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IS THE LANDSCAPE HALF EMPTY OR HALF FULL OF FOREST? BIOCENTRIC CONSERVATION VERSUS SOCIO-ECOLOGICAL LAND USE IN THE BRAZILIAN ATLANTIC FOREST

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A PAISAGEM ESTÁ MEIO VAZIA OU MEIO CHEIA DE FLORESTA? CONSERVAÇÃO BIOCÊNTRICA VERSUS USO SOCIOECOLÓGICO DO TERRITÓRIO NA FLORESTA ATLÂNTICA BRASILEIRA

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Abstract

US-style biocentric conservation policy which discriminates against poor farmers of the Brazilian Atlantic Forest is questioned using radical environmental history, critical political ecology and relational ontology perspectives. On-going field research undertaken in the mountains of central Rio de Janeiro state over the last three decades has detected the gradual marginalization and substitution of small farms by conservation units, rural weekend homes and hobby farms. Ecological GOs and NGOs hail the forest re-growth that has occurred as an example of how new environmental service and recreational functions can replace previous agrarian functions. In practice this involved erasing poor farmers from the landscape. It is argued that the main beneficiaries of this forced afforestation approach to conservation have been middle- and upper-class urbanites of Brazil as well as indirectly post-industrial countries so that the whole process borders on carbon colonialism with a distinctly urban bias. Against biocentric conservation another kind of land use is proposed which involves going beyond reinvented nature with socio-ecological land use which addresses environmental injustice and underwrites dignified rural livelihoods.

Keywords: forced afforestation, environmental justice, sustainable rural livelihoods, Atlantic Forest, Brazil.

Resumo

Com base em abordagens da história ambiental radical, da ecologia política crítica e da ontologia relacional, a adoção de políticas de conservação biocêntrica do tipo norteamericano no Brasil é questionada aqui porque descrimina contra agricultores pobres da Mata Atlântica. Em pesquisa em curso há décadas em zona montanhosa no centro do estado do Rio de Janeiro foi detectada a marginalização e a substituição de pequenas propriedades rurais por unidades de conservação, casas de veraneio e fazendas “hobby”. Isso provocou um processo de regeneração de florestas que é exaltado por organizações governamentais e não-governamentais como exemplo de novas funções de serviços ambientais e de recreação que substituíram funções agrárias anteriores. Na prática, contudo, apagaram o pequeno produtor pobre da paisagem. Argumenta-se aqui que os principais beneficiários da regeneração florestal forçada são membros das classes médias e altas urbanas do Brasil e, indiretamente, os países pós-industriais, exprimindo um imperialismo carbônico que privilegie o urbano. Contra este tipo de conservação que se

baseia na natureza reinventada, sugere aqui outro – o uso da terra sócio-ecológico – que corrige a injustiça ambiental e contribui para modos de vida rural dignos.

Palavras chave: regeneração florestal forçada, injustiça ambiental, modos de vida rural sustentáveis, Mata Atlântica, Brasil.

1. Introduction

The inspiration for this critique of biocentric conservation in the Brazilian Atlantic Forest stems from participation in applied research projects on sustainable rural development in mountainous areas of the biome undertaken by the federal GO EMBRAPA, the research arm of the Ministry of Agriculture. In discussions with colleagues, who were agronomists, soil scientists and environmental engineers, I was surprised by their positive reactions to my findings that over time substantial areas of crop land had been replaced by forest on researched farms. This reaction was understandable given the advanced stage of deforestation of the biome: the local landscapes were now half empty of forest instead of almost completely empty in 1980.

I argued in vain that the process of forest regeneration involved environmental injustice toward poor farmers. Farms were small and the amount of forest now present on them was well above the mandatory 20% required by conservation legislation for the Atlantic Forest biome. From my political ecology reading of the landscape the amount of forest in the landscape was now half full, not half empty. In prime farming areas of the biome where medium and large holders have prevailed historically, only 20% is preserved, if that, because it is possible to buy marginal land elsewhere and count it toward the mandatory minimal limit. My colleagues' misreading of the landscape also can be questioned from a relational perspective because it projected an imaginary pristine nature into the distant past that existed before humans arrived in South America.

A number of key concepts from the recent Environmental History, Political Ecology and Relational Ontology literature are used here to understand the environmental injustice involved with forced afforestation policies in the Brazilian Atlantic Forest. These perspectives are discussed in detail and then illustrated in a mountainous area of Rio de Janeiro state, which has a disproportionate number of conservation units and is exposed to socio-ecological threats from the nearby metropolitan region.

2. Environmental History, Political Ecology and Relational Ontology arguments against biocentric conservation

The concepts of *conservation refugees*, *environmental dispossession* and *environmental ethics* from Radical Environmental History and Studies are combined with the concepts of *nature enclosures*, *green*

washing and *urban-rural exploitation* from Political Ecology to critically evaluate biocentric conservation policy. A relational approach of *hybrid society-nature*, *actor-network reassembly* and *connectivity* is also applied to socio-ecological land use to philosophically go beyond rationalist concepts of essentialized nature on which biocentric conservation is rooted.

In a global context of environmental backsliding, geopolitical wars over energy sources, violent counter-imperial movements and increasing social and regional inequality after 2000 Environmental History took a radical turn. A new generation of historians started to castigate past iconic actors of biocentric conservation, such as Marsh, Yellowstone and the Grand Canyon, that only took the good of the ecosystem into consideration and so justified ethnic and class cleansing of the landscape. In the hundred-year conflict between Western conservation and native peoples and poor peasants, the latter have been criminalized, dispossessed and turned into conservation refugees in order to produce pristine Nature to be visited in the comfort of a Sport Utility Vehicle or luxury mobile home by well-to-do urbanites from rich regions. Starting in colonial times and continuing into the present, biocentric Western worldviews of an essentialized Nature without (rural) human presence have been imposed on the rest of the world in order to create distilled nature reserves free from *anthropic action*. Local populations were removed from their ancestral territories and their productive systems deformed (Adams & Mulligan, 2003; Dowie, 2009; Griffin et al., 2019; Jacoby, 2014/2001).

This history of environmental injustice has its roots in a dualistic scientific worldview that arose in the late 19th Century in which researchers who study natural phenomena were radically separated from those who investigate human phenomena. On the biophysical side of this divide, scientists use reductionist explanatory frameworks in which interaction between analyzed parts of one phenomenal level are thought to cause what is observed at the level immediately above it (Merchant, 2004 Simmons & Cox, 1985). As a result, biophysical researchers receive little or no training in the human and agronomic sciences and this completely distorts the attitude that they bring to conservation. Biophysical scientists also tend to hold a naïve view of an idealized nature which existed before humans on the planet, the remnants of which must be set aside and protected. Consequently, park rangers and administrators with this worldview come to their work with a default negative attitude toward any human resident present in or near “nature areas”.

Against this view of rationalist science and biocentric conservation, Radical Ecologists and Environmental Historians developed a holistic view of science and conservation which mobilizes disciplinary knowledge across phenomenal scales and in the case of deep ecology and spiritual ecology even embraces a supernatural dimension inadmissible to secular materialism. Instead of separating nature from society, in the holistic view culture and environment are seen to be entangled entities and conservation policy needs to be decolonized. Instead of US-style national parks, European-style conservation/heritage units with sustainable human use are promoted. In the place of elitist biocentric environmental ethics, *homo-ecocentric environmental ethnics* are advocated in order to attend to both human and ecosystem value and moral status (Merchant, 2004; Pepper, 1996; Simmons, 1993).

