

FOREST TRANSITION AND ECOLOGICAL MODERNIZATION: EUCALYPTUS FORESTRY BEYOND GOOD AND BAD¹

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Introduction: the relation between ecological modernization and forest transition

From the dawn of environmentalist movements in the 1960s, factors contributing to the degradation of the environment have overshadowed factors that have improved its quality (BUTTEL, 2000). However, since Brundtland's Report was published in 1987, there has been a progressive tendency to consider the relevance of improving the quality of the environment in order to understand and strengthen mechanisms of social change. Thus, theories emerged that emphasized the equal if not greater importance of explaining improvement rather than degradation.

Among these theories, ecological modernization falls within the context of reflexive modernization, which not only presents a radical modernity as opposed to traditional industrial categories and modes, but also emphasizes the growing role of subpolitics as a force for bringing about social transformation (BECK, 1992, 1995; BUTTEL, 2000).

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Subpolitics is here understood as the irruption of politics away from hierarchical and formal responsibilities. In other words, the “brain” of society, which predicts, monitors and decides can no longer be located (BECK, 1995, p. 30; 53). Differently from perspectives which see technological development as problematical, ecological modernization defends technological progress as a possible means to address environmental problems (FERREIRA; SEIXAS, 2010; MOL; SPAARGAREN, 2000; OLIVIERI, 2009).

Ecological modernization, which is aligned with ideas of a sustainable society and a low carbon economy, comprises a relatively optimistic theoretical body of work: environmental quality can go hand in hand with economic development, as long as economic institutions and mechanisms undergo reforms in accordance with ecological rationality criteria (MOL, 1997). Spaargaren (2000) identifies the ecological sphere’s growing autonomy, not anymore confined to the economic sphere. In other words, this theory sets out to analyze how institutions and social actors can integrate environmental concerns into their everyday lives, transcending the divide between ecology and economics (GUIVANT, 2009).

Similar to ecological modernization, the Forest Transition Theory (FTT) identifies a potentially positive relationship between economic development and environmental quality. The term forest transition, initially proposed by Mather (1992), refers to a change in the characteristics of land use from a period when forest cover was in a state of continual reduction to one when forest cover is predominantly expanding. FTT aims to cast light on the causes and mechanisms of this phenomenon, relating it predominantly to economic development. As industrialization and urbanization intensify, changes in social and economic forces stimulate the abandonment of agricultural land. Some of this land converts to forest by means of secondary succession, tree-planting or both and, at some point, the increase in forest cover exceeds losses due to deforestation, thus marking the transition (RUDEL, 1998). Debates on forest transition have implications for studies on the human dimensions of global environmental change and for the creation of policies that can promote forest conservation and restoration (KLOOSTER, 2003).

We can clearly see similarities between the two theories, such as the focus on the processes of environmental improvement and the possibility that this improvement takes place alongside economic development; the association of development with democratization; technological progress, industrialization and urbanization as driving factors of environmental improvement; the emphasis on the Nation-state as a unit of analysis; the emphasis of transitions as gradual, smooth and non-linear changes; the tendency towards universalism, determinism, and isomorphic transitions.

FTT has been subject to criticism, some of which can be applied to the general context of reflexive modernization. Perz (2007a; 2007b), for example, argues that the greatest limitations of the FTT relate to its similarity to modernization, particularly the frequent use of universal arguments that disregard contextual causes. One of the most relevant criticisms of the case at hand is that these theories, when used as a discourse, can legitimize a political culture that absolves the agents of environmental destruction and the State from their responsibilities (BUTTEL, 2000).

Despite acknowledging the validity of these criticisms, Buttel (2000) argues that it is worth making an effort to overcome these problems. He claims that ecological modernization has the potential to mitigate the pessimism and the lack of attention to processes of environmental improvement, characteristics which have been at the materialist core of environmental sociology. One of the suggestions put forward by this author is that comparative perspectives should be adopted to make reflexive modernization appropriate to the context of developing countries.

With regard to FTT, studies carried out in Argentina (GRAU et al., 2008), Brazil (BAPTISTA; RUDEL, 2006; PERZ; SKOLE, 2003; WALKER, 2012), El Salvador (HECHT et al., 2006), Mexico (BRAY; KLEPEIS, 2005; KLOOSTER, 2003), Puerto Rico (AIDE et al., 2000) and Vietnam (MEYFROIDT; LAMBIN, 2008), among others, suggest that there is considerable complexity in terms of the mechanisms involved in forest cover dynamics and in land use and cover change. This raises concerns regarding the wider applicability of the existing models of forest transition. In general, these studies have highlighted the importance of processes undertaken at sub-national and supranational levels, of local social institutions, and of cycles of land use and cover change taking place over relatively short periods of time.

