and especially what would come to be known as environmental history. Part of it reflects the emergence of political ecology within geography and in development studies. Another part is that colonial and post-colonial histories integrated the world within new forms of globalization. Environmental outcome reflected not just local practices (which were often demonized such as shifting cultivation and the use of fire) but it took a while for the environmental meanings of

this integration to emerge and converge. Environmental historians were more focused on relatively narrow case studies within Europe and the US for the most part—this is why Pádua’s work has been so important since he helped “invent” the field in Brazil—an outlier as a kind of eccentric interest, and initially, other than archives, few other techniques and technologies were invoked. This would change mightily with the new capacities and sciences applied in archeology, shorter term regional histories as well as ethnography. But some of the mainly archival work was quite extraordinary: you can think of the labors of Carl Sauer on the “The Early Spanish Main”, for example.<sup>70</sup> You can think of the brilliant work of Leroy Ladurie, *Times of Feast, Times of Famine*, a thousand-year history of his area, *Carnival at Romans...*<sup>71</sup> He brings in a lot of rural France into a bio-coproduction history as well as a social history. This has to do with the Annales school—its regional tastes and interests in the long duree and to look at changes over time and continuities over time. It was not that long term climate changes were unknown or unimagined, its that the climate science, the techniques of pollen analysis or starch analysis or even how to read some of the old texts was imperfect, and also how deeply the impacts of one place influenced outcomes on another through broader planetary changes and socioeconomic connections which have always been intimate. So, it's not that environmental history was entirely absent, it's that the means of integrating the sciences and socio-humanist histories were still figuring out how to be together. It takes a while for the various disciplines to see the relevance of each other. To be fair, I think Amazonia has often led the way in thinking about these integrations, both in the short and long duree. This reflects the brilliance of its archeologists, and paleo climatologists and paleo ecologists and historians of the socio-natural world to try to cobble together an understanding of these ecosystems that are

---

<sup>70</sup> Sauer, C. O. (1938). "Theme of plant and animal destruction in economic history." *Journal of Farm Economics* 20(4): 765-775, Sauer, C. O., L. B. Baisden, I. T. Kelly, M. Warthin and A. Corwin (1939). *Man in nature: America before the days of the white men*. New York, Chicago [etc.], C. Scribner's Sons, Sauer, C. O. (1966). *The early Spanish Main*. Berkeley, University of California Press.

<sup>71</sup> Emmanuel Leroy Ladurie (born 1929) is a French historian, associated with the third generation of the Annales School, specialized in the medieval history of Languedoc, and one of the key practitioners of microhistory. His books referenced are *Times of Feast, Times of Famine: A History of Climate Since the Year 1000* (New York: Farrar Straus & Giroux; Reissue edition, 1981); *The Peasants of Languedoc* (Urbana: University of Illinois Press, 1977); *Carnival in Romans* (New York: Geirges Braziller, 1980). His most famous book is *Montaillou, village occitan de 1294 à 1324* (Paris: Gallimard, 1975).

millions of years old, and a very complex system of human-landscape engagement in Anthropocene as well as its modern pyrocene.

Then you have, of course, things like Cronon's work *Changes in the Land* or the work of Richard White.<sup>72</sup> These are really foundational but they're spatially bounded, they focus on the temperate zone thinking about questions on how places change, and how complexities of forms of colonialism interact with differences in forms of economies and ontologies in profoundly conflictual ways. These works were initially less ecological in their framing. That is to say they don't do the historical integration. But they show that the things that we see now are not as they have always been, nor are they by definition determined so that, as they say, another world was possible. But I think it's useful to also look at the Latin American writers –such as Euclides da Cunha– who were always attuned to socio biotics of place, and that whole cohort of late 19<sup>th</sup> century and early 20<sup>th</sup> century writers and colonial critics that form part of a broader circle of cultural critics who stay highly tuned to the significance of environment in Brazilian identity<sup>73</sup>.

I didn't really read Richard White until much later, but I think what was really important were people like Billie Lee Turner and, again, Denevan saying that there was a lot more interaction.<sup>74</sup> These were people working out what Mayan agriculture might have looked like. This was the explosion that you get in the 1980s, also in ethnobiology. In general, this whole question of ethnobiology and how indigenous populations actually have a science. I know it now sounds like “how obvious is that?”. But the

---

<sup>72</sup> William B. Cronon (born 1954) is an American historian. He is the author of books and essays that deeply marked the trajectory of environmental history as an academic field in the United States. He obtained two PhDs, one from the University of Oxford in 1979 and one from Yale University in 1985. He taught at Yale University and the University of Wisconsin-Madison. His first book is *Changes in the Land. Indians, Colonists and the Ecology of New England* (New York: Hill & Wang, 1983). Richard White (born 1947) is an American historian, specialized in the American West, environmental history, and indigenous history. He obtained his PhD from the University of Washington in 1975, and taught at several universities, including the University of Utah, Michigan State University, the University of Washington, and Stanford University. The books referenced here are *Land Use, Environment, and Social Change: The Shaping of Island County, Washington* (Seattle: The University of Washington Press, 1979) and *The Roots of Dependency: Subsistence, Environment, and Social Change Among the Choctaws, Pawnees, and Navajos* (Omaha: University of Nebraska Press, 1983).

<sup>73</sup> This cohort, largely Amazon or Northeastern based, had a great deal to say not just about Brazilian literature and the degrees of its cultural derivations but also its new imaginaries. See Ventura, R. (1991). *Estilo tropical : história cultural e polêmicas literárias no Brasil, 1870-1914*. São Paulo, Brazil, Companhia das Letras.

<sup>74</sup> Billie Lee Turner II (born 1945) is an American geographer. He obtained his PhD from the University of Wisconsin at Madison in 1974. He is an expert on Maya agriculture and the prehispanic environmental history of the Americas. He has taught at several American universities, including the University of Oklahoma, Clarke University, and the University of Arizona.

ideologies about indigenous populations, particularly as small scale tribal units, the Chagnon, you know, *The Fierce People*, given to violence and weird stuff and the curiosities and cannibalism.<sup>75</sup> In a certain sense, the ideology is about the tropics and the tropical people. They were very obscuring and made it really difficult to break through this barrier about what the tropics were and could be.

Let's also never forget that there is that modernist and modernization backbeat that always goes on, the idea of progress, that those forms of engagement with landscape and history were primitive, and that there really is a modern way of integrating into the world, which involves a universalism and a technology-based monocropping. It comes out of the agricultural institutions, whether it's the green revolution for "perfecting" small farmers or the large-scale agro-industrial development that comes out of the American systems. The idea is that the existing systems are not very good and that the real productivity is one that involves increasing yields per hectare of one species.