Contemporary Political Ecology also presents critical views contrary to biocentric conservation. Political ecologists focus on how poor vulnerable rural and urban social groups suffer disproportionate risk from environmental degradation, carbon emissions and global climate change at the same time that they can lose their livelihoods to make way for essentialized nature (Huber, 2017; Holifield, 2015; Peet et al., 2011; Taylor, 2015). Political ecologists also increasingly criticize policies of mitigation of climate change based on carbon trade-offs because these green wash unsustainable agricultural, industrial and services activities, occult the destructive nature of capitalism and permit postindustrial and recently industrialized countries to continue polluting if they compensate this with state and private grants for conservation in poor countries. Adding insult to injury, carbon colonialism places the blame for rising global emissions on deforestation in the developing countries and not on industry and post-industrial life styles, which produce most of the emissions. This in turn validates nature enclosures and green wars that are perpetrated against tribal peoples and poor peasants who resist leaving areas set aside for conservation (Bumpus & Liverman, 2011; Büscher & Fletcher, 2014, 2018; Forsythe, 2003; Hoefle, 2013; Peet et al., 2011).

As most nature reserves are created in essentially rural areas, Kelly-Reif & Wing (2016) consider this to be *urban-rural exploitation*. Land is cheaper there and no one ever suggested leveling Wall Street and replacing the skyscrapers with forest. Class conflict becomes even more apparent when critical views of rural and eco-tourism are included in the evaluation of environmental policies. These leisure activities are often the only public use permitted by national park administrators and the main beneficiaries are urban middle- and upper-class individuals, i.e. people with a similar social background as the park administrators, and this accentuates bias against poor rural folk (Bicalho, Hoefle & Araujo, 2002 Hoefle, 2016).

Finally, these two approaches can be enhanced philosophically and ethnologically with 21st Century relational perspectives in the social sciences, which go beyond just studying conflict over natural resources and propose an integrated view of natural and social networks composed of humans, animals, plants, landscapes and objects, all of which are considered to be actors in their own right (Cresswell, 2013; Descola, 2013; Holbraa Pederson, 2017; Latour, 2004, 2005, 2013; Whatmore, 2002).

Latour (1994, 2004, 2013) and Descola (2013) are perhaps the greatest critics of the separation of human society from biological nature, which they empirically show to exist only in modern Western science. Against this view of a single ontologically independent Nature, whose secrets are revealed by objective Western science, relationalist social scientists show that there are as many natures as there are cultures, each of which groups people and other beings in different ways. Scientific concepts of Nature and Society/Culture are considered to be incomplete ontological amalgamations that occult at least fourteen different inter-relational modes of existence identified in Western thought which span the divide between humans and non-humans. Humans have ten specific modes and share another four with non-human entities. As a result, instead of splitting up phenomena for separate study by human and biophysical scientists, who due to different epistemologies and methodologies do not understand one another, a relational perspective proposes the holistic study of human and non-human networks.

Relational ontology also takes the interdisciplinarity of Environmental Studies a step further by turning phenomenal scales on their side and so flattening relationships between humans and other beings in an attempt to go beyond anthropocentric Western science, which has historically exalted human superiority. Against the extremes of rationalist Nature and socially constructed Nature, relational radical empiricism occupies the middle ground: other beings are considered to have their own modes of existence outside of our own, which can converge or cross paths with "us" and so enter into relationships of dependence, inter-dependence or maintain their independence vis-à-vis humans. Relational theorists also further develop the metaphysical dimension in environmental ethics and ideological worldview by including beings of metamorphosis (divinities of transformation) and beings of religion (gods of salvation and the end of times) in their investigations (cf. Latour, 2013).

Consequently, starting out from very different theoretical perspectives Environmental History, Political Ecology and Relational Ontology arrive at the same conclusion: biocentric conservation is unjust and so cannot be considered to be sustainable in any socio-ecological sense of the word. Indeed, it is bad faith to promote environmental conservation at the cost of poor rural people in some parts of a national territory in order to validate unfettered development in the vast majority of the urban and rural landscapes present in the rest of that country. Rickard (2007) is more to the point when he contrasts the US national parks ringed by gaudy motor lodges, fast-food establishments and souvenir shops and productivist landscapes further afield to the European model of conservation units within larger governance regions promoting overall sustainable development.

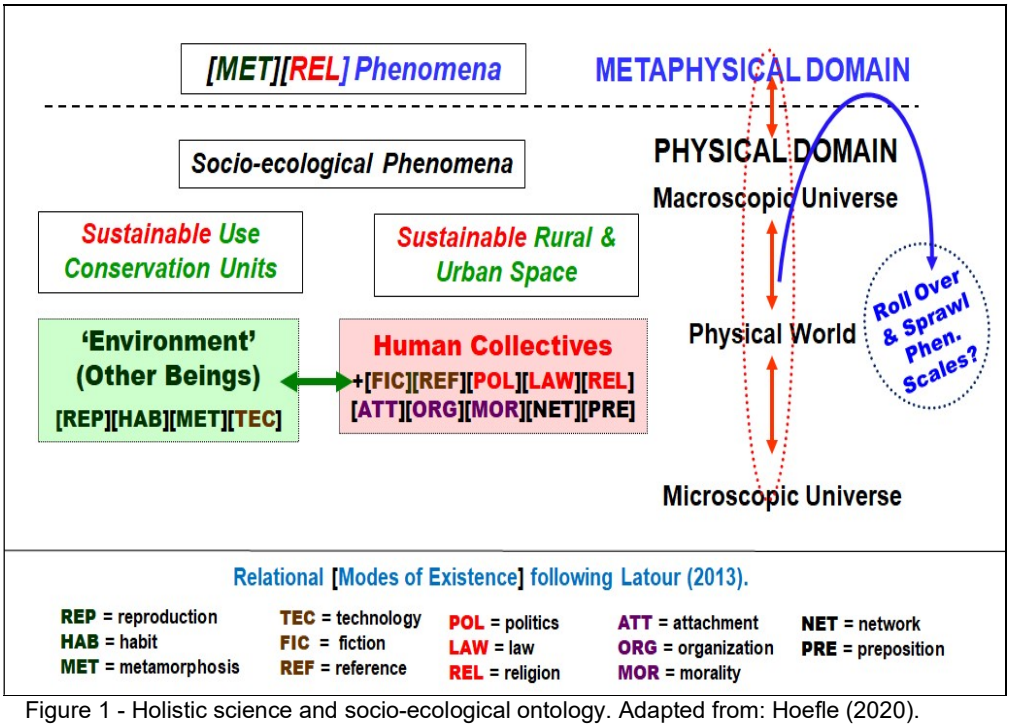

Figure 1 - Holistic science and socio-ecological ontology. Adapted from: Hoefle (2020).

Thus informed by these three theoretical perspectives, what would socio-ecological land use look like? First of all, there would be no sharp separation between human spaces and natural spaces so that while a gradient from less to more domesticated space would be recognized there would be sustainable use throughout all of it (Figure 1). All living and non-living actors are considered to have intertwined modes of existence, some specific and others held in common. Similarly, the interaction of metaphysical and physical entities, like that present in animist worldviews, is included in investigations. Finally, to avoid anthropocentrism and disciplinary chauvinism, real interdisciplinary science would flatten, or better, roll over phenomenal scales, turning them into so many tangled paths of existence coursing side-by-side on a level ontological playing field.

