

COMO A EDUCAÇÃO FORMAL, A AGRICULTURA PRODUTIVISTA E O DESFLORESTAMENTO PROVOCAM DESENCANTAMENTO AMBIENTAL E INJUSTIÇA ONTOLÓGICA NO BRASIL

HOW FORMAL EDUCATION, PRODUCTIVIST FARMING AND DEFORESTATION PROVOKE ENVIRONMENTAL DISENCHANTMENT AND ONTOLOGICAL INJUSTICE IN BRAZIL

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Resumo

Abordagens da ecologia política e da ontologia relacional são usadas para demonstrar que a educação ambiental bio-cêntrica e o desmatamento provocado por sistemas agrícolas produtivistas causam a perda de folclore animista que, como parte de modos de vida rural não-produtivos, contribuem para o uso da terra socio-ecológico sustentável nos biomas da Amazônia e da Mata Atlântica no Brasil. No discurso ambientalista internacional ambos biomas são críticos para reduzir emissões carbônicas globais e para preservar biodiversidade planetária. Grande parte deste discurso se baseia em ontologias seculares naturalistas e na conservação bio-cêntrica que pregam a ampliação de áreas silvestres e que praticamente não têm lugar para humanos, muito menos para entidades espirituais que mediam seres humanos e não-humanos. Em primeiro lugar, são contrastadas ontologias naturalistas e socio-ecológicas. Nas primeiras, se estabelecem reservas naturais de preservação integral em algumas áreas e liberam a grande maioria de um território nacional para o desenvolvimento desfreado. A ontologia socio-ecológica, por sua parte, propõe o uso sustentável em todo território nacional, sejam em áreas de conservação, sejam em áreas produtivas. Como poucos brasileiros seguem estas duas ontologias, são introduzidas na discussão visões do mundo animistas e espiritualmente bifurcadas. Nos casos de estudo no Brasil demonstram-se que visões híbridas animista e espiritualmente bifurcadas predominam em zonas florestadas de forma que as visões híbridas são pertinentes para a conservação. Os resultados empíricos apresentados sobre os dois biomas são baseados em mais de quarenta anos de pesquisa de campo. Veremos que o alcance de altos níveis de educação formal e o desflorestamento total de áreas para praticar a agricultura produtivista provocam o desencantamento ambiental além da perda da biodiversidade. A socio-ecologia relacional se mostra aberta ao diálogo com outras visões de vida e modos de vida, evitando assim a injustiça ambiental de cunho ontológico.

Palavras chave: conservação socio-ecológica, ecologia relacional espiritual, animismo ameríndio, religião popular híbrida, “selva” brasileira.

Abstract

Political ecology and relational approaches are used to demonstrate how biocentric environmental education and deforestation provoked by productivist farming systems cause the loss of animist lore which as part of overall non-productivist rural livelihoods contribute to sustainable socio-ecological land use in the Amazon and Atlantic Forest biomes of Brazil. Preservation of both biomes is a central point in international environmentalist discourse about reducing global carbon emissions and preserving planetary biodiversity. Much of this discourse is based on secular naturalist ontologies and biocentric conservation of the so-called (re)wilds, which have no place for most humans let alone for notions of spiritual entities that mediate human and non-human beings. First, naturalist ontologies involving full conservation of some areas and unfettered development in the vast majority of a national territory, are contrasted with relational socio-ecology, which proposes sustainable use of all of a territory. As very few Brazilians fully adhere to these two worldviews, animist and analogical spiritually-bifurcated worldviews are then introduced into the discussion and hybridized animist-spiritually bifurcated worldviews are shown to predominate in preserved wooded regions of the Amazon and Atlantic Forest so that these worldviews are pertinent for conservation. The empirical results presented from these two biomes are based on over forty years of primary field research. High levels of formal education which eradicates any belief in “supernatural” entities and clean-cut land clearing to make way for productivist agriculture are shown to provoke environmental disenchantment in addition to the loss of biodiversity. Relational socio-ecology is open for dialogue with other worldviews and ways of life so avoiding ontological environmental injustice.

Keywords: socio-ecological conservation, spiritual relational ecology, Amerindian animism, hybrid worldviews, Brazilian Amazon and Atlantic Forest.

1. Introduction

This work systematically explores cultural diversity in *who* actually believes in animist spirits of the wilds, in metamorphic and metaphysical beings and in vitalism of the land and *why*, while the positive and negative environmental and social *functions* and *meaning* of the spirits of the countryside were treated in another recent publication (Hoefle, 2023). The latter used an interpretive perspective while a more conventional empiricist quantitative perspective is used here. With this I seek to engage biophysical scientists on their terms and in their scientific language in the hope of converting them from environmentally unjust biocentrism to relational socio-ecology.

In other recent publications I dealt with the most blatant forms of environmental injustice, such as expelling native peoples and poor peasants from within biocentric conservation units (a.k.a. national and state parks), which only take the good of the ecosystem into consideration while permitting unfettered development beyond their limits (Bicalho & Hoefle, 2022; Hoefle, 2019, 2020). More subtle forms of ontological environmental injustice are treated here. First of all, the advance of productivist farming systems provokes large-scale deforestation, which removes the abode of the spiritual entities of the “wilds” so that tales about them are no longer told to future generations. Secondly, elitist scientific disdain for unlettered country people promotes a pejorative view of them as ignorant despoilers of the land. Finally, urban-biased formal education propagates secular naturalism, which is dismissive of alternative worldviews. Students first learn in primary school that enchanted creatures and other mythical beings of the “wilds” are quaint folklore, i.e. they do not really exist. Then, in secondary and university education, such supernatural entities are held to be beyond the purview of scientific investigation and indeed are so much superstition. The smug certainty of scientists who “believe that we know and we know that the others [only] believe ... in all that nonsense” (Latour, 2013, 171, 173) in turn induces resentment from believing people in the form of anti-science and political polarization. To avoid all of this, we “must put an end to belief but not to beliefs” (Latour, 2013, 183).

The second part of the chapter shows how these issues work out in two critical biomes for global conservation: the Brazilian Amazon and Atlantic Forests. The Amazon has some of the best-preserved rain forest in the country but is under pressure from a host of different social actors. As the first biome occupied by Portuguese colonization, the Atlantic Forest was for centuries the most pressured biome of Brazil but in recent decades has seen considerable regeneration of forests in response to conservation measures. We will see that the Amazon has a rich lore of enchanted creatures of the forest and rivers found mainly among the historic population while very little lore is encountered in the Atlantic Forest biome and when found is limited to specific places that remained wooded over time.

2. Going beyond the purview of conventional Western Science

Secular naturalism

Most readers, like the author himself, were indoctrinated in a secular naturalist view of the world in their formal education (Figure 1). In this worldview scientists who study natural phenomena are 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, stretching “up” from the interaction of sub-atomic particles at one extreme to astronomical phenomena at the other (Merchant, 2005; Simmons and Cox, 1985).