Methodological aspects

The purpose of this paper is to analyze the case of eucalyptus monocultures, focusing on the role of forestry industries.

We explore the analytical possibilities that an ecological modernization perspective can add to the debate on forest transition, addressing the issue of whether or not to include forestry monocultures and assessing the indirect influence these monocultures may have on the recovery of native forest cover.

Our analysis is based on general observations of the controversy around eucalyptus in Brazil, focusing in particular on the case of São Luiz do Paraitinga, in the state of São Paulo. In addition to the literature and media content, we carried out thirty-nine semi-structured interviews with managers, businessmen, environmentalists, land owners and rural inhabitants from S.L. do Paraitinga, as well as a representative from Fibria¹. Furthermore, there was a direct observation of six municipal council meetings (Environment, Rural Development and Planning). Fieldwork was carried out between March 2010 and September 2011.

Eucalyptus monoculture in Brazil

Debates on the social and environmental impact of eucalyptus plantations are intense and controversial. Various papers address their advantages and disadvantages (e.g. AB'SÁBER et al., 1990; CANNELL, 1999; FEARNSSIDE, 1998; LIMA, 1996; SCHÜTZ, 2008; VIANI et al., 2010) and there are many arguments that seem to create a clear divide between the pros and the cons, the 'truth' and the 'myths'.

Commercial forest plantations are a complex issue and require “a non-essentialist or dichotomous perspective to understand how environmental dynamics and demands become part not only of the discourse, but also of the practice of powerful economic actors, potentially resulting in unexpected consequences that may affect the relationship between production and consumption in the new framework of market globalization” (GUIVANT, 2009, p. 194).

In this paper, we start from a plausible hypothesis to open up another line of argument: eucalyptus plantations have the potential to benefit the environment by favouring the connectivity and the conservation of native forest remnants close to forestry plantation fields. The objective is not to test the hypothesis but to use it as a basis for critical reflection.

This choice is based on studies suggesting that eucalyptus plantations: do not show evapotranspiration rates that exceed those of native forests (ALMEIDA; SOARES, 2003; CANNELL, 1999; LIMA, 1996); are used by fauna for shelter, transit and foraging (LYRA-JORGE et al., 2008; MAZZOLLI, 2010; PENTEADO, 2006; TIMO, 2009); and allow undergrowth, rich in native vegetation, to develop (TABARELLI et al., 1993; VIANI et al. 2010).

Thus, the environmental impact of eucalyptus depends on how plantations are managed, and they possibly have ecological functions that are more favourable for recovery via secondary succession than pastures. This and other empirical evidence have shown that eucalyptus plantations are not necessarily the ‘green deserts’ that they are often claimed to be. However, given that any generalization should be treated cautiously, it is important to bear in mind that this depends on the effective implementation and evaluation of the management system proposed for each case.

Two other observations support the hypothesis we presented above. The first is linked to the history of forestry in Brazil, which can be divided into three phases: (i) the period before tax incentives, up to 1965, which focused on adapting species to the land and climate, and on cultivation techniques; (ii) the period of tax incentives, between 1965 and 1988, when Brazil had the largest surface area of eucalyptus plantations in the world and there was considerable deforestation to accommodate homogenous forest plantations; and (iii) the period after tax incentives, from 1988 until today (CERQUEIRA, 2008).

Currently, companies in this sector seek environmental certification (e.g. ISO 14.000, Cerflor and FSCⁱⁱ), which means they have to abide by certain international criteria and standards. The most coveted endorsement for forestry companies, FSCⁱⁱⁱ, involves, among other criteria, adhering to international laws and agreements, providing reassurances regarding land ownership and use, respecting the rights of indigenous and traditional populations, preserving and improving the well-being of communities and workers, drawing up a management plan, monitoring and evaluating forest management and its impacts, and preserving areas with high conservation values (FSC BRASIL, 2011).

The second observation is related to forest products, including cellulose, wood and vegetable charcoal. As far as is known, if these are not extracted from plantations then they are extracted from native forests.

The demand for these products is rising (FEARNSIDE, 1998; VIANA, 2004); hence, it is even more important for plantations to be managed according to environmental quality criteria. A study carried out by the Chamber of Deputies' legislative advisory service is revealing:

It seems evident that large-scale eucalyptus plantations, such as the ones that were introduced in Brazil from the mid-1960s, much like any other plantation under the same conditions, produced and still produce, the aforementioned environmental and social impacts. One must not forget that a large number of homogenous reforestations were established when legislation and environmental awareness were still incipient. Nowadays, mistakes made in the past cannot be repeated. [...]