Actually, I want to mention something else about Berkeley, which is where Miguel Altieri is working on agroecology.<sup>76</sup> He's an entomologist, so he fits in as a critique against the biocidal form of agriculture, which, of course, still dominates most of the agronomic schools. What you see at this time is that again there's a bit of localized studies. Again, it's looking at these questions of agricultural change and comparisons.

This is also, again to go back to the Cold War, a period when there was really a lot of investment in land use and development, whatever we choose to describe that, as in many cases I'm not sure we could say it improved some features of life and livelihood. Whether this is really development in the social context in which it occurred is another set of questions. But what you see is going from a limited case study to *Changes in the Land*. This is not to take anything away from these. And if you looked at environmental history at that time, you didn't really see very much expansiveness. I

---

<sup>75</sup> Napoleon Chagnon (1938-2019) was an American anthropologist. Chagnon is famous for his ethnographic study *Yanomamo, A Fierce People* (New York: Holt, Rinehart and Winston, 1968), a widely read and debated text, often criticized for misrepresenting the Yanomamo peoples and reinforcing longstanding prejudices against them.

<sup>76</sup> Miguel Altieri (born 1950) is a Chilean entomologist. He obtained his PhD from the University of Florida in 1979. He is an expert in agroecology, landscape ecology, and intercrop relations. He teaches at the University of California at Berkeley.

think it took somebody like Richard Grove to target a big colonial experience. His *Green Imperialism* is of course that key reference.<sup>77</sup> He was in a terrible accident, but he also has a book called *El Niño in World History*, which was finished by a student of his.<sup>78</sup> But also, you get somebody like Mike Davis with *Late Victorian Holocausts*, which looks at the impact of the double dynamic of a climate change and colonialism at the same time, so that you have cascading disasters.<sup>79</sup> This begins to put these questions of environmental history into a much more political frame.

Also, let's look at Cronon's second book, *Nature's Metropolis*.<sup>80</sup> It talks about what in our present-day lexicon we would call ecological footprints. He shows in that really very brilliant book how much things shift around and what impacts they have, and the issue of the social and environmental cost being displaced from the places where things are consumed. Not that other places, like urban areas, don't have environmental problems. This is someone like Frederick Law Olmsted, who has had a 200-year birthday two days ago, so, there's been a lot of homage to him in the newspapers, rightfully so.<sup>81</sup> But this is about how those places can be ravaged at a distance and remain invisible to the places that are benefiting from the ravages. You begin to see the expansiveness in how people begin to think about these things. You can also think of Donald Worster's wonderful book, *Rivers of Empire*, about the control of water, making reference to a lot of really great geographical work by Fogle and other people.<sup>82</sup>

An in his book on the *Dust Bowl*, Worster talks about environmental management as an outcome of a development process interacting with a climatic process.<sup>83</sup> And it's so incredible how much. The other thing is the scale. What we see as environmental

---

<sup>77</sup> Richard Grove (1955-2020) was a British historian. He obtained his PhD from the University of Cambridge in 1988. His book *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism 1600–1860* (Cambridge: Cambridge University Press, 1995) is considered a landmark in the history of the links between colonial and environmental history. Grove's career, spanning several continents and institutions, was severely impacted by a car accident that left him severely disabled since 2006.

<sup>78</sup> Richard Grove and George Adamson, *El Niño in World History* (London: Palgrave, 2018).

<sup>79</sup> Mike Davis, *Late Victorian Holocausts: El Niño Famines and the Making of the Third World* (London: Verso: 2000).

<sup>80</sup> William B. Cronon, *Nature's Metropolis. Chicago and the Great West* (New York and London: W.W. Norton and Co., 1991).

<sup>81</sup> Frederick Law Olmsted (1822-1903) was an American architect and social critic. Prominent among his extremely prolific and influential career is the design of Manhattan's Central Park.

<sup>82</sup> Donald Worster (born 1941) is an American environmental historian. One of the founding figures of American environmental history, his work encompasses issues related to water, catastrophes, the history of capitalism, and intellectual history. The book referenced here is *Rivers of Empire: Water, Aridity, and the Growth of the American West* (New York: Pantheon Books, 1986).

<sup>83</sup> Donald Worster, *Dust Bowl: The Souther Plains in the 1930s* (New York: Oxford University Press, 1979).

history starts to pick up in scale and to put in other elements. It's not just about human change in agricultural practices, but rather about interactions and cascades. When you think about this, for example in the case of the Dust Bowl, then you start to have these huge migrations. It makes the Central Valley of California possible because it gets this big influx of labor that it actually needed with the development of refrigerator cars and railroads so you could send fresh fruits to the East Coast. It's one of these things that starts to give a sense about the impacts. It was not just that people changed practices, it's that large scale economic change occurred and large scale sociocultural changes occurred as well. So, these start to really manifest and you can think that California actually has such a deep, yet forgotten Dust Bowl history.

Even though the Annales School always was at a pretty large scale and large temporal scope, American environmental history was not so much. And then you do also have people like Da Cunha who were thinking about the environment and about people's relationship to nature and the meaning of it. And also, he wrote about flooding. He wrote about quilombos and about deforestation. All the little newspaper articles he was writing about environment were very astute. And then, of course, his commentary on Amazonia sits in the social, but it also sits so deeply in the environmental at the same time that he's a trailblazer in terms of these and also of his emotion.

There is also Aldo Leopold, who wrote "Thinking Like a Mountain."<sup>84</sup> You have those emotional texts, as well as the emergence of the scientific, analytic, human impacts scholarship, which would be the likes of Paul Ehrlich and the Club of Rome that begin to emerge.<sup>85</sup> But these are modeling exercises, not exercises in environmental history. They're a distillation of economic and technical processes. They have become powerful and intelligible. The thing about history is that it while it is big in scope and

---

<sup>84</sup> Aldo Leopold (1887-1948) was an American writer. For much of his professional career he was linked to the United States Forestry Service and the University of Wisconsin. The text referenced here is a chapter from *A Sand County Almanac: And Sketches Here and There* (New York: Oxford University Press, 1949), Leopold's most influential book. A mix of naturalist observation and philosophical musings, the book is famous for introducing concept of "the land ethic".

<sup>85</sup> Paul R. Ehrlich (born 1932) is an American biologist. He obtained his PhD in 1957 from the University of Kansas. Soon after he joined Stanford University, where he spent most of his career. He is known for his book *The Population Bomb* (San Francisco: Sierra Club, 1968), an analysis of the risks caused by global overpopulation. The Club of Rome is a think tank ran by an international group of scholars and activists who met in Rome. The influential report they launched, authored by Donella H. Meadows et al., *Limits to Growth* (Virginia: Potomac Associates, 1972) used computer models to argue that the use of resources in the Earth was growing at unsustainable levels and would therefore inevitably collapse.

scale, at least in temporal scale, it had such a localized feel to it. We can be grateful for that, because climate scientists talking about climate stuff is not all that fun. Remember, this is about the 1980s when we start to get James Hansen and others.<sup>86</sup> “Here's what our models are saying.” And again, it comes out of the nuclear monitoring of environmental change that was so deeply a part of the Cold War period that the atmospheric testing, the atmospheric monitoring, the temperature watching, vulccanism how planets changed over time, and so on.

