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# **The Swedish Dream**

– appropriation of nature at the timber frontier in ‘Swedish America’, Norrland, 1850-1900

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## Abstract

This thesis provides a historiographical account of the multiple socio-ecological transformations that occurred in Västernorrland, Sweden, during the second half of the 19th century. By engaging with ecological Marxist thinking, such as the world-ecology framework proposed by Jason W. Moore, these transformations are conceptualised as part of a broader movement of *commodity frontiers*. Drawing upon a wide and varied range of sources, a synthesis is achieved that links the agrarian colonial project and its related modes of life, the institutionalisation of new property regimes through scientific programmes, the entrance of foreign capital and the switch to coal-based infrastructures. I argue that these processes are entangled and co-evolve, but are ultimately driven by the entry of capitalism and its inherent drive towards capital accumulation, with repercussions for how ‘natural resources’ and the forests are debated about and utilised today. In the context of the accelerating climate crisis, these considerations can help elucidate the borders of possibility implicated by our contemporary understandings of the crisis, and help critique and transcend them. Thus, the thesis contributes to the development of ecological Marxist theory by extending its empirical base, but also offers different explanations to a broadly studied era of modern Swedish history.

Keywords: socio-ecological transformations, modernity, human-nature relations, Sweden, environmental history, capitalist transitions, steam-power, historical natures

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# 1. Introduction

In the 2018 regional elections, the Health Care Party (Sjukvårdspartiet) received 37% of the vote in Västerbotten county, Norrland. For Norrland, the region covering the northern two-thirds of Sweden and traditionally its most politically left-leaning region, this was a remarkable case of voter flight. The region has no more than ten hospitals with maternity care, and it is not uncommon to have more than 200 km to the closest hospital. At the time of writing, national telecom company Telia has been disbanding its landlines without guaranteeing that the mobile networks have coverage. This has led to cases where citizens have simply not been able to call an ambulance during emergencies (DN 2021). The dismantling of social safety nets has cut through contemporary political sentiments in Norrland. Journalist Po Tidholm summarises: ‘the countryside is dying, and almost no-one is acting’ (in Lundberg 2016). At the same time, its forests have become a hot topic, as the Swedish government is ramping up its efforts to ‘green’ the economy, aiming for a 100% renewable energy mix by 2040 (Energimyndigheten 2020). Biofuels and the resources offered by the forests of Norrland have been central to these debates, and the role of the forest – resource, carbon sink, ecosystem, plantation – is being contested from all angles (Expressen 2021, Röstlund 2021a, Wetterberg 2021).

This thesis concerns itself with social issues, the precarity of life under capitalism and state-mediated ways of rationalising and using nature. But, rather than the 2020s, it is set in the second half of the 19th century. The timber frontier, or the breakthrough of the Swedish sawmill industry, is often depicted as a process constitutive of modern, industrial Sweden. Through the exploitation of the Norrland forests grew an industry that still wields significant power today. Historian Eric Hobsbawm has written that historical works, in “investigating the past, even the remote past, are also thinking and expressing opinions in terms of and about the present and its concerns.” (Hobsbawm 2002: 282) By analysing the timber frontier, as it manifested itself in the Västernorrland county (see *figure 1*), I hope to elucidate how dynamics that were present or created then can be instructive for understanding society today. Thus, I aim to extend the empirical base of ecological marxist theory, and, by doing this, propose an alternative narrative to an oft-studied era of Swedish history. I contend that the Swedish timber frontier was part of a wider network of *commodity frontiers* (Tsing 2003, Moore 2015), edges of space and time through which capitalist power extends. In this case,

the frontier centres on timber, and the frontier can be seen to move successively through the northern parts of Sweden. The present focus will be on Västernorrland, where the frontier reverberated from the coastal towns of Sundsvall and Härnösand through the commercially unexploited old-growth forests of the interior land, where a simultaneous process of agrarian colonisation took place. Within 50 years, Sweden rose from exporting barely any timber at all to become the biggest timber exporter globally, with Västernorrland providing the majority of those exports (Björklund 1998:32). I proceed from the world-ecological notion of the contradiction between the accumulation of capital and the reproduction of life. Västernorrland and its timber frontier provide a case of this model of capital and nature, in which the following questions guide my inquiry:

- How can the emergence of the timber frontier be explained from a socio-ecological perspective? Why did it occur?
- What socio-ecological transformations did it entail?

The investigation will cover the emergence of a techno-managerial regime of nature, the conquest of nature and social reproduction by capital and the fuel that made it all possible - coal. Thus it takes a rather eclectic view of social, economic and cultural processes, but ties them together by an analysis that links all these processes to the transition to, and workings of, capitalism. My argument focuses on the so-called 'non-economic' processes that are inherent to capitalist production. I expand from the narrow view of labor-produced value, to analyse what the 'background conditions' to this value production are. This allows me to analyse the timber frontier and its related social and economic phenomena from a more holistic perspective. I will proceed to give a short account of the world-ecological framework which I build upon in this paper and the methodological implications it has. Then I give a broad history of the timber frontier, including its demographic, economic and political changes that occurred. Lastly, I analyse and link these processes through a socio-ecological lens.

### *1.1 Timeline and map*

1824 - New law on delineation of land in Västernorrland

1840 - Removal of British tariffs

1848 - First Companies Act is passed in Sweden

1849 - First steam-saw is built in Sundsvall

1850 - Sweden exports half a million cubic metres of wood

1859 - Establishment of The National Forest Agency

1867 - Start of the Famine of 1867-1869

1870 - Start of big sawmill boom

1871 - Steam-power overtakes water-power in the sawmill industry

1879 - Sawmill boom slumps, water-powered mills phased out

1879 - First major strike in Sweden breaks out - The Sundsvall Strike

1900 - Sweden exports five million cubic metres of wood

1906 - 45% of all land in Västernorrland is company-owned

1906 - Bolagsförbudslagen, forest companies are banned from buying land

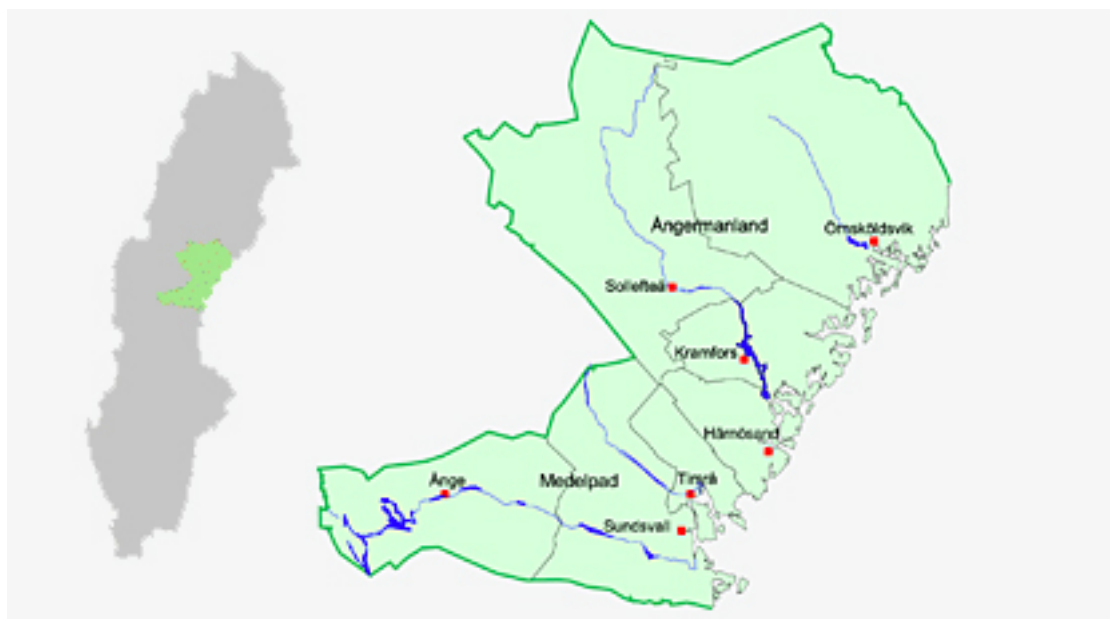


Figure 1. Map of Sweden and Västernorrland county. Source: Riksantikvarieämbetet 2019.

## 2. Methodology

### 2.2. Methods

This thesis is a historiographic account of the Swedish timber frontier and its manifestation in Västernorrland. I make use of a wide range of source material which I interpret and synthesise to provide an account of this period of fundamental socio-ecological transformation. As such, it situates the phenomena within a broader context of world history, following a scholarly tradition tracing back to the 20th-century *annalistes*. The *annalistes* subscribed to a method of history that diverged from the event-centred historical writing and emphasised the slowly changing processes occurring not only within, for example, a nation-state, but on smaller or larger spatial scales and contextualised in a bigger picture (Brundage 2017: 10). The Annales School is influenced by the historical materialism of Marx, but in its approach to history it is open to bringing in methods and knowledge from other disciplines. Fernand Braudel, a leading proponent of the school, approached time through three conceptions: 1. *la longue durée* – the long term influence of geography on human civilisations, 2. *la moyenne durée* – the economic, social and political over the medium term and 3. *historie événementielle* – short-term, event-oriented history (Donnelly & Norton 2021: 46).

In the later part of the 20th century, Immanuel Wallerstein was one of the main scholars drawing on the Annales school to build a ‘world-systems’ approach (Wallerstein 1979). The world-systems approach looks beyond the nation-state to the world-system as a unit of analysis. This enables an integrated analysis of history that sees the relations between different parts of the world-system in an international division of labour. Following the *annalistes* polemic against event-centred history, Wallerstein expanded that epistemological critique to attempt to transcend the perceived autonomy of the 19th century’s ‘holy trinity’: society, economy and culture (Wallerstein 1991: 14). Finally, this project has been carried on by Jason W. Moore and others under the umbrella of world-ecology. A world-ecological perspective unites the world-systems approach with environmental historiography and emphasises ecological elements in novel ways that are able to link natural and societal changes in a relationist fashion (Moore 2015). This paper, then, analyses the Swedish timber frontier by applying a long *durée* analysis that considers the frontier not as a uniquely



Swedish phenomenon but part of a larger international division of labour and organisation of capitalist natures in commodity frontiers during the long 19th century.

The aim is to bring together an analysis of the economic-social side of capitalism with the ecological base it springs from. This builds on the philosophical materialism of Marx, who wrote that the first historical act is the ‘production of material life itself’ (Marx quoted in Foster 2000: 116). This philosophical proposition of humanity-in-nature, the notion that humans are from and part of nature, has however not been reflected in the analytical procedures of the burgeoning scholarship on environmental issues. These have tended to view nature and society as ontologically separated, thereby externalising nature as an object of study (Moore 2015: 34). By viewing nature/society in a holistic but dialectally joined manner, it is possible to analytically-methodologically apply the philosophical insights of materialism. This means to observe in history not only the history of, for example, capitalism, but also the specific historical natures that emerge from and with historical capitalism. This is the ontological position that this paper takes, one of nature and society co-joined, but also co-evolving, constantly creating ‘new’ historical natures (further elaborated in the Theory section).