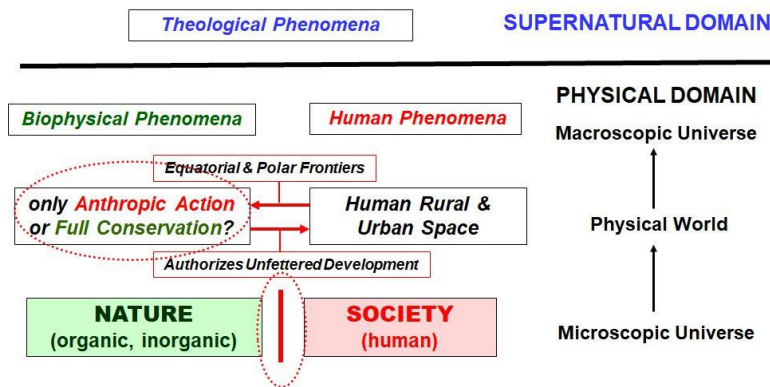


Figure 1. Scientific disciplinary bifurcated naturalism.

From the early 20th Century onward mass public education instilled this kind of worldview, to which “environmental education” was included in the curriculum by the end of the century. However, environmental education is still based on problematic dualisms which separate society/culture from nature, supernatural phenomena from natural phenomena and visible/material from invisible/immaterial culture. Consequently, in the face of global ecological degradation, the only course of action presented to students is more “wildlife” conservation which supposedly will compensate the emissions provoked by the expansion of agribusiness, industry and the cities where most of them live. This is to say the only choice is either full conservation units without (rural) human presence or “anthropic action” outside the park entrance gates. This sort of biocentric logic lies at the root of national and global carbon trade-off policies which are criticized by political ecologists because if industrial and post-industrial countries contribute to conservation of forests in the Global South they can continue polluting without doing much of the expensive work needed for reducing emissions at home. The fallacy of this conservation approach is evident in the unabated growth of global emissions despite all the smoke and mirrors espoused at global climate summits (cf. Bumpus and Liverman, 2011; Büscher and Fletcher 2014, 2018; Machequeiro, 2023).

Against naïve empiricist and naturalist science informing biocentric conservation, Radical Ecologists and Environmental Historians of the late 20th Century and early 21st Century developed a holistic view of science and conservation which mobilized disciplinary knowledge across phenomenal scales and in the case of deep ecology and spiritual ecology could even embrace a supernatural dimension inadmissible to

secular materialism. Instead of separating nature from society, in the holistic view, culture and environment are seen to be interrelated entities and conservation needs to be decolonized of US-style national parks mentalities. Instead, European-style conservation/heritage units with sustainable human use are promoted. In the place of elitist biocentric environmental ethics, *homo-ecocentric environmental ethnics* were advocated in order to attend to both human and ecosystem value and moral status (Adams & Mulligan, 2003; Merchant, 2005; Pepper, 1996; Simmons and Cox, 1985).

Relational socio-ecology

Twenty-first Century relational perspectives in the social sciences take interdisciplinarity further with a hybrid 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 (Descola, 2013; Holbraad and Pederson, 2017; Latour, 2004, 2005; Whatmore, 2002). Latour (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 thus 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 beings. 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 entangled human and non-human networks (Figure 2).

Relational ontology also avoids reductionism 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 and underwritten despoiling the planet (Descola, 2013; Latour, 2004, 2005). Against the extremes of rationalist Nature and phenomenological 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 like Latour (2013) 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. Consequently, all phenomena are socio-ecological and the object of scientific study, not just natural material phenomena.

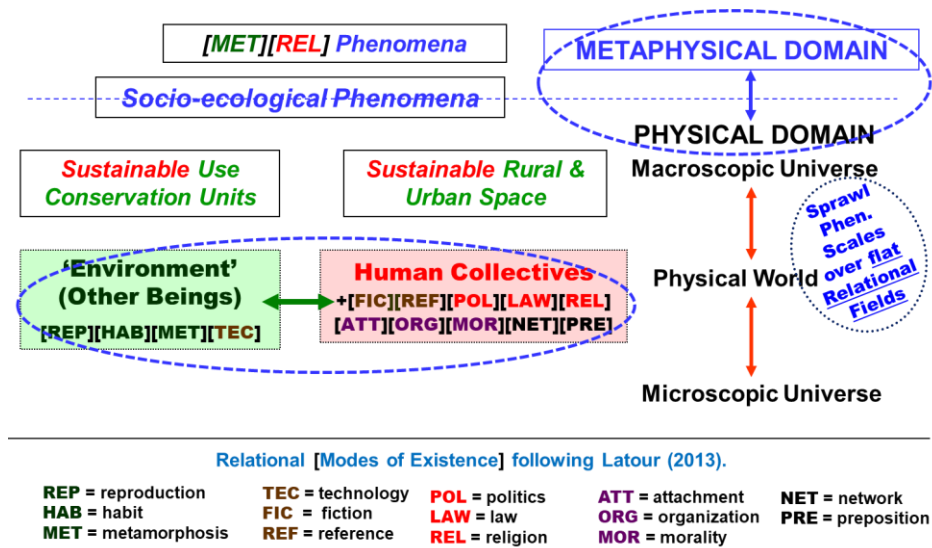


Figure 2. Relational socio-ecology.

3. Dialogue with Hybrid Worldviews

Secular naturalism and *relational socio-ecology* presented above are two “recent” ideal types of worldview. *Tribal animism and totemism* and *analogical spiritually-bifurcated peasant worldviews* are “older” worldviews, and hybridity between the former and the latter are important for understanding how planetary environmental issues are played out in Brazil.

Animism was the original worldview prevalent in what became Brazil at the time of the Portuguese Conquest. Over the centuries considerable difference arose between official Catholic doctrine in Europe and the hybrid animist-Catholic worldviews found throughout the Brazilian countryside. Priests were few and far between and missionaries had to be tolerant with their flock or they would loss it. As a result, the violent process of disenchantment that occurred in mercantile zones of Europe (cf. Schneider, 1990) never took place in much of Brazil (Hoefle, 1995, Souza, 1987). Religious diversity increased even more so as Brazil became a newly industrialized country in the latter 20th Century when subaltern and emerging middle-class people searched for religious sects that served their ideological needs better than historically dominant Catholicism (Hoefle, 1995, Lehmann, 1996, Stoll, 1990). In other words, even today very few Brazilians subscribe to a purely secular worldview.

Animism

First, let us begin with the *animist worldview* present among Amerindians in Brazil as treated in the anthropological Amerindian literature. In animist worldviews, Nature is not considered to be a separate entity divided into material-physical and spiritual-supernatural or into organic-vital and inorganic-nonvital phenomena. Nor does animism group beings in the way that scientific biological classification does:

separating humans, animals and plants into different meta-groups of beings organized in nested hierarchies of inclusion/exclusion according to appearance and evolutionary history (Frake, 1964; Berlin, 1992).