There's a great book called *A Nuclear Winter's Tale*.<sup>87</sup> It's an environmental history of the Cold War, and it's really excellent. It's a little bit of a slog, but it's also about how social movements, basically, at least for the time being, undid the nuclear, mutually assured destruction dynamic. Both the women who were invading nuclear sites in England and the rich were trying to work on creating consciousness that if there is a nuclear winter, it's really going to be bad. This isn't just blowing like what we see in Kiev right now or in other areas in Ukraine where they destroy the city. It's throwing elements into the atmosphere and changing the climate in a way that will make it impossible for anyone and most organisms to survive. If we think about environmental history in the way that paradigms shift, it moves in a way from a local to a global scale: El Niño or the colonial botany studies and the colonial imperial stories into a planetary story. From human globalization into planetary change. There is a huge paradigm shift, even though it comes slowly.

It has been really a matter of a couple of decades. We have a lot of different capacities. The capacity to see that local issues can have big global impacts and reach. That climatic rates of change are far more variable in different places. That we didn't understand the rates of change: The antartic ice sheets are melting at three times the rate they were predicted to, that there are Carbon bombs all over the place—from the permfrost to the tropical peat forests, to of course deforestation itself. What looks like

---

<sup>86</sup> James Hansen (born 1941) is an American physicist and astronomist. He obtained his PhD from the University of Iowa in 1967. He has since worked at NASA and Columbia University, among other institutions. Although a significant part of his career has focused on other planets, including Venus, he is renowned for studying the transformations in the physics of the Earth's atmosphere and for creating public awareness about anthropogenic climate change.

<sup>87</sup> Lawrence Badash, *A Nuclear Winter's Tale. Science and Politics in the 1980s* (Cambridge: The MIT Press, 2009).

it's local and regional actually has, both as drivers and consequences, larger scale effects. And this is what we have trouble understanding. We are not actually built for this. This is really quite transformative too. Now when you start to look at land uses, and the big environments—forests, big grasslands, swamps you can't stop yourself from thinking about the environmental services in these. It's not just a question of political ecology but also of planetary effects that begins to infuse one's thinking. And also about the virtues of nature, the planet itself.

I'm giving you my personal sense of things that I've found most influential for my own thinking in terms of the region's vast and complicated environmental histories from numerous perspectives which I can only briefly mention. These range from archeology to climate modeling, and the most intimate ethnographies about land and resources uses and their meaning, to the most abstract planetary speculations and science and technology studies. If we think about the intellectual history of the last 30 years, in which I'm going to situate myself, there has been extraordinary Amazonian work and it has been among the most vibrant settings for intellectual, political and cultural thinking ranging from the deep past to futurology.

There has been a massive reconfiguration of how one thinks about Amazonia, an almost total paradigm shift from the counterfeit Paradise—a place whose soils were too impoverished to nourish civilizations, to a recognition that Amazon Dark earths—equal as a land technology to irrigation or terraces for overcoming soil constraints—along with extensive domesticated landscapes, complex ranges of semi to domesticated plants, and a long history of forest “constructions” as ecological places, recast the whole narrative of the empty and impoverished tropics and primitive people in dire need of the civilizing, globalizing, christianizing, modernizing conquests, to a “shock and awe” of what has been lost. The massive engineering work alone is staggering. The work of science journalist Charles Mann's 1491 book on indigenous knowledge and land change, really helped illuminate just how extensive, and horrifying the loss of the people and much of the ecological awareness has been across the hemisphere. The constant epidemics that killed over 90% of the population not only obliterated multiple worlds as ethnicities were vaporized by the combination of viruses, slavery and displacement,

but the world lost significant intellectual treasures and understandings, other ways of apprehending the world, not to mention the artisans of astonishing artistic masterpieces.

The environmental history of Amazonia owes a massive debt to the deeply illuminating work done by archaeologists that is so dazzling it takes your breath away. These are the efforts by Eduardo Neves, Mike Heckenberger, Jose Iriarte, Denise Schaan (now, alas deceased) Clarke Erickson, Acleu Ranzi, Sanna Saunaluoma, Heike Prumers, Stephen Rostain, Anna Roosevelt, Sarah Watling, Francis Mayle, Umberto Lombardo among many many others. The complexity of the methods, from classic excavation to laboratories to Lidar to modeling and philosophy, integrating natural archives with human traces have made this body of work—and I have left out many superb thinkers, has simply moved Amazonia out of the realms of the “forest primeval”, into the rethinking of the anthropocene and the pyrocene in ways that don’t carry the signature of rampant destruction with which we now associate these eras: our times. Rather, rooted in diversity, ecological cohabitation and deeply different ontologies, spiritualities, and indigenous sciences, its possible to image the anthropo-tropics as storehouses of knowledge systems and ways of being that kept the forest up, embraced very large populations, and civilizations The work of historical ecologists, and I only name a few here, such as Bill Balee, Miguel Arroyo–Kalin, Carolina Levis, Charles Clement, Andre Junqueira using, again and panoply of techniques from field surveys, herbarium studies, ethnobotany, genetics, palynology and ethnography have helped flesh out and materialize the shaping of the Amazon through time and space. As with the archeology, it is vastly multidisciplinary. It is arduous socio-ecological research, and yet has helped us so deeply in reimagining what societies, pasts, futures and “socio-bioeconomies” might look like. They have helped us incarnate the forms of palpable potentials. While we could go on discipline by discipline, the rise of ecologically inflected ethnography as carried out by cultural anthropologists, ethnobiologists, geographers has also brought an array of understandings of actual practices to light. I would place my colleague Darrell Posey, no longer in this incarnation, as a leader in the

analysis of indigenous, caboclo and kilombo thinking about ways of being in the tropical world which will not incinerate us all unlike the current models on offer.