### **2.3. Critiques and limitations**

There have been some critiques of the methodological consequences of expanding the analysis beyond the economic sphere, or, to use the terminology of Moore, not only the *exploitation* but also the *appropriation* of nature and so on. One argument is that Marx and Engels were fully aware of the possibility to include ‘nature’ or environment into their analysis, but still decided to focus on the mode of production as the proper way of historical analysis (Nayeri 2016). I would argue the emphasis on appropriation and the subsequent opportunities for tying together an analysis of environmental changes with social processes constitutes a valuable contribution to theory, opens new avenues for analysis and follows in a tradition of constructive feminist and environmental Marxist critiques (cf Federici 1975, O’Connor 1988, Fraser & Jaegghi 2018). Also, I would argue that Moore is not privileging one (appropriation) over the other (exploitation), but shining the light on another part of the whole, and pointing out the dialectical relationship the two have. Similar to the old parable about the blind men and the elephant, where each man subscribes to his truth from his own fractional experience, we must seek to synthesise accounts of reality to learn of the whole.

There is no exploitation without appropriation. This is part of a methodological expansion that provides explanatory power to cases such as the timber frontier in Sweden. Following a materialist conception of nature and history, this thesis argues that the production of value is inseparable from non-economic conditions and that a Marxist analysis can profit from untangling the relations between the appropriation of nature and exploitation of labour. While its strength lies in the possibility to apply a relationalist thinking to processes that may initially appear separate and drawing conclusions on larger, long-term structures and developments it pays the price of superficiality. Especially within the frame of a master's thesis, the wide scope of the world-ecological approach does not allow for the detail of, for example, a micro-history (Donnelly & Norton 2020: 47).

#### **2.4. Sources and literature**

One thing unifies all historical research - the sources. They can vary in character, primary sources such as documents, reports, newspaper articles can be used, or secondary sources written at a temporal distance from the events in question, including articles, books, monographs, biographies and so on. The two are often combined, and secondary sources are generally based on first-hand material (Danto 2008). Research, like this thesis, that engages primarily with secondary sources, is to some extent qualitatively different from research based on primary sources, but some basic critical notions are fundamental to both. Irrespective of the type of source, the historian has to evaluate the source in terms of validity and reliability (Danto 2008: 63). What are the biases of the author, in what context was the text written, how well does it account for its use of historical material? When reading and assessing the material, these questions are necessary to maintain a critical approach. The vast scope of a world-systems research inquiry has effects on the use of sources. Rather than diving in the archives looking for primary sources, I use secondary sources as the base for my research. To synthesise the specialised research of many scholars into a unified account offers the possibility higher abstraction and the creation of a new narrative (Brundage 2017: 22), and that is what I intend with this thesis. By synthesising literature from a range of disciplines and eras and applying novel theoretical interpretations of them, I hope to shed new light on the timber frontier and its effects.

Several reasons led me to use secondary sources as the main data. The world-system approach to historical writing implicates a broad approach to the events of history and therefore a

reliance on a synthesis of other, more specialised, works. This has allowed me to make use of works from forest history, economic history, geography, ecology and other disciplines. However, my use of primary/secondary sources does not always adhere to the classic, Rankean hierarchy, where original documents are the ideal source type (Donnelly & Norton 2020: 64). The theory-driven nature of this thesis means that the hard distinction between primary/secondary does not decide the relevance of the source, rather the sources' relevance to my inquiry guides my use of them (Donnelly & Norton 2020: 70). Further, it could be argued that all sources, whether 'primary' or 'secondary', involve interpretation, and are subjective, which again emphasises the conscious and critical reading of the sources no matter where they come from. My process has in this sense involved a purposive sampling approach (Bryman 2012: 418) carried out in a snowballing manner, where initial sources have led me on to more specialised literature. During the course of the research these sources have been compiled under meta-codes derived from my theoretical framework, such as colonialism, ecological and social transformations, labour, capital and so on. These have then been condensed in to the present thesis. Consequently, I make use of a range of sources to put forward my argument, drawing on multiple disciplines to offer the most holistic synthesis possible.

## **2.5. Temporal and geographical limitations**

Because the historical process analysed here represents the intersection of many different, interrelated, conflicting seeds of historical change, it is difficult to maintain a clear demarcation. But the timber frontier had its most violent and fundamental effects on the region of Västernorrland (see map, *figure 1*) during the approximate time frame of 1840-1900, which is why for this thesis, it will be the main focus. As said, the timber frontier had ramifications beyond this geographical area, and certainly beyond this timeframe, but for assessing the specific characteristics of this historical nature – the first wave of timber-induced industrialisation in Sweden – this limitation will suffice.

# **3. Theoretical framework**

## **3.1. Theory**

I will analyse the timber frontier using a dual approach. As a case of capitalist transition, the frontier is viewed as the dialectically joined process of production of nature and production of capital (Moore 2003, 2010a: 34). At the frontier, the combination of an endless conquest of

nature on the one hand and endless accumulation of capital on the other are viewed in the context of world-history. This paper is written largely in conversation with the world-ecological framework of Moore, but to analyse the specificities of, for example, the fossil economy that arose from the frontier, other theoretical contributions will be considered as well. For distinguishing between the two processes, I borrow the term used by philosopher Nancy Fraser: ‘non-economic conditions of possibility’ (Fraser 2021: 99). This facilitates a broader analysis of both the economic phenomena of capitalism, but also its relations to social and ecological conditions that are not accounted for in strictly economic analysis. The inside, the *zone of commodification*, is dominated by a capitalist mode of production and capital accumulation. Commodity production and exchange, however, do not happen in a vacuum. Rather the social re/production of labour, as well as the production, and externalisation of nature, is carried out in the *zone of appropriation*. These are the non-economic conditions of capitalism – the conditions that are fundamental to value relations, but are being devalued and kept out of the zone of commodification (Moore 2015, Fraser 2021).

### **3.2. Notes on Moore and ‘world-ecology’**

In *Capitalism in the Web of Life* (2015), Moore lays out the foundations of his ‘world-ecological’ methodology. As mentioned, Moore draws upon a world-systems framework and aims to synthesise core Marxist insights with those of environmental historiography (Moore 2015: 11). Key for this paper will be his writing on the commodity frontiers, on which he has also elaborated in a two-part article entitled ‘Amsterdam is standing on Norway’ (2010a, 2010b). In the view of Moore, capitalism is neither an economic nor social system, but a way of organising nature. This proposal is rooted in his effort to transcend the dualism through which capitalism holds our political imagination captive – the dualism of Nature and Society (Moore 2015). In his formulation, capitalism is a mosaic of relations which “work through nature; and [/] nature works through that more limited zone, capitalism.” (Ibid.,: 1) A possible critique of this statement is that organising nature is not a specific feature of the capitalist mode of production, but I think Moore provides an answer to this point in that there are specific ways in which capitalism is violent and destructive, such as capitalist agricultures and monocultures (97). Fraser has argued along the same lines, showing empirically and structurally the internal dynamics inherent to capitalism that lead towards environmental degradation. In its parasitic relations with its ‘others’ (or, for Moore: the zone of appropriation), the eternal-growth imperative of capital ontologically renders, for example,

nature as free and self-replenishing (an observation made by Marx as well, see Foster 2000: chap. 5). Admittedly, ecological destruction occurs in other societal organisations than capitalism, but they are derived from external factors, rather than dynamics inherent to the system (Fraser 2021). Instead, Fraser points to the prevalence of social learning to avoid ecological disasters in non-capitalist societies, which brings to mind the numerous case studies of natural resource management by Ostrom, which emphasised the long-term adaptation of environmental practices (Ostrom 1990), often stretching over several centuries. These stand in stark contrast to the perpetual acceleration of extraction in capitalist ecological regimes.

Moore distinguishes between capitalism as a project and as a historical process. He argues that the project of capitalism, its logic, unfolds itself through the manifold projects of science, empire and capital to produce (external) nature. This theoretical argument has to be combined with an empirical component that spotlights the historical forms it has taken – historical natures/capitalisms (Moore 2015, Fraser 2021). This highlights the co-production of life between species and environment and presents question of agency. A controversial topic within environmentalist thinking, it ultimately relates to fundamental questions regarding how to deal with the climate crisis, and *who* will deal with it (Latour 1993, Hornborg 2014). I follow the critique of a Cartesian mode of thinking and identify in this the externalising logic of capital. The philosophical materialism of Marx leads him to state that man ‘by thus acting on the external world and changing it, he at the same time changes his own nature.’ (Marx in Smith 2008: 54) Thus, humans are active agents in the real world, *but* their interactions with it, for example the social systems they organise, are co-produced (‘changes his own nature’) with the external world, which leads to specific historical natures and capitalisms around the world. This avoids the pitfalls of conceptualising nature as a passive object into which an active humanity imposes itself and allows for an analysis of the dialectal relations and entanglements between for example humans and nature.

This also helps to politicise history. By questioning both the category of ‘humanity’ and ‘nature’, we can move towards a critical examination of historical conditions. The same way in which the ‘Anthropocene’ concept (Crutzen 2006) has been critiqued for its tendencies of universalising culpability (Hornborg & Malm 2014), by conceptualising nature not as a passive object of human domination, but as an crucial part in the unfolding of human-nature

relations we will be able to see not only how the relation of domination is actively produced within capitalism, but how it can be and is resisted, leading us towards alternative visions of existence. For geographer Neil Smith, this was illustrated by the production of nature through labour, he claims that ‘under capitalism the appropriation of nature and its transformation into the means of production occur for the first time on a world scale’ (Smith 2008: 49). Under capitalism, this implies a society-nature relation predicated on the drive to produce exchange values.