Indeed, if attitudes towards our culture of waste do not change, if we do not invest in the reuse and recycling of paper and other materials, in ten years the business sector will require millions more hectares of eucalyptus plantations to meet external demand, which will exacerbate the environmental and social impacts we observe today.

Currently, it is up to the government to find the means of making their proposal for small-scale eucalyptus plantations feasible. It is clear that environmental impacts will be significantly reduced and social gains will be achieved through the use of techniques for combining homogenous plantations and native forests, and of agro-forestry systems; employing tools such as forest certification schemes and complying with environmental legislation regarding permanent preservation and legal reserve areas; and respecting traditional communities. (VIANA, 2004, p. 24; 27)

Even if certification schemes are not perfect and cannot guarantee that certified areas are actually complying with all of the requirements (see ARGÜELLO, 2010 and LEYTON, 2008), it is a step forward for a sector plagued by accusations of environmental degradation and disrespect for human rights. Despite improvements in its position regarding sustainability – and the fact that in this it has been a pioneer in Brazil (Carlos A. Joly, personal communication) – the sector associated to the eucalyptus production chain is still stigmatized by its past practices and faces resistance from diverse sectors of society.

The forest production chain has been majorly influenced by consumers demanding certified and 'eco-friendly' products. Similar to other economic sectors, sustainability is central to marketing strategies in the forestry sector. The foreign market is one of the main incentives for this interest in certification (FEARNSIDE, 1998; VIANA, 2004), highlighting globalization as one of the drivers of environmental improvement, and not merely the cause of destruction (MOL, 2000).

This provides support for the hypothesis that eucalyptus monoculture can benefit the environment. Supposing that this were the case in all cultivated areas and would therefore positively influence the recovery of surrounding native forests, does it follow that forestry monocultures should be included in calculations on forest transition? The simple answer is no.

This argument is based on an empirical reality which the authors know about – eucalyptus monoculture in Brazil, more specifically in the state of São Paulo (FARINACI, 2012) – although we suspect it is also applicable to several other places (e.g. GERBER, 2010; ROBBINS; FRASER, 2003; SCHÜTZ, 2008).

The first argument for not including forestry monocultures in forest transition calculations is that, despite benefits they may have regarding other land uses, homogenous plantations of forest species are not forests, *stricto sensu*. The inclusion of forestry plantations in forest transition is underpinned by the FAO's (United Nations Food and Agriculture Organization) definition of forests (LAMBIN; MEYFROIDT, 2010), which in itself is being challenged^{iv}. Both ecological and social dynamics are different in forestry monocultures and native forests. Furthermore, eucalyptus plantations serve primarily to economic purposes and periodic fluctuations occur in their area depending on the harvesting cycle (for cellulose, usually a seven year cycle).

Secondly, as previously mentioned, there are socio-environmental liabilities that companies assume with local populations (VIANA, 2004, p. 26), and by extension, with society as a whole. By ignoring or underestimating this fact, forest transition theorists would be condoning an environmental management logic based on a *fait accompli* (SCHÜTZ, 2008).

Thirdly, the alleged contribution of forestry monocultures to capturing atmospheric carbon (LAMBIN; MEYFROIDT, 2010) seems to be somewhat uncertain due to the balance between emissions and sequestration throughout the production chain of eucalyptus. As for native forests, there is little doubt as to their contribution to the climate (FARINACI, 2012).

Therefore, would it be appropriate to ignore homogenous forest plantations in debates on forest transition? Once again, the answer is no. Although different from native forests, forest plantations are not like other crops, as can be observed in ecological research (e.g. ALMEIDA; SOARES, 2003; CANNELL, 1999; LIMA, 1996; LYRA-JORGE et al., 2008; TABARELLI et al., 1993; TIMO, 2009). They provide the possibility of economic development and income generation linked to environmental improvement. As well as benefiting the recovery of native vegetation they can contribute to preventing erosion, moderate local temperature, provide transit and shelter for fauna, and supply wood, among others benefits.

Brazil is in prime position to exploit this type of activity, given that it has large areas perfectly suited to forestry (FEARNSIDE, 1998). However, it is essential to plan where plantations are established and how they are managed, as well as consider concerns of a social nature.

In this scenario, the ecological modernization perspective contributes to an understanding of the issue. Sub-politics has a crucial role in balancing the economic objectives of the industry with a type of economic development that is environmentally responsible and socially just.