Animism, by contrast, groups some humans together with certain animals, which are said to display cultural behavior, and with beneficial spiritual entities. These animals are thought to live socially in invisible villages and obey kinship and marriage rules. In the distant past, these animals once were able to speak directly to people but today communication is only possible in dreams and trances. Against this group of beings are aligned other human enemies, dangerous solitary animals and malignant spirits. Important animals and plants each may have a guardian spirit, which mediates relations between them and people, i.e. between the hunter and the hunted or the cultivator and the cultivated. Proper ceremony and respect are shown when killing individual animals and harvesting food so that notions of balanced reciprocity may exist which can limit overexploitation of food sources (Descola, 2013; Reichel-Dolmatoff, 1976).

As Matta (1973) long ago noted and is emphasized in contemporary ethnographic accounts of Amerindian villages, space is seen as being round: a village is located in a circular clearing with a round big house or a circle of round individual family houses arrayed around a common located in the middle, followed by a ring of gardens behind the houses (Figure 3). After that, a band of mixed fields, fallows and forests exists followed by deep forest stretching out dozens of kilometers into interfluvial and mountainous lands. Descola shows how the enormous forested zone is not considered to be a hostile wilderness in the Western sense because hunters are completely familiar with every part of it, a multitude of memories are associated with each place and protector spirits are said to cultivate the forest (2013, 40-41).

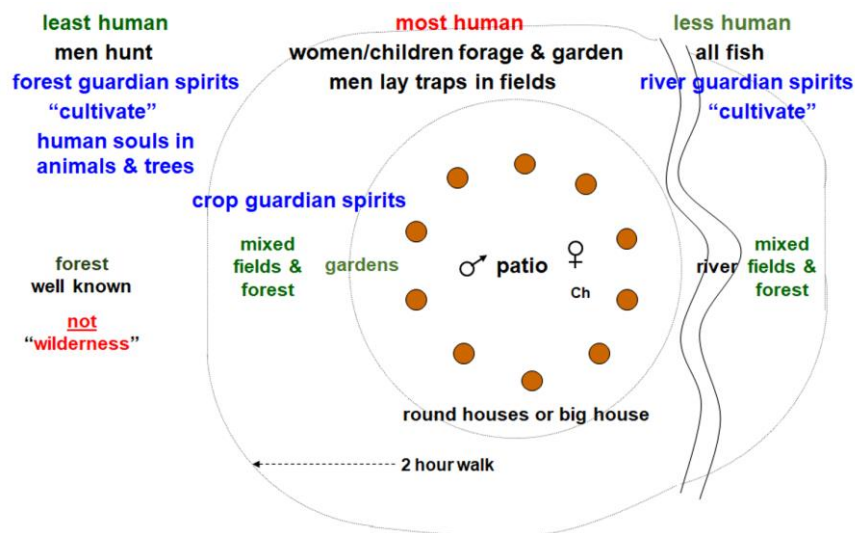


Figure 3. Round flattened animist space and relational field.

Animism also involves a flattened cosmology with the afterlife being found relatively close by in this world. After death a soul roams the forest in a solitary way or attaches itself to a specific animal or tree before finally dissipating and eventually forming a new soul that will enter the body of a baby in the womb.

Direct descendants should avoid contact with all individuals of the animal or tree species thought to abode their parents, which means that kin forego utilizing these species for food or material and this also contributes to overall conservation of wildlife (Matta, 1973; Reichel-Dolmatoff, 1976).

Not just humans, animals and plants are considered to be living beings, many of which are considered to be salient beings like people, but land, water and even rocks can also be considered to be alive and possess similar vital attributes. Consequently, humans are not beings set apart but rather are intimately tied to a holistic earth whose vitality must be actively conserved. What Science calls Nature is animated with spiritual entities with which humans must interact in a reciprocal way and contact with the ancestors is not severed by death. The envy of souls of the ancestors, of spirits of the wilds and of fellow villagers in turn limits individual selfishness because a person who neglects kinship and community obligations in order to accumulate riches at the expense of others suffers spiritual attack or is accused of witchcraft (Evans-Pritchard, 1937; Reichel-Dolmatoff, 1976; Sahlins, 1966; Schneider, 1990).

Analogical spiritually bifurcated worldviews

Now we shall turn to a fourth ideal type of worldview, which arose with the rise of states and empires in Antiquity. In these social formations, humans started to actively domesticate landscapes on a greater scale according to their needs by promoting the presence of some species and eliminating others. Increasing inequality between social castes and classes also arose, all of which was reflected in worldviews. Schneider (1990) distinguished these worldviews from previous ones by the existence of *spiritual bifurcation* between beneficent supreme gods identified as patrons of one polity while those identified with one's enemies were considered to be maleficent. Supernatural beings approved humanity's greater domestication of the landscape and could intervene to help people adversely affected by natural events which these deities had originally created and still controlled. People could beseech this help preventively, such as in rites enacted to achieve a plentiful harvest, or after the fact when illness was contracted. Descola (2013) calls this kind of worldview *analogical* because it joins different human and non-human beings into an all-inclusive intertwined web of unlike entities.

In the first early civilizations, much like in animism, common people did not separate natural, supernatural and social realms. Everything was considered to be alive, conscious, to possess a soul and to be interrelated, including plants, animals and even stones. All were just other beings but some beings possessed more powers than humans. They lived longer, could change shape, were omnipresent with the ability to be in different places at the same time and moved freely between terrestrial and extra-terrestrial realms. These powerful beings were called gods, deities, spirits or just an all-pervasive force which animated the universe (Trigger, 2003, 441-415).

However, a major change in worldviews occurs here with the spatial dislocation of the abode of the gods to distant and extra-terrestrial realms even if they regularly intervened and occasionally appeared in This World. Spirits were no longer close at hand or occasionally sighted in the forest like in animism. As

regular contact with the deities only occurred in the afterlife, then these spirits were also temporally removed. Furthermore, notions of balanced reciprocity between humans and spirits were abandoned. The gods granted grace and humans were eternally in their debt, mirroring social relations in This World between divine or divinely-ordained sovereigns and their subjects (Schneider, 1990).

Environmental disenchantment

The shift toward secular naturalism took over six hundred years to materialize in Europe (Figure 4). After 1200 religious reforms starting first in the Catholic Church and then cumulating in the Protestant schism rooted out three persisting elements of “paganism” still current among unlettered lay persons: 1) contact with spirits of the forest, 2) lost souls present in This World and the possibility of contact with the Other World through dreams and visions and 3) ecstatic millenarian cults of the saints intermediating this contact in order to obtain miraculous cures and good fortune.

