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Abstract

The article presents the findings of a long-term incorporated comparison of forestry capitalism's globalization process. Primary data was collected by participant observation in pulp investment areas in Brazil between 2004 and 2011 and semi-structured interviews with key industry personnel, particularly in Finland. It is argued that the key cyclic change in industrial forestry from innovation–capitalization to material–territorial accumulation explains why and how the industry has globalized to the south via industrial tree plantations. The interlinked northern (Finnish) and southern (Brazilian) cases reveal that industry trajectories are influenced by who controls the supply chains of commodities. The findings are relevant for theorizing about the globalization of natural resource exploitation sectors. Changes in agrarian political economies and agency of state, business, and social movement actors—that is, socio-ecological relations and landscapes—help to explain how and why national and global capitalism and its developmental–environmental impacts are transformed.

Keywords

- industrial tree plantations,
- pulp and paper industry,
- forest industry,
- Brazil,
- Finland,
- Pöyry,
- agrarian political economy,
- capitalist world-system

Introduction

This article argues that the capitalist globalization of natural resource exploitation sectors, such as industrial forestry, has been taking place principally by a systemic cyclic change to north–south material–territorial expansion. The comparison of two interlinked studies in the global north and south—forest industry

development in Finland and Brazil—demonstrates the role that agrarian political economy and agency can play in processes of capital accumulation. Answers are sought to the questions of how and why connections between the Global North and South develop through the process of globalization. In seeking answers, the role of socio-ecological relations, something which is not normally in the spotlight of capitalist transformation theory, is highlighted (Moore, 2011). Yet the way landscape is transformed is at the core of explaining how the current systemic shift in forestry capitalism is taking place. Illustratively, as shall be discussed, in Finland the forest industry gets the timber it needs—wood—from forests that are more biologically diverse and more publicly accessible than in the Brazilian pulp holdings, which are characterized by a total commodity frontier controlled by corporations which squeeze maximum returns from fenced monoculture tree plantations.

The story of forest industry globalization, a partial but crucial slice of which is discussed here, sheds light on broader questions around development and globalization. As shall be argued, Finnish companies are deeply involved in the expansion of the global paper industry in the Global South. The Finnish presence in Brazil has been strong since the 1970s, when Aracruz, the first large-scale pulp mill based on eucalyptus plantations, was created. Almost all large-scale pulp projects in Brazil have been built with the Finnish company Pöyry as the main consultant. The absolute majority of machinery has come from Metso of Finland;[1] in a few cases it has come from the Austrian company Andritz, which has a major factory producing pulp lines in Finland, and other, smaller specialist companies in Finland and the EU. Finnish paper companies, such as UPM-Kymmene, have been among the most important customers buying pulp from Brazilian companies such as Votorantim. The Finnish and Brazilian trajectories are highly connected through the commodity and technology chains of capitalism.

The direct Finnish impact in Brazil and elsewhere in the Global South's forestry areas is a crucial element when breaking down structural analysis of north–south expansion to the actual corporate agents globalizing forestry capitalism. Global capitalism cannot be understood without studying in detail its key corporations. Thus the focus here is on companies and industry. There is a dearth of research on the political economy of globalizing Northern multinational timber firms (Dauvergne and Lister, 2011) and this research hopes to fill that gap. In the general debate about resource-based industry and its trajectories, the literature on forestry (pulp and paper) is not as extensive as the literature on minerals (principally oil; Karl, 1997). However, the forest industry has been extensively studied in Finland and no other industry has received such social, economic, political, and environmental focus (Kuisma, 1993; 2006). There is also a budding body of literature on the new paper pulp investments in the Global South. But the northern and southern trajectories have not been compared or studied together in depth, in order to tease out the differences and connections and reasons for these. Sonnenfeld (1999) is a rare exception, but he focuses on the leadership in pulp mill technology that brought world dominance to Nordic companies. He does not consider developmental or landscape-change questions related to the Global South exporting cheap commodities such as pulp—whose fiber comes from vast industrial tree plantations (ITPs)—to northern manufacturers. Marchak (1995), in her *Logging the Globe*, and Carrere and Lohmann (1996), in their seminal book *Pulping the South*, discuss globalizing pulp production, but do not explicitly connect the analysis to theories explaining the globalization of capitalism. Furthermore, a lot has happened since the aforementioned works were written.

The globalizing Finnish forest cluster companies have been critical service and machinery providers and producers in investments based on corporate land use rather than smallholder-based forestry (Kröger and

Nylund, 2012; Lang, 2008a; Myllylä and Takala, 2011; Nylund and Kröger, 2012; Pakkasvirta, 2010).[2] Nordic firms and states took advantage of the global economic crises in the last decades of the twentieth century to establish a world-dominant pulp and paper sector, including related manufacturing and technology (Sonnenfeld, 1999). This boosted the establishment of large-scale ITP pulp extraction investments in the Global South, often on tropical forest lands customarily owned by traditional populations (Carrere and Lohmann, 1996; Marchak, 1995). The grabbing of large, corporate-controlled land areas has meant that ever-larger pulp lines, more automated machinery, and corporate plantations have been developed in the south. Yet, in Finland, the mainstay of forestry land tenure is still family-based, not corporate ownership-based. In this sense family forestry kind of steers the industry development, placing boundaries on it. But the Finnish forest companies, when globalizing, severely limit local development possibilities, as plantations offer few jobs (Carrere and Lohmann, 1996), cause dispossession (Kröger, 2012a), and displace local livelihoods in order to sustain high-return commodity exports (Nylund and Kröger, 2012).