3. Brazilian conservation policy over time

Today both biocentric full preservation national parks and conservation units which permit sustainable use are present in Brazilian environmental policy but are skewed spatially. During much of the 20th Century conservation policy in Brazil mimicked the US model of biocentric national parks. Inspired by Yellowstone, the Brazilian Forest Code of 1934 enabled the creation of two of the first three full-preservation National Parks in a mountainous region of Atlantic Forest located between Rio de Janeiro and São Paulo. In addition to these, a large conservation area already existed within the city of Rio de Janeiro since the 1860s. Ideally only nature tourism could be practiced within the limits of the parks but in fact some farmers who had been living in the area for centuries were allowed to stay (but as we will see below their farming systems were completely deformed by restrictions). The Forest Code of 1965 in turn created new kinds of conservation of units: full-preservation Biological Reserves where only research can be undertaken and National Forests where economic use can occur. In the 1990s in a context of neo-liberalism, the federal government enacted legislation permitting Private Natural Reserves, which made class-based, urban-rural conflict even more explicit (Bicalho & Hoefle, 2020).

In 2000 the National System of Conservation Units (SNUC) was implemented in Brazil, which made an important distinction between full-preservation units on one side and on the other nature reserves with multiple sustainable uses. National Forests, Extractive Reserves, Sustainable Development Reserves and Indigenous Lands fall in this latter group, which allow low-impact land use and permit prior residents to stay, particularly if they are “traditional populations”, such as Amerindians and historic riverine peasants of the Amazon, who are numerous in that region. Consequently, the second kind of conservation units is concentrated in the Amazon while biocentric National Parks and *de facto* biocentric Private Nature Reserves are the norm elsewhere in Brazil. Land use in the Amazon is also more restrictive. Outside of conservation units 80% of the land on private farms should remain in forest while this drops to 20% to 35% in other

Brazilian biomes. In addition to these limits twenty meters of gallery forest must be protected in either side of water courses in all biomes.

4. From deforestation to forced afforestation in the Brazilian Atlantic Forest

In environmentalist discourse and older kinds of environmental history, the Brazilian Atlantic Forest is considered to be the most threatened biome in the country. Dean (1995) in a historical study of deforestation of the Atlantic Forest since Portuguese colonization in 1500 up to 1990 details how over the centuries successive export cycles provoked extensive forest clearing until only 7% to 8% of the original forest cover remained in the late 20th Century. This occurred because the biome was the first to be occupied by European colonists and today most of the Brazilian population live in teeming cities located on the coast or just inland.

The Atlantic Forest occupies an area of 1,315,460 km^2 situated along the east coast of Brazil, stretching from Rio Grande do Norte state in the north to Rio Grande do Sul state in the south (Figure 2). With altitudes ranging from sea level up to nearly 2,800 meters in the highest peaks, the Atlantic Forest presents a huge variety of tropical and sub-tropical micro-environments and has one of the greatest biodiversities on the planet, being home to about 15% of the world's species (Dean, 1995; Lino, 1992; SOS Mata Atlântica, 2019). This state of affairs no doubt justified conservation efforts but not achieving this through the perpetration of environmental injustice to poor farmers of the biome.

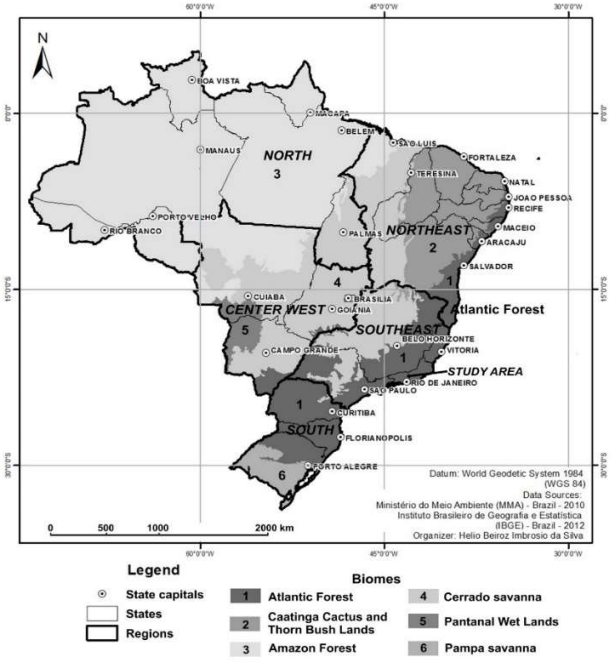

Figure 2 - Brazilian biomes and the study area near Rio de Janeiro.

During the 1980s regional trends were set in course which changed the long-term dynamics of deforestation to forest regeneration in the Atlantic Forest. One could almost call this a process of forest transition (cf. Mather and Needles, 1998). Highly competitive export commodity production arose in the Central-West region of Brazil. This development did not affect flatter lands of the Atlantic Forest which not only remained competitive in commodity production but also adopted what Wilson and Barton (2015) call super-productivist systems. Both trends caused farm redundancy and forest regeneration in agriculturally marginal parts of the Atlantic Forest, much like what occurred in the U.S. Atlantic Forest during the 19th and 20th Centuries (Hoefle, 2019). In the mountains located behind the industrial cities of the South and Southeast regions, farming remained dynamic in valley bottoms where vegetables and fruit are produced for the metro market but became redundant on the upper slopes where forest re-growth has been concentrated. In a classic push-pull migration pattern, the farm sector lost population to the industrializing cities during the latter part of the 20th Century, which restricted planting labor-intensive crops and caused problems with farm succession. At the same time, from the 1990s onward, numerous conservation units were set up in the mountains where most of the remaining forest of the biome was located. Poor farmers bore the burden of this policy because in the past the higher slopes were not appropriate for export crops and historically were left to smallholders whose farming systems have now been deformed by unjust conservation measures.

Consequently, these developments transformed deforestation to afforestation in the Atlantic Forest, particularly if one counts robust secondary growth as forest like Araujo et al. (2007) do. These researchers reported 20.8% of the biome in forest at the date of their publication as opposed to only 12% today by the NGO SOS Mata Atlântica (2021). Current figures reported by the IBGE (2022) put forest cover at 27%, even if this is qualified as “only 27%”. Based on this, one could argue that the Amazon biome of the North and particularly the Cerrado savanna biome of the Central-West are currently under greater pressure from agribusiness and mining than the Atlantic Forest. The World Wildlife Fund (2021) recently revised its figures for the Cerrado to only 19.8% of the savanna lands remaining in pristine conditions. The current right-wing federal government sabotaged environmental restrictions after 2018 and the Amazon is once again under onslaught by illegal loggers, gold prospectors and ranchers.

The negative effects of forced afflorestation on poor farmers are illustrated in a case study in the mountains of Rio de Janeiro. Brazilian conservation efforts first arose in this area during the 1930s and it is where extensive ecological corridors and mosaics were implemented after 1990 (CNRBMA, 2004; ITPA, 2011). Rio de Janeiro state is situated in the Southeast region where the most dynamic metropolitan and industrial areas are located in Brazil. The nearby mountainous areas are considered to be important sources of clean water, carbon sinks, second homes in the country and recreational areas which are thought to compensate the polluted air, fouled rivers and stressful violent lifestyle of the sprawling coastal cities. Indeed, when treating increasing emissions produced by cities the automatic solution is always planting

more trees in rural areas of the Atlantic Forest, as Moreira (2011) suggested in an article on the environmental impact of the growing fleet of vehicles in Brazil.