Scientific advances are also essential to find alternative production systems that are less harmful to the environment (including people).

São Luiz do Paraitinga is an example of the complexity of factors involved in eucalyptus monocultures and provides some indication of how these can be addressed.

Controversy around eucalyptus monocultures in São Luiz do Paraitinga

São Luiz do Paraitinga is a municipality with around 10,000 inhabitants, situated within the crystalline plateau on the inland side of the Serra do Mar mountain range, in the meso-region of the Vale do Paraíba in São Paulo (Figure 1) (IBGE, 2010; PETRONE, 1959). The municipality's architectural heritage is considered to be the most important in the State of São Paulo. As well as the architecture, traditional manifestations of the intangible cultural heritage are prominent features, such as the Holy Ghost Festivities, carnival processions, the *Cavallhada* Festival (enacted medieval tournament on horseback), folk dancing, myths and legends. Natural heritage is also one of its significant features: 10% of the area of the municipality is within the Santa Virgínia Centre of the Serra do Mar State Park and 13% is within its buffer zone (VILLANI, 2007).

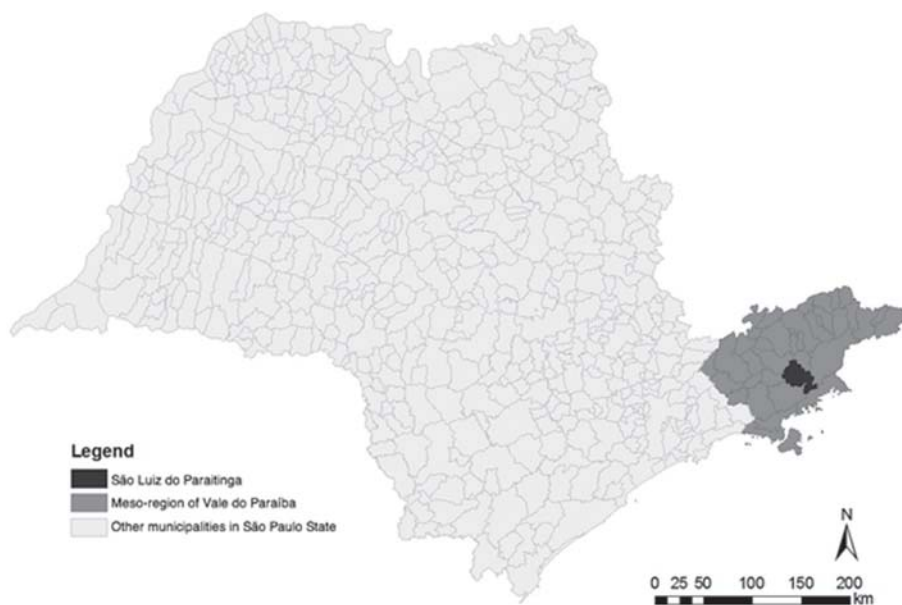


Figure 1: Location of São Luiz do Paraitinga municipality in the State of São Paulo and in the meso-region of the Vale do Paraíba

At the start of fieldwork in São Luiz, while researching the increase of native forest cover, the controversy concerning eucalyptus monoculture came to light (FARINACI, 2012). During interviews it was a recurring theme: the economic and environmental advantages and disadvantages of eucalyptus monoculture were always mentioned. Many different views were expressed: eucalyptus monoculture was seen

both as an economic alternative and as a threat to the customs and livelihoods inherent to this rural area (SILVEIRA, 2008).

The narratives often mentioned, generally in reference to large plantations, the following points: that “eucalyptus dries the water”; the abrupt change in the landscape; damage to local roads; the lack of economic benefits for the municipality; water contamination caused by herbicides; concern with what could be produced on lands once the eucalyptus was removed; and isolation among rural inhabitants.

Benefits were also mentioned, especially the presence of wild animals in eucalyptus forests and the advantages of using eucalyptus instead of native wood.

In this regard, João Paulo Villani (interviewed on 04/2010), manager of the Santa Virgínia Centre of the Serra do Mar State Park, observes that eucalyptus plantations are beneficial to the conservation of the park as there is fire control and animal movement is encouraged. In his view, the main threat to the park is livestock grazing, mainly because land is cleared using fires, and these can spread to native forests. In addition, he estimates that between 40% and 50% of the area of the properties used for forestry are maintained as areas of permanent preservation (APP), which consequently generates “enormous reserve areas outside the park, unlike cattle farming.”