It is argued that a systemic change of cycle in forestry capitalism explains the recent decades of globalization. Only an expansion monopolizing new territories for the industry can fix the problem of over-accumulation of capital and secure higher rates of return for key forestry capitalists. The companies with accumulated capital goods and know-how in the system cores, such as Finland, search for outlets to sell their capital-intensive technology. Plantation economies are prime destinations, and large-scale pulp investments exacerbate the problems of land tenure concentration and environmental havoc in the southern commodity frontiers, causing multiple scales of conflict (see Gerber, 2010; Overbeek et al., 2012).

Research Material and Methods

The article presents the findings of a long-term incorporated comparison of forestry capitalism's globalization process. Primary data was collected by participant observation in pulp investment areas in Brazil between 2004 and 2011 and visits to companies' headquarters in Finland. A total of 150 semi-structured interviews with key industry, state, and civil society actors were conducted. The interview participants were selected through the snowball method, by asking key interviewees who they would recommend for further interviews. Several hour-long interviews were conducted with directors from companies such as Stora Enso, Veracel, and Pöyry and from industry organizations such as Bracelpa, the Brazilian paper and pulp industry organization. Trade union leaders both in Finland and Brazil, as well as social movement members and transnational and local NGO personnel and other civil society activists, were interviewed. Local people in pulp investment areas were interviewed during visits between 2004 and 2011. Brazilian state actors and politicians from all levels and relevant regulatory institutions were also interviewed. The languages of Finnish, Portuguese, and English were used. The interviews were electronically recorded or recorded in writing by the interviewer, depending on the wishes of the interviewees. Confidential data is not disclosed. Interviewees were asked for their interpretations and standpoints on certain issues including the globalization of the paper industry system, Brazilian pulp investments' significance and details, the role of the landless, the Brazilian state, the Finnish state's role in relation to companies' expansion, and future predictions.

Participant observation was also undertaken in different camps and settlements belonging to the landless movement and indigenous groups, observing their daily life, their politicizing and organizing work, their campaigning, their protests in several situations—such as roadblocks related to pulp-expansion and land

occupations—their civil society networking, and their engagement in electoral and institutional politics, meaning state institutions. Almost all major pulp investment areas in Brazil were covered by field research, with visits to eucalyptus plantations, mills, and other important sites, and discussions with engineers, foresters, and other technicians about the technical and political aspects of expansion. Research was not only completed with directors at headquarters; field research in other South American contexts with significant forest industry land tenure changes, including Uruguay and Venezuela, was also conducted. I also participated in a three-week academic training course co-organized by key companies and University of Helsinki forestry personnel, where new industry personnel were hired. This enabled conducting an internal industry ethnography by experiencing how the industry people speak amongst themselves and what relations exist when criticism or resistance is not present. Information gathering also took place in Finland and Sweden while participating as an invited speaker in industry, public, and state-organized seminars and debates along with key actors from companies, the state, and civil society, at which the expansion phenomenon and policy was typically discussed. The focus on state, business, and civil society provided the chance to understand the expansion from the viewpoints of all the impacted parties. A comprehensive set of research material was collected, of which only a small section is presented here in the form of direct quotes. It is used to analyze the Finnish–Brazilian dimension of the north–south expansion in global forestry capitalism.

Process-tracing and triangulation were used to perform an incorporated comparison of cases. A mixture of diachronic and synchronic forms of incorporated comparison was used (McMichael, 1992). Diachronic comparison is a comparison across time and space of multiple instances of a single historical process, in this case the globalization of forestry capitalism. In this comparison, ‘land control’ and ‘accumulation’ are units of analysis whose study in different contexts allows for the detection of variants, whilst taking into account that national variants influence each other in an international process. This can lead to the mapping of generalities in forestry capitalism. Synchronic comparison throws up particularities and variation in the industry in Brazil and Finland, embedded in the distinct histories of the societies.

Besides illustrating the key changes in global pulp capitalism (diachronic analysis), the interconnected but distinct Finnish and Brazilian trajectories offer stereotypical examples of two extremes of land control (synchronic analysis): corporate large-scale and smallholder/family forestry.[3]

New Global Forestry Cycle as a Socio-Ecological/Capitalist Process

Globalizing capitalism can be seen as a socio-ecological process. Political economists such as world-system scholars have started emphasizing the environmental dimensions of capitalism (e.g. Bunker and Ciccantell, 2005). Moore (2011) sees capitalism as world ecology, a relational bundle where capitalism-in-nature means the production of nature and accumulation of capital are inseparable. Opening new commodity frontiers to produce timber, for example, relies on drastically modifying nature and existing human ecologies. The pulping of rural mosaics of socio-ecological relations and landscapes into corporate ITPs has been the central tool for globalizing forestry capitalism. The social aspects of the industry and corporate agency are analyzed to illustrate how the globalizing capitalism-in-nature that ‘pulps’ territories operates.