The paganist beliefs to be eliminated were exactly traces of remaining animist elements. Anyone claiming to have direct contact with spirits of the forest or of the Other World were accused of witchcraft and trafficking with the Devil because these apparitions were now considered to be manifestations of Satan. The hysterical propagation of witchcraft accusations spread from northern Italy to southeast England where mercantilism first arose in Europe so that historians consider this phenomenon to be an eminently modern event. With the restriction of kinship obligations, witchcraft accusations fell mainly on vulnerable elderly widows. These women were often healers who collected wild herbs in the forest where they were accused of having contact with Satan (Schneider, 1990).

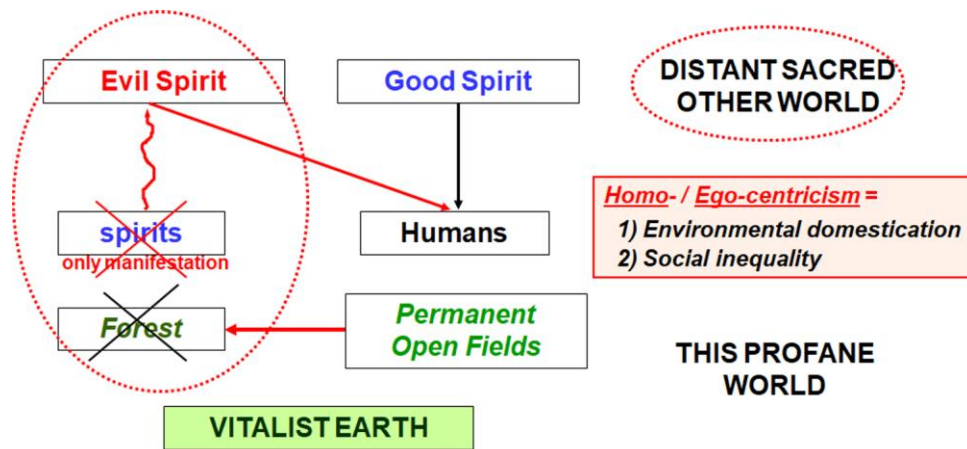


Figure 4. Disenchantment of analogical spiritually bifurcated worldviews.

Animist and spiritually bifurcated worldviews and environmental ethics can be encountered throughout rural Brazil but rarely in pure form. True, the few remaining tribal Amerindians of the Amazon maintain animist worldviews but acculturated indigenous peoples and the mestizo historical peasantry can in greater or lesser degree incorporate animist elements into a spiritually bifurcated Christian worldview,

involving a benevolent God aided by saints pitted against a malevolent Devil, all interfering in mundane affairs. Throughout the rural interior of Brazil, a post-reformation religious outlook, without animist elements and aligned to secular naturalism, was only found among commodity farmers originally from southern Brazil, i.e. exactly the rural actors most engaged in deforestation. Consequently, the focus in this work is on the grey area of hybrid indigenous-peasant rural population situated between the extremes of idealized Amerindians and productivist farmers.

4. Researching environmental ethics and worldview in Brazil

This work is based on more than forty years of research on environment perception and worldview undertaken in four distinct biomes of Brazil: 1) the semi-arid caatinga bushlands of the Northeast (1977-79, 1981, 1994, 2002), 2) the Atlantic Forest of the Southeast (1994-2023), 3) the Amazon rain forest of the North (1975, 1997-2013) and the Pantanal wetlands of western Brazil (2015). Methods and interpretive frameworks shifted through time from Humanist Structuralism to Political Ecology and finally to Relational Ontology. Research in the Caatinga and in the Pantanal wetlands biome is not treated here.

Field research in the Atlantic Forest from the mid-1990s onward used Political Ecology, Environmental Studies and Postmodernist currents in the social sciences to interpret the results. Following these perspectives, research tried to capture cultural variation in environment perception and injustice according to age, gender, ethnic group, level of formal education and religious affiliation as well as according to variation in farming system used and degree of landscape deforestation. In-depth interviews were undertaken with 103 families selected according to cultural differentiation present in three kinds of landscape: deforested, mixed field-and-forest and forested. The enchanted creatures and metamorphic humans were investigated in much the same way that the flora and fauna were in the ethnobiological research conducted. Where were they found? What did they look like? What did they eat? Did some other creature attack or eat them? Were they used as nicknames for certain people in a positive or negative way? I was assisted in the field by undergraduate and graduate students under my direct supervision who were trained to ask about the creatures in an objective way without inducing answers, with a disarming opening question like, "Has anyone seen Curupira around here?", which implies that maybe the interviewer believed in them.

This approach was further refined by adding relational ontology to research undertaken between 1997 and 2013 in the Central and Western Amazon. Research focused on the advancing southern and eastern frontiers situated respectively in the Madeira River valley in southern Amazonas state and the Tapajós valley in western Pará as well as on preserved riverine areas located beyond the frontier. This article adds original material from fieldwork undertaken in Pará in 2008, 2010 and 2013, which did not appear in Hoefle (2009). This was important for comparative analysis because Amazonas is the most environmentally preserved state and Pará the worst. A total of 280 families were interviewed concerning animist elements and religious worldview. Enchanted creatures, metamorphic humans, the evil eye, vitalism

and divine intervention were treated in the same way by my students as we did in the Atlantic Forest but this part of the general questionnaire on farmer livelihoods was often ignored in fieldwork by colleagues who were geotech geographers and biologists, which speaks volumes about their limited view of science.

5. Regional identity, cultural diversity and enchanted worldviews in the Amazon

The Amazon rain forest is considered to be a crucial biome for preventing global climatic change. Ever since the planned colonization projects and massive road building programs of the 1970s, deforestation in northern Brazil has been roundly condemned because it causes loss of bio-diversity, interferes with precipitation patterns and river discharge, releases carbon dioxide through forest burning and by eliminating trees reduces the capacity for absorbing carbon (Davidson et. al., 2012). Against this, the Amazon became one of the world's great laboratories of socio-environmental experimentation, particularly after the end of military rule and the promulgation of a new Brazilian constitution in 1988. A host of global, national, regional, state-level, municipality-level and community-level actors interact in multi-scalar (or if a flat ontology reader prefers trans-local multiple-site) alliances surrounding regional and global environmental, developmental and ethnic issues.

Given the significant and continuing presence of indigenes and riverine peasants in the Amazon, the region possesses a rich lore of spiritual entities of animist origin which are thought to live in the forest (Curupira mother protectors of the forest, giant Mapinguari monsters, Juma and Martin Amerindian-like spirits) and the rivers (mother protectors of the rivers, enchanted pink dolphins, lara sirens, giant snakes). In the most general way, these beliefs are held to varying degrees by Amerindians and hybrid peasants in preserved parts of the region, while settlers who come from deforested regions of Brazil do not believe in the local lore. However, even among the historic population, a subtle variation from belief to disbelief in the different elements of an enchanted worldview exists according to socio-spatial background of different individuals and regarding how the spiritual entities might, or might not, be related to hunting and farming and hence to environmental conservation.