In the region of the Vale do Paraíba, the expansion of eucalyptus plantations in the last two decades has been controversial and led to protests by sectors of society concerned about environmental and social impacts (ARGÜELLO et al., 2009; ARGÜELLO, 2010; SATO et al., 2005). In São Luiz do Paraitinga, where 8% of land is covered by eucalyptus (CANTINHO et al., 2011), by virtue of public civil actions the expansion of eucalyptus plantations is prohibited, as is the transportation of logs on certain roads. In addition, the municipal Directive Plan restricts the area used for forest plantations of exotic species to a maximum of 18% of the area of the municipality. These two legal instruments will be analyzed below to explore the relations that have developed around the issue of eucalyptus plantations in the municipality.

Public Civil Action

The legal dispute concerning eucalyptus monoculture in São Luiz do Paraitinga involves the historian Marcelo Toledo, a local resident. He recalls that it all started in 1999 when he was researching traditional religious festivals (information provided in an interview on 01/2011).

At the time, he became aware of the problems reported by residents of Alvarenga, a rural neighbourhood, where there were large eucalyptus plantations, especially those of the Suzano Papel e Celulose Company. These residents spoke of the ‘emptying’ of the countryside, a situation which had been aggravated by the activities of forestry companies.

Residential groupings became physically isolated as a number of farms that once employed several families had been sold or leased. The access paths that passed through these farms had been blocked, and even when access was possible, “women would no longer go to the houses of their friends because they were afraid of crossing the

eucalyptus plantations.” Chapels on these farms, important centres of social cohesion, were demolished or were inaccessible.

Moved by these accounts, in 2004, the then Councillor Marcelo Toledo, sent a draft legislation to the Municipal Council Chamber setting out restrictions on eucalyptus plantations. The project was passed by the councillors, but was vetoed by Mayor Danilo Mikilim. Thereafter, the issue became a hot topic of local debate.

In 2006, after he had left office, Toledo began to arrange meetings in neighbourhoods to discuss the issue of eucalyptus trees, during which time he collected signatures for a *Lei Popular* [a law introduced through the initiative of the citizens]. In August of that year, Toledo presented a report to Wagner Giron De La Torre, Taubaté Regional Public Defender, who was impressed by its quality, as it was detailed and contained the minutes of all meetings, attendance lists and photographs.

In February 2007, a resident of the rural area, whose smallholding was neighbouring an area belonging to Votorantim Celulose e Papel (VCP), filed a Civil Action for moral and material damages, having presented symptoms of poisoning since 2005. The suspicion is that the water supplied to the resident’s house had been contaminated by the herbicide glyphosate. VCP and Monsanto were named as defendants.

In November 2007 the *Lei Popular* project was defeated. Also in November, the Taubaté Regional Office of the Public Defender filed Public Civil Action 593/2007, where the defendants were VCP, Suzano, and state and local governments. The São Luiz do Paraitinga court denied the injunction request and the Office of the Public Defender appealed to the Court of Justice of the State of São Paulo, which, in an unprecedented decision, granted the injunction. Despite appeals on the part of the companies, the decision was validated, which means that from August 2008 eucalyptus plantations were suspended in the municipality, until the aforementioned companies carry out an environmental impact study and an environmental impact report.

In 2009 an injunction was granted in favour of Public Civil Action 396/2009, also filed by Taubaté’s Regional Office of the Public Defender, prohibiting trucks from transporting eucalyptus logs through the residential area of the district of Catuçaba and via the Abilio Campos Monteiro highway. The central argument was that the constant flow of trucks through the centre of Catuçaba, a stronghold of cultural traditions, would damage and disrupt inhabitants’ way of life.

These achievements on the part of S.L. do Paraitinga’s civil society seem to have triggered a series of actions against eucalyptus plantations in the region, all initiated by De La Torre. At the time we concluded this paper, Guaratinguetá and Piquete also saw legal actions resulting in the restriction of eucalyptus monocultures, and in Redenção da Serra and Taubaté actions had been filed. According to Cristiane Bittencourt, Planning Advisor for São Luiz do Paraitinga:

I think that this injunction is novel, and it does not apply only to monoculture. Stopping an economic activity because of potential environmental impact...this very rarely happens in Brazil, almost never.

So, this is something new, to do it through debate, to deal with this for the town's sake. When you set a precedent for an issue such as this, many people come on board. Now, I think we have to have a more profound dialogue to obtain real benefits, both social and environmental. (interviewed on 01/2011)

What is curious about this “David against Goliath” conflict is that the most compelling arguments employed by those opposing eucalyptus monocultures in São Luiz do Paraitinga were not technical arguments based on the natural sciences, but those which defended the rural population's cultural traditions and symbolic values.