This requires a further definition of the concept of *nature*. The word that is, according to literary critic Raymond Williams, the perhaps "most complex in the [English] language" (1983: 219), will require some clarification. Several conceptions of nature occur throughout this paper. First there is the scientific-realist nature, as studied by climate scientists, governed by biophysical processes. Following that is the nature viewed from the point of capital, a nature that serves as tap and sink but fundamentally a sphere devalued but integral to value production, offering ‘free gifts’. This nature is ontologically separated from humanity, its *Other*. Lastly, we arrive at the ‘historical nature’, namely the nature that coevolves with human history through their metabolic interactions (Fraser 2021). In this paper, I am concerned with the specificities of the historical nature created at the timber frontier. Additionally, I use the concept of *value* to connect different phenomena. Building on Marx’ law of value, which views abstract socially necessary labour time as the substance value (Pirgmaier 2021), I utilise the relational thinking of Moore and Fraser to reach beyond the substance of value and analyse the relations that make it possible. These include longstanding feminist critiques, such as reproduction of labor-power (Federici 1975), and ecological critiques regarding appropriation of nature (O’Connor 1988, Moore 2014: 249). Following this, Moore argues that the appropriation of ‘Cheap Natures’ are key to every new wave of capital accumulation. For identifying these patterns, commodity frontiers are central. These are the spaces where capitalism, through the nexus of science, capital and empire, redefines itself and opens up new possibilities of extraction (Moore 2015).

### **3.3. Frontiers**

The frontier concept is a recurring one within Marxist thought. It relates to the question of how capitalism expands and grows. Marx, in his critique of Adam Smith, terms this primitive accumulation (Harvey 2005: chap. 4), a concept David Harvey develops into ‘accumulation

by dispossession', arguing that there is nothing primitive about this stage, as it is a continuous feature of capitalism. Rosa Luxemburg observes in capitalism a need to conquer and colonise non-capitalist spheres in search of new markets and surplus value: "capitalism needs non-capitalist social strata as a market for its surplus value, as a source of supply for its means of production and as a reservoir of labour power for its wage system." (Luxemburg 2003: 348) Luxemburg's argument derives from a theory of *underconsumption*, stating that in a closed capitalist system workers will not be able to afford the commodities they produce, causing a crisis of demand, pushing capitalism to dominate external markets. Harvey, on the other hand, argues that capitalism has a tendency towards *overaccumulation*. Firms, in competition, will invest towards productive gains, but as these gains are generalised profit rates will fall, and 'too much capital chases too few profits' (Out of the Woods 2014). This leads to crisis and devaluation of capital, and sets the stage for new rounds of accumulation. Common in all these accounts is the notion of a sphere external to capitalism, and how this is necessary for the continued survival of the system. When we attempt to 'green' these theories, this will be of fundamental importance.

As examples of accounts that include an ecological component to these processes, I use James O'Connor and Moore. O'Connor coined the term 'the second contradiction of capitalism' whereby he introduces yet another theory of crisis, that of *underproduction*. He argues that capitalism dominates its environment, both the ecological and social one, and in this process has to produce these environments for its continued extraction of them. But O'Connor points out that this social and ecological reproduction of the conditions of production comes at an increasingly high cost. He mentions capitalist work and family relations, as well as the costs of preventing ecological destruction and repairing the destruction from the past (Out of the Woods 2014, O'Connor 1988). O'Connor argues that the free gifts of nature are not free under capitalist exploitation, but provide a huge, and rising cost, something which is all the more evident in 2021, with a rapidly unfolding climate crisis. In *Capitalism* Moore develops O'Connors ideas through the nexus of unpaid work/energy. For Moore, this sphere is necessary for the survival of capitalism but is *devalued* and kept outside of it. This encompasses feminist critiques of Marxism: all the unpaid work that goes into the social reproduction of labour, mainly carried out by women historically, but also by nature. This means, when thinking about frontiers and the expansion of capital, that it is not enough to talk about exploitation and value as a merely economic phenomenon, but rather they should be

dialectally linked to the *appropriation* of unpaid work; human and extra-human. The frontier landscape, then, becomes a place defined by novel modes of appropriation, enabled by a mix of power, science and culture (Moore 2015: 54). ‘Every act of exploitation (of commodified labor-power) therefore depends on an even greater act of appropriation (of unpaid work/energy).’ (54)

O’Connor and Moore point out how capitalism creates an ontological separation between humans and nature, and critique this from a materialist point of view. Only by externalising nature can capitalism divorce itself from the ecological degradation it causes and justify it by a logic of prices and value that obscures its material basis. Their point cements what appears quite logical, that capitalism does not exist in a vacuum, ontologically divorced from nature, but is dependent on it at all levels. Also, it shows how the logic of endless accumulation inherent to capitalism (M-C-M’, see Malm 2016: 657) is predicated on an appropriation of spheres external to capital, displacing loads and costs onto them while reaping the profits for itself. I would argue that this development does not necessarily stray away too far from other eco-Marxist interpretations; for example Foster points to how use-values, i.e. these ‘devalued’ spheres, are necessary for value production (2000:167), and Parenti argues for the role of the state in delivering use-values to capital accumulation (2015).

## **4. Results**

### **4.1. Timber frontiers**

“The extension of capitalist power to new, uncommodified spaces became the lifeblood of capitalism.”

Jason W. Moore (2015: 63)

“When the axe cut through the forests of Norrland and when the rivers brought the children of the forests down to the coast to give gold to the company men, the villages and cottages became desolate and sad. For when the forests die, so do the people.”

Otto Dalkvist (1933: 9, translated by author)

The phenomenon of commodity frontiers is not new. They have been central to the expansion of capitalism since at least the 16th century (cf Moore 2010a, 2010b). Through commodity frontiers, capitalist relations are spread, but the frontier also represents an appropriation of



nature through territorial and geographical claims (Moore 2014: 260). The 19th century was a period of accelerating industrial expansion in Europe, and this caused an increased appetite for timber in the cores of the world-system. The preceding centuries had however decimated the forest stands of continental Europe significantly, and the demand had to be satisfied further away from the core of Western Europe. This meant that a timber frontier opened up encompassing Scandinavia, Northern America and Russia.

*Deforesting the Earth* (2006), the magnum opus of geographer Michael Williams, describes how the timber frontier swept through Sweden. At the start of the 19th century, an increasing population, agriculture and industry were all contributing to growing pressure on Swedish forest resources. This set the scene for the explosive forestry boom, described by Williams as a ‘free-for-all, cut-out-and-get-out’ exploitation which ate its way through the coniferous forests of northern Sweden during the latter half of the century (2006:417). The frontier started in the central Swedish provinces of Värmland and Dalarna, because of their vicinity to the ironworks and the port of Gothenburg, but as the forests were decimated, it pushed along towards the north (Björklund 1998). The rising international demand for timber products created the foundations for a sawmill industry that became most developed in the region of Västernorrland. By 1875, Sundsvall had overtaken Gothenburg as the biggest export hub for Swedish timber products. 25 years later, there were 108 steam-powered sawmills in Västernorrland and the Sundsvall area had the highest density of sawmills in the whole world (Ibid.,: 13). The process did not only entail a reshuffling of export centres, but also a massive increase in absolute terms. In 1850 the Swedish timber export consisted of half a million cubic metres of wood, in 1875 it had risen to two-and-a-half million, and in 1900 it doubled again to five million – a tenfold increase in 50 years (13). The rate of exploitation drove the frontier beyond Västernorrland and further north, first into the unexploited forests of Jämtland and Västerbotten, and eventually, by the end of the century, the sawmills of Sundsvall were fed with timber floated all the way from Finland (7).

Already in the 1850s, concerns about the state of the Västernorrland forests were raised. In his quinquennial report for 1851-1855, the county governor Wilhelm Gynter wrote that high timber prices and demand bred greed and that everyone wanted part in the looting of the forests (*BiSOS*, 1860: 31). In the 1850s, the timber exploitation was still in its infancy, but for Gynter the signs were clear. In his report from the following period, he concluded that the

exploitation of the forests was ‘little short of a war of extermination’ (BiSOS 1860:14). The growing concerns regarding exceeding felling were also treated by Gynter’s successor, Curry Treffenberg. In 1875, during the boom of the industry, he argues against timber scarcity, claiming that it is mainly large, old-growth, large-diameter pines that are being felled, and that the forests will recover from it (*BiSOS* 1875:29). It is however telling that in the mid-1870s the country governor discusses the question of forest devastation (*skogsförödelse*), even if he denies it in favour of economic gains. But in what ways did the compositions of the forests change? We have seen how the frontier moved north in search of more resources, and that the biggest trees were of principal interest to the forest industry. Forest ecological studies have attempted to map the ecological transformations occurring during the era (Östlund 1993, 1995, 1997). Comparing cases from around Norrland, the general pre-industrial image is one of a multiple-storied, pine-dominated old-growth with a significant portion of dead trees. This is radically altered by the timber exploitation, which with its preference for large-diameter pines changed the age composition of the forests and virtually eradicated the large trees, which were in some cases several hundred years old (Östlund 1993: 21). This process drove the frontier deeper into the interior and further north. The underlying structures that made this possible, and the transformation it entailed, will be detailed below.

## 4.2. Colonialism

“The large forests are desolate and wasteful, because no-one needs the timber, which falls down and decays.”

Carl Linnaeus (quoted in Östlund et al. 1997:1198)

### 4.2.1. *Agri/cultural*

The colonisation of Norrland has been dubbed the last colonising venture based on self-sufficiency in Europe (Andersson et al., 2005). The colonisation of the interior of Northern Sweden, where Samis had lived for thousands of years, during the 18th and 19th centuries also represented a land-use change, from nomadic to agricultural. This colonisation was carried out with the explicit aim of ‘cultivating the wilderness’ – an agrarian colonising movement based on the cultivation of cereals (*Ibid.*,: 304). However, the harsh environmental conditions created a particular form of agricultural lifestyle, a semi-subsistent one that depended on hunting, foraging and cattle breeding to complement cultivation (Andersson et

al. 2005, Bäcklund 1988). The land use was thus in essence quite similar to the Sami one, with some differences in the types of domesticated animals. The state played a prominent role in the colonial organisation, both promoting agrarian colonisation, but also considering Sami interests to maximise the tax income which had been collected from the Samis since at least the 14th century. However, the colonising effort led to conflicts with the Samis who lived in the forests, were less nomadic and had fewer reindeers. 19th century legislation on Sami grazing rights favoured the nomadic, reindeer-herding Samis and the forest Samis were excluded. This led to their increased participation in the colonial project as they became settlers in line with the state's agricultural vision (Andersson et al. 2005: 307). To expand as far as it did, into less and less productive lands, the agricultural frontier was dependent on the timber frontier. Without the additional incomes from forestry, it would have been difficult to reach subsistence. Thus, the agricultural frontier in Norrland moved much in conjunction with the resource frontier. Also, the process was underpinned by an agrarian revolution, where new technology led to increased productivity and prolonged seasons. As a comparison, cultivated land in western Europe grew by 110% between 1700-1870, but in Sweden, that figure was 250% (Gadd 2000: 232).