Farmers in the Atlantic Forest suffer further restrictions than those applied to other biomes. In 2006 the implementation of Law no. 11.428/2006 prohibited cutting primary forest and cutting secondary growth with a diameter of more than 3 cm, i.e. the equivalent of a hoe shaft. These restrictions barely affect commodity farmers in long-deforested flatter land of the biome who can even compensate using all of their land if they invest in private or public conservation elsewhere in the biome, ideally in the same river valley. Most small holders are situated in steep terrain with numerous water courses that is located in two parallel mountain ranges which roughly run north to south down the lower half of the biome: the Serra do Mar (the Coastal Mountains) and the Serra da Mantiqueira located further inland. In the study area these farmers were directly impacted by both the expansion of existing conservation units and creation of new ones in the attempt to form a continuous mosaic of forest as well as by the specific restrictions to farming in mountainous areas.

The Brazilian NGO SOS Mata Atlântica is the most important environmental group working in the Atlantic Forest. This organization was created in 1986 by a group of scientists, business people, journalists and environmental activists who pressured for the government measures cited above and was responsible for lobbying for the establishment of a number of conservation units, particularly in the mountains of the Southeast and South (SOS Atlântica, 2021). The marginality of the mountains for Brazilian agribusiness producing for global commodity markets also made the task of SOS Atlantic Forest far easier than promoting conservation in other regions (for more details see Hoefle, 2019).

5. Nature enclosures near metro Rio de Janeiro

The study area of central Rio de Janeiro state is situated at the point of transition from essentially rural space inland to the metropolitan region of Greater Rio de Janeiro located on the coastal plains. Three different kinds of rural landscape are encountered in this area: 1) deforested landscapes which stretch from the lower leeward slopes of the Coastal Mountains, across the Paraíba River Valley and up the windward slopes of the Mantiguera Mountains, 2) mixed field and forested landscapes situated in the high inter-mountain valleys of the Coastal Mountains and 3) forested landscapes on the high windward slopes of the same mountains (Figure 3). Productivist tomato production and dairy farming predominates in the first landscape while dynamic productivist and post-productivist vegetable and fruit farming is undertaken in the inter-mountain valleys (details concerning these landscapes are available in Bicalho & Hoefle, 2002; Hoefle, 2009, 2019). This chapter will focus on the third kind of more forested landscape where historically undercapitalized farmers suffered a process of nature enclosures from conservation units and restrictive

legislation as well as pressure from the expansion of weekend homes whose owners of metro origin want to consume “nature”.

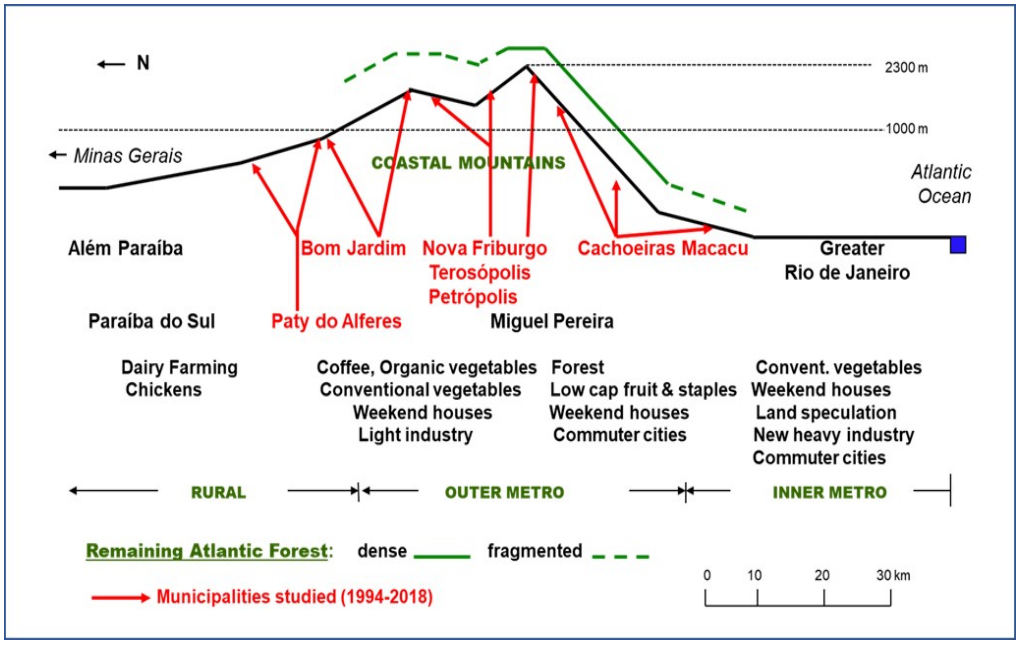

Figure 3 - Cross section of land use in metro Rio and beyond.

In contrast to the dynamic farming of the inter-mountainous valleys, until 2000 one could still encounter slash-and-burn agriculture in steeper upper valleys of Bom Jardim, Nova Friburgo and Cachoeiras de Macacu municipalities. Little or no bottomlands are present in these places and fully modern agriculture never developed there. The lower hillsides were cultivated with shifting agriculture and the hilltops were covered by 50- to 100-year old secondary forest. Food crops, such as maize and sweet potatoes as well as a large number of vegetables were planted for self-provisioning on the middle and lower part of the slopes together with yams, manioc and bananas for the market. A system of shifting agriculture with six-year fallows was used so that fertiliser was seldom necessary. The great variety of rustic crops planted also reduced the need for pesticides, which were rarely employed (Figure 4).

As these areas are located near the conservation units set up from the 1990s onward, farmers were pressured by environmental agencies to curb rotating fields and to stop the practice of slash-and-burning. This represented the final blow to farming in the upper valleys because during the 1980s farmers had been changing crops and methods to adjust to the loss of children and workers who left for other types of

employment in urban areas. Farmers ceased producing low-price staples on the drier convex part of slopes and concentrated on bananas planted in concave depressions located along small creeks flowing down the slopes. Bananas are permanent crops which involve little work, do not need expensive agro-chemical products and generate reasonable income. This change in itself caused considerable forest regeneration on slopes (Figure 5, 6).

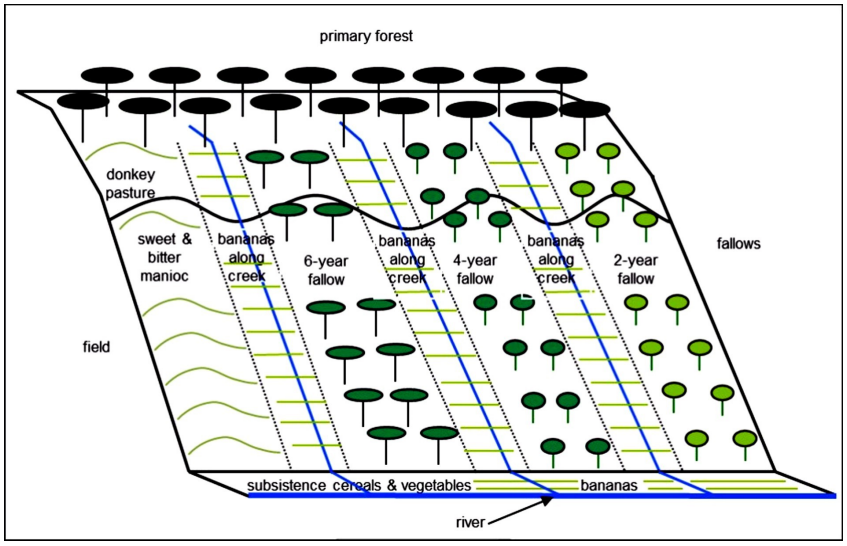

Figure 4 - Shifting agriculture with medium fallowing in the upper valleys of the windward slopes of the Coastal Mountains, c. 1960.

Source: Field research (2011).