This cultural issue was very interesting. Because, if we get into this debate on environmental issues, until you can prove... I will not get into hydrology studies, because I am not an expert. But when these points concerning culture came up, things changed. We conducted a survey of cultural implications, and there was no way to deny it. (Marcelo Toledo, interviewed on 01/2011)

Thus, while evidence on environmental impacts is still disputed, there is little doubt about the social and cultural impacts. Even the representative of Fibria^v recognizes that the company may have made mistakes, such as demolishing chapels and encouraging the exodus of small farmers: “Some of them are irreparable, I am sorry, as for others we are perfecting techniques and research to minimize the impacts.” If there is still any doubt, the human dimension has once again shown itself to be key to addressing environmental issues.

Participatory Directive Plan

According to information provided by Cristiane Bittencourt^{vi}, the Directive Plan (DP) was discussed in 2005 and 2006 at approximately 50 public hearings in urban and rural areas. The Directive Plan's management group (most of its members were from civil society) organized these hearings. Representatives from the fields of health, environment, welfare and law, among others, took part, and a multidisciplinary team from São Paulo State University (UNESP) provided support. In December 2009, the town council approved the São Luiz do Paraitinga Participative Directive Plan (Complementary Law 1.347/2010) which was passed into law in January 2010.

With regard to eucalyptus plantations, the Directive Plan lays out directives restricting or regulating monocultures, in a clear demonstration of the concern of municipal public authorities and civil society in relation to this matter (FARINACI, 2012). This Directive Plan has innovative features in comparison to others, as it deals with development and environmental restoration in rural areas and establishes the *outorga onerosa*, which is a legal instrument allowing a person or company to build or explore an area above the limits stated in the Directive Plan, in exchange of a payment of charges.

Few Directive Plans in Brazil deal with rural issues. I believe that the Directive Plan should address rural issues when the municipality is predominantly rural, as in the case of São Luiz where 95% of the territory is rural. [...] The Directive Plan covers the diversification of rural property, land planning based on agro-ecological zoning, planning for water basins and individual planning for properties. The Directive Plan denotes limitations [regarding monocultures], and also grant rights (to cultivation) with the payment of charges. As a law scholar, I see this as being very innovative and it is likely to provoke plenty of discussion in Court [...] I think it generates debate, it is an advance in terms of legislation.

There is this restriction on eucalyptus, but in São Luiz there is also the serious problem of pastures, which may be a significant degrading factor for the environment, through the impact of erosion. Therefore, the issue of monoculture is not just something that affects eucalyptus. But, as a manager, I think we have to talk about this. The Directive Plan calls for further regulation and I think that this regulation has to be discussed with both local people and forestry companies. I think we can achieve a successful partnership in terms of preserving the environment and society, benefitting communities that suffer some type of impact on their activity. (Cristiane Bittencourt, interview on 01/2011)

But there are other types of homogenous plantations...

Until now we referred to homogeneous eucalyptus plantations as if there were only one type of plantation. However, there are other types, usually left out of the spotlight or ignored altogether because they are difficult to interpret. In São Luiz, in addition to the plantations of large companies on privately-owned, leased or contracted farms, there are small-scale plantations, for private use or occasional selling, and those established by individuals on a small or medium-scale for charcoal production or to supply sawmills (SILVEIRA, 2008).

Smaller-scale plantations are subject to different monitoring and enforcement mechanisms. First, because they are not certified, and second, because they are more difficult to identify on satellite imagery. The difficulty in differentiating the types of properties with eucalyptus plantations may lead to confusing interpretations. An example is the work of Cantinho et al. (2011), which indicated an increase in the area of eucalyptus plantations in São Luiz do Paraitinga between 2008 and 2010, and concludes that the injunction prohibiting the expansion of plantations had not been effective yet. However, the injunction relates to Suzano and VCP and there is no evidence that the observed expansion did not occur outside the areas managed by these companies. Therefore, in order to advance discussions on this issue, types of homogeneous tree plantations must be differentiated, as treating them in a monolithic way can compromise interpretations of studies.

Monitoring by remote sensing is undoubtedly an important tool for environmental management (Batistella et al., 2008). However, the lack of maps showing the boundaries of rural properties makes this monitoring more difficult. The current requirement to

present geo-referenced surveys for property registration and the Rural Environmental Registry (CAR) will help municipalities circumvent this problem. Given the problems of regulating land tenure that we still experience in Brazil, investments targeted for this purpose would accelerate the process.