#### 4.2.2. *Legal*

To organise the colonisation of Norrland, the delineation surveys were of crucial importance. They were initiated already in the 1680s, due to a growing pressure from the ironworks industry to delineate the land belonging to the Crown from private land. The process required a lot of administration and did not reach Norrland until the early 19th century. It had proceeded in waves, and the new round initiated in the 1820s was influenced by the political currents of the time. The consensus was that the state should retreat from all its land claims and that private property should reign. By 1824, the Riksdag had decided that *all* state forests be sold. However, the process proceeded slowly, and largely excluded the Northern forests as they were deemed unmarketable (Arpi 1959: 13-16). As the colonising efforts were ongoing, the locus shifted from the ironworks to the farmers. In line with ongoing political discourse on Norrland as 'land of the future' (Sörlin 1988), with unique characteristics to be exploited, together with the population growth and significant emigration to the United States, farmers were offered big areas of land to establish homesteads (Arpi 1959: 24, Gadd 2000: 303-304). These land plots often did not satisfy the specific needs of a Norrland mode of agriculture. For example, they did not receive sufficient areas of hay meadows for necessary grazing but

were instead allocated excessive amounts of forest land, of which they had little use (Arpi 1959:26). In Västernorrland the delineations finished in 1869 (Oskarsson & Busk 2007).

#### *4.2.3. Political*

The colonial project was rooted in a conscious political effort of expanding the Swedish territory and realising the ‘potential’ of Norrland. It was no new notion within Swedish political history; already Gustav Vasa had the idea of claiming the land (Oskarsson & Busk 2007). Then, the emphasis was on claiming the territory to fend off Denmark and Russia and to acquire taxes from the Sami (Kvist 1995:11-12). In the 18th and 19th centuries, other drivers pushed the colonial front. The iron ore industry, which required forest resources for fuel inputs, was advancing north during this era and settling along the Bothnian coast. The issue of Norrland and its future was an ever-present topic in the Swedish political discourse. The colonial ambitions and visions had their proponents (and opponents) already during the 16th and 17th centuries, giving voice to idealisations of Norrland as pure and inhabited by noble savages (Sörlin 1988: 27). Norrland was defined by its ‘slumbering’ potential for natural resource extraction and land use, a potential that could benefit Sweden as a whole (Ibid.,: 34). This view was shared by prominent scientists like Olaus Rudbeck and Carl Linnaeus, who, perhaps contradictorily, argued for agrarian expansion *and* the ethical superiority of the Sami mode of life simultaneously. Linnaeus also noted about the forests that they were ‘completely futile, since no one builds houses from them and they provide no food’ (43, translated by author).

The 19th century marked a new attitude towards Norrland. In the preceding centuries, Norrland was seen as a distant resource tap to be exhausted. In the words of councillor Carl Bonde in 1635: the ‘Swedish West Indies’ (30). The 19th century entailed a more active colonisation of the region, connected to the industrialisation processes that were brewing. Norrland earned the new epithet ‘Sweden’s America’ because of its rapid industrialisation, population increase and unexploited resources (chap. 2). These are some of the colonial fantasies that underpinned the attitude from the core towards Norrland. Schematically it can be viewed as an evolution from a mercantilist, colonial attitude in line with the contemporary discoveries of the ‘New World’ to a more capitalist nation-state project aspiring for ‘unity’ under the flag of modernity.

### **4.3. Life at the frontier**

#### *4.3.1 Hybrid agriculture and the growing forestry sector*

“The higher the productivity of labor, the greater is the pressure of the workers on the means of employment, the more precarious therefore becomes the condition for their existence, namely the sale of their own labor-power for the increase of alien wealth, or in other words the self-valorization of capital.”

Karl Marx (1990:798)

The agrarian colonialism of Norrland presented a number of unique challenges. The harsh climatic conditions, with short growing seasons and a persistent risk of crop failure, forced the settlers into hybridised forms of subsistence agriculture. Fishing and hunting were cornerstones in this hybrid, and the short growing season favoured grass which led to a dependence on dairy farming (Lindmark & Olsson Spjut 2018: 64, Gadd 2000). The forest was not commercially utilised in any higher regard, but mainly for building materials and firewood (Lindmark & Olsson Spjut 2018: 64). The pre-industrial commercial uses that did exist centred on tar and potash production. Potash was made from deciduous trees and tar from pine stumps and snags. The tar trade was linked to the whims of the world market, which is illustrated by its eventual demise when sailing ships, which were maintained using tar, started to disappear in the 20th century. The tar production established some mercantile relations between direct-producing farmers and the merchants on the Bothnian coast, and although the production was small-scale, the distribution and trade were organised in a commercial, capitalist way (Gaunitz 1979: 46). These already established protocapitalist relations were then expanded upon and scaled up with the entry of the forest companies.

The agrarian small-scale production in Västernorrland remained uncaptialised in comparison to southern Sweden, where a capitalist agriculture was forming. As mentioned, it is related to the mixed nature of agriculture in Norrland, but also the role forestry came to play in the sustenance of the inhabitants of Västernorrland (and Norrland broadly). In contrast to the rest of Sweden, the forest sectors, with its connections to a lucrative export market, outgrew the agrarian sector. Farmers received extra earnings by working part-time in the forestry sector, which offered wages that were unmatched by agricultural production. The weak potential within agriculture also did not lead to the forestry earnings being reinvested into agriculture. The fact that workers become proletarianised within the forestry industry, but maintained their

positions within the agricultural sector stood in contrast to southern Sweden, where a more complete proletarianisation happened in agriculture (Schön 1972). The rapidly growing sawmill industry required a lot of labour, which led to significant labour migration from the surrounding regions to participate in the felling and logging work (Björklund 1998: 18).

This duality of the part-time proletarian, part-time farmer was also reflected in the production chain of the timber. At the coasts, the capitalisation was more complete, and workers became completely dependent on selling their labor. Here, the companies wielded significant power over the workers, also providing them with housing and other means of subsistence. When conflicts arose, as they did for example in 1879, when 22 out of 23 sawmills in Sundsvall went on a strike against the decreasing real wages and increasing greed of the companies, they used that power to crack down heavily on the workers. The military was called in, and workers lost their jobs and housing. This put them in a position of vagrancy, which legally meant that they were either put in jail or compulsorily enlisted in the army (Björklund 1998: 24-25). The settlers, who combined forestry and agriculture throughout the year, were in this sense more free, but still depended on the incomes from forestry, especially in the more remote locations. The timber felling largely used the same tools as agriculture, the technological innovation was only introduced gradually, and labour was organised in similar ways to agriculture. The companies would contract a worker to cut a certain amount of timber, and he would, in turn, hire a few assistants, often relatives or villagers, to carry out the work of cutting and floating. In practice it only required a horse and a sledge, which qualified most farmers for the role (Gaunitz 1979). However, it was mostly men who worked in felling, floating and sawing. This increased the burden on women to take responsibility for the farms left behind (Bäcklund 1988).

#### *4.3.2. Imports of food and labour*

During the period of the study, Sweden went through dramatic demographic changes. Both a rapidly increasing population and strong emigration currents characterised the 19th century. In Västernorrland, there was a constant immigration surplus and high birth rates. Between 1840 and 1870, the population increased from 85 875 to 150 234 (Schön 1972: 85). The coastal towns of Härnösand and Sundsvall, especially, saw an increase; Sundsvall trebled its population to more than six thousand during the period. The clustering movement towards the coastal towns, a development that will be further studied below, represents the complementary

side of the colonial movement, the capitalist organisation at the centres of production. Agriculture remained important but was also stagnating in the face of increased proletarianisation. This, combined with the harsh climatic conditions, illustrated by the famines of 1868 and 1869 due to crop failures, led to an import-dependence in the region. By steam-ships and train, an increasing share of the foodstuffs was imported. This co-evolved with the agricultural shift to fodder production, moving away from subsistence farming to single crops (Gadd 2000: 241). In 1880, Norrland as a whole made up 14% of the Swedish population but produced 7% of the country's total grain and root vegetable output (Lindmark & Olsson Spjut 2019: 71). 20% of the grain consumed in Norrland was of foreign origin and, of Swedish meat imports, 50% was headed to Norrland (Ibid.,:71). In 1913 Norrland had reached an annual import of 140,000 tonnes of cereals (Ahlmann 1921:144).

#### **4.4. Institutions, mapping and knowledge**

“For the first time, nature becomes purely an object for humankind, purely a matter of utility; ceases to be recognized as a power for itself; and the theoretical discovery of its autonomous laws appears merely as a ruse so as to subjugate it under human needs, whether as an object of consumption or as a means of production.”

Karl Marx (1993:410)

##### *4.4.1. Forestry agencies and education*

We have mentioned how the state carried out a colonial project in Norrland during the 19th century and established an increasingly liberal property regime. But what tools did it have, or create, to establish this? In this chapter, we review the ‘turn to management’ of the forests that was underpinned by a revolution of knowledge. In 1791, the first *hushållningssällskap*, or agricultural society, was established on the island of Gotland. The purpose of the society was to support agriculture and its ancillaries. Even though forestry was placed as an ancillary, it received significant political attention as the societies spread through Sweden, attracting powerful – and forest-owning – members. From 1855 onwards, the societies received subsidies and could expand their operation, which employed specialists within the fields, carried out educational programs organised public meetings (Enander 2007:26). It is fair to say the agricultural societies were influential in the public debate on forestry, as well as in how policy was enacted, and they were early proponents of replanting practices (Enander 2007). The agricultural societies were in some way the seed for the establishment of a

Swedish Forest Agency (Skogsstyrelsen, in 1883 part of Domänstyrelsen). It was established in 1859 and managed all state forest land. It reflected the changing attitude towards the state's role in land ownership, a return of the state if you will. Even though the Riksdag had decided in 1824 to rid the state of all its forest land, this had not been completed and in the 1850s, the political tides had changed. The state should now increase its forest ownership through purchases and delineation (Enander 2007: 28).