We have now a sense of the range of the physical transformations. We have the anthropogenic Amazon with the forests being changed all the time by humans. But they are still forests. They still harbored at least a tenth of planetary biodiversity in complex ecological ways. We don't know culturally exactly what it was like in the past, and the systems of course are changing rapidly. We know that there are very interesting cultures in these places that don't necessarily work from the configurations that we imagine. Remember that most of our models of social evolution come out of the Middle East. They come out of systems of annual cropping, more rigid labor systems, more hierarchical and unequal. This is the idea advanced by James Scott in "Against the Grain"<sup>88</sup>

That David Graeber and David Wengrow book that just came—The Dawn of Everything—essentially says that maybe we can give a different interpretation from the conventional one about the rise and the forms of states and urbanism, ones less derived and rooted in forms of urbanism and production systems that are rooted in inequalities. They also make the compelling case for the importance of indigenous thinking in the creation of what we call enlightenment ideas of freedom and solidarity. I would also argue, and I'm not an environmental determinist, that if your system is a tropical system which is given to very strong events, and we know Amazonia rains like hell, you have these big winds, you have periodic droughts, you have water that goes up 20 meters, this is not the same as the rainfall patterns of central Iraq in 6000 years ago. It's completely different. Amazonia is just really dynamic. And the system that is built in Amazonia is pretty resilient because it's built on tubers and trees with less specific harvest regimes and organisms that outlive humans. Yes, there's corn and probably it was the place where some kinds of corn were domesticated, but it has many domesticates that we enjoy everyday, from Cacao to vanilla, to chiles, to peanuts, to

---

<sup>88</sup> Scott, J. (2008). *The Art of Not Being Governed*. New Haven, Yale University Press, Scott, J. C. (2017). *Against the grain: A deep history of the earliest states*, Yale University Press.

sweet potatoes, to rubber as well as the more arcane products that circulate in regional economies.

Recent research engages a constant reconfiguration of what Amazonian environments were in the past and how those are reflected in what we see now. There is plenty of reason to believe that the social organizations that occurred were not these Iraqi patriarchal states, but other complex systems. And we certainly know that many kilombos headed by women, and that indigensou women had complex social and political roles. That is what the David Graeber book brings to the fore. They are not specifically talking about Amazonia, but a lot of rethinking goes on. I would point to the work not just of Darell Posey, who worked with the Kayapo for decades to elucidate their sciences and pointed out how these could be epistemic bridges to the future. There are different forms of knowledge, there are different ontologies about nature that can give you a social form that's quite different in ways of being with nature and social systems that might not follow the narrative derived from the middle east. There are a couple of really great papers by people like Carlos Fausto and Eduardo Neves: "Was There a Neolithic?"<sup>89</sup> The linear stages of civilization that everybody assumes as universal, did those actually occur in Amazonia? The form of domestication is completely different from the domestication of grasses. The reliance of domesticated landscapes. It is a different, enabling framing, less spatially constrained with resources islands, mounds, deep integration of travel on water and land. And while nature can be unruly, there is an integration with nature, being in a society with nature, unlike the ideologies of domination and providencialism that so structures our current ways of being with the natural world in its modernist passion for uniformity, modularity, legibility.

Amazonia is also an integrative aquatic system. Eurocentric history comes out of a less aquatic world. There is the Tigris and the Euphrates... These rivers would barely have a name in Amazonia. You know, they're puny rivers by Amazonian standards. So,

---

<sup>89</sup> Carlos Fausto and Eduardo Neves, "Was There Ever a Neolithic in the Neotropics? Plant Familiarisation and Biodiversity in the Amazon" *Antiquity*, Vol. 92, No. 366, 2018, 1604-1618.

we have to think about these aquatic things in a different way, the so-called aquatic epistemes. Given the kind of flooding we are now seeing with increasingly intense storm patterns, there is certainly a lot to learn from Amazonia about how to deal with water. If you really thought about being a water person, how different you would be? I'm going to reference Oliver Coomes here about all the forms of interaction of people with rivers, including large scale aquatic shifts, making a huge shift in the river bed of the Ucayali River. It's one of the largest rivers in the world. These modifications are widespread through Amazonia.<sup>90</sup>

I can't conceive of this aquatic life because I was raised in the mountains and live in the mountains. I'm not that comfortable in water. But you can certainly see with any Amazon child, just give them a canoe and off they go, like kids on bikes. Everybody moves around with these different water ways. But increasingly these are compromised by huge infrastructure programs, dams on the headwaters, and of course the mercury pollution that turns these mighty rivers into circuits of poison.

Archaeology, ethnography and cultural/historical geography have been extraordinary for helping us understand these worlds better. For example, Mike Heckenberger has worked the Upper Xingu, which was the longest occupied area by a single group in Amazonia that we know about.<sup>91</sup> People there can take him to where a village was in the 12<sup>th</sup> century, where a village was in 15<sup>th</sup>, and so on. In a certain sense you can have the long duration of the Upper Xingu through the collecting. The other perspective that is really emerging, for example in the work of Clark Erickson, is to look at all large-scale causeways, roads, connections through vast areas of the Beni.<sup>92</sup> And now there's recent work by Jose Iriarte.<sup>93</sup> Amazonian societies were engineering

---

<sup>90</sup> Zarin, D. J., V. F. G. Pereira, H. Raffles, F. G. Rabelo, M. Pinedo-Vasquez and R. G. Congalton (2001). "Landscape change in tidal floodplains near the mouth of the Amazon River." *Forest Ecology and Management* 154(3): 383-393, Raffles, H. and A. WinklerPrins (2003). "Further reflections on Amazonian environmental history: Transformations of rivers and streams." *Latin American Research Review* 38(3): 165-187.

<sup>91</sup> Michael Heckenberger, *The Ecology of Power: Culture, Place and Personhood in the Southern Amazon, AD 1000-2000* (London: Routledge, 2005).

<sup>92</sup> Clark Erickson, James E. Snead, and J. Andrew Darling, *Landscapes of Movement: The Anthropology of Trails, Paths, and Roads* (Philadelphia: Penn Museum Press, 2009).

<sup>93</sup> Iriarte, J., M. Robinson, J. G. de Souza, A. Damasceno, F. da Silva, F. Nakahara, A. Ranzi and L. Aragao (2020). "Geometry by design: Contribution of Lidar to the understanding of settlement patterns of the Mound villages in SW Amazonia." *Journal of Computer Applications in Archaeology*. 2020; 3 (1): 151-169.

societies as we are beginning to appreciate. This perspective is a far cry from ideology of Primitivity that so inhered in these perceptions of *originarios*.

This dynamic is really changing how we think about urban areas and Amazonia, which is not that people just migrate to the city and necessarily stay there, or that all indigenous people are rural, and also that there are many types of *originarios* that are the outcome of complex processes. Also Caboclo, peasants and *ribeirinho* populations have a complex relation to cities and towns and they always have. They often they have multi-site households. You have the work of Christine Padoch and Eduardo Brondizio on this incredible mobility and flow of people goods and processes which is not necessarily a new thing: mobility between places.<sup>94</sup> Alfredo Wagner writes a lot about this new social cartography, about how people, although they are urban, use these rural areas a lot.<sup>95</sup> You could think of these as subsidies from nature but also these perhaps reflect a deeper Amazonian history of indigenous urbanization in which the settlement was an anchor, but people moved through landscapes a great deal on their roads and causeways that remote sensing is revealing.