What does the example of São Luiz do Paraitinga show us?

The case of São Luiz is one in which the claims of a small community had unexpected repercussions, with the potential to reverberate throughout an entire region. By identifying sectors of the government which were sensitive to these claims, the community secured legal support and the means to bring about a change in attitude of at least one large corporation. According to Ferreira e Ferreira (1995), the recognition of the needs of society as demands, by the traditional political organizations, is dependent on mediation by law. Perhaps the difference in this case is the fact that the authorities took into consideration the statements of rural inhabitants, which put into perspective the scientific evidence, as presented by the companies, that eucalyptus trees do not 'dry the water', among other effects.

This situation demonstrates, once again, that environmental and social issues cannot be separated.

If you read the reports from the public hearings of the Directive Plan, which record a summary of people's statements, you will see that people say "there was a water source on my property and it is no longer there." These are people who live in the countryside and know what they are talking about. Nevertheless, companies claim that they are managing the land in a totally responsible way.
(Cristiane Bittencourt, interview on 01/2011)

One can conclude that the Judicial, Executive and Legislative positions were based on the precautionary principle^{vii}, and it was up to the companies to provide proof through Environmental Impact Studies and Reports or via compensatory measures by means of payment of charges. In line with what has been observed, Andersen and Massa (2000) underline the conceptual association between ecological modernization and the precautionary principle, suggesting the significant role of the State in establishing pathways to ecological modernization.

It is also clear the effectiveness of environmentalism through 'radical' proposals, whose significance tends to be overlooked in debates on reflexive modernization (BUTTEL, 2000). In this case, radicalism seems to have been instrumental in the adaptation of norms, via legal instruments aimed at environmental improvements that are socially just. This is made clear in De La Torre's position when he stated "the injunction challenges the expansion of monoculture plantations for mercantile purposes" (Speech at a meeting of the Councils of Rural Development and Environment of São Luiz do Paraitinga, on 29/04/2010).

Ferreira and Tavolaro (2008) argue that, in Brazil, the middle class supporting the environmental cause hardly finds a legal framework capable of translating their demands into effective regulations. In São Luiz do Paraitinga, this middle class – equipped with the formal intellectual means, yet sensitive to local knowledge – seems to have been more successful in employing arguments based on social justice to transform their claims of an environmental nature into legal instruments. Such instruments have stimulated some important environmental degradation agents to seek a dialogue with the local community in order to adapt their practices, or promote compensatory activities. Furthermore, the controversy generated a demand for researchers to seek more scientific evidence in order to understand the situation.

The literature suggests ‘win/win’ solutions, which will lead industries to adopt for themselves forms of ecological modernization. However, there is no compelling evidence that a comprehensive eco-modernization will occur merely as a result of innovative ideas brought up in the boardrooms of these industries (ANDERSEN; MASSA, 2000).

The example of São Luiz shows the role played by the pressure of society, not just in their decisions as consumers, but mainly through political networking aimed at developing legal instruments that can underpin their claims. It also shows that technical solutions do not always satisfy social interests and needs.

Conclusions

The argument outlined in this paper indicates the potential of the ecological modernization perspective to enrich the understanding of the role of forestry plantations in forest transition debates, as it provides a differentiated view of the possibilities for the conservation and recovery of native forests. We argued that these plantations should not be accounted in forest transition, however, they should also not be simply ignored. Nevertheless, it is worth emphasizing that ecological modernization does not provide sufficient explanations to understand all the factors involved in the situation presented, for example, in regard to collective action. As outlined in the extensive literature of Ostrom and others (e.g. DIETZ et al., 2003; FEENY et al., 1990, OSTROM, 1990, OSTROM et al., 2002), a commons (or common-pool resources) management approach would be useful to address this, enabling a better understanding of the role of social leaders and of redundant institutions^{viii} – such as complementary monitoring conducted by official bodies, certifying entities and by the local population.

One aspect that deserves attention in future studies is the balance between innovation and cultural traditions, and the influence of these cultural factors on the capacity of collective mobilization. The great importance of the architectural heritage of São Luiz, the preservation and reinterpretation of its intangible culture, and its pride in being the birthplace of prominent intellectuals and artists such as Oswaldo Cruz, Elpídio dos Santos and Aziz Ab’Sáber, has certainly contributed to the municipality – albeit small – being a focus of attention and empathy from people far and wide. This includes many scientists, artists and tourists, all potential sources of innovative ideas.