Biology as taught in school approaches the subject of worldview treated here in dualistic terms: either an individual believes in the supernatural entities (and is *traditional* or *superstitious*) or does not (and so is *modern* and *rational*). However, reality in the Amazon is far more complex. A person can believe in a large number of spiritual entities and forces as well as selectively in some and not others or even only in one spirit (which he or she may have had what was considered to be actual contact) and does not believe in any of the others. A shade below this kind of certitude is the view that the spiritual entity has never been seen but the person has an open mind that it does or might exist and one day it may still be encountered. The same response with a different tone of voice expressing doubt moves in the direction of disbelief. Finally, the blanket denial of "not believing in any of that idiocy" is an answer of absolute disbelief.

At first glance, when comparing the worldview of the local population present along the rivers and highways who are from the less developed North and Northeast, on one hand, with that of individuals from

the developed Central-West, Southeast and South, on the other, it would seem that the use of non-productivist or productivist agriculture is decisive for worldview disenchantment (Table 1). The worldview present in areas of riverine farming is still highly enchanted with the majority of people believing in a number of enchanted forest spirits, such as Curupira and Mapinguari, and in one or more enchanted river creatures, such as giant snakes and sirens. At the other extreme, large productivist commodity producers, who arrive from deforested agribusiness regions of Brazil, do not believe in or are unfamiliar with the enchanted spirits of the Amazon, nor do they believe in those in their regions of origin. A similar relationship exists between belief in spiritual intervention into farming with almost all of the riverine peasants believing in divine help and most in diabolical harm and many in the evil eye while the opposite occurs with commodity beef and soy farmers. With regard to a vitalist view of the land, only the most productivist and highly educated farmers had a materialist view of a separate Nature to be dominated with high tech farming while most everyone else held a vitalist view of the land and water as living entities that are crucial for maintaining all life.

Animist & spiritually bifurcated elements	Amazon rivers	Amazon roads	Urban Amazon	North-east	Center-West	South, Southeast
<i>Belief in animist forest spirits</i>						
2 or more spirits	59.0	55.9	28.6	17.3	11.1	11.5
1 spirit only	8.3	8.8	7.1	11.5	11.1	7.7
never seen	11.1	2.9	0	23.1	22.2	0
not exist	21.6	32.4	64.3	48.1	55.6	80.8
Total	100.0	100.0	100.0	100.0	100.0	100.0
<i>Belief in animist river spirits</i>						
2 or more spirits	42.0	26.7	0	9.4	0	5.5
1 spirit only	21.9	36.7	33.3	9.4	55.6	5.5
never seen	9.2	6.6	0	21.9	11.1	0
not exist	26.9	30.0	66.7	59.3	33.3	89.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
<i>Belief in vitalism and spiritual interference in farming</i>						
evil eye	42.2	36.4	22.2	30.2	20.0	10.0
divine aid	70.3	77.8	87.5	83.9	60.0	50.0
diabolical harm	66.7	64.7	50.0	25.8	40.0	0
vitalism	97.6	94.7	75.0	96.7	50.0	66.7

Table 1. Belief in animist spirits of the forest & rivers, vitalism and spiritual interference by regional origin (%).

Source: Field research, 2002-2013.

However, the high level of disbelief among people who come from urban areas of the Amazon shows that the relationship is much more complex than mere technical determinism whereby natural risk is supposedly controlled with productivist farming methods. As will be seen below, other influences, such as level of education and class position are more important. Urban individuals are highly disbelieving of river spirits but then most people do not believe in enchanted dolphins which causes overall belief in river spirits to fall. This is clearly the case of farmers of southern Brazil who had higher levels of education and did not believe in enchanted spirits while some farmers from the same regions who had low levels of formal

education did. Consequently, regional origin involves an aggregate of technical, social and ideological influences.

This can be seen when worldview is related directly to specific farming systems and to whether the person is a farmer or a worker (Table 2). Without doubt, small non-productivist farmers along the rivers and highways have a more enchanted worldview and productivist farmers situated along rivers and highways less so, but the relationship swings up and down according to whether the person is a farm owner or a worker, which suggests the greater importance of class position and access to higher education rather than mere technical control of natural processes.

Animist & spiritually bifurcated elements	Riverine farming systems				Road farming systems						
	Above flood plain peasant	Above flood plain capitalized	Flood plain peasant	Flood plain capitalized	Peasant	Small capitalized		Medium capitalized, cattle ranching		Commodities	
						farmer	worker	farmer, rancher	worker	farmer	worker
<i>Belief in animist forest spirits</i>											
2 or more spirits	62.8	21.4	59.5	32.5	23.3	32.7	66.7	27.8	29.4	0	20.0
1 spirit only	14.3	7.2	5.4	14.0	16.7	11.5	33.3	0	29.4	0	0
never seen	4.3	0	10.8	7.0	15.0	1.9	0	0	17.6	0	40.0
not exist	18.6	71.4	24.3	46.5	45.0	53.9	0	72.2	23.6	100.0	40.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<i>Belief in animist river spirits</i>											
2 or more spirits	47.9	25.0	50.0	31.8	21.0	7.9	20.0	12.5	12.5	0	0
1 spirit only	20.8	12.5	20.0	27.3	17.7	13.2	40.0	6.2	0	0	40.0
never seen	4.2	0	6.7	11.4	8.1	2.6	0	0	0	0	20.0
not exist	27.1	62.5	23.3	29.5	53.2	76.3	40.0	81.3	87.5	100.0	40.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<i>Belief in vitalism and spiritual interference in farming</i>											
evil eye	36.5	14.3	68.0	24.4	36.5	29.8	81.3	16.7	50.0	0	0
divine aid	73.7	75.0	85.7	100.0	73.3	100.0	100.0	75.0	33.3	50.0	100.0
diabolical harm	69.6	75.0	50.0	60.0	50.0	57.1	100.0	25.0	0	0	0
vitalism	92.9	100.0	100.0	100.0	86.4	100.0	100.0	25.0	100.0	60.0	100.0

Table 2. Belief in animist spirits of the forest & rivers, vitalism and spiritual interference according to farming system and local environment.
 Source: Field research, 2002-2013.

Indeed, non-productivist slash-and-burn agriculture and semi-extensive stock-raising along the rivers and roads involve *lower* environmental and market risk than cropping of sensitive vegetable and fruit crops and productivist rice and soybean farming. This is particularly true for farming above the flood plain which is not subject to flood risk and involves small fields of highly-resilient manioc scattered out in fallows of varying ages. Vegetable and fruit crops for the Manaus market, planted on the flood plains or above, but require the use of expensive crop defensives, are subject to a number of crop pests and may or may not have a viable harvest price which compensates the higher production costs. The same happens with soybean production, the most productivist of Brazilian farming systems, in which even a slight variation in weather can reduce productivity below profitable levels. Production costs are high, produce prices fluctuate and profit margins tight so that this kind of farming involves more environmental risk via market risk and not less.