Where farmers tried to continue cropping old fallows, the federal environmental protection agency IBAMA (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis) forced them to stop or be fined. Today farmers become anxious when a helicopter flies nearby for fear that it may be the IBAMA checking for illegal fields. Recent legislation requiring farmers to geo-reference their land will make IBAMA's work easier. The agency now has access to satellite imagery in real time which has been used effectively to combat deforestation on the Amazonian frontier (before the current anti-environmentalist federal government).

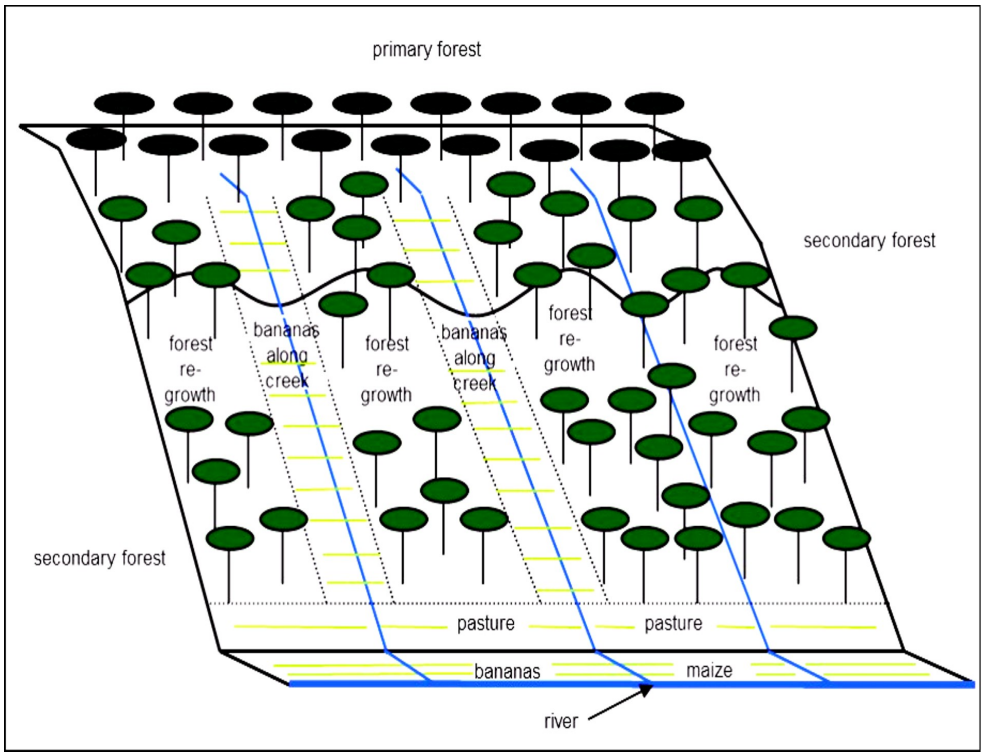

Figure 5 - Permanent banana cropping and afforestation in the upper valleys of the windward slopes of the Coastal Mountains, 2011.

Source: Field research (2011).

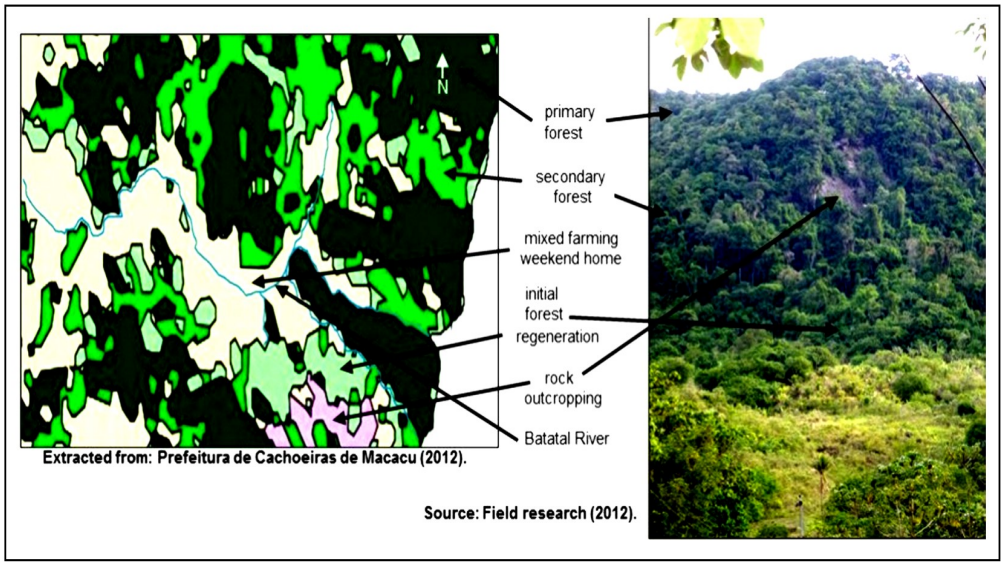

Figure 6 - Different phases of forest regeneration in the Batatal valley, Cachoeiras de Macacu Municipality.

However, as fields are no longer rotated, land degradation occurred. Local farm extension agents in vain tried to show that the fallowing system was sustainable as did more enlightened EMBRAPA researchers like the late Heitor Coutinho who argued that in addition to promoting recovery of soil fertility the practice of fallowing also resulted in better soil structure than that found in permanently cultivated fields. These arguments fell on deaf ears because the IBAMA officials are usually biologists with little or no training in the human and agricultural sciences so that they often consider people to be a menace.

As a result, rural population has not been renewed and elderly farmers now predominate. Of interviewed farmers (n = 32) in Cachoeiras de Macacu, 22% are between 50 and 59 years of age and 58% 60 years and over. Farming now makes up a smaller part of their income, most of which comes from monthly government social transfer payments. No income is received for environmental services and farmers resent this fact. Some family members manage to find work as caretakers on nearby weekend homes, work weekends in a local rural hotel or full-time in a small mineral water factory in which they earn the minimum wage (Table I).

Similar trends were encountered in the upper reaches of the Pitu Aceso valley, situated on the high leeward side of the Coastal Mountains in Bom Jardim municipality. This area is not part of a buffer zone of a conservation unit but has significant forest reserves present so that the valley has suffered the same restrictions to cutting fallows, has an aging rural population and has lost population since 1980. Over the last three decades all workers and most farmer children left the countryside so that of the 61 families previously present only 19 remain today. Closed houses and homes in ruins are a common sight. Farmers between 50-59 years of age now constitute 39% of the total and 28% are 60 or over. Elderly couples try to till their land but they are no longer in physical conditions to do so and the only temporary labor available is that of neighbors who also lack labor.

Table I - Average annual income for interviewed small farmer families in Cachoeiras de Macacu.

Source of Income	*US$2011**
Farming	246.56
Non-farming	374.47
Retirement	381.71
Other transfer payments	21.81
TOTAL	1,024.55

Source: Field research (2011). * US$1.00 = R$2.40

All of these contrary pressures to farming resulted in forest cover increasing significantly, particularly in the upper part of the valleys. Before 1980 in the Batatal Valley of Cachoeiras de Macacu, interviewed farmers only had about 10% to 20% of their land in forest while today farms located in the upper valley have 65% of their land in forest and farms of the middle valley 38%. This is well above the mandatory 20% of farms that must be maintained in forest. To make matters worse farmers who still plant bananas along

creeks located on the slopes in the upper valley are infringing environmental legislation which protects water courses and if enforced could exclude what little land that they still till. As one moves down the valley it widens so that more bottomland is present in the middle part. Farmers there no longer farm on slopes and concentrate their activities in the bottomlands. That is if they have not sold their prime farm land to weekend tourists and land speculators. Concerning this, Figure 7 only shows "half of the truth" (cf. Clifford, 1986). The photograph does not include a weekend house sub-division just off to the right and to the left land being bought up by a crime lord to raise horses for money laundering purposes. Consequently, the bucolic rural setting in between is being hemmed in and farms are sold off one-by-one.