Finally, one question remains unanswered. Proposals that combine forestry production with respect for local livelihoods and environmental conservation, generally emphasize small-scale plantations (e.g. AB'SÁBER et al., 1990; VIANA, 2004). The challenge, therefore, seems to be how to make small-scale activities viable for industries? Interdisciplinary research that combines knowledge from the natural and social sciences could make a considerable contribution to addressing this issue. Moreover, all levels of government should position themselves more clearly with regard to this matter.

Notes

ⁱ Fibria Celulose S.A. is a company formed through the merger, in September 2009, of Votorantim Celulose e Papel (VCP) and Aracruz Celulose.

ⁱⁱ Cerflor (The Brazilian Forest Certification Program) is awarded by the Brazilian Society of Forestry; the FSC (Forest Stewardship Council), an international NGO, establishes principles and criteria that are adopted by other certifying bodies.

ⁱⁱⁱ According to information provided by Henrique Quero Polli, Fibria's environmental coordinator, in an interview conducted in March 2010.

^{iv} The NGO, World Rainforest Movement (WRM), launched a campaign that seeks to question FAO's definition of forests; in September 2011 a petition was submitted asking for the definition to be revised (http://www.wrm.org.uy/bosques/Carta_aberta_a_FAO.html).

^v Henrique Quero Polli, Fibria's environmental coordinator, in an interview conducted in March 2010.

^{vi} Cristiane A. P. Bittencourt, Masters in Urban Planning and Environmental Law, coordinated the progress of the Participatory Directive Plan as an Administrative Advisor for the municipality (2009) and, in 2010, she was named Planning Advisor. The interview was conducted in January 2011.

^{vii} The precautionary principle is an underlying element of sustainable development and involves anticipated actions to protect people and the environment against any possible risk of serious harm (UNESCO, 2005).

^{viii} Understood as how informal or formal rules structure political, economic and social interaction (NORTH, 1991).

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FOREST TRANSITION AND ECOLOGICAL MODERNIZATION: EUCALYPTUS FORESTRY BEYOND GOOD AND BAD

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Resumo: Neste artigo, o caso da eucaliptocultura é usado para explorar as possibilidades analíticas da modernização ecológica para as discussões sobre transição florestal. São abordadas as problemáticas da inclusão de monoculturas florestais no cômputo da transição e da influência indireta que essas monoculturas podem exercer na recuperação da cobertura florestal nativa. São analisados aspectos gerais sobre o tema, bem como um estudo de caso em São Luiz do Paraitinga, SP. Argumenta-se que as monoculturas florestais não deveriam ser incluídas no cômputo da transição, porém tampouco deveriam ser ignoradas nas discussões sobre conservação e recuperação florestal. O estudo de caso mostra o papel desempenhado pela pressão da sociedade, não apenas com suas decisões como consumidores, mas principalmente de uma articulação política para construir instrumentos jurídicos.

Palavras-chave: Eucalipto. Monocultura florestal. Transição florestal. Modernização ecológica. Mobilização social.

Resumen: En este artículo, el caso de los cultivos de eucalipto es usado para explorar las posibilidades analíticas de la modernización ecológica en las discusiones sobre la transición forestal. Se enfatiza en la problemática sobre la inclusión de los monocultivos forestales en el cómputo de la transición y de la influencia indirecta que esos monocultivos pueden ejercer en la recuperación de la cobertura vegetal nativa. Son analizados aspectos generales sobre el tema, así como un estudio de caso en São Luiz do Paraitinga, SP. Se argumenta que los monocultivos forestales no deberían ser incluidos en el cálculo de la transición. Sin embargo, ellos tampoco deberían ser ignorados en las discusiones sobre conservación y recuperación forestal. El estudio de caso muestra el papel desempeñado por la presión de la sociedad, no sólo con sus decisiones como consumidores, sino, principalmente, de una articulación política para construir instrumentos jurídicos.

Palabras clave: Eucalipto. Monocultivo forestal. Transición forestal. Modernización ecológica. Movilización social

Abstract: In this paper, we use the case of eucalyptus monoculture to explore some analytical contributions of ecological modernization to the discussion on forest transition. We address the issues of including tree monocultures in transition calculations, and the indirect influence that these monocultures can play on native forest recovery. We analyze general aspects of the topic, as well as a case study in São Luiz do Paraitinga, in São Paulo. We argue that monoculture tree plantations should not be included in transition calculations, but neither should they be ignored in discussions about conservation and forest recovery. The case study shows the role played by pressure from society, not only by means of decisions as consumers, but mainly through political activity for developing legal instruments.

Keywords: Eucalyptus. Forest monoculture. Forest transition. Ecological modernization. Social mobilization.