In the capitalist world-system, production has tended to shift from core to peripheral countries (Wallerstein, 1974), but the high value-added nodes in the commodity chain have remained disproportionately in the core (Chase-Dunn and Hall, 1997). Furthermore, the production that has moved out of the manufacturing cores has

often been the most polluting. Hall (2002) argues that the establishment of ITPs requires inflicting considerable environmental damage. This in turn requires legal regimes with strong land tenure rights, which allow for pollution to undergo legally under the protection of private property (ibid). Thus, Hall argues that, for example, the move of pulping by Japanese companies from Japan to the ITPs of Southeast Asia and Australia was primarily a search for pollution havens by Northern industry. Local resistance movements criticizing the threat and changes to existing socio-ecological relations forced the ITP industry to move from Thailand to Australia (ibid). In the absence of resistance that ensures investments are critically observed and negative impacts controlled, the full socio-environmental costs incurred in extraction areas are typically not transferred to commodity prices. Bunker and Ciccantell (2005) argue that the export of natural resources in this way causes the core areas to benefit—from the availability of cheap, indeed too cheap, raw materials—while the commodity exporting areas are impoverished in the process. In this view, raw material production-based economies such as Brazil (Bunker and Ciccantell, 2005; Kröger, 2012a) are at the periphery or semi-periphery, whereas manufacturing economies such as those in the Global North and, increasingly, China (Dauvergne and Lister, 2011) are core areas where wealth accumulation and development is growing because of the benefits of commodities being sold at too low a price. In this sense, within the global paper industry system, Brazil is a semi-peripheral country focusing on the production of pulp, a raw material, for the core.[4] Brazil imports the technology that the core (Finland) produces and adheres to an investment model that creates increasingly capital-intensive resource extraction. Although pulp companies from the south have become major market pulp exporters (e.g. Chile's CMPC and Arauco, Brazil's Fibria and Suzano; see Kröger 2012b for analysis of this rise), this does not mean that the north–south power balance based on flow of too-cheap commodities (such as pulp) to the north, damaging populations in the southern production areas, would have equalized the setting. People in the southern investment areas still pay for the accumulation of wealth in the north.

Finland's rise to becoming a hegemonic, core technology and value-adding manufacturing hub in the global forest industry system was based on innovation capitalization. Expansion of the system to Brazil and Brazil's global positioning has been mostly based on territorial–material expansion, not on technological capitalization. Drawing on Arrighi (1994), capitalism has two cyclical logics of expansion: internal capitalization (C) and territorial material (M). Once capital is over-accumulated within a marked territory by technological development and innovation, which cannot any longer maintain high levels of returns, a need arises to invest capital and capture resources by territorialization. As Moore (2011, p. 121) puts it, 'Innovations, centered in and effected by emergent hegemonic complexes, lead to phases of material expansion'—both in output numbers and in the territorial terms of the system. This perspective on capitalism sheds light on the current rush to the Global South. The contemporary territorial expansion marks a new cycle of accumulation, in an M-C-M+ systemic cycle. Combined with Polanyi's (2001) study on capitalist over-commoditization of land, labor, and money and the resistance to this, the theory explains well the trajectory of forestry capitalism.

The interlinked Finnish and Brazilian cases reveal that industry trajectories are strongly influenced by who controls the supply chains of global commodities. Until the 1910s–1920s, forest capitalists in Finland used predatory means, dispossessing peasants, grabbing forests, and thus creating corporate timberland. From the early 1900s, this movement based on naturalization of the market and the power of capitalists was fiercely resisted by a counter-movement from the progressive Finnish state, civil society, and business actors. This transformed the timberland control in the supply chain from corporate-dominated to smallholder-steered. This

can be seen as part of a cyclical process that Polanyi (2001) argued to be the marking trait of capitalist growth. Counter-movements resist the destruction caused by the ideology of a neo-liberal, capitalist movement which chases the unattainable dream of commodifying nature as resources and life as labor, and argues that 'markets' self-regulate.

In recent decades the pendulum has started to swing again in favor of large-scale forestry capitalists on a global level. Northern companies and governments support the corporate model, most vehemently by globalizing multinationals' control over foreign lands and supply chains. Corporate ITPs are the central tool in this new material expansion. The cyclical changes and power struggles over forest industry supply-chain control are not limited to this industry, or to Finland, but speak to the most important fluctuations in global capitalism.

The new cycle was in full swing by 1997–2007. The leading southern pulp producers, Brazil, Chile, and Indonesia, all more than doubled their exports in that decade (Dauvergne and Lister, 2011), while northern producers downsized capacity in traditional production areas such as Finland. In the cores, companies either placed even more emphasis on higher value-adding business (for example, UPM is building the world's first wood-biodiesel pilot plant in Finland) or stopped capitalization expansion, focusing on material expansion (such as Stora Enso's aggressive expansion across the globe via ITPs, mergers and acquisitions, and joint ventures) instead of innovation. Profitable pulp mills were shut in the north, while the southern polluting havens were opened and expanded. Wasteful paper consumption and consumerism increased disproportionately in the north (Dauvergne and Lister, 2011).

Mergers were essential in amassing capital for global material expansion and consolidating and concentrating power. In 1998, Enso, a Finnish state-owned paper company, merged with Swedish company Stora, the world's oldest private company, which dates back over 800 years. Stora Enso became the world's second largest paper producer, and began an aggressive move to downsize in the Global North and move to the south. To make pulp investments in South America and Asia possible, the company sold most of its timberlands in Sweden in the 2000s (Genfors, 2007. 'SE Fast growing plantations in the south', unpublished presentation at the University of Helsinki seminar on Industrial Forest Plantations, August 10). The other Finnish forest companies in the global top 10, UPM-Kymmene and Botnia, also established pulp projects based on corporate land ownership in the Global South, in Uruguay.

For the industry, the reasons for these moves were clear; they emanated from the principles of capitalism. Rising costs, over-production, and competition had led to several decades of falling returns within the industry. In 2008, Latin America and China were the only places where companies' returns on capital were higher than 10%. A fix was needed. The corporate pulp model offered it. Brazil's Fibria produced pulp at US$222 per tonne in 2009, 57% below the average world price (Dauvergne and Lister, 2011).