These reflect extraordinary recasting of Amazonia and this is mirrored in the rise of social movements and their rights that is reflected in Brazil's 1988 constitution, who articulate their own version of what development might look like. These movements animate their own histories and are writing their own histories as well. These are of course, the rubber tappers movement, the Black movements, which emerged from almost total invisibility in the 1980s. This is the outcome of extraordinary research on afrodescent history especially in Brazil but also throughout the Amazon countries. Its often forgotten that Suriname alone had more imported slave than all of the US. Amazonas and Maranhão were among the most important slaving depots, and of course there was the extensive enslaving of native populations. These places were not just single villages any more than indigenous areas constituted isolated single villages but what we might think of as systems of towns and villages, more or less similar to what

---

<sup>94</sup> Christine Padoch, Eduardo Brondizio et al. "Urban Forest and Rural Cities: Multi-sited Households, Consumption Patterns, and Forest Resources in Amazonia," *Ecology and Society*, Vol. 13, No. 2, 2008.

<sup>95</sup> For example, Alfredo Wagner de Almeida, "Territórios e territorialidades específicas na Amazônia: entre a 'proteção' e o 'protecionismo'," *Cademo CRH*, No. 25, Vol. 64, 2012, pp. 63-71.

you had in Europe. These kilombos embodied what Gomes and Reis called, the “invention of freedom” as these communities reconstituted themselves in new ways within forests<sup>96</sup> These were regional areas. Of course, the Saramaka come to mind in Suriname: enormous areas of Afro-descendant and *Quilombola* culture and politics, which interacted in very complex ways with the outside world. And then the rise of indigenous politics, which now has moved into a realm that's much more complex. Especially interesting right now is the concept of urban Indians. Basically, 30% of indigenous populations now reside in urban forms. In the Andes, in places like Quito, they've been there for 5000 years. But you can see it now in places like Roraima and Manaus, a new indigenous urban social cartography.

Given the precarity of livelihoods, the precarity of employment, the precarity of the politics, in these areas access to natural resources becomes extremely important. Even in places like Iquitos, 30% of the population is engaged in fishing and so on, so that when you start to look at the urban areas, it looks like a different kind of tropical urbanism with the forest moving to the city and the city moving to the forest. But it isn't only that. And again, Eduardo Brondizio and Christine Padoch's work show how much how fluid these urban areas are both in terms of aquatics and of social relations. Even the models of kinship derived from extrapolating from other sites don't work that well. They work through different forms of kinship and this constant relationship to forests. You can see that also in the *quintales*, these huge urban forests. There is a need for urban forest given the urban heat island, but also the food supplement and the pleasure that people get from being in the shade in the tropics, in a city which is many degrees hotter than the surrounding areas. So, the urban areas, the urban dynamics, the historical dynamics, the social movements, those are just a few of the emergent things that are important shaping the current environmental histories. The other, of course, is the expansion of global corporate capitalism into Amazonia. And the forms of resistance to it.

---

<sup>96</sup>Gomes, F. D. S. and J. J. Reis (2017). *Freedom by a Thread: The History of Quilombos in Brazil*, Diasporic Africa Press.

It's not that Amazonia has not had globalized commodities, after all. Gold and gems and rubber and drugs and all of that have been flowing out of the region for centuries. Amazonian commodities have been in regional trade circuits for millennia. It's just that until rubber period, the economic focus on Amazonia wasn't that strong (even though the geopolitical concerns were intense). Prior to the post war period, commodities moved through what we might call mercantile forms: What the social relations of production were: family, community, slaves etc didn't matter that much. Mercantile systems are agnostic. If you produced rubber through a tribute system with an indigenous group or through small scale producers, as in the estuary or through debt peonage for the rubber, it made no difference to the marketing.

Now, what you have, of course, with the livestock and soy-corn rotation, less with the cattle, but certainly with the improved and GMO soy and corn, is a highly integrated system, with very stringent product requirements in commodity itself and in the way its produced through various technology packages. These systems are also super agglomerated. And most of those corporations like Monsanto, Bayer, Syngenta, BASF they are all Chinese now. It is not just a question of the Chinese as purchasers, but also as the owners of the technology, and most of the financing is now coming through the corporations, not so much through bank loan forms of financing. It's no longer so much through the Banco do Brasil, or a development bank, but much more through private capital.

These include the professional groups that finance these corporations including hedge funds, basically retirement funds like TIAA-CREF, sovereign wealth funds, so the forms of financing have moved. If we compare with the rubber period with the *regatoes*, but even if we think about the Banco do Brasil, those were operations which actually had some transparency about how they functioned and you could follow them better. Now it's part of global speculative finance, which is not particularly responsible finance. In the corporate financing of production the risk is borne by the producer, but the benefits go to the speculators and investors. The volatility of the systems is refracted onto in the producer, but the whole production system is closely mediated by the

corporations that provide the seeds and inputs and in this way its almost a form of contract farming. In this sense, we see a massive transformation of the socio finance landscape as well as the lands themselves. And these monocrops are still expanding. While the soy/corn system is not as widespread as cattle, but its functions are somewhat different. Cattle have the deep history in Latin America as the mechanism of land-grabbing, with low labor and relatively low inputs, flexibility and relatively good demand, and expanding demand in Asia. And what we see now, and I'll finish with this as this takes me up to my current book, is clandestine economies.

The gold economy, the timber economy, the coca economy, and others that are unregulated and destructive, have cascades, whether it's the poisoning of the rivers, or the opening up of the roads that make the forest more fragile and fragmented, and lead ultimately to their vulnerability to fire under climate change. This coincides with the historical moment of Bolsonaro dismantling of the institutional and regulatory apparatus of Amazonia, the situation in Peru where its former presidents have been deposed for corruption, the real volatility of political institutions and questioning their legitimacy. These issues are being debated in national congresses. In Brazil the congress has been debating basically legalizing land-grabbing, marginalizing land claims of indigenous populations by opening indigenous lands to mining and industry. Two key aspects are the so-called "temporal framewok" on land, which implies that if you had not started demarcation by 1988, you're bounded by what existed in 1988. So, the temporal bounding is an amnesty for clearing. And there is a lot of "degazetting". That means that state lands that have been designated as conservation units can lose their protection, sometimes by decree. You have the degazetting of extractive reserves in places like Rondônia or Amapá, and the degazetting of national parks or parts of national parks right now.