In this context of the penetration of urban capital, local extension agents complain that the IBAMA never fines the "new" rural actors. A local rural hotel which serves as a Protestant religious retreat cut a swath of primary forest down to the river in order to install a slide for the guests to use. There is hardly a tree in sight on the grounds. Similarly, environmental agents would never dare to fine the crime lord for fear of losing their lives. As the IBAMA has to bureaucratically show results the only ones left for enforcing the ban on cutting forest are the politically-weak poor farmers.

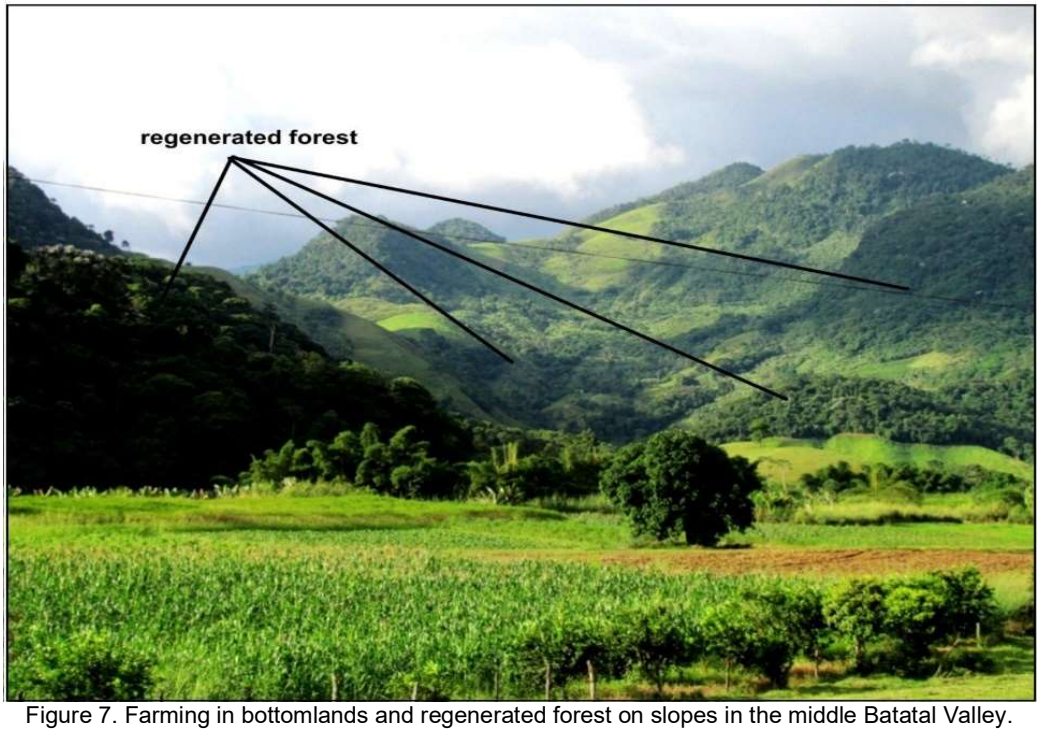

Figure 7. Farming in bottomlands and regenerated forest on slopes in the middle Batatal Valley.

Source: Field research (2011).

It has thus been a long time since farming provoked deforestation in the Coastal Mountains of Rio de Janeiro. On one hand, the mountain cities of Petrópolis, Teresópolis and Nova Friburgo have grown over time, shanty towns have expanded up the surrounding slopes and forest was removed so creating a

dangerous situation for mud slides when heavy rainfall occurs. Outside urban areas sub-divisions have been built with second homes for city people to consume “the rural and nature” which were literally carved out of the forest (Figure 8). Farmers, on the other hand, suffered forced reforestation without just compensation. In 1980 22.9% of their land was in forest, which increased to 27.5% in 1985, 30.4% in 1996, 35.4% in 2006 and 36.8% in 2017 (IBGE 1980-2017).

Sadly, the zeal of the IBAMA and the SOS Mata Atlântica to persecute poor farmers may still prove to have been in vain. The conservation units of the Coastal Mountains of Rio de Janeiro state contain some of the best preserved Atlantic Forest in the country but it is under assault from emissions from new and old heavy industries in the nearby metro region. Southwesterly prevailing winds from the sea carry air pollution from the metro area inland to the mountains which form a barrier and precipitation falls in the form of acid rain. Local people on the windward side of the mountains note that the color of the forest is a lighter green today and that it appears to be “tired” or “sick”, which could be the beginning of a process of high altitude deforestation caused by acid rain.

Figure 8. Who is responsible for deforestation in the mountains?

Source: advertisement in *Revista Programa* 15(19), 06/08/1999.

The polluting industries are fined and ironically the proceeds go to supporting the same conservation units which are being affected by their emissions. This gives rise to a contradictory situation in which the Rio de Janeiro state environmental agency INEA (Instituto Estadual do Ambiente) has become dependent on these funds for maintaining its conservation units and is reluctant to enforce environmental measures to reduce emissions. This is particularly evident in the case of the CSA mega steel mill. Fines are green washed in the form of financial support for the Três Picos State Park in Cachoeiras de Macacu and trees were planted for the 2014 Olympics. Similarly, the huge state petroleum consortium Petrobras runs an old refinery in Duque de Caxias and is trying to finish a new one in Itaboraí which will spew out even more air pollution. Petrobras is ironically also a major partner for financing projects of a number of environmental GOs and NGOs which work in the Atlantic Forest. Green washing these industrial emissions not only affects forests negatively but also local low-income people living in the metro area who suffer from ill-smelling toxic air and soot falling on their homes as well as on the crops of urban and periurban farmers.

One last result of the net gain in forest in the biome has been greater connectivity between people, flora and fauna (cf. Hodgetts, 2018), but for good and for bad. Rural people report more frequent sighting of birds, monkeys and other wildlife close to their houses because forest is now nearby and not just on hill tops like in the past. However, not all of this wildlife is welcome. In August, 2018 a grey jaguar was filmed on a cell phone in a person's backyard in a village in Cachoeiras de Macacu municipality. Biologists welcomed this as a sign that the jaguar population was recuperating. This notwithstanding, the appearance of the jaguar caused an uproar because it was dangerously "out of place" as animal geographers would put it (cf. Cresswell, 2013; Philo & Wilbert, 2000). The resurgence of yellow fever was another distinctly negative kind of connectivity. The creation of a mosaic of conservation units facilitated the spread of yellow fever down the ecological corridor in 2017 causing the first major outbreak of the disease in Southeast Brazil in over fifty years. The primate population was decimated by the disease as well as by rural people shooting any monkeys which appeared near their homes. This is not exactly the kind of "connectivity" that animal geographers have in mind.