Supply chains have been revolutionized, as has generally been the case in global capitalism recently. The past decade has seen the true fruition of global pulp capitalism, where pulp is produced on six continents and transported globally. Emergent large-scale southern producers have created joint ventures with multinationals from the north. As demand is greater than supply, large-scale mills producing pulp very cheaply are able to nudge prices down and share markets. They do not have to compete against one another, but instead challenge the smaller mills, communities, and classes composing counter-movements against global supply chain control. Class struggle both drives and delimits the territorial expansion of the industry system. Lang

(2008b) provides further evidence on the centrality of class struggle, for example by quoting a *Financial Times* article where a Stora Enso official says to the newspaper that 'Were it not for labour unions at home, we would be moving all of production capacity to countries like Brazil.'

Concentration of supply chain control has reduced systemwide production costs within global pulp capitalism. The capital-intensiveness of the megatonne corporate model wreaks socio-ecological havoc. Havoc is the precondition for this type of global power creation. As Moore (2011) notes, drawing on Arrighi (1994), such re-organizing moments signify a new cycle of accumulation. Pulping the south through territorial–material expansion is a re-organization of world ecology by forestry capitalism's new accumulation cycle. Next, the most important events in the grand move from capitalization into material expansion are illustrated by a discussion of the Finnish and Brazilian forest industry trajectories. These details allow an understanding of how and why M-C-M+ cycles are inherent in capitalist globalization. It is important to explain the currently occurring cyclic change to material expansion in global capitalism, as M-C-M+ cyclic expansion creates more powerful political–economic actors than capitalization cycles without significant material expansion (C-C+) do (Arrighi, 1994; Moore, 2011). The new territorialization will have severe consequences.

The Finnish Forest Cluster

The revolution in the Finnish forest industry took place in the 1870s with the advent of steam-powered sawmills and wood pulp papermaking. The expanding demand for forest products in Western Europe and Russia provided incentives to develop the technology nationally. National entrepreneurs started to develop local expertise in the production of machinery for the forest industry (Raumolin, 1991). With the progression of the Great Land Reform, begun in the 1700s under Swedish rule (Nylund, 2009), demand turned to higher round wood sales figures for independent farmers (Palo and Uusivuori, 1999). However, the majority of the rural poor were left outside the boom and dispossessed of their timberland, as the agrarian political economy still allowed rampant forest grabbing in the peripheries.

Small and medium-sized associations and movements of farmers, such as the Pellervo cooperative movement established in 1899, started to advocate reform of the forest industry accumulation logic by land reform (Kuisma, 1999). The first goal was to enhance the lot of the rural population, three-quarters of whom were still either leaseholder farmers or landless rural workers in the early twentieth century (Palo and Uusivuori, 1999). The rising pro-agrarian view shared by most farmers, some intellectuals, businessmen, and the emerging popular parties saw rising corporate forestland control as 'a threat not only to agriculture and the farmers but to the nation as a whole' (Donner-Amnell, 2004, p. 182). Reflecting the rising pro-smallholder views, major agrarian policy changes occurred. In 1925, the purchase and ownership of forest holdings by forest companies was strictly regulated by Lex Pulkkinen. This policy continued until 1998. In practice, the law stopped corporate land acquisition in Finland. Detailed instructions regarding how to justly set wood prices were also established, and new policies allowed smallholders access to additional land and higher earnings (Palo and Uusivuori, 1999). Thus, both the agrarian political economy and control and quality of the supply chain were revolutionized.

This resistance movement forced forest capitalism to expand via value-adding innovation capitalization. Foreign powers needed Finnish forest products, and capital was eager to develop the industry. Counter-movements managed to precipitate regulation making destructive commodity exportation impossible or very hard, thus steering the style of accumulation. In the view of the political majority, the unchecked accumulation

threatened national unity and thus sovereignty. The effective implementation of land reform took place only after Finland's independence in 1917 (Palo and Uusivuori, 1999) and the bloody 1918 civil war, in which the plight of the landless was a central feature. Resistance led to regulation. Restrictions on material expansion of the corporate model boosted the creation of a forest industry cluster.

A family forestry model was created. This meant the whole production process—from the forest to the final product, including technological development and suppliers—took place locally or regionally (Rytteri, 2000), without major disparities between national cores and peripheries. The family forestry model is still in place. Companies own only 8% of all forestland and the government 34%; 5% is owned by other bodies, and the rest by individuals. There are about 900,000 forest owners, almost a fifth of the population of Finland. Most (706,000) forest estates are under 20 hectares in size. Forest control is still rural and family-centered: smallholder families represent 85% of felling (Finnish Forest Association, n.d.). As a result of organization, felling prices in Finland are the highest in the world. These agrarian relations benefit the citizens at large.

The counter-movement to capital created a trajectory on which the major national classes could fortify themselves as well as develop synergy benefits. This created strong 'forestry nationalism' between the 1920s and 1990s. In the industrial–political thinking of this nationalist capitalization phase, it was taken for granted that the interests of both the forest industry and the nation would coincide.

However, when globalizing, forestry nationalism has followed the distinct logic of material accumulation and taken a grip over foreign and/or previously local community-held lands, which has led to criticism at home and abroad. Due to Finnish paper companies' extensive land ownership in the south—including Stora Enso, in which the highest share of voting power (about 35%) is held by the Finnish state—popular novelist Tuuri (2009) labeled Finland a 'colonial power' in an op-ed article in the country's largest newspaper, *Helsingin Sanomat*. Nikkanen (2010), a renowned journalist, framed Finland as an 'innocent empire'. This argument posits that Finnish corporate-state actors deny their power and agency in the current global transformation of the forest industry system. Such criticism was a continuation of similar arguments made by researchers in Finland about South American pulp expansion (Kröger and Pakkasvirta, 2006; Pakkasvirta, 2010).