Techno-economic capitalization is more important for provoking disenchantment by way of greater deforestation, which, in turn, eliminates the abode of the spirits and ultimately belief in them. Historic riverine farming involves a low degree of landscape domestication. Fields are small and forest areas nearby while the opposite occurs with productivist commodity production. Contact with the wilds through hunting and fishing are common for men and the occasional attack of a jaguar or alligator is a risk for all. Men hunt alone or in pairs at night deep in the forest where all sorts of noises are heard and shadows are seen in the pitch-black darkness, which can be interpreted as encounters with enchanted and extra-ordinary creatures such as Curupira, Mapinguari, Juma and Martin. However, hunters do not avoid specific areas where they might encounter these creatures. The closest thing I encountered was one man living on the advancing frontier of western Pará who thought that he had discovered a lair of Curupira and start avoiding this spot but not a larger territory which this spirit might protect.

Large-scale forest clearing along roads and near cities contributes to environmental disenchantment because it removes the forested landscape in which the spirits live, so that they cease to exist locally and stories about them fade from oral tradition. This applies to peasant, capitalized and productivist farming. Two-thirds of the non-productivist peasants along the roads of western Pará originally came from deforested landscapes of western Maranhão. Consequently, fewer of them believed in forest or river spirits, 36% and 37% respectively.

Deforestation can even trump formal education. One young man with a complete secondary school education (a rarity in the Amazon), who lived on the edge of the medium-sized city of Parintins, stated that forest spirits *used to exist* nearby and that his father had seen them on various occasions but with land clearing they had gone to live in distant forest areas. As he had no direct empirical experience with forest spirits in the future he will probably tell less or maybe nothing at all about them to his children. In another case, one elderly man related tales of enchanted creatures to the author and his grandchildren present were amazed to hear about such entities.

A direct relationship exists between environmental ethics and higher levels of education (Table 3). Of individuals who have not gone to school or have studied up to the primary level, 36% to 45% believed in two or more forest spirits and 21% to 42% in two or more river spirits. After that belief falls off quickly. In interviews, the higher the level the education, the greater was the irritated reaction to questions about the enchanted entities because it seemed that the researcher doubted the person's level of rationality. With this, we see that one ideological aspect, education, strongly influences another, environmental ethics, though even here, not as directly as one might think.

Animist & spiritually bifurcated elements	Illiterate	Incomplete primary school	Primary school*	Incomplete middle school	Middle school*	High school*	University*
<i>Belief in animist forest spirits</i>							
2 or more spirits	36.4	42.2	45.2	34.9	28.6	21.4	0
1 spirit only	15.1	16.9	19.1	20.9	9.5	14.3	0
never seen	19.7	10.8	9.5	9.3	4.8	3.6	0

not exist	28.8	30.1	26.2	34.9	57.1	60.7	100.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<i>Belief in animist river spirits</i>							
2 or more spirits	25.0	21.1	42.4	34.5	30.8	4.7	0
1 spirit only	20.3	26.8	18.2	20.7	7.7	14.3	0
never seen	15.6	8.4	6.1	10.3	0	4.7	0
not exist	39.1	43.7	33.3	34.5	61.5	76.3	100.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<i>Belief in vitalism and spiritual interference in farming</i>							
evil eye	40.0	35.9	38.3	41.5	9.5	21.4	20.0
divine aid	69.2	87.5	77.8	63.6	71.4	45.5	50.0
diabolical harm	48.0	48.0	52.9	44.4	0	10.0	0
vitalism	93.1	100.0	94.7	100.0	100.0	81.8	25.0

* primary school (4 years), middle school (4 years), high school (3 years), university (4 years).

Table 3. Belief in animist spirits of the forest & rivers, vitalism and spiritual interference according to level of education (%).

Source: Field research (2002-2013).

As more primary schools have been opened in rural areas since the democratic reforms of the 1988 Constitution mandated funding universal education, the young of the Amazon have had the opportunity to obtain a basic level of formal education. Girls in turn are more studious so that they go to school for more years, which would lead us to expect that the young and females would be more sceptical of the spirits of the wilds. This does not occur because primary school teachers are local people. Women were in fact *more* believing of both forest and river spirits. With regard to enchanted dolphins, women would relate stories of actual encounters, which involved close relatives and friends, while most men considered the alleged seduction of a maiden by a dolphin to be far too convenient for explaining an inconvenient pregnancy. On the other hand, when taking dolphins out of the equation the majority of men and women believed in the giant snakes.

Finally, the relationship between religious affiliation and belief in enchanted entities reinforces the importance of level of education. During the last few decades Catholicism has been losing members to introduced Protestant sects but religious affiliation and level of education do not follow a simplistic Weberian transition from enchanted folk Catholicism to disenchanting Protestantism and finally to scientific secularism. If this were the case, one would expect that on theological grounds Protestants would react strongly to questions about belief in animist beings because the latter are considered to be manifestations of the Devil. In fact, Pentecostal groups and Cruzistas (members of a traditionalist Catholic movement which arose in reaction to the Vatican reforms of the 1960s) of the poor western part of Amazonas state believed much more in forest spirits (79% and 100% respectively versus 47% for Catholics), a bit less in spiritual interference in farming activities and much more in the area of social behavior (particularly with regard to diabolical interference in the morality of individuals) in which enchanted dolphins are transformed into a manifestation of the Devil. Both Pentecostals and Cruzistas are poor, practice non-productivist farming, live in forested areas and have low levels of formal education, and these traits, rather than the disenchanting influence of religion, explain why so many of them have enchanted worldviews. A few Lutherans were interviewed who had highly disenchanting worldviews but not because their religion demonized the forest

spirits but rather because they were settlers from the South, where productivist farming in domesticated landscapes prevails and high levels of education are common.

6. Deforestation and disenchantment in the Atlantic Forest of Southeast Brazil

The Brazilian Atlantic Forest is considered to be the most threatened biome in Brazil but over the last thirty years considerable regeneration of forest has occurred in response to aggressive policies restricting deforestation. Located in the oldest area of European colonization in eastern Brazil, deforestation has surged and ebbed over time according to commodity export cycles and progress in national industrialization. This caused widespread conversion of tropical woodlands into fields and cities so that by 1990 only 5% to 8% of the original land cover remained (Andrade, 1973; Dean, 1995). After decades of aggressive measures for promoting environmental preservation this process was reversed. Today, the Brazilian census bureau IBGE reports that 27% of the biome is now in primary and secondary forest cover (IBGE, 2023).