It's a Catch-22. If it's cleared because of a land invasion then it no longer serves the "conservation capacity" that it was originally preserved for. You might as well just hand it over to the person who cleared it. It's this alchemy of turning things that were illegal and making them legal. Another dynamic is that there's just much more forest vulnerability now both as an extension of legal and illegal roads, and the enhanced

clearing all exacerbated by climate change. I was talking with Mike Heckenberger last week, and he kept saying that in that transition forest, the forested southern arc of deforestation, the remaining forests are really unstable. They are very vulnerable to fire and desiccation. We already know that parts of Amazonia are no longer net absorbers of carbon, but now emitters of carbon, particularly in the eastern Amazon and southern Amazon. The question that emerges is if Amazonia is that important in global climate, and we know it has been key in past climate, and is considered one of the major climate “tipping points” what is going to happen now? Both the modelers and the field assessments are not comforting, and this has to do regionally with the coupling of forests with the cycling and recycling of their rainfall. Forest climate hydrology in Amazonia is deeply coupled.

When we look Carlos Nobre ‘s work<sup>97</sup> and that of his collaborators, as well as scientific panel on the Amazon, the coupled systems of water and forest and the creation of the rainfall systems in much of the basin are highly dependent on forest evapotranspiration. If forests are gone and replaced with soy or pasture the evaporation by the forest is gone as well. This destabilizes nearby forests which are simultaneously affected by more general climate change. What we see right now is a much greater instability and a loss or a weakening of the atmospheric flows from east to west that affect Andean hydrologies, but also the moist air masses—atmospheric rivers— that are deflected to the southern Brazil, can be terrifically weakened, and produce terrible droughts, like in 2019, when about a third of largest wetland, the Pantanal, burned. At the same time the Parana River was very problematic for transportation, for its fisheries, for irrigation, for hydropower. And of course, this puts that whole agrarian system into question, because it's essentially rain-fed. And then there is the question of the water systems of the mega city of São Paulo. So, we're seeing already that these areas are, if you will, living in the future of a desiccated Southern Cone after Amazonia hits its tipping point into a more open savanna..

---

<sup>97</sup> Lovejoy, T. E. and C. Nobre (2018). "Amazon Tipping Point." *Science Advances* 4(2), Lovejoy, T. E. and C. Nobre (2019). Amazon tipping point: Last chance for action, American Association for the Advancement of Science. 5: eaba2949, Gatti, L. V., L. S. Basso, J. B. Miller, M. Gloor, L. G. Domingues, H. L. Cassol, G. Tejada, L. E. Aragão, C. Nobre and W. Peters (2021). "Amazonia as a carbon source linked to deforestation and climate change." *Nature* 595(7867): 388-393.

And then the other question that we have to ask is, with the breadbaskets of Russia and Ukraine destabilized, what does that mean? One of the things they produce in Ukraine is sunflower soy and corn oil. Those are global commodities that can be substituted by maize and soy. So, we're very likely, even with the fertilizer questions being raised at this moment, to see quite a bit of expansion in these monocrops this year. The explosive deforestation this February more or less expresses the future of annual GMO monocrop expansion as a function of global demand and volatility in these commodities. So from the point of view of Amazonian environmental history, we don't know yet with what or how it will be written

I'm going to end this by quoting Euclides da Cunha who wrote that the Amazon is the last unfinished page of Genesis writing itself. The question is what's going to be on that page? In my book, I have this page intentionally left blank.

## REFERENCES

- Arroyo-Kalin, Manuel et al., "Civilisation and Human Niche Construction," *Archaeology International*, No. 20, 2017, 106–109.
- Badash, Lawrence. *A Nuclear Winter's Tale. Science and Politics in the 1980s* (Cambridge: The MIT Press, 2009).
- Balée, W. L. and C. L. Erickson. *Time and complexity in historical ecology : studies in the neotropical lowlands* ( New York, Columbia University Press, 2006).
- Braudel, P. "Les origines intellectuelles de Fernand Braudel: un témoignage". *Annales. Histoire, Sciences Sociales*, Cambridge University Press, 1992.
- Butzer, K. W. "The Americas before and after 1492: An introduction to current geographical research." *Annals of the Association of American Geographers* 82(3), 1992, p. 345–368.
- Butzer, K. W. "Collapse, environment, and society." *Proceedings of the National Academy of Sciences of the United States of America* 109 (10), 2012, p. 3632–3639.
- Butzer, K. W. and E. K. Butzer. "The 'natural' vegetation of the Mexican Bajío: Archival documentation of a 16th-century savanna environment." *Quaternary International* 43–4, 1997, p. 161–172.
- Butzer, K. W. and G. H. Endfield (). "Critical perspectives on historical collapse." *Proceedings of the National Academy of Sciences* 109 (10), 2012, p. 3628–3631.
- Cartmill, M. *A View to a Death in the Morning: Hunting and Nature through History*, (Cambridge: Harvard University Press. 1996)

- Chagnon, Napoleon. *Yanomamo, A Fierce People* (New York: Holt, Rinehart and Winston, 1968).
- Chakrabarty, Dipesh. *The Climate of History in a Planetary Age* (Chicago: University of Chicago Press, 2021).
- Clement, C. R., W. M. Denevan, M. J. Heckenberger, A. B. Junqueira, E. G. Neves, W. G. Teixeira and W. I. Woods. "The domestication of Amazonia before European conquest." *Proceedings of the Royal Society B-Biological Sciences* 282 (1812), 2015, p. 32-40.
- Clement, C. R., C. Levis, J. Franco-Moraes and A. B. Junqueira. "Domesticated nature: the culturally constructed niche of humanity". *Participatory biodiversity conservation*, Springer: 2020, p. 35-51.
- Coe, M. T., P. M. Brando, L. A. Deegan, M. N. Macedo, C. Neill and D. V. Silverio. "The Forests of the Amazon and Cerrado Moderate Regional Climate and Are the Key to the Future." *Tropical Conservation Science*, 10, 2017
- Coomes, O. T., C. Abizaid, Y. Takasaki and S. Rivas Panduro. "The Lower Ucayali river in prehistory: Cultural chronology, archeological evidence and a recently discovered Pre-Columbian site." *Geographical Review* 111(1), 2021, p. 145-167.
- Coomes, O. T., S. Rivas Panduro, C. Abizaid and Y. Takasaki. "Geolocation of unpublished archaeological sites in the Peruvian Amazon." *Scientific Data* 8(1), 2021, p. 1-8.
- Cronon, William B. *Changes in the Land. Indians, Colonists and the Ecology of New England* (New York: Hill & Wang, 1983).
- Cronon, William B. *Nature's Metropolis. Chicago and the Great West* (New York and London: W.W. Norton and Co., 1991).
- Davis, Mike. *Late Victorian Holocausts: El Niño Famines and the Making of the Third World* (London: Verso: 2000).
- Da Cunha, Euclides. *Os sertões* (Rio de Janeiro: Laemert, 1902).
- De la Cadena, Marisol. *Earth Beings: Ecologies of Practice across Andean Worlds* (Durham, NC: Duke University Press, 2015).
- Dutra e Silva, Sandro. "Nature's Revenge: War on the Wilderness during the opening of Brazil's 'Last Western Frontier,'" *International Review of Environmental History*, Vol. 5, Issue 1, 2019, 5-21.
- Dutra e Silva, Sandro. "Challenging the Environmental History of the Cerrado: Science, Biodiversity and Politics on the Brazilian Agricultural Frontier". *Historia Ambiental Latinoamericana Y Caribeña (HALAC) Revista De La Solcha* 10 (1), 2020, p. 82-116.
- Eloy, L., S. Hecht, A. Steward and J. Mistry. "Firing up: Policy, politics and polemics under new and old burning regimes." *The Geographical Journal* 185(1), 2019, p. 2-9.
- Eloy, L., S. B. Hecht, A. Steward and J. Mistry. "Firing up: Policy, politics and polemics under new and old burning regimes". *Geographical Journal* 185(1), 2019, p. 2-9
- Erhlich, Paul R. *The Population Bomb* (San Francisco: Sierra Club, 1968).