Nationalism permitted and fostered an absence of recognition for the negative impacts of globalization. Until the 1970s, different classes and social actors, such as the trade unions, government, companies, political parties, and civil society, were united through the shared goal of increasing industrial output, rural revenues, and employment (Jensen-Eriksen, 2007). The forest sector became a major component of Finnish national identity; it symbolized work, sovereignty, and overcoming economic hardship (Donner-Amnell, 2004). Resistance to environmental degradation started to erode the consensus in the 1980s, but these concerns met a national response and civil society continued to share the industry view of forestry as the economy's backbone. However, downsizing in Finland and recent reports of industry abuses in the Global South have started to erode the overwhelming support that the capitalism/socio-ecology of forestry has long enjoyed in Finland. This can be explained by a systemic cyclic change in the world's forestry capitalism—in which Finland is one of the most important constituent players—from drivers focused on capitalization to material accumulation.

Counter-Movements, Capitalism and Globalization

Systemic cyclic changes in capitalism, as with all economic outcomes, are determined in natural resource politics between civil society and corporations, largely intermediated by the state (Kröger, 2010). Counter-movements against over-accumulation can influence industrial trajectories. The Finnish rural cooperatives had a major, cyclic impact on forcing change in the first decades of the 1900s. But by the 1970s, the capitalization trajectory that ensued had become devoid of external criticism, and this absence started to produce unchecked accumulation, the negative environmental–social consequences of which were notably felt. Unchecked capitalization was evident in plant pollution; environmental concerns were outside the class-consensus that had been created as a response many decades before to derail unchecked material expansion.

The first environmental counter-movements checking the then predominant mode of capitalization surged as lake pollution caused by an industry that prioritized production became more evident.[5] Environmental movements arose in the 1980s and managed to curb pollution through a combination of protesting and state involvement. Sonnenfeld (1999) argues that the inclusion of environmentalists in policy-making led to the early development of cleaner paper production techniques that the country could profitably sell at a time of rising global environmental consciousness.

In this sense, counter-movements may help in creating sounder accumulation trajectories, integrating socio-environmental concerns to change the technical quality of forestry capitalism (from polluting to less polluting) or even the accumulation style (from capitalization to territorialization). However, such gains remain only within narrow local boundaries, possibly producing negative impacts if the polluting production is moved to another, less regulated context. For example, cleaner pulping technology has been a boon in selling ever-larger mills under the guise of 'green economy' to countries in which the agrarian political economy has violent, highly unequal, and concentrated land tenure systems. In such contexts, those who promote ITPs as a green and best solution and a path forward, such as the Food and Agriculture Organization of the United Nations (FAO), the forest cluster companies and the state actors allied with them (such as the Finnish and Brazilian governments), have ensured huge new forestry enclaves for corporations. These enclaves are visible signs of the new material accumulation cycle of the industry. This cyclic change was required for forestry capitalism because it is a system that demands high returns to be able to continue expanding.

Concrete social agents have ushered in the new cycle. Vandergeest and Peluso (2006) argue that since the Second World War, the FAO has been the central organization in global forestry, promulgating a plantation-relying forestry empire. The ITP-based expansion took place in agrarian political–economic settings allowing the creation of what Peluso and Vandergeest (2001) call 'political forests', where 'forests' are politically constructed and might not even contain forest land, where 'forest' demarcation serves the political needs of land control more than the ecological concerns of forest preservation or use. The material expansion results in the highest returns for capitalists if land is controlled by them and maximized. Fenced private fast-growth plantations extensively utilizing pesticides, herbicides, fertilizer, and cloned trees in row spacing arose as a tool to secure land control and maximize productivity. Such ecological tools have been central in expanding capitalist control and revenues in the new global-scale cyclic change from capitalization to material globalization.

In general, the current trend guiding capitalist globalization logic—visible in the surge in corporate land enclosures (see White et al., 2012)—is territorial, for the reason that cyclic change trajectories with territorial

expansion (M-C-M+) increase global clout more enduringly and efficiently than mere internal capitalization revolutions following each other without significant territorial expansion (C-C + ; for general discussion on this generality, see Arrighi, 1994 and Moore, 2011). We are in a new material expansion phase of global capitalism. However, this might well be the last major material expansion cycle, as argued by Klare (2012) in his book *The Race for What's Left: The Global Scramble for the World's Last Resources*. Nature places limits on endless unchecked accumulation (Bunker and Ciccantell, 2005). The current expansion makes the already troubled socio-ecological relations in frontiers such as Brazil even more troublesome. Rural mosaics consisting of myriad socio-ecological relations, such as indigenous and other traditional communities with livelihoods and culture tied to the existence of primary forests, are destroyed and the 'freed' land turned into a resource extraction-base for the core.[6] In the expansion frontier, northern capital-intensive technology meets southern agrarian political realities and huge natural dimensions. This explains why in globalizing production—although there are also small-scale pulping technologies, such as Finland's Chempolis—the pulp line production of over one megaton per year by Metso (Finland) is the most important technology sold in new mills. Discussion of the Brazilian trajectory helps to illustrate these general points in detail.