The forest agency was intended to act as a role model in terms of forest management, demonstrating to private forest owners the importance of an organised forestry. The immediate period after its establishment represented an 'explosion of education' in forestry (Eliasson 2002: 328) and the numerous expansion in forestry personnel in Norrland carried out controlling functions, regulations and drew plans for the forest uses (Eliasson 2002, Enander 2007: 28). Even if the explicit aim of the institution was to promote organised and rational forestry, the practices in Norrland went against those principles. On state land, as well as on private, the method of 'timmerblädning' was used, a method that ensured economic competitiveness, but performed poorly in terms of regrowth (Enander 2007:28). Eventually, the forests had been stripped of all old-growth trees, leaving only the young and smaller trees, and changing the equilibrium of the ecosystems and thus the regeneration dynamics of the forests (Östlund 1993). Even if forestry practices along the timber frontier did not correspond to the ecological concerns that were being raised in the public debate, the agency did play a role in fortifying notions of forestry management through their establishment of forest schools that educated forest rangers (Enander 2007: 32). 'Sustainable' or not, the new institutions and the knowledge claims regarding the forests represented a new relation to the forests which externalised them as a resource. In the words of geographer Ray Hudson: 'Natural resources are not naturally resources.' (2005: 42)

#### *4.4.2. Mapping the forests*

The scientific interest in Norrland through geology, geography and forestry science can not be separated from the economic interest. The hope of finding iron ore drove geological ventures, the inventory and chemical experimentation with peat led to its use as an energy resource and the forests were of obvious economic concern (Sörlin 1988: 116). In the 19th century the imperialist core of Western Europe conquered frontiers far beyond their borders, aided by their scientific geographic societies. Sweden followed this expansionist thrust and in 1877 the



Swedish Royal Geographic society was founded (Sörlin 1988: 122). The scientific developments were coupled with the afore-mentioned managerial-bureaucratic ones. A bureaucratic army managing and mapping the forest had been created. Armed with its tools of science, concerns of a ‘rational’ management of the forests and the power of the state, the rest of the Norrland landscape was colonised. The most crucial weapon of this process was cataloguing – mapping. Through mapping and classification, a base was laid to distribute land. To illustrate the massive land ownership transformations that occurred, this table shows the increase in millions of hectares owned privately and publicly the start and end of the timber frontier.

	Homesteads	Crown parks
1850	6,0	0,03
1900	13,7	4,4

Table 1. Million hectares of state/private land in Norrland. Source: Enander 2007:20.

Thus land for both private and public use increased drastically and was made available for commodification. During colonisation, land claims related to farming had been prioritised, but vast amounts of forest land were still largely left undelineated. The growing pressure from the sawmill industry actualised the need for a delineation of these lands. This work was at the hands of the land surveyors (*lantmätare*), who surveyed the land and according to instructions from the state allocated plots of land to farmers depending on their needs (Osvald 1958, Berglund & Karlsson 2015: 13). The surveyors then put in their proposals to the county, who formalised it (Gaunitz 1979).

## **4.5. Capital, companies and the forests**

### *4.5.1. Short history of the companies*

But what fuelled this increased demand for timber? Who drove the timber frontier, and where did their capital come from? To explain the emergence of this new wave of forest exploitation, we will assess the background to how and why so many forest companies appeared around the middle of the 19th century.

Ignoring, for a while, the international factors of a world-market demand, several key domestic developments opened the door for a new wave of exploitation of the forest. During

the decades preceding the timber frontier, a set of liberal economic policies were enacted. Traditionally, the sawmills had a small-scale, household production character (Gaunitz 1979, Schön 1972), and were explicitly constrained by the state. Since the 17th century, any international trade from the northern coastal cities was forbidden, and the ironworks were prioritised in terms of access to forest resources. Gradually, the sawmills were allowed some timber quotas from state forests, and in 1812, the international trade restrictions were lifted, allowing a trade network independent of Stockholm to be organised (Wik 1950: 77-80). Still, the production was rather stagnant. In 1848, the first companies act was passed. It allowed for a group of smaller capitalists to join each other in a company and laid the groundwork for how the sawmill industry in Norrland was organised (Wik 1950: 71). In 1864, a decree on full freedom of trade was passed, meaning that there were no restrictions on establishing new sawmills. From then on, there was in practice a free bank establishment. This, in combination with the abolition of a passport requirement for domestic and international travel provided the sawmill industry with conditions for capital provision and mobile labour (Enander 2007: 16, Holmberg 2005). During a 16-year period, the state had fundamentally changed the playing field, enabling capital accumulation and investments in a previously unseen way. The result was clear: during the period between 1848-1874, 46 saw mill companies were established in Norrland and, after 1866, steam sawmills were springing up 'like mushrooms' (Holmberg 2005, Wik 1950: 71). But, as I have alluded to, the business was very capital-intensive, and Norrland was not a capital-rich region. Consequently, the investments came from the mercantile cores of Sweden – Gothenburg and Stockholm – as well as from abroad. The organisers of this process were the 'timber capitalists' (träpatroner), entrepreneurs already linked up to the international market through their trading houses, and eager to exploit a new frontier (Wik 1950, Glete 1987, Björklund 1998).

#### *4.5.2. Capital and world-markets*

Since the start of the 19th century, international trade had been growing from the northern port cities. Early on, it was mainly potash and tar that were being traded. Through them, trade networks were being established, both on the interior, between small-scale producers and merchants along the coasts, and externally, with international trade partners (Gaunitz 1979). As industrialisation accelerated in England, Germany and France, so did the demand for timber products. England had effectively closed off the market with Europe to benefit their colonies, but in 1840, they abolished their tariffs, followed by the full repeal of the

mercantilist Navigation Act in 1849, which opened up a huge market for Swedish timber (Williams 2006: 417). In 1841, Swedish export duties on timber were waived (Holmberg 2005). The era of ‘free trade’ had commenced. The effects on trade were clear: in 1850 the Swedish timber export consisted of a half million cubic metres of wood, in 1875 it had risen to two-and-a-half million, and in 1900 it doubled again to five million – a tenfold increase in 50 years (Björklund 1998: 69). In 1865, the export of timber to France was cleared of all customs and fees as well. Around this time, England surpassed France as the main importer of timber and remained so for the rest of the century (SCB 1972: 47). As for the sawmills, the extant, small-scale ones largely failed to transition to this new market (Glete 1987: 153-154). Instead the timber capitalists entered the picture. They scaled up production, and concentrated it to the coastal areas. Using the trade networks from the paths and tar trade, they secured timber from the farmers in the interior. The capitalists mainly came from the trading houses from Stockholm and Gothenburg and had access to information, contacts and capital from abroad, which put them in an advantageous position when negotiating over felling contracts. Many of the pioneers also came from abroad, such as the Dickson family and Friedrich Bünsow.

#### *4.5.3. Buying the forests, changing the forests*

So we have seen how a state-backed agrarian colonisation movement occurred during the 18th and 19th century, and how this changed the property relations and forest uses of Västernorrland and Norrland. This set the scene for the timber frontier, as the forest-hungry timber capitalists wanted to secure their access to the raw materials needed for their production. As we saw in *Table 1*, both homesteads and crown parks in Norrland grew considerably in size during the period of study. This afforded the sawmill companies two options: acquiring land or felling rights directly from farmers, or from the state. Since before the advent of the timber frontier, the state had offered the small-scale, often household, sawmills certain quotas of timber to fell (Schön 1972, Gaunitz 1979). With the increased demand, however, the previous arrangements did not suffice. The result was the introduction of felling contracts, which provided the sawmill companies with long-term rights to ‘mine’ the forest as they pleased. The contracts were written with both the state, on their Crown parks, as well as with the farmers, regarding the forests in their homesteads (Enander 2007: 20). They stated that companies could extract timber from the land during a 50 year period. Increasingly, companies would also buy the whole land from farmers and then lease it back to

them. The farmers, who had in many cases received more forest land than they needed, benefited from this offer, but did not share the knowledge of the export market that the timber capitalists had. Subsequently, large areas of land were transferred into the realm of the forest companies and capitalised, with a growing concern among farmers and the public that the forest companies were deceiving the farmers. The Baggböle case, where one of the most prominent timber capitalists, the Dickson family, was accused of acquiring timber that had been illegally felled, has become eponymous with the public's averse sentiments towards the timber capitalists. The greed of the timber capitalists was the beginning of the demise of the liberal era, as the political discourse changed to one of restricting the forest companies, and propagating a more active state role. In 1889 a law limiting felling contracts to a maximum of 20 years was introduced, and in 1905 that number was lowered to five years (Björklund 1984, Kardell 2004: 50), marking the end of the aggressive land accumulation by the forest companies. By the end of the century, the companies had acquired large amounts of land all across Norrland. The highest concentration was in Västernorrland, where 45% of *all* land belonged to forest companies in 1906 (Ahlmann 1921: 112).

However, the forest companies were required to invest in the extractive infrastructure themselves, which meant an extensive network of floating routes was established at the frontier. All the major rivers of northern Sweden became important avenues of transport for sending the timber to the coastal sawmills. Capital went into clearing and rerouting of the rivers which included serious environmental transformations. To facilitate the logging splash dams, box booms and flumes were built. The clearing was a dangerous enterprise and the fact that companies sometimes offered hard liquor as payment to the floaters added to this (Eliasson 2002: 339, Törnlund & Östlund 2006: 54). These investments opened up previously unavailable parts of forest land of exploitation (Björklund 1998: 68). In the Umeå area, the sawmill companies spent approximately the same amount on creating floating channels as they did on constructing sawmills (Gaunitz 1979: 48). To illustrate, the total length of floating routes in 1860 was 1000 km; 35 years later it had risen to 20 000 km (Enander 2007: 17). Floating also assumed primacy in land politics. In 1880 it was legislated that floating was the 'first use' of watercourses, as long as it provided economic gain (Törnlund & Östlund 2006: 60).

## 4.6. Steam and technology

“Extracted from confiscated lands and transported in bulk across long distances, energy deposits formed over hundreds of million years were consumed in the blink of an eye in order to power mechanized industry—without regard for replenishment or pollution. Equally important, fossilized energy provided capitalists with a means to reshape the relations of production to their advantage. “

Nancy Fraser (2021:114)

We have seen how the state-agrarian colonialism movement opened up the frontier, and how a global current of ‘free trade’ policies attracted capital to the area. But in what ways did the sawmill industry contribute to the social-ecological transformation? In this section, we investigate the role of new technologies in these processes, specifically steam - and its corollary coal.

### 4.6.1. Steam-mills

The first steam-powered sawmill was built in Sundsvall in 1849. It marked the start of the sawmill boom in Västernorrland – but the technology was not new. In fact, in 1728 a fully functioning steam engine was built in the Dannemora iron ore mine but the project was scrapped due to unfavourable fuel options (unlike in England, there was no direct access to coal) (Lindmark et al 2019:65). In the mid-18th century, the accessibility of coal had changed, and sawmills were, in addition, able to use sawdust to power the steam engines. Still, water-powered mills remained competitive for decades to come, and it was not until 1871 that the amount of steam-powered sawmills surpassed the water-powered ones in Västernorrland.

	Steam sawmills	Water-powered sawmills
1861-65	18	31
1866-70	31	71
1871-75	55	50

Table 2. Number of water and steam driven sawmill in Västernorrland between 1861-1875. Source: Schön 1972: 109.