The study area included five municipalities straddling these mountains at the point of transition from essentially rural areas located inland to the metropolitan region of Greater Rio de Janeiro situated on the Atlantic seaboard. Within these municipalities three kinds of landscapes were researched according to the farming system used and the degree of deforestation present: 1) productivist vegetable farming undertaken in completely deforested areas located on the leeward side of the mountains between 600 to 800 meters altitude which had once been important for coffee growing, 2) productivist and post-productivist vegetable farming in a mixed field-and-forest landscape located in mountain valleys at altitudes between 800 and 1,000 meters, which were too high for coffee growing in the past and 3) non-productivist shifting-field farming in forested areas located on the steep windward escarpment at 200 to 1,100 meters altitude, which were too humid for viable coffee growing.

Poor farmers of the windward escarpment were the ones most impacted by environmental preservation legislation passed at the turn of the century. Cutting secondary forest in medium-length fallow areas became illegal so in practice these farmers lost up to two-thirds of their productive land. This summed up with their children leaving for urban jobs meant that elderly farmers with more than 60 years of age made up 58% of land owners interviewed in 2011, i.e. five years after the ban on cutting fallow forest came into effect. These farmers had great difficulty in planting more lucrative crops that demanded more labor input and basically specialized in bananas which as a permanent crop did not require much work but afforded little income. Many farmers and their heirs ended up selling out to urban people from the metro area who built second homes in the nearby mountains.

As the biome was deforested and the Amerindians killed off or died off from introduced diseases, enslaved and “acculturated” or simply expelled centuries ago, the Atlantic Forest possesses little animist lore, basically just the forest spirit Curupira. In addition, an African derived spirit of the countryside is recognized as well as metamorphic werewolves of European origin. In the research few productivist farmers

on the leeward side of the mountains and in the mountain-valleys had heard of Curupira (a.k.a. Caipora) and when they had they did not really know what it was. Only one boy remembered a story that his grandfather had told him about giving porridge to Caipora in a hunting context at the beginning of the 20th Century when the local landscape was still predominantly forested but he did not know why his grandfather did this.

The worldview in areas of non-productivist agriculture of the forested windward side of the mountains was found to be highly enchanted with half of the farmers believing in Curupira, 80% in Saci and 85% in werewolves in the 1990s. Much more was known about Curupira and descriptions matched those encountered in areas of peasant agriculture elsewhere in Brazil. The spirit was said to have the appearance of a small Amerindian man who is half-human and half-animal. His feet are pointed backwards, he has pointed ears and fur and he is mounted on a peccary. Curupira eats wild fruit and as "chief of the forest" controls human hunting activities so as to maintain a balance between kills and reproduction. There was a common tale related about a hunter who killed five peccaries. Curupira suddenly appeared and complained that five peccaries were more than the man could eat. With a wave of his hand, Curupira brought four of the animals back to life, sent them scurrying off into the forest and told the hunter that he should consider himself lucky that he had left him one peccary to take home.

Saci Pererê and werewolves are also human-like rural spirits but unlike Curupira they do not live only in deep forest which might explain why these spirits were well-known in more deforested landscapes even if the productivist and post-productivist farmers there did not believe in them. Saci Pererê had the appearance of a little black man who wears a red cap, smokes a pipe and has only one leg. However, unlike Curupira, Saci had no clear environmental or social function other than to play tricks on humans. Werewolves were described as men who temporarily were transformed into large hairy dog-like creatures with long ears, large teeth and claws. Their function was social rather than environmental. A man became a werewolf because he was evil, was mentally disturbed or did not believe in God.

The higher proportion of people who believed in these spirits in the area of non-productivist agriculture was also related to the poor lighting facilities. At the time of the first research in the 1990s, most farmers of the forested escarpment did not have electricity and transport was still by horseback so that there were numerous tales of close encounters with spirits at night on dark lonely roads. The name for spirits in Portuguese, *assombrações*, evokes the image of terrifying nocturnal encounters: the root *sombra* literally means shadow in the supernatural sense. This can be seen in the answer received when one productivist farmer stated half-jokingly that the electricity company had done away with belief in spirits. He explained his answer: before electricity and proper lighting, they had lived in *darkness*, so when a strange shadow was seen moving about at night it was assumed to be a spirit.

With regard to religious worldview, Rio de Janeiro is where Pentecostal Protestantism has made more inroads in Brazil and the zone of productivist vegetable farming in the mountains is even more Protestant than the metropolitan area. This raises the question: did Protestant farmers have more secular

worldviews, eradicate traces of animism and so deforest their land more? On theological grounds Protestants usually reacted strongly to questions about belief in animist beings. When asked about Caipora/Curupira, Saci Pererê and werewolves the usual response was that the only thing that really exists was Jesus Christ and the rest was merely superstition. This notwithstanding, 17% of the interviewed Protestants were found to believe in Saci and in werewolves because of personal encounters in which they claimed to have actually seen these creatures. However, this was explained away by their neighbors who considered such sightings to really be the Devil in disguise.

For Protestants the Devil is everywhere and is always ready to tempt individuals into sin, especially young maidens. In fact, it is advisable to not even mention his real name and instead refer to him as The Bad Thing. This view of the omnipresence of the Devil and in particular Protestants having distilled the country spirits into manifestations of the Devil amused Catholics. When asked about bush spirits one Catholic man remarked to the general laughter of all present that they no longer existed locally because The Bad Thing arrived and scared them all off.

Nevertheless, for Protestants this struggle with the Devil was limited to social affairs and rarely enters farming. Religious worldview by itself was found to be of marginal importance for provoking deforestation. In the productivist landscapes of the leeward side of the mountains on average Protestants were indeed found to have only 7% of the forest cover remaining on their farms while Catholics had 15%, which is hardly a significant difference. Similar average figures were encountered in zones of productivist agriculture in the mountains, where 8% and 15% of farms were still forested respectively for each religious group.

Problems with crop disease or poor luck with produce prices were also never attributed to the Devil by Protestants. Nor did God have much to do with these problems either. His help could on rare occasion be invoked when mundane productive problems became unbearable but it was far more common to ask for divine intervention only for very serious health problems like a grave illness or a snake bite. Local Catholics behaved similarly and did not invoke the saints as assiduously as in the North and Northeast of Brazil.

What made a greater difference in forest cover in the mountain valleys and the windward escarpment was the farming system used. Before the 2006 ban on cutting secondary growth in the Atlantic Forest biome, non-productivist farmers usually had about a fifth of their highest land in primary forest and two-thirds of the rest in varying stages of fallow. Farmers who used conventional productivist farming there deforested their land just like farmers did on the leeward side of the mountains. Farmers using newer alternative post-productivist methods in the mountains on the other hand had let their steepest marginal lands revert to secondary forest which covered 37% of their property versus only 9% for farmers using productivist methods. Farmers using post-productivist methods stated that they wanted the forest cover to protect water sources for irrigation and to have access to fence post and crop stake materials, the cost of which had become extremely expensive even before the 2006 ban.