The Brazilian Eucalyptus Pulp-Based Trajectory

The material expansion for greater corporate power in the Global South is not limited to the forest industry but is a symbol of the more general historical existence of north–south capitalism, now operating principally through the creation of ever-larger scope and scale of control over operations and supply chains by multinational companies (see Bunker and Ciccantell, 2005). In Brazil, as elsewhere, the eucalyptus planting sector is trying to 'territorialize monopoly', in the words of Oliveira (2010, p. 79)—that is, it seeks to own and control as much land as possible. This practically always has been the approach in Brazil: state and capitalist actors promoting corporate forestry development, and resistance being either crushed, ignored, or divided (Kröger, 2012a). Yet in 2004, the Brazilian Landless Movement gained international attention with a protest against the expansion of tree plantations by Veracel, a joint venture half owned by Stora Ensel (together with Brazilian private and state capital). Following this, strong agrarian movements have managed to slow or discontinue expansion in pulp project areas (Kröger, 2011).

Eucalyptus receives some of the most negative international coverage because of its harmful socio-environmental impacts on large-scale, fast harvest-cycle monoculture use, so why is the Brazilian government dedicated to helping ITP expansion? The main reason lies in the agrarian political economy and the concentrated land tenure by the country's political elite; large-scale landowners have organized as the 'rural caucus' in Brazil's congress. In contrast, the member countries of the Bolivarian Alliance to the Americas (ALBA) in Latin America (field research, 2004–2011) and Vietnam (Sikor, 2012), for example, have barred expansion of the corporate-forestry model. The main reason in each case is the political will and capacity for promoting smallholder or communal land tenure instead of corporate land tenure.

Besides concentrated capital control, including land, the forest industry and Brazilian government have promoted material expansion more than capitalization. Since 1944, the dominant forest industry associations (first ANFP, then Bracelpa) and government policies have focused only on pulp (interview with Ludwig Moldan, Bracelpa, São Paulo, 25 June 2008). Bracelpa and the companies argue that this makes more sense as Brazil has a competitive advantage in large-scale production based on corporate land ownership and huge mills. In

interviews, engineers explained to me that the main reason for huge mills is the decreased cost assured by economies of scale, because less steel, machinery, etc. is required for one huge mill than for many smaller ones. More metal and capital are required to build several smaller mills adding to the same production capacity. In this sense, large-scale has some advantages—but for the producers, not those seeking employment.

Brazilian large-scale pulp mills use almost solely exotic species (mostly eucalyptus) plantation wood, most of which is corporate-owned. Of the total pulpwood plantation land in 2009 (about 1.84 million hectares), 70% was directly owned by pulp companies, 11.4% of pulpwood lands were rented by companies, and 18.6% of land was under outgrower schemes (Bracelpa, 2010, p. 12). The corporate control figure of 70% of pulpwood plantations is consistent with general land use in Brazil, where industrial plantations cover 70.5% of fields, the rest being controlled by smallholders (IBGE, 2006).[7]

This suggests that forestry development follows the existing agrarian political economy in a country. Under corporate land control-led material accumulation, local capitalization development does not take place to any great extent. Brazilian economists Teixeira and Guerra (2000) argue that pulp investments in rural peripheries such as southern Bahia are not tied by inter-industrial synergy to their surroundings or nearby populations. The industrial trajectory is isolated to the export-focused pulp mill. However, such mills do benefit the heavily industrialized centers in Brazil, especially São Paulo, where European companies such as the Finnish company Metso produce machinery and equipment for pulp mills. The unequal division between the nodes of capitalization and territorialization—these nodes channeling profits up the supply chain—is not only global (north–south) but also national (industrial cores–rural peripheries) in range. The prospect of national benefits helps to explain why a government would support expansion.

Price competitiveness in global markets will ensure that material expansion continues. The pulp produced in South America has lower production costs than the pulp in Finland. An economist at the Finnish Paper Union calculated that tree and pulp mill costs in Nordic countries are four times higher than those in Brazil. Furthermore, paper industry workers in Finland earn 8–10 times more than those in Brazil. However, the labor costs are almost irrelevant when considering the total cost structure of producing pulp (Mäisti, 2006, unpublished presentation at the seminar ‘Pulp Production and Workers’ Rights in Brazil', organized by The Trade Union Solidarity Centre of Finland. Helsinki, 7 June). This is because the as much as 60% of production costs can be taken up by the cost of fiber, which is roughly two times cheaper to produce in Brazil than in Sweden (with similar costs in Finland; Dauvergne and Lister, 2011). The relative cheapness of fiber can be explained by the tropical climate, more lax environmental–social regulation, and land laws that allow for monoculture plantation landscapes.

Because of its agrarian political economy, Brazil is at the fulcrum of the general cyclic change from capitalization to material expansion in global natural resource capitalism. Real-world social actors, such as Finnish corporations, are central in the industrial forestry component of this process, as the final section of this essay argues.

Key Corporations Driving the Cyclic Change

The corporate control over capital accumulation could not be territorialized without active and aggressive north–south networking and the support of investors, governments, lobby groups, media organizations, certification bodies, and research institutions. To start with, southern pulp projects come with an inherent mutual reliance on the chemical companies (e.g. BASF, Bayer, Kemira) and machinery companies (e.g. Metso, Andritz, Ponsse) based in the north. These supply the paper industry; they are a push factor behind new pulp investments and the ensuing over-commoditization of land, providing for and dependent on the chemical and machinery needs of ever-larger pulp plants and tree plantations.