The transition to steam-power was not unilinear. As demand rose, there was an increase in scale and a concentration of production along the coasts. This increased productivity but was

not contingent on a shift towards steam-power. Rather, the presence from the mid-century on of water turbine technology offered a competitive alternative to steam-power until at least the 1880s. Steam-power enabled non-stop production, independent of natural conditions (Schön 1972), which stood in stark contrast to the water wheel technology, which was inoperable between December and April due to the ice, and between August and November due to the summer and autumn droughts. Water turbines were competitive with steam thanks to the use of dams and canals but ultimately relied on their location for water supply (Johansson 1998: 218). Also in the concentration of sawmills along the coasts, water turbines were present and took advantage of the vicinity to the ports, as well as the large-scale factory-style organisation of the sawing. The location on the coasts also solved the recurrent problem of damage to the boards. With the sawmills located at the interior, the boards would be sawn at the mill and then floated to the ports, which often resulted in damaged or discoloured timber. By sawing them closer to the ports, this risk was minimised. (Schön 1972, Björklund 1998, Johansson 1998).

Thus, steam technology did not change the organisation of production by itself but was part of a co-evolving process that included the use of water turbines. If water turbines had the disadvantage of being ultimately reliant of natural conditions, steam was not without risk either. To make the large-scale steam-mills profitable required a scaling up of production that entailed larger quantities of timber to be floated during the flood seasons; this meant more workers, more expansive yards and still, a vulnerability to unfavourable weather conditions (Johansson 1998: 216). Neither the fuel question was straightforward. The boilers could be fuelled by sawdust and rest products from saw mill production, but the sawdust generated by production already had a use: it was sold to the ironworks for their charcoal production, (Ibid.,: 214). Steam engines were also poorly regulated, and it is estimated that a third of all steam-mills were completely decimated by fire before 1920 (216). Thus we can see that steam played a part in, but was not the only driver of, the scaling up and clustering of production towards the coast. To scale up and increase productivity, the timber capitalists had to employ more labour, and by clustering production in to the cities, they could gather a sufficiently big pool of workers. The process is similar to the transition to steam in England a couple of decades before (Malm 2016). As in England, steam ultimately takes over from water and becomes the dominant, probably because the turbine-driven mills were more sensitive to extreme weather like flooding, *and* the fact that scaling up meant bigger turbines which meant

more extensive and costly dam constructions at the sawmills as well as inland (Johansson 1998: 219).

#### *4.6.2. Emergence of a capitalist mode of production*

“Every social formation is ‘in transit’ between two modes of production, with elements of the preceding mode ...”

Louis Althusser (2020: 97)

We have covered the small-scale production that was predominant in Västernorrland before the arrival of the timber frontier. But the capitalisation of the industry introduced a new mode of production, the capitalist one. With the booming sawmill industry, production at the coastal centres increased and scaled up. In contrast to the pre-existing ‘handicraft’ sawmills in the interior parts of Västernorrland, the new sawmills were organised like factories. They were technologically more advanced, using a fine blade and multi-frame saws. They required capital investment, and the combination of forest purchases and factory establishments by the timber capitalists led to increased capitalist organisation and control of the production (Schön 1972: 99). The interior, small-scale sawmills, that often had existed within families for generations (Glete 1987: 154), were outcompeted as productivity and scale rose. In the cities around the mills, proletarianisation was complete. The workers had nothing but their labor-power to sell, and with the booming of the industry, the sawmill sector attracted more and more labour. It could offer wages that other sectors could not, which effectively diminished the sectors of linen-weaving, agriculture and ship-building (Schön 1972: 106). This process also entailed a ‘deskilling’ of production. In contrast to the handicraft small-scale sawmills, practically no professional experience or knowledge was required at the large saws (Schön 1972: 108).

The demands for labour by the sawmill industry drew workers out of other sectors in Västernorrland, but also attracted labour from around the country. The rapid economic development was accompanied by rapid population growth. But the life of the workers was a precarious one. The sawmill industry was highly dependent on the conditions of trade, which put the workers in a vulnerable position. This is evidenced by the 1879 strike in Sundsvall. The early 1870s were prosperous and led to increased real wages, but when the market

slumped in the second half of the decade, it put the industry in a deep crisis. The wages fell, but the crisis continued, ultimately leading to a Parliament-financed loan of 3 million krona in 1879. When the loan was followed by a new reduction in wages, the starving workers, who had hoped that the companies would use the loan to support them, decided to strike (Kämpe 1979, Björklund 1998: 24). Following the strike, and its violent crackdown, unionising sentiments were spreading in the Sundsvall area. Many conflicts with the timber capitalist ensued, and in all cases, it resulted in workers losing their jobs, housing and being forced to move. It was not until after First World War that unions managed to become established within the sawmill sector (Björklund 1998: 26).

#### *4.6.3. The fuel of industrialisation - coal*

The sawmill boom led to the penetration of a capitalist mode of production along the coasts of Västernorrland, of which novel steam and water-power technologies were crucial. With the eventual dominance of steam-power, what can be said of the corresponding change in the energy system? The literature points out that steam sawmills could avoid entering in to a coal dependence, because they could use sawdust and firewood to power the mills (Gårdlund 1942: 101, Bladh 2020: 75). However, it is unclear to what extent this excluded coal as a fuel in the steam-mills, a question which merits further research. Independently of the coal consumption of the steam-mills, however, their introduction in the sawmill industry coincides with a shift to a mineral energy system in Sweden. Sweden did not have any significant coal supplies, so the demand for coal had to be satisfied by imports. Correspondingly, the rate of timber exploitation rises in line with the coal imports.

As evidenced by *figure 2*, the coal imports coincide with the increased world market integration of the Swedish economy. Industry, such as manufacturing, played a big part, as did the development of coal-based transport infrastructure. How did this link to the development of the timber frontier? To push the frontier and exploit further areas of forest, several inputs were needed. There was a need for labour, to cut and float the timber, but also the infrastructure for transportation and communication.

To satisfy the needs of a growing labour force at the geographical edge of farming, a food distribution system was developed where foodstuffs were imported from southern Sweden and abroad. This system was based on steam-ships, trains and roads. At the start of the



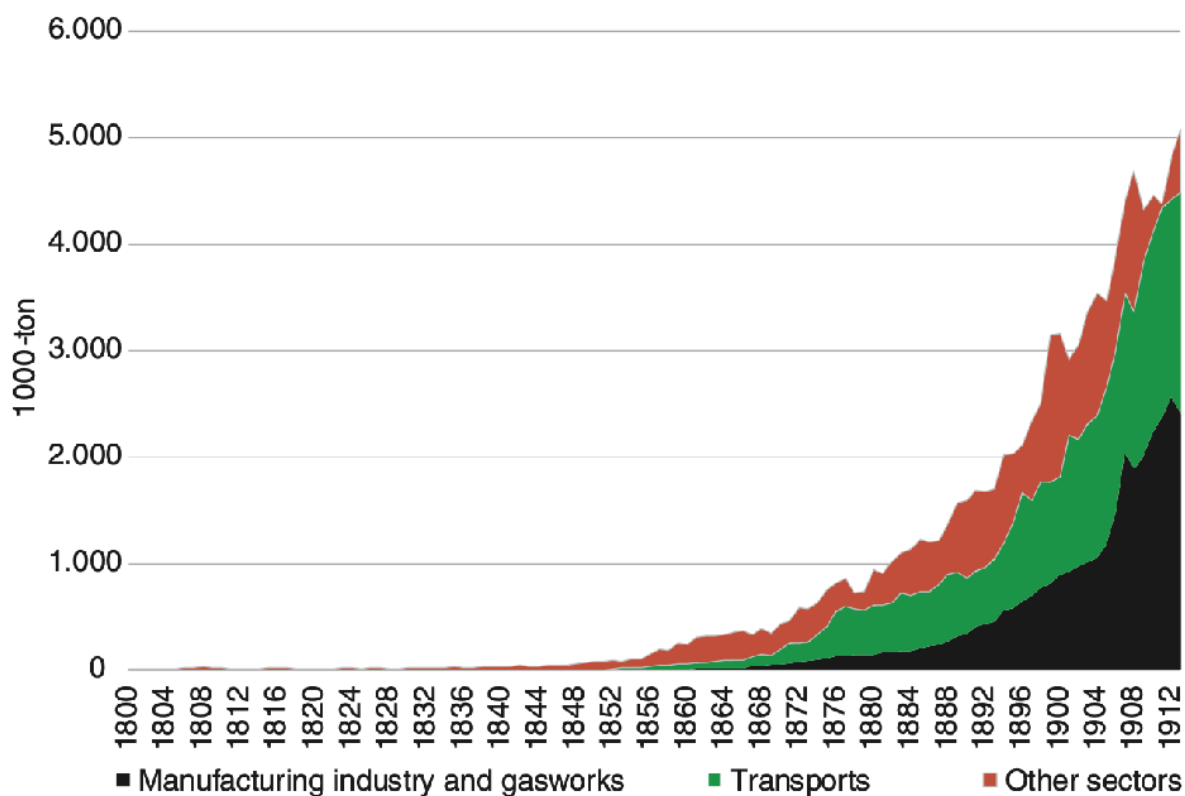


Figure 2. Swedish coal imports by sector of destination, 1800-1913. Source: Lindmark & Olsson-Spjut 2019.

frontier, steamers were the main part of this mix, but during its course, a railway and road network developed. These coal-based infrastructural developments fuelled the import-based food system, allowing settlements, and especially non-subsistence-based settlements, to grow further away from the coast (Bäcklund 1988: 47, Lindmark & Olsson Spjut 2019: 70). The system was in large parts funded by the sawmill companies themselves, and the settlements that arose around production sites offered housing for workers, and in some cases healthcare and fuel for household consumption. The timber capitalists even appointed the teachers for the local schools (Björklund 1998: 14).

In comparison to the rest of Sweden, which reported a predominant sailing ship tonnage compared to steam-ships, in Norrland steam-ships were of much bigger importance than sailing ships. Out of sailing ship tonnage intended for domestic trade, Norrland accounted for 7%, while its share of steamer tonnage was 35% (Lindmark & Olsson Spjut 2019: 71). By 1913, Norrland registered a yearly import of 140,000 tons of cereals, of which 100,000 tons came by sea (Ahlmann 1921:144). The preference of steamers ahead of sailing boats for

shipping, and thus the use of coal ahead of wind energy, could perhaps be explained by their superior capacity in terms of load and that they could sail through the ice, thus increasing the transportation season (Björklund 1998:13). Furthermore, the railways reached southern Norrland in the 1870s, and the northern parts in 1895 and enabled a deeper integration of the communication networks. By allowing transports of grains and other staples by train, it was possible to maintain a year-round supply of these wares that had previously been impossible due to the freezing harbours (Lindmark & Olsson Spjut 2019:71). The agricultural imports were subsidised by a 25% discount on normal freight rate by the state railways (Pettersson 2006: 81). This integration of coal-based technologies occurred at the hand of the timber capitalists, as evidenced by their involvement in the growing settlements, but the state also played an active role in it as a provider. Construction of The Northern Main Line (Norra Stambanan) was initiated in 1866, and successively expanded to Västernorrland reaching the town of Ånge. Many significant railway developments followed, for example, the line between Sundsvall and Trondheim, Norway, in 1882 (Björklund 1984). Inland roads were also built to ease food transports, and this was organised in part by the forest companies (Lindmark & Olsson Spjut 2019).