Reinforcing the thesis of the importance of farming systems vis-à-vis worldview is the fact that enchanted worldviews did not come back again with the re-growth of forests. None of the post-productivist farmers had heard of Curupira or believed in Saci and werewolves. Finally, it should be noted that most farmers, irrespective of the agricultural system used, retained an organic-vitalist view of the environment in which land, water and even rocks for some are considered to be alive. Consequently, it is possible to have a spiritually disenchanted view of farming in function of the productivist methods employed but the propagation of a materialist mechanistic attitude involving an inert nature depends on the level of formal education attained. As most farmers engaged in productivist farming in deforested areas did not finish primary school they did not study natural sciences in school and so still retained an organic view of the land common in disenchanted spiritually bifurcate worldviews. At the time of the original research, this view of the land was only changing in the mountain valleys where formal educational attainment was higher and students went on to secondary school where they had contact with agronomic, biological and physical sciences.

7. Conclusion

This work dealt with complex processes which lead to environmental disenchantment, loss of animist traces and metaphysical interference in general. Particular emphasis was attributed on the role of formal education and the use of productivist farming systems in deforested landscapes. The use of productivist farming was related to social class and formal education attainment. However, women and the young also attain higher levels of education but this does not always lead them to be more disbelieving. This depends on the level of education achieved, especially from middle school onward when students have contact with secular biology. We also saw that having a vitalist worldview also depends on formal education. Vitalism can continue even after disenchantment and adopting productivist farming if levels of education do not go beyond primary school.

Productivist farming also provokes disenchantment in an indirect manner through removing woodlands. No forest, no Curupira. Once the lore is lost through deforestation it does not come back with the regeneration of forest as we saw among post-productivist farmers of the Atlantic Forest. Believing and disbelieving are also part of regional identity. Settlers who come from deforested regions where lore was lost in the past are doubly disbelieving, of the lost lore in their place of origin as well as any local lore which was not part of their upbringing. The Weberian Catholic-Protestant-secular transition was also disproven for Brazil because Pentecostals are usually poor or middle class at best and so receive less formal education.

However, we must not see this as a linear process for which there is no recourse. Ontological environmental injustice can be overcome in much the same way as the more usual forms of environmental injustice involving expelling native peoples and poor peasants from within biocentric conservation units.

Therefore, steps toward overcoming this kind of environmental injustice identified in the research should involve promoting socio-ecological ontology in school and in local development policy by:

- 1) Promoting wider socio-ecological networks connecting local actors to like-minded regional and national GOs and NGOs in order to protect their legal rights;
- 2) Adopting a trans-disciplinary approach to conservation and sustainable development which unites specialized knowledge from the natural and the human sciences in consonance with detailed local knowledge;
- 3) Training extension agents and conservation staff in both the natural and human sciences in order to learn how to deal with people, to comprehend traditional livelihoods and to understand that social reproduction is much more than biological subsistence, and
- 4) Implementing socio-ecological development that goes beyond mere preservation of “natural” species within what are really only wildlife refuges by also by promoting viable economic activities with low carbon footprints that improve local livelihoods and promote social equity within the whole of a national territory.

Bibliography

- ADAMS, W. & MULLIGAN, M. (2003). *Decolonizing nature*. London: Earthscan.
- ANDRADE, M. (1973). *A terra e o homem no Nordeste*. São Paulo: Brasiliense.
- BERLIN, B. (1992). *Ethnobiological classification*. Princeton: Princeton Univ. Press.
- BICALHO, A. & HOEFLE, S. (2022). Conservation and dispossession in the Pantanal wetlands of western Brazil, In M. H. Pina, F. Martins, A Rocha (Eds.). *The Overarching Issues of the European Area: Sustainable Development and Territorial Preservation in a Globalized World*. Porto, Faculdade de Letras da Universidade do Porto. pp. 202-221.
- BUMPUS, A. G. & LIVERMAN, D. M. (2011). *Carbon colonialism?* In R. Peet, P. Robbins & M. J. Watts (Eds.), *Global political ecology*. Milton Park: Routledge, pp. 203-224.
- 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.
- DEAN, W. (1995). *With broadax and firebrand*. Berkeley: Univ. of California Press.
- DESCOLA, Ph. (2013/2005). *Beyond nature and culture*. Chicago: Chicago Univ. Press.
- EVANS-PRITCHARD, E. (1937). *Witchcraft, oracles and magic among the Azande*. Oxford: Clarendon.
- FRAKE, C. (1964). *Notes on queries in ethnography*. *American Antropologist* 66 (3), 132-145.
- HOEFLE, S. (1995). *Igreja, catolicismo popular e religião alternativa no sertão nordestino*. *Revista de Ciências Sociais* 26 (1): 24-47.
- HOEFLE, S. (2009). *Enchanted (and disenchanting) Amazonia*. *Ethics, Place and Environment* 12 (1), 107–130.
- HOEFLE, S. (2019). *Ghosts in the forest*. In C. GRIFFON, 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.

HOEFLE, S. (2023). *Spirits in the wood: a relational socio-ecology of the Brazilian "wilds"*. Treballs de la Societat Catalana de Geografia 96, 33-66.

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

IBGE (Instituto Brasileiro de Geografia e Estatística). (2023). *Biomass brasileiros*. Available at <https://educa.ibge.gov.br/jovens/conheca-o-brasil/territorio/18307-biomass-brasileiros.html> [accessed 03/12/2023].

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

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

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

LEHMANN, D. (1996). *Struggle for the spirit*. London: Polity.

MACHEQUEIRO, R.R. (2023). *The carbon calculation*. Tucson: Univ. Arizona Press.

MATTA, R. (1973). *Um mundo dividido*. Petrópolis: Vozes.

MERCHANT, Carolyn (2005). *Radical ecology*. 2nd edition. London: Routledge.

PEPPER, D. (1996). *Modern environmentalism*. London: Routledge.

REICHEL-DOLMATOFF, G. (1976). *Cosmology as ecological analysis*. Man 11, 307-318

SAHLINS, M. (1966). *Tribesmen*. Englewood Cliffs: Prentice Hall

SCHNEIDER, J. (1990) *Spirits and the spirit of capitalism*. In E. BADONE (Ed.), *Religious orthodoxy and popular faith in European society*. Princeton: Princeton University Press, pp. 24-54

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

SMITH, N.J.H. (1996) *The enchanted Amazon rain forest*. Gainesville: Univ. of Florida Press

SOUZA, L.M. (1987). *O diabo e a terra de Santa Cruz*. São Paulo: Companhia das Letras.

STOLL, D. (1990). *Is Latin America turning protestant?* Berkeley: Univ. of California Press.

TRIGGER, B. (2003). *Understanding early civilizations*. Cambridge: Univ. of Cambridge Press.

WHATMORE, S. *Hybrid geographies*. London: Sage, 2003.

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