- Erickson, Clark, James E. Snead, and J. Andrew Darling, *Landscapes of Movement: The Anthropology of Trails, Paths, and Roads* (Philadelphia: Penn Museum Press, 2009).
- Fausto, Boris and Eduardo Neves, "Was There Ever a Neolithic in the Neotropics? Plant Familiarisation and Biodiversity in the Amazon" *Antiquity*, Vol. 92, No. 366, 2018, 1604-1618.
- Galeano, Eduardo. *Las venas abiertas de América Latina* (Montevideo: Siglo Veintiuno, 1971).
- García Márquez, Gabriel. *Cien Años de Soledad* (Buenos Aires: Editorial Sudamericana, 1967).
- Gatti, L. V., L. S. Basso, J. B. Miller, M. Gloor, L. G. Domingues, H. L. Cassol, G. Tejada, L. E. Aragão, C. Nobre and W. Peters. "Amazonia as a carbon source linked to deforestation and climate change." *Nature* 595(7867), 2021, p. 388-393.
- Gomes, F. D. S. and J. J. Reis. *Freedom by a Thread: The History of Quilombos in Brazil* (Diasporic Africa Press, 2017)
- Geertz, Clifford. *The Interpretation of Cultures* (New York: Basic Book, 1973).
- Graeber, David and David Wengrow. *The Dawn of Everything: A New History of Humanity* (London: Allen Lane, 2021).
- Grove, Richard. *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism 1600-1860* (Cambridge: Cambridge University Press, 1995).
- Grove, Richard and George Adamson, *El Niño in World History* (London: Palgrave, 2018).
- Hartt, C. F. "On the occurrence of face urns in Brazil." *American Naturalist* 6(10): 1872, 607.
- Hartt, C. F. "Recent explorations in the valley of the Amazonas, with map." *Journal of the American Geographical Society of New York*: 1872, p. 231-252.
- Heckenberger, Michael. *The Ecology of Power: Culture, Place and Personhood in the Southern Amazon, AD 1000-2000* (London: Routledge, 2005).
- Hecht, Susanna. *The Scramble for the Amazon and the "Lost Paradise" of Euclides Da Cunha* (Chicago and London: The University of Chicago Press, 2013).
- Hecht, Susanna. "Why the Brazilian Amazon Burns?," *Current History*, 119 (814), 2020, 60-65.
- Hecht, Susanna and Alexander Cockburn. *The Fate of the Forest Developers, Destroyers, and Defenders of the Amazon. Updated edition.* (Chicago and London: University of Chicago Press, 2010 [1990])
- Hecht, Susanna & Cockburn, Alexander. *O Destino da Floresta: desenvolvedores, destruidores e defensores da Amazônia* (São Paulo: Editora Unesp, 2022).
- Hecht, Susanna and Darrell Posey. "Preliminary findings on soil management of the Kayapó Indians" in Darrell Posey & William Balée (eds.), *Resource Management in Amazônia: Indigenous and Folk Strategies* (New York: New York Botanical Garden, 1989), 174-188.
- Hecht, S. Milton Santos: Rebel of the Backlands, Insurgent Academic and Prescient Scholar, Duke University Press. *The Nature of Space*, 2021, p. i-xv.

- Holston, James. *Insurgent Citizenship: Disjunctions of Democracy and Modernity in Brazil* (Princeton: Princeton University Press, 2007).
- Immerwahr, Daniel. *How to Hide an Empire: A History of the Greater United States* (New York: Farrar, Straus and Giroux, 2019).
- Iriarte, J., M. Robinson, J. G. de Souza, A. Damasceno, F. da Silva, F. Nakahara, A. Ranzi and L. Aragao (2020). "Geometry by design: Contribution of Lidar to the understanding of settlement patterns of the Mound villages in SW Amazonia." *Journal of Computer Applications in Archaeology*; 3 (1), 2020, p. 151-169.
- Jamieson, Dale. *Reason in a Dark Time: Why the Struggle to Stop Climate Change Failed—and What It Means For Our Future* (New York: Oxford University Press, 2014).
- Jamieson, Dale and Bonnie Nadzam. *Love in the Anthropocene: Stories on Human Love in a World Without Nature* (New York: OR Books, 2015).
- Kroeber, T. *Ishi in two worlds: A biography of the last wild Indian in North America*, (Los Angeles/Berkeley: University of California Press. 2004)
- Lehmann, J., D. C. Kern, B. Glaser, William I. Woods and . Eds. *Amazonian Dark Earths: Origin, Properties and Management* (Dordrecht, Kluwer Academic Publishers, 2003).
- Leopold, Aldo. *A Sand County Almanac: And Sketches Here and There* (New York: Oxford University Press, 1949).
- Leroy Ladurie, Emmanuel. *Carnival in Romans* (New York: Geirges Braziller, 1980).
- Leroy Ladurie, Emmanuel. *Montaillou, village occitan de 1294 à 1324* (Paris: Gallimard, 1975).
- Leroy Ladurie, Emmanuel. *The Peasants of Languedoc* (Urbana: University of Illinois press, 1977).
- Leroy Ladurie, Emmanuel. *Times of Feast, Times of Famine: A History of Climate Since the Year 1000* (New York: Farrar Straus & Giroux; Reissue edition, 1981).
- Levis, C., F. R. Costa, F. Bongers, M. Peña-Claros, C. R. Clement, A. B. Junqueira, E. G. Neves, E. K. Tamanaha, F. O. Figueiredo and R. P. Salomão. "Persistent effects of pre-Columbian plant domestication on Amazonian forest composition." *Science* 355(6328), 2017, p. 925-931.
- Levis, C., B. M. Flores, P. A. Moreira, B. G. Luize, R. P. Alves, J. Franco-Moraes, J. Lins, E. Konings, M. Peña-Claros and F. Bongers. "How people domesticated Amazonian forests." *Frontiers in Ecology and Evolution* 5, 2018, p. 171.
- Levis, Carolina et. al. "Persistent Effects of Pre-Columbian Plant Domestication on Amazonian Forest Composition," *Science*, Vol. 35, No. 6328, 2017, 925-931.
- Lovejoy, T. E. and C. Nobre. "Amazon Tipping Point." *Science Advances* 4(2), 2018
- Lovejoy, T. E. and C. Nobre. *Amazon tipping point: Last chance for action*, American Association for the Advancement of Science. 5: 2019, eaba2949.
- Martínez-Pinzón, Felipe and Javier Uriarte, eds. *Intimate Frontiers: A Literary Geography of the Amazon* (Liverpool, Liverpool University Press, 2018).
- McMichael, Crystal et. al., "Sparse Pre-Columbian Human Habitation in Western Amazonia," *Science* Vol 336, Issue 6087, 2012, pp. 1429-1431.