## **5. Discussion**

In 1988, James O'Connor made a radical proposal. He suggested that capitalism cannot be viewed in separation from nature. The production of value in capitalism originates from abstract (human) social labour, yes, but its conditions are delivered by nature. Value production is therefore a dialectally linked co-production (Moore 2014: 246, O'Connor 1998: esp chap. 2) between labour and an externalised nature. This brings a previously unattended ecological dimension to Marxist analysis, but certainly one that is rooted in the philosophical materialism underpinning Marx' work. In *The German Ideology*, Marx and Engels argued that the first historical act is the 'production of material life itself' (in Foster 2000: 116); thus it is incomplete to view value-production separated from the life-making that sustains it. Likewise, in a footnote to *Capital*, Marx noted that fish are a means of production, arguing that 'no one has discovered the art of catching fish in waters that contain none.' (Marx 1990: 287). O'Connor was building on this notion, the inherent coupling of the natural conditions to capitalist production. These conditions are often obfuscated when analysis centres on the economic phenomenon; market relations, exchange rates, productivity, technological

progress. But O'Connor argued that they are essential, and most importantly, the 'free ride' of capitalism on nature, is nearing its end.

If natural conditions are what make capitalist value production possible, capitalism has to find ways to integrate nature in its sphere of production. Throughout the history of capitalism, Moore argues, commodity frontiers – zones at the edge of empire where capitalism finds ways to cheaply appropriate nature – have enabled this (Moore 2014). But 'nature' has to be made available for appropriation. It is not only about the physical extraction of resources from nature, but its ontological severing from humans. In capitalism, nature is 'externalised', while human labour-power is 'internalised'. Value originates from social (human) labour, while nature is a provider of free gifts. Based on this, a relevant question to pose is: how was nature produced at the Swedish timber frontier? What process enabled the delivery of use-values that are extracted from nature by capital to enter into capital accumulation and surplus production (Burkett 1999: 91)? And what socio-ecological transformations followed?

### **5.1. Delivering use-values to capital through territory and science**

“Early capitalism’s landscape transformations, in their epoch-making totality, were unthinkable without new ways of mapping space, controlling time, and cataloging external nature—and they are inexplicable solely in terms of world-market or class-structural change.”

Jason W. Moore (2015:67)

Three processes can be identified as crucial to the foundations for capitalism’s entry into Västernorrland. The agrarian colonial movement by the Swedish state, the scientific-bureaucratic institutions that co-evolved with it and the ‘imperialism of free trade’, the liberalisation of domestic and international markets. The expansion of capital into the forests of Norrland was deeply intertwined with the *last colonial project in Europe itself* (Andersson et al. 2005). Before the 19th century, the region of Norrland was inhabited by indigenous Sami populations and, along the coasts, settlers. In the 19th century, the settler movement intensified due to a number of reasons. Due to the increasing population, there was a land question coming up to the fore in Swedish politics, the agrarian revolution had reinforced the belief in agricultural systems as the basis of society, and Norrland was in many ways portrayed as a fertile *terra nullius* for agricultural colonialism and cultivation of cereals.

During the first half of the century the immigration surplus was directed towards these settlements, which extended the farming frontier, and also actualised the need for delineation of land. The colonial project was a state project – the farmers who resettled in Norrland were for example exempted from tax obligations – and the role of Norrland, first as colonial resource frontier and later as integral to a wider project of modernity, had been present in the discourse for centuries (Sörlin 1988).

The delineation surveys, already started in the 17th century, assumed a pivotal role in the organisation of the colonial project. Through these state-sanctioned practices, huge areas of land that was previously deemed ‘no man’s land’ (or everyone’s land) and therefore without value, were being brought into a logic of capital. The communal character of the land changed, which is reflected in the political discourse of the time. During the 19th century, the matter of ‘skogsåverkan’ or illegal felling of Crown forests, was intensely debated. Eliasson (2002) has demonstrated the gradual transformation of perception in this regard – how skogsåverkan went from being largely unprosecutable because no one ‘owned’ the forest to the penetration of a liberal conception of property among the farming class. The delineation involved the application of a new scientific regime on the land. Surveyors equipped with the tools of maps and the backing of state authority performed inventories of the land, classified its properties in terms of agricultural potential, forest stands and value – its potential for productivity. Schön (1972) argues that the introduction of steam technology represented a severing of the relation to nature, but I would argue this shift, or rift, is already initiated with the ontological shift that the delineations represent. The new land borders establish a liberal property regime that produces a nature that is open to be appropriated and exploited.

To successfully map, delineate and value the forest entailed a claim of both territory and ontology which necessitated an institutional authority to carry it out. During the course of the century, a gradual professionalisation occurred in this field. From the agricultural societies evolved the forest agency, with forestry educated officials making authoritative claims over the forests. Thus, as a new property regime was being hegemonised, connected to the professionalisation of the forest ranger and the spread of a homogenised ontological relationship to the forests and mediated through these educational establishments. This was the turn towards management (Östlund et al. 1997) which ultimately was a manifestation of the state policy and ideology. Through tools of science and empire, nature was externalised

and made quantifiable. Lastly, the frontier was preceded by a shift in ideological currents in Western Europe. In the decades preceding the dramatic boom at the timber frontier, the Swedish state had been heavily influenced by liberal economic currents. Private ownership and free-market relations that eased both domestic production and capital accumulation – the rapid industrialisation had brought Britain to world ascendancy, and its turn towards a free trade regime altered the dynamics of the world-system. The accumulated capital of Britain, based on coal and colonies (Pomeranz 2000, Marks 2015), searched for new frontiers to exploit throughout the world-system, such as the Swedish one.

## **5.2. Appropriation of nature at the frontier - land grabs, railways and social reproduction**

If science and property provided the fertile ground for capital to appropriate the zones of appropriation, the conquest of nature took form through a combination of infrastructural and technological innovations, a restructuring of the sphere of social reproduction, the legal enclosure of land and appropriation of labour, all of which combined in fundamental socio-ecological transformations.

### *5.2.3. Land and railways*

As mentioned, the colonial movement changed the property relations of land in Norrland. With the entrance of the forest companies and their metropolitan capital, they immediately preyed on these relations. Initially, by felling contracts, and later, by buying whole homesteads, capital gained legal control of the land and resources. By the end of the century, at least 45% of the land was owned by the companies (Ahlmann 1921: 112, Sörlin 1988). Thus the access to the resources was secured, but being able to profit from their extraction required additional measures. Infrastructure for transportations had to be built. This led to a major reconfiguration of the landscapes as thousands of kilometres of floating routes were created by building dams and flumes, rerouting rivers and so on. Along with this network of bio-technics, a coal-fuelled transportation system developed. Railways and roads connected the inland to the coasts and Norrland to the south. These infrastructures pushed the frontier further into the interior, but simultaneously compressed the distance of Norrland to the rest of Sweden and the world. Quicker and more frequent communications enabled more trade and export. The imperative of capital was to organise nature in a way to maximise productivity by compressing time-space, ever-expanding and appropriating more nature into its habitat.

### 5.2.3. *Mode of production*

Land grabs, railways and floating networks made the forests *accessible* for capital, but the *extraction* – the felling, floating and construction of the infrastructures – required a huge labour force. We have seen how the pull from wage labour within the forestry sector and the agrarian colonialism produced a constant immigration surplus to Västernorrland during the period. The organisation of work, however, was predicated on the co-existence of modes of production. Whereas the sawmill industry represented an increasing shift towards a capitalist mode of production, with rapidly developing productive forces, relations of property and production, this was not true for the whole chain of production. The logging and floating of the timber was carried out by the farmers, who welcomed the extra wages, but did not abandon their semi-subsistent farming for wage work. Instead, the former type of work was carried out during only parts of the year when the agricultural burden was lighter and conditions for logging were better. In effect, this gifted the timber capitalists with a significant competitive advantage on the world market. The labour costs were kept low since they only paid for a certain amount of trees to be logged, and the capitalists did not have any responsibility for the social reproduction of labour as the logging work complemented subsistence agriculture. It was also fairly similar to farming work: it was carried out by the same people using tools not uncommon to the farm and the technological refinement of the logging process did not develop considerably (Gaunitz 1979). Note how the zone of appropriation (of nature, of ‘invisible’ labour) expanded ahead of the zone of commodification. In this case, one can argue that the appropriation of nature at the origin of the production preceded the full penetration of capitalist relations, and that capital benefited from the non-capitalisation of the subsistence farming to maintain low labour costs and avoid the extensive investments it would require to organise the felling process in a capitalist way. Even though capitalisation is present at parts of the production chain, there was no incentive from capital to change the relations of production in the interior parts of Västernorrland, as it parasitised on the unwaged labour of women and nature to make Swedish timber a highly competitive commodity.

At the sawmills, however, the capitalist organisation of production reigned. By scaling up and concentrating the sawmills, labour was organised around the cities of Sundsvall and Härnösand, which grew exponentially in the second half of the 19th century. Jobs were on

offer but were highly dependent on the volatility of demand in the timber market. The new technologies of water turbines and steam further severed production from its dependence on nature, allowing it to continue for longer periods of the year. Ultimately, for this purpose steam proved superior, and from 1885 was dominant among the saw-mills (Johansson 1998: 218). The factory-like organisation of the mills also led to the deskilling of labour, which put the workers at the sawmills in an even more vulnerable position. Un-unionised, with only their labour to sell, they were at constant risk of being replaced. Thus, along the production chain capital organised itself differently. The exploitation of labour at the factories was predicated on the full proletarianisation of labour, while the felling and floating made use of pre-existing modes of subsistence to save costs.

#### *5.2.4. Invisible labour and imported food*

The strictly economic perspective sees the role of the railways and steamships as productivity-enhancing technological innovation, but by applying the notion of social reproduction, another image emerges - the establishment of new conditions of social reproduction, ones that attune primarily to the needs of capital. The growing population and difficulties associated with Northern agriculture could be responded to by increased food imports. The steamboats were the first step in this new network of food supplies where Västernorrland, as they integrated into a wider economy, became more and more dependent on imported goods. The railways and roads continued and deepened these relations, and pushed the frontier deeper into the forests by making more distant land available for exploitation and transports. Were the railway stopped, settlements started to grow (Sörlin 1988). Furthermore, the railways were seen not only as a key to unlocking the resources laying dormant in the forests and bedrock but as a way to control the wild lands – straight lines of metal through an untamed wilderness (Ibid.,: 75). Thus the expansion of steam-fuelled technologies pushed the frontier deeper in to the forests, creating specific modes of living dependent on imported foods, work in the forest industry and standing in a new relation to nature. Västernorrland, which had before hosted a variety of productive sectors such as linen-weaving, ship-building, agriculture, became increasingly focused on the export of one commodity – timber – and with a social reproduction organised according to the needs of that commodity.