Consulting companies are central players in the paper industry system, acting as ideologists and masterminds. Finland's Pöyry Consulting is the leader in new pulp project planning across the world and in Brazil. According to a company executive, João Cordeiro, 'Pöyry provides intelligence and services in the system. … Pöyry goes to Brazil together with the industry'. Cordeiro explains that the company is 'number one in the world in the area of business services', with most profit coming from

[t]he engineering consultancy on pulp mills and also the elaboration of environmental licenses; studies like the Environmental Impact Analysis [are] required before investment. Pöyry is a catalyst of big investments … analyzing the investment, buying equipment and providing engineering services and supervising the construction [of the mills]. Mills are bought as packages nowadays, Pöyry inter-coordinates different suppliers. Five hundred people are needed to do this [to plan a pulp project from scratch]. Before, [a pulp investment] did not come as a package, it came in parts (Interview, Helsinki, March 2008).

It seems that a commodification of the whole expansion process in itself by the key consulting companies has eased material expansion. Carrere and Lohmann (1996, p. 89) argue that Pöyry and its fellow consulting companies are crucial go-betweens, 'bringing together Northern machinery and techniques with Southern land and forests'. Marchak (1995) argues that even though Pöyry has enormous influence, its success lies rather in two simple features typical of market economies: it happened to have the right skills to offer at the right moment, and its notions of global development match those of most governments, companies, and aid agencies. This would suggest that major cyclic changes are somehow taking place without the active agency of social actors. Carrere and Lohmann (1996) and Lang (2008a, 2008b) attribute much more complicity to the main actors. They furthermore claim that Pöyry has used questionable and unethical practices in order to expand. The June 2012 decision of the World Bank, a traditional financing ally of corporate material expansion, to place Pöyry Management Consulting Oy Finland on its Corporate Procurement Listing of Non-Responsible Vendors for three years for 'submitting false invoices and providing improper benefits to WBG staff' (World Bank, 2012) may support these claims. Pöyry denied attempting to corrupt the Bank's officials.

In any case, Pöyry has most of the world mapped, and is ready to offer intelligence. According to Cordeiro,

[i]t starts by feasibility study (if it is worth it), where [to invest], in which place, Pöyry is present in all phases. Pöyry is 15 years ahead of the [pulp and paper] industry, [regarding investment] decisions, as you have to plant trees [before the mill]. … The production is [nowadays] much more like agriculture than industry (interview, Helsinki, 2008).

It can be argued that such a vanguard position places agency, and thus also responsibility, on Pöyry. It can be argued that the consultancy will be able to define to a considerable extent the future parameters of paper

industry expansion. However, Cordeiro argues, ‘the initiative normally comes from the client, even though Pöyry does the screening’. Yet Pöyry's Chairman of the Board (also the major shareholder), Henrik Ehrnrooth, emphasized in his (unpublished) inaugural speech at the Industrial Forest Plantations course at the University of Helsinki on 8 August 2007 that ‘we must find ways to convince critics that plantation expansion is the way forwards’. This does not suggest a passive role.

If agency matters, then it raises numerous questions about the possibilities of change. For example, does the cyclic change offer possibilities for transforming the global division of labor between companies of different countries? What would this inter-capitalist change mean for forestry capitalism? Dauvergne and Lister (2011) argue the global power balance can shift, as the new global supply chains offer faster-paced growth opportunities for the new southern companies, which the northern companies did not have in their ascendancy period. Pulp markets are becoming dominated by Southern mega-mills from countries with the favorable natural–political condition of a concentrated agrarian structure with vast land areas. Yet Bunker and Ciccantell (2005) argue such focus on commodity export actually boosts the concentration of most value-adding processes into the Global North because of cheap imported commodities. New paper mills will be located close to markets, with new pulp production concentrated far away from these markets, where large-scale production is possible.

Some countries (Finland, Sweden, USA, Canada, and Japan) act as the center of the globalizing paper industry system. Cordeiro notes that ‘the paper industry is regional, continental, but starting to globalize with still modest globalization’ (interview, Helsinki, 2008). Here globalization is understood as the increase in horizontal industry relations and expansion of horizontal production models, signifying that all types and levels of production and consumption could take place everywhere. Some changes towards this end have taken place, as seen in Cordeiro's statement that ‘in the old days [the industry model] had to be totally vertical’ (interview, Helsinki, 2008); that is, in his understanding, less globalized and more regional (with a strong division of labor between regions). This understanding of globalization can be labeled as the ‘industry-view’ or as the ‘equal globalization ideal’.

In explaining this ‘industry-view’ of ‘equal globalization’, the interviewed company directors wanted to downplay the role of state–paper-industry relations, and were uneasy with questions about the role of their companies in north–south expansion. They framed themselves as responding to demand and supply: ‘We try to keep the balance’, argued Hannu Hytönen from Pöyry in his unpublished presentation at the Industrial Forest Plantations course at the University of Helsinki in 2007.

If the executives acknowledged agency, it was the agency of national entrepreneurs rather than transnational actors. Cordeiro from Pöyry and João Borges from Stora Enso argued that the Brazilian pulp industry and the eucalyptus-based model was created mostly by capitalist entrepreneurs in Brazil who immigrated from Europe after the Second World War (for example, the Feffers family, who founded Suzano, immigrated from Germany and were the first in the world to use eucalyptus for pulp), or foreigners operating in Brazil who had the master idea for a large-scale pulp mill (such as Erling Lorentzen, the Norwegian behind Aracruz). However, although some of the initial initiatives came from capitalists in Brazil, the actual building of the current large-scale model, with huge pulp mills, could not have taken place without the involvement of the globally crucial Finnish technology and service-providing companies. The tendency of capitalist agency in the new material expansion

has been to hide its power with persuasive discourses, representing the globalization they cause as an agency-free, naturally occurring phenomenon of demand and supply balancing in free-wheeling markets.