6. Rethinking Urban Exploitation of the Rural

Philo (1992) once complained about the distorted research done by older generations of rural geographers who were white, male, middle-aged, married, middle-class, sound of mind and body and city dwellers who preferred to study successful farmers with many of the same social attributes. To this we may add class and scientific prejudice, environmental bias and recreational aesthetics. Many environmental researchers perceive poor farmers as country bumpkins who want to deforest the landscape, much in the same way that Nugent (2002) complained about similar perceptions in the Amazon of "pathological peasants with chainsaws". Accustomed to hearing the usual narrative of linear deforestation of the Atlantic Forest, when presented with a landscape which is now half full of forest, researchers see it as half empty and in

need of further environmental protection from ignorant farmers. Similar perceptions of African landscapes have been made by Western environmentalists who "misread the landscape" (Fairhead and Leach 1996) and create a "lie of the land" (Leach and Mearns 1996).

With this in mind, maybe we should be more critical of the concepts of "counter-urbanisation" and "multi-functionality". Fielding thought that counter-urbanization could be just as much of a threat as a blessing to poor rural people and only five of the thirty-six changes he listed for this process benefit rural people and many of these are cancelled out by the other changes (1990: 234-238). This echoes Lipton's (1979) critique of "urban bias" in development practice in less developed countries which provides well-paid jobs for urban planners, bureaucrats and consultants at the same time that the rural poor stay poor. Lipton's work provoked considerable debate at the time which resulted in a revised view that the whole urban sector was not set against the whole rural sector but rather certain middle- and upper-class urban people against lower-class rural people (Moore, 1984). This conflict takes the specific form of the penetration of urban capital mobilized by liberal professionals, high-ranking civil servants, crime lords and politicians to buy second homes and hobby farms or simply to engage in land speculation in parts of the countryside located up to two hours relative distance from urban areas (Bicalho & Hoefle, 1989; Janvry, 1981).

Framed this way, research on counter-urbanization, migration into the country and multi-functionality can be seen as a theoretical extension of taking the peri-urban and metropolitan studies further afield. In these views, the countryside is not just a place for agricultural production but also for an array of non-agricultural production and consumption activities which are called new functions: industrial and office relocation, rural tourism, nature areas, eco-tourism, holiday homes, land speculation and money laundering, refuse dumps, etc. If one looks at who benefits from the new activities which sprang up in the city's countryside in the second half of the 20th Century (cf. Bryant & Johnston 1992, Bryant et al., 1982) and then in the accessible countryside further out (Boyle & Halfacree, 1998; Marsden, 1998, 2006; Murdoch, 2006) almost all of the beneficiaries are people of middle- and upper-class urban origin, both those who periodically go out into the country to consume it or ex-urbanites who want to live in (Woods, 2011).

The case treated here exemplifies the dark side of environmental policy and rural/nature tourism as new functions of the countryside, which negatively impact the historic poor farmers of the Coastal Mountains of Rio de Janeiro. This area is not exceptional in Brazil and indeed is part of a general trend that has been observed in forty years of rural research throughout the Southeast, Northeast, Central West and North regions (Bicalho and Hoefle, 1989, 2015, 2020; Hoefle, 2013, 2016, 2020). This does not mean that we must throw the baby out with the dirty bath water. As an investigative strategy, multi-functionality is a fine heuristic device for envisioning all of the different activities which can contribute to rural livelihoods and even as a tool for regional sustainable governance like in the European Union (cf. Muirhead and Almas, 2012, Rennington et al., 2012).

However, it is another thing all together to be seduced by self-serving pseudo-environmentalist propaganda espoused by "new" social actors at work in the countryside. A researcher must enter a study

with a critical attitude concerning the policy implications of multi-functionality and networks, open to seeing negative conflict between social actors or just the neutral juxtaposition of activities, in addition to genuine positive multi-functional combinations of activities and for *all* social actors. It is impossible to remain theoretically impassive to situations like that described by Murdoch (2006) in the "preserved countrysides" of the United Kingdom where the farmers still present have been reduced to being mere spectators to the political struggle between the affluent new actors of urban origin. One researcher's "post-structuralist" networking is another's penetration of urban capital causing proletarianization of poor farmers and rural exodus. Leslie Symons was an older generation rural geographer who long ago expressed concern that English farmers were being turned into mere caretakers of country estates and second homes (Symons, 1967). All the subsequent research on migration into the English countryside confirmed his worst fears.

Bibliography

ADAMS, W. M. & MULLIGAN, M. (Eds.). (2003). Decolonizing nature. London: Earthscan, pp. 1-15.

ARAUJO, M. H, CRUZ, C. B. & VICENS, R. (2007). Levantamento da cobertura vegetal nativa do bioma Mata Atlântica. Rio de Janeiro: Instituto de Estudos Socioambientais do Sul da Bahia.

BICALHO, A.. & HOEFLE, S. (1989). Urban capital and the pseudo-modernization of agriculture in the rural hinterland of Northeast Brazil. In R.B. Kent & V.P. Harnapp (Eds.), *1989 yearbook of the conference of Latin American geographers.* Baton Rouge: Louisiana State University Press, pp. 35-48.

BICALHO, A. & HOEFLE, S. (2002). Environment perception and sustainable development in the Atlantic Forest of Southeast Brazil. Montréal: Union Géographique International/Université de Montréal.

BICALHO, A. & HOEFLE, S. (2015). Conservation units, environmental services and frontier peasants in the Central Amazon: multi-functionality, juxtaposition or conflict? In D. C. Wood (Ed.), *Climate change, culture, and economics*. Bradford: Emerald Scientific, pp. 67-105.

BICALHO, A. HOEFLE, S. & ARAUJO, A. (2020). Ribeirinhos em resistência à gestão biocêntrica de unidades de conservação pública e privada no Pantanal. *Espaço Aberto,* 10 (2), 206-235.

BOYLE, P. & HALFACREE, K. (Eds). (1998). Migration into rural areas. London: Wiley, 1998.

BÜSCHER, B. & FLETCHER, R. (2014). Accumulation by conservation. *New Political Economy,* 20 (2), 273 - 298

BÜSCHER, B. & FLETCHER, R. (2018). Under pressure: conceptualising political ecologies of green wars. *Conservation and Society*, 16 (2), 105-113.

BRYANT, C., RUSSWURM, L. & McLELLAN, A. (1982). The city's countryside. London: Longman.

BRYANT, C. & JOHNSTON, T. (1992). Agriculture in the city's countryside. London: Belhaven.

BUMPUS, A. & LIVERMAN, D. (2011). Carbon colonialism? In R. Peet, P. Robbins & M. J. Watts (Orgs.), *Global political ecology.* Milton Park: Routledge, pp. 203-224.

CLIFFORD, J. (1986), Introduction: partial truths, in, Clifford, J. & Marcus, G. E. (eds.), *Writing culture.* Berkeley: Univ. of California Press, pp. 1-26.

CNRBMA (Conselho Nacional Reserva da Biosfera da Mata Atlântica). (2004). Serra do Mar – Corredor de Biodiversidade. Available in: http://www.rbma.org.br/anuario/mata_06_ smar _varias_cor_bio.asp. [Accessed: 16/03/2018].

CRESSWELL, T. (2013). Geographical thought. Chichester: Wiley Blackwell.

DEAN, W. (1995). With broadaxe and firebrand. Berkeley: Univ. of California Press.

DESCOLA, Ph. (2013/2005). Beyond nature and culture. Chicago: Chicago Univ. Press.

DOWIE, M. (2009). Conservation refugees. Cambridge: MIT Press.

FAIRHEAD, J. & LEACH, M. (1996). Misreading the African landscape. Cambridge: Cambridge Univ. Press.

FIELDING, A. J. (1990). Counterurbanisation. In A. Pinder (Ed.), *Western Europe*. London: Wiley, pp. 226-239.

FORSYTH, T. (2003). Critical political ecology. Milton Park: Routledge.