As we have seen, farming in Norrland had a special character due to the climatic conditions. Traditional subsistence farming based on the cultivation of cereals was hardly possible but had to be combined with fishing, hunting and cattle breeding (Ahlmann 1921: 116). The agricultural production was also increasingly specialised on producing a single crop, animal fodder (Gadd 2000: 241). This increased the dependence on imports of food supplies, as illustrated above. The expansion of the sawmill industry drew more men into the forestry, which left the burden of social reproduction on the women, who had to take care of the farms, children and the home. The domestic sphere became more sharply associated with women. This made invisible the increased workload of women in this new 'mixed' mode of production. As the men were providing important extra incomes for the household, this further cemented the patriarchal structures of male domination. Conveniently for the forest companies, they only paid loggers for their seasonal inputs, as they were sustained by the farms for the rest of the year, but this would have been impossible without the increased burden placed upon women to maintain the homes.

This relates to what Nancy Fraser has called a 'crisis of care'. Similar to how nature and its work is devalued within capitalism, so is the work of social reproduction. The transfer of responsibility for the domestic sphere, and thus the *creation* of a domestic sphere, onto women, parallel to the movement of men into the sphere of wage-labour, institutionalised new forms of subordination, as the power relations within the household shifted and became entangled with the defence of male domination. Fraser identifies this with the 'liberal competitive capitalist' period of the 19th century, where little input from the state left workers to reproduce autonomously (Fraser 2016). The crisis is represented by the contradiction within capitalism towards endless growth and a simultaneous undermining of its conditions of reproduction (of nature, of social reproduction).

In this case, it goes beyond the scope of the study to trace specifically how the changing gender relations undermined capitalist production, but some indications can be found. The agricultural mode of living at the frontier was already defined by its harsh conditions. To transfer the responsibility of sustenance, through farming, hunting and cattle breeding, onto the women alone, plus the care of children, placed a huge burden on their shoulders. This is part of the explanation to the shift toward food imports rather than subsistence. Additionally, as the families grew dependent on the cash income from the forestry sector, it made them



vulnerable to the ups and downs of the market. If the timber prices went down and wages plummeted, they were left in precarious situations. This is illustrated by the near-universal strikes of Sundsvall in 1879. Inversely, if social reproduction broke down, for example as a result of crop failures, such as in 1867-1869, people starved, and the incomes from the forestry could not sustain them. Thus, in its re-organisation of social reproduction, capital created a social system that was vulnerable from all sides and built on inequality between the genders.

Similar patterns can be observed in its ecological relations. The ‘cut-out-and-get-out’ mentality prevailed at the frontier, with no regard for the regrowth or health of the forests, even as concerned voices were being raised. The old trees were removed from the forests, and as the forests could no longer quench the thirst of capital, it moved on into other unexploited areas, leaving behind it altered ecosystems with ecological consequences still being discovered today (for example the importance of dead trees to forest ecosystems). In this way, the social and ecological transformations of the timber frontier mirror each other. They are both organised according to the unsustainable drive towards capital accumulation. This drive homogenises socio-ecological relations to eradicate what is unruly and different (Tsing 2015). Forests are redefined from being common spaces where multiple species and worlds co-exist into natural resources that are organised as plantations to best benefit the extraction of their value, ontologically separated from humans. Agriculture, the very sustenance of life, is shifted to animal fodder mono-crops because of the demand of the market, and food is supplied from far-away.

#### 5.2.5. *State and coal*

What characterised the timber frontier, more than anything else, was the ferocity by which it appropriated and capitalised nature. Within just a few decades, the Västernorrland coast had become the most sawmill-dense in the world, and Swedish timber exports exceeded that of any other country. It was predicated on many of the structural and ontological shifts described above, but the speed, scale and scope of the transformation was based on the *annihilation of space by time* (Harvey 1989). And what enabled this process? The permeation of coal in the fabric of life. Scholars have written about how oil and extensive resource use is consumed and reproduced through the everyday lived practices of people in the Global North (Huber 2014, Brand & Wissen 2021). In Västernorrland, and Sweden and Europe broadly, coal now started

to play this role in everyday social and economic life. The Swedish case differs from the generic narratives of industrialisation that centre on the development of the railways and coal-fuelled infrastructure – here the timber floating presented a biological technology that still offered high productivity and remained in use for the duration of the frontier. But coal came to permeate society in ways that were integral to both social reproduction and world-market relations. The import-based food system that sustained life at the frontier was built on coal-technology. Coal was the fuel of the steamboats that connected Västernorrland to the world market through timber exports and food imports as well as the trains that connected its coasts with the interior – it was the glue that tied all the developments at the frontier together.

Similarly, seeping through all the developments we have discussed is the state. According to geographer Christian Parenti, ‘managing, mediating, delivering, and producing the environment is a core and foundational feature of the modern, territorially defined, capitalist state.’ (2015: 830). Thinking through the non-economic conditions of capitalism, it is clear that non-human natures are a source of wealth by providing use-values to capital, and the territoriality of the state positions it as an intermediary of non-human natures to value production. This occurs through its enforcement of place-based property regimes, infrastructural production and the scientific production of a capitalist nature (Parenti 2015: 830). All of these elements are present at the timber frontier. Use-values are made available through the redefinition of land relations, the railways, the steamboats, the surveying, cataloguing and mapping of forest resources all contribute to the process of delivering use-values to production. Thus, the explanation for the penetration of capitalist social relations lies not only with the emergence of the timber capitalists and the breakthrough of the new relations of production, but fundamentally with the formation of a capitalist state. Through its policy, it expresses a capitalist rationality that precedes and lays the foundations for the capitalist mode of production.

## **6. Conclusions**

This thesis has proposed a new way to think about the processes of historical change that Västernorrland became a part of during the 19th century. Building on the world-ecological research project, it has offered a synthesising account of the multiple developments that occurred at the frontier and analysed it through the lens of socio-ecological transformation. It has shown the dialectical project of the conquest of nature and the accumulation of capital as

a co-produced process that engenders specific ecological and social relations. By widening the analysis of capitalism to include its non-economic conditions of possibility, it has been possible to link it to the changes in human-nature relations, property regimes, the Swedish colonial project, the scientific-managerial regime, world markets and the invisible exploitation of women and nature and their roles in capital accumulation. By this, I have offered a contribution to the theoretical development of world-ecology and the discussion of the relations between capitalism and nature, as well as proposing an alternative history of the Swedish sawmill boom and timber frontier during the second half of the 19th century.

From this tentative inquiry into the Swedish timber frontier, I have begun to argue that the frontier implied a *capitalist ecological revolution* (Merchant 2010). It was predicated on a fundamental ontological shift in the relation to nature. This shift externalised nature according to a capitalist rationality, which took expression in the colonial venture that sought to cultivate the wilderness, delineate the land according to private property regimes and map and catalogue it according to its productive capacities. These processes were backed and carried out by the state and laid the groundwork for the subsequent delivery of use-values, timber, to capital. Combined with this were the economic reforms at the national and international level, which followed a liberal economic consensus of free trade. This benefitted the organisation of capital, and strengthened the position of the timber capitalists as they sought to supply the demand from the core states of the world-system with the ‘latent’ resources of the Norrland forests.

Further, I have shown that the timber frontier, and the capitalisation of the forestry, entailed several socio-ecological transformations. At the sawmills in Härnösand and Sundsvall, a proletariat emerged following the capitalist organisation of production into large-scale factories with its own conflict-ridden and precarious history. At the origin of production, the timber felling and floating, agriculture was combined with wage-work. This entailed an accelerated gendered division of labour and the appropriation of the unwaged labour of women within the sphere of social reproduction. It also led to massive ecological transformations, as forests were stripped of ‘productive’ trees, namely the largest and oldest ones, and waterways were rerouted following the demands of timber floating. Likewise, it affected the particular Norrland mode of agriculture. The new circumstances encouraged the switch away from a mixture of fishing, hunting and cattle breeding combined with cereal

cultivation towards the cultivation of mono-crops to be used as animal fodder. As the frontier expanded deeper into the interior forests of Västernorrland, roads and railways followed – 'straight lines of metal through an untamed wilderness' (Sörlin 1988: 75).

Permeating these transformations was coal and steam-power. Steamboats, trains and roads drove the coal-fuelled integration of Västernorrland to the domestic and world-market, annihilating space by time. It enabled the shift within agriculture towards mono-crops through the provision of imported food supplies. Steam-power was key to these infrastructures, but also to the capitalist organisation of production at the sawmills. It changed the power relations between capitalists and workers, as they were able to scale up production and locate it in the cities, where labour was always available. The frontier movement began to gain speed at the middle of the 19th century, and by the end of the century had transformed Västernorrland in irrevocable ways. Through the timber frontier, Västernorrland, but also Sweden, transformed. It changed relations between humans and nature and amongst humans themselves. This offers a deeper sense to the quote by Social Democratic editor and writer Otto Dalkvist: "For when the forests die, so do the people." (1933: 9) The socio-ecological transformations of the Västernorrland represented the ontological, social and ecological metamorphosis of Sweden into modernity.

The echoes of these transformations are still sounding today. Over a hundred years later, writer Po Tidholm observed that 'the countryside is dying, and almost no-one is acting' (Lundberg 2016, translation by author). The fervour of the timber frontier has died down, and today the sawmill industry is responsible for less than 2% of Swedish GDP (Tidholm 2021). However, the property regimes and the separation of forests into the realm of productivity still hold our imaginations captive. The successive dismantling of social security systems and livelihoods in Norrland are met first with proposals of how the forests can offer economic productivity again, and second by arguing for their role in a state-mediated agenda for a green transition. Although they are different in the ecological harm they would generate, they are both based on the ontological separation between nature/society, and ultimately conceptualise nature as a resource to be used by humans according to their needs. This externalisation of nature is linked to the historical project of capitalism, as I have shown above, and continuously reinforced today, especially through the intimate links between industry, education and the state (Tidholm 2021). Another example of how capitalism

organises nature and labour today can be found in the sawmill industry. Then, the timber frontier relied on an immigration of labour from the rest of Sweden for its appropriation of cheap labour, now, cheap labour is found beyond the borders of the country. Most of the seasonal forestry workers travel from Eastern Europe, among the big companies Swedes make up less than 3% of the seasonal workforce (Röstlund 2021b). Arriving in Sweden they are in the grip of the companies, who offer lower wages than the collective agreements and miserable living conditions.

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