- Meadows, Donella H. et al., *Limits to Growth* (Virginia: Potomac Associates, 1972)
- Meggers, Betty. *Amazonia: Man and Culture in a Counterfeit Paradise* (Chicago and New York: Aldine and Atherton, 1971).
- Meggers, B. "Environmental limitations on the development of culture." *American Anthropologist* 56, 1954, p. 801-823.
- Muir, John. *John Muir's Last Journey South to the Amazon and East to Africa: Unpublished Journals And Selected Correspondence*, edited by Michael P. Branch (Washington D.C.: Island Press, 2001).
- Neves, E. G. Was agriculture a key productive activity in pre-colonial Amazonia? The stable productive basis for social equality in the Central Amazon. *Human-Environment Interactions*, Springer, 2013, p. 371-388.
- Neves, E. G. and M. J. Heckenberger. "The call of the wild: rethinking food production in ancient Amazonia." *Annual Review of Anthropology* 48, 2019, p. 371-388.
- Padoch, Christine. Eduardo Brondizio et al. "Urban Forest and Rural Cities: Multi-sited Households, Consumption Patterns, and Forest Resources in Amazonia," *Ecology and Society*, Vol. 13, No. 2, 2008.
- Pyne, Stephen J. *The Pyrocene. How We Created an Age of Fire, and What Happens Next* (Berkeley: University of California Press, 2021).
- Raffles, H. and A. WinklerPrins (). "Further reflections on Amazonian environmental history: Transformations of rivers and streams." *Latin American Research Review* 38(3), 2003, p. 165-187.
- Reis, Artur César Ferreira. *A Amazônia e a Cobiça Internacional* (Rio de Janeiro: Editoria Nacional 1960).
- Salisbury, David and Marianna Schmink, "Cows versus Rubber: Changing Livelihoods among Amazonian Extractivists," *Geoforum*, Vol. 38, Issue 6, 2007, 1233-1249.
- Sanjad, N. Charles Frederick Hartt e a institucionalização das ciências naturais no Brasil (SciELO Brasil. 2004)
- Sauer, Carl. *Agricultural Origins and Dispersals* (New York: American Geographical Society: 1952).
- Sauer, Carl. *The Early Spanish Main* (Berkeley: University of California Press, 1966).
- Sauer, C. O. "Theme of plant and animal destruction in economic history." *Journal of Farm Economics* 20(4): 1938, p. 765-775.
- Sauer, C. O., L. B. Baisden, I. T. Kelly, M. Warthin and A. Corwin. *Man in nature; America before the days of the white men* (New York, Chicago [etc.], C. Scribner's Sons, 1939)
- Scott, James C. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven: Yale University Press, 1998).
- Scott, J. *The Art of Not Being Governed*. (New Haven, Yale University Press, 2008).
- Scott, J. C. *Against the grain: A deep history of the earliest states* (New Haven, Yale University Press, 2017)
- Skidmore, T. E. "Lévi-Strauss, Braudel and Brazil: A case of mutual influence." *Bulletin of Latin American Research* 22(3): 2003, p. 340-349.

- Sternberg, H. O. R. *A água e o homem na várzea do Careiro* (Belém, Museu Paraense Emílio Goeldi, 1998).
- Sternberg, H. O. R. and M. E. Goeldi. "A água eo homem na várzea do Careiro." *Yearbook of the Association of Pacific Coast Geographers* 62: 2000, p. 152-154.
- Ventura, R. *Estilo tropical : história cultural e polêmicas literárias no Brasil, 1870-1914*. (São Paulo, Brazil, Companhia das Letras. 1991)
- Wagner de Almeida, Alfredo. "Territórios e territorialidades específicas na Amazônia: entre a 'proteção' e o 'protecionismo'," *Caderno CRH*, No. 25, Vol. 64, 2012, pp. 63-71.
- Watling, J., M. P. Shock, G. Z. Mongeló, F. O. Almeida, T. Kater, P. E. De Oliveira and E. G. Neves. "Direct archaeological evidence for Southwestern Amazonia as an early plant domestication and food production centre." *Plos one* 13(7): 2018, e0199868.
- William I. Woods , W. G. Teixeira, J. Lehmann, C. Steiner, A. M. G. A. WinklerPrins and L. Rebellato, Eds. *Amazonian Dark Earths: Wim Sombroek's Vision* (New York, Springer, 2009)
- WinklerPrins, A. M. and K. Mathewson. *Forest, Field, and Fallow: Selections by William M. Denevan* (New York, Springer, 2021)
- WinklerPrins, A. M. A. and C. Levis. "Reframing Pre-European Amazonia through an Anthropocene Lens." *Annals of the American Association of Geographers* 111(3), 2020, p. 858-868.
- White, Richard. *Land Use, Environment, and Social Change: The Shaping of Island County, Washington* (Seattle: The University of Washington Press, 1979).
- White, Richard. *The Roots of Dependency: Subsistence, Environment, and Social Change Among the Choctaws, Pawnees, and Navajos* (Omaha: University of Nebraska Press, 1983).
- Woods, W. I. and W. M. Denevan. "Amazonian Dark Earths: The First Century of Reports". In William I. Woods, Wenceslau G. Teixeira, Johannes Lehmann, Christoph Steiner, Antoinette WinklerPrins, Lilian Rebellato. *Amazonian Dark Earths: Wim Sombroek's Vision* (New York, Springer, 1987), p. 1-14
- Wolf, Eric. *Europe and the People Without History* (Berkeley: University of California Press, 1982).
- Worster, Donald. *Dust Bowl: The Souther Plains in the 1930s* (New York: Oxford University Press, 1979).
- Zarin, D. J., V. F. G. Pereira, H. Raffles, F. G. Rabelo, M. Pinedo-Vasquez and R. G. Congalton. "Landscape change in tidal floodplains near the mouth of the Amazon River." *Forest Ecology and Management* 154(3), 2001, p. 383-393.

Received: 08/03/2022

Approved: 20/12/2022