GRIFFIN, C., JONES, R., & ROBERTSON, I. (Eds.). (2019). Moral ecologies. Cham: Palgrave-Macmillian-Springer.

HOLBRAAD, M & PEDERSEN, M.A. (2017). *The ontological turn. an anthropological exposition*. Cambridge: Cambridge Univ. Press.

HODGETTS, T. (2018). Connectivity as a multiple: in, with and as 'nature'. *Area,* 50, 83-90.

HOEFLE, S. (2009). Ética ambiental, sistema agrícola e paisagem cultural na Mata Atlântica no Sudeste. *Ateliê Geográfico,* 3 (8), 22-52.

HOEFLE, S. (2013). Beyond carbon colonialism. *Critique of Anthropology*, (33), 193-213.

HOEFLE, S. (2014) Fishing livelihoods, seashore tourism and industrial development in coastal Rio de Janeiro. *Geographical Research*, vol. 52, no. 2, 198-211.

HOEFLE, S. (2016), Multi-functionality, juxtaposition and conflict in the Central Amazon. *Journal of Rural Studies*, 44: 24-36.

HOEFLE, S. (2019). Ghosts in the forest. In C. Griffin, R. Jones & I. Robertson (Eds.), *Moral ecologies.* Cham: Palgrave-Macmillan-Springer, pp 99-125.

HOEFLE, S. (2020). Conservation refugees and environmental dispossession in 21st century critical geography. *Boletín de la Asociación de Geógrafos Españoles,* 84 (2895), 1-33.

HOLBRAAD, M & PEDERSEN, M. (2017). The ontological turn: an anthropological exposition. Cambridge: Cambridge Univ. Press.

HUBER, M. (2017). Industrializing political ecology. *Annals of the American Association of Geographers,* 107, 151-166.

HOLIFIELD, R. (2015). Environmental justice and political ecology. In T. Perreault, G. Bridge, G. & J. McCarthy (Eds.), *Routledge handbook of political ecology*. Milton Park: Routledge, pp. 585-597.

IBGE (Instituto Brasileiro de Geografia e Estatística). (1980-2017). Censo agropecuário. Rio de Janeiro.

IBGE (Instituto Brasileiro de Geografia e Estatística). (2022). Biomas brasileiros. https://educa.ibge.gov.br/jovens/conheca-o-brasil/territorio/18307-biomas-brasileiros.html. [Accessed: 24/11/2022].

ITPA (Instituto Terra de Preservação Ambiental). (2011). Onde atuamos. Available in: http://www.itpa.org.br/?page_id=24. [Accessed: 16/03/2018].

JACOBY, K. (2014/2001), Crimes against Nature. Berkeley: Univ. of California Press.

JANVRY, A. (1981). The agrarian question and reformism in Latin America. Baltimore: Johns Hopkins Press.

KELLY-REIF, K. & WING, S. (2016). Urban-rural exploitation: an underappreciated dimension of environmental injustice. *Journal of Rural Studies,* 47, 350-358.

LATOUR, B. (2004). Politics of nature. Cambridge: Harvard Univ. Press.

LATOUR, B. (2005). Reassemblying the social. Oxford: Oxford Univ. Press.

LATOUR, B. (2013). An inquiry into modes of existence. Cambridge: Harvard Univ. Press.

LEACH, M. & MEARNS, R. (eds.). (1996). The lie of the land. London: IAI.

LIPTON, M. (1979). Why poor people stay poor. London: Temple Smith.

LINO, C. (1992). Reserva da biosfera da mata atlântica. Campinas: UNICAMP.

MARSDEN, T. (1998). Economic perspectives. In B. Ilbery (Ed.), *The geography of rural change*. Harlow: Pearson, pp. 13-30.

MARSDEN, T. (2006). Pathways in the sociology rural knowledge. In P. Cloke, T. Marsden & P. Mooney (Eds.), *Handbook of rural studies*. London: Sage, pp. 3-17.

MATHER, A. & NEEDLE, C. (1998). The forest transition. *Area,* 30 (2), 117-124.

MERCHANT, C. (2004). *Radical ecology*. 2nd Edition. London: Routledge.

MOORE, M. (1984). Political economy and the rural-urban divide, 1767–1981. *Journal of Development Studies,* 20 (3), 5-27.

MOREIRA, A. (2011). Frota de veículos cresce 119% em dez anos no Brasil, aponta Denatran. G1 Auto Esporte. Available in : http://g1.globo.com/carros/noticia/2011/02/froat-de-veiculos-cresce-119-3m-dez-anos-no-brasil-aponta-denatram.html. [Accessed in: 17/06/2018].

MURDOCH, J. (2006), Networking rurality. In P. Cloke, T. Marsden & P. Mooney (Eds.), *Handbook of rural studies*. London: Sage, pp. 171-184.

MUIRHEAD, B., ALMAS, R. (2012). The evolution of Western agricultural policy since 1945. In R. Almas & H. Campell (Eds.), *Rethinking agricultural policy regimes*. Bingley: Emerald, pp. 23-49.

NUGENT, S. (2002). Whither o campesinato? *Journal of Peasant Studies*, 29, 162-189.

PEET, R., ROBBINS, P. & WATTS, M. (Eds.). (2011). Global political ecology. London: Routledge.

PEPPER, D. (1996). A history of environmental thought. London: Routledge.

PHILO, C. (1992). Neglected rural geographies. *Journal of Rural Studies,* 8 (2), 193-207.

PHILO, C. & WILBERT, C (Eds.). (2000). Animal spaces, beastly places. New York: Routledge.

PREFEITURA DE CACHOEIRAS DE MACACU. (2012). Uso da terra no município de Cachoeiras de Macacu (map). Cachoeiras de Macacu: Secretaria do Meio Ambiente.

RENNINGTON, K., RENWICK, A. & BURTON, R. (2012). Western European approaches to and interpretations of multi-functional agriculture and some implications of a possible neo-productivist turn. In R. Almas & H. Campbell (Eds.), *Rethinking agricultural policy regimes*. Bingley: Emerald, pp. 73-97.

RICKARD, T. (2007). Rural sustainability issues for national parks. In T. Sorensen (Ed.), *Progress in sustainable rural development*. Cairns: IGU-CSRS, pp. 191-198.

SIMMONS, I. (1993). *Interpreting nature*. London: Routledge.

SIMMONS, I. & COX, N. (1985). Holistic and reductionistic approaches to geography. In R. J. Johnston (Ed.). *The future of geography*. London: Metheun, pp. 43-58.

SOS MATA ATLÂNTICA. (2019). Área de cobertura da Mata Atlântic. Available in: https://www.sosma.org.br/artigos/qual-e-area-de-cobertura-da-mata-atlantica. [Accessed in: 27/02/2020].

SOS MATA ATLÂNTICA. (2021), SOS Mata Atlântica: história, parceiros e nossa causa. Available in: https://www.sosma.org.br. [Accessed in: 13/04/2021].

SYMONS, L. (1967). Agricultural geography. London: Bell.

TAYLOR, M. (2015). The political ecology of climate change adaptation. London: Earthscan.

WHATMORE, S. (2002). Hybrid geographies. London: Sage.

WILSON, G. & BURTON, R. J. (2015). Neo-productivist. agriculture. *Journal of Rural Studies,* 38, 52-64.

WOODS, M. (2011). Rural. Milton Park: Routledge.

WWF (World Wildlife Fund). (2021). Ameaças ao cerrado. Available in: www.wwf.org.br/ natureza_brasileira/questoes_ambientais/biomas/bioma_cerrado/bioma_cerrado ameacas. [Accessed in: 13/04/2021].

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