Concluding Remarks

Forest-industry globalization suggests that changes in agrarian political economic settings influence capital accumulation style. Agency, interaction between companies, the state, and resistance, can lead to systemic cyclic changes in the style of accumulation from internal capitalization to external material-territorialization—a transformation illustrated by discussion of Finland, a prime example. As capitalization eventually led to lower returns because of over-accumulation, a grand turn to material accumulation has been a precondition for expansion of forestry capitalism during the past decades, producing high returns. The territorial expansion from the north to the south has been secured primarily by industrial tree plantations in agrarian political economic settings of concentrated land tenure, examined in this study with the pivotal example of Brazil. In terms of Arrighi's (1994) theorizing on capitalism, forestry capitalism's expansion first by Finnish capitalization (C) and then by Brazilian territorialization (M) are interlinked cyclic phases; the M-C-M+ cyclic changes are an underlying explanation for why and how the globalizing trajectory of the paper industry system has emerged in the way it has.

An incorporated comparison of Finland and Brazil, seeking generalities and particularities in their land control and accumulation trajectories, depicted why and how forestry capitalism is now territorializing the Global South. Generalities have been found, explaining *why* certain land control and accumulation styles were used. In the period before the 1910s in Finland and the trajectory seen in Brazil, capital has been accumulated primarily by territorial expansion. These periods concentrated land control with capitalists, dispossessing rural populations on the way. Material expansion that molds existing socio-ecological relations is a condition required to foster global capitalism, to secure high returns, to globalize an industry system; for these reasons it was used both before the 1910s in Finland and in Brazil today. Territory-monopolizing expansion has been essential for creating global forestry capitalism where a strong north–south division of labor and revenue exists between commodity-exporting and importing countries.

Particularities have also been discovered, explaining *how* Finland specifically became a core and Brazil a commodity-extraction location within the global forest industry system. The post-1910s counter-movement in Finland successfully established family forestry. This helped to transform accumulation logic from corporate land control expansion to internal capitalization. Thereafter, largely state and cooperative-financed innovation created capital-intensive forestry technology. Later, from the 1970s, this capitalization boosted a new wave of territorial expansion, which sought to find places where forestry machinery and services could be sold. It resulted in new southern plants offering cheaper raw material for the northern producers.

The role of corporate decisions, contested territories, and resistance is emphasized. I have argued that agency, including movements to counter over-accumulation and particularly agrarian resistance, can actually make a difference to capital accumulation. As Moore (2011) reminds us, citing Arrighi (1994), in these cyclic changes as well as others, there is potential for creative, new organizational revolutions by states, businesses, and societies. Some of the latest resistance cases in Brazil suggest that a counter-movement is being built to topple the corporate land control-based globalization (Kröger, 2011). The over-commodification of land, labor, and money has led to a need to regulate capitalist expansion, as Polanyi (2001) suggested.

This article has focused on the ‘pulping’ of places—turning landscapes into areas of monoculture pulpwood production—as a way to examine current globalization. Industrial tree plantations, whose land is controlled, fenced, and maximally exploited by corporations, have become the central ecological tool in the expansion of global forestry capitalism within the cyclic change from capitalization to material globalization. Such socio-ecological maneuvers in the practice of exploitation are also central to the globalization of other industries.

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Notes

1 According to the company, ‘More than 75% of the world's pulp flows through Metso valves’ (metso.com, Pulp and Paper).

2 ‘Forest cluster’ is a concept referring not only to forestry and forest industries but also to the linked industries: when talking about the forest industry here, I refer to this greater cluster.

3 ‘Smallholder’ is typically defined in the same way in Finland as it is in Brazil, with the majority of families in both countries controlling estates of about 20 hectares. However, ‘corporate’ does not translate equally between both contexts. Corporate land control is much larger in size and tighter in grip in Brazil.

4 Although Brazil is sometimes seen as among the most important emerging powers and economies, there are great differences between industries depending upon the division of labor and broad socio-economic-environmental gains. Analysis should be broken up from the country level to the industry-specific level. Brazil is a core country, for example, in the airplane production industry (Embraer being a primary example). But in the natural resource sectors, the developmental outcomes of Brazil's industries—understood as widely as possible and signifying also socio-environmental outcomes and livelihoods—exhibit peripheral characteristics, and not characteristics of wealth-accumulating cores. This is because the focus is on raw material exports, which are not taxed highly enough, do not provide many jobs, and work by accumulation by dispossession through large-scale enclosed private production enclaves (see Kröger, 2012a).

5 Landscapes were also transformed in Finland. Particularly since the 1950s, biodiversity-rich primary forests were turned into secondary forests for timber production, which now dominate. Also, the conflict between the Finnish state and forestry capitalism with traditional alternative economies such as the Sami indigenous peoples relying on reindeer husbandry in Lapland (see Raitio, 2008) resembled in many places a colonial setting of pulping the landscape for the sake of territorial expansion. However, the criticism of biodiversity loss and excessive focus on timber yields, although existing, has not transformed into a major counter-movement such as caused by plant pollution, perhaps because timber sales are an important source of income for most Finnish rural estates.

6 Also capitalization is taking place (in some places) in the south, and not all expansion is based on corporate plantations, as smallholder plantations also expand (see Sikor, 2012). Such differences are explainable by

varying political-environmental contexts. Yet it is clear that the main industrial forestry globalization process is now taking place via corporate material expansion.

7 In Brazil, family farmers (smallholders) typically control 20 hectares of land.

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