Introduction: Land Use, Second Conquest, and the Anthropocene in Latin America from the Mid-Nineteenth Century to 1950

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Until the late eighteenth century, large areas of Latin America and the Caribbean remained largely untapped for the exploitation of capital and barely integrated into the world market. The attainment of political independence from the Spanish crown and the establishment of republics from the 1820s onwards initially had little impact on this situation. It was not until the middle of the nineteenth century that the Latin American republics and the Brazilian empire were rapidly integrated into the capitalist world economy. Liberal elites in Latin America and external, Western European and, increasingly at the end of the nineteenth century, U.S. American investors promoted extractive and export-oriented agrarian economies (Bértola and Ocampo 2010). This led to a comprehensive and profound transformation of land use and of the relationship between humans, the environment, and their territories.

While the nineteenth century is considered the age of the industrial revolution, most human societies worldwide were characterized by regionally differentiated forms of subsistence-oriented agriculture (Osterhammel 2011: 314–316). This also applied to Western Europe, except for England, but especially for Latin America. On the one hand, efficient forms of agriculture adapted to diverse ecosystemic conditions persevered under the colonial regime despite the substantial disruption of complex agricultural systems in regions like the central Andes, with their sophisticated irrigation channels and terraces, or the agroecological systems in Mesoamerica. Indigenous agricultural practices, such as the *milpa* in Mesoamerica or the vertical control of different ecological floors in the Andes, played a crucial role in sustaining Creole and mestizo populations during the colonial period and the early republic.

On the other hand, the demographic catastrophe and genocide during the Conquista, which resulted in the disappearance of 90 percent of the indigenous population of the Americas, significantly influenced land use by the mid-seventeenth century and led to a rewildering of former agricultural landscapes. European

settlement, particularly in Latin America, remained limited until the end of the nineteenth century, focusing on specific core areas such as parts of the Andean highlands. The areas under effective control, whether of Eurodescendant, colonial or postcolonial influence, can be conceptualized as an archipelago of regional islands (in regard to Brazil see Pádua 2024: 29). Forests and other ecosystems, such as those in the Amazon-region, expanded again, leading to more extensive forested areas by the mid-nineteenth century compared to the end of the colonial period in the mid-seventeenth century (Denevan 1992: 379–381). This phenomenon contributed to the "pristine myth," the notion of an untouched nature, as perceived by the nineteenth century European explorers (Hemming 2015). During the eighteenth century, there was finally also a demographic recovery of indigenous populations, including in the Amazon basin.

Latin American ecosystems, once under the control of indigenous population, became target areas for agricultural colonization and expansion of the new nation-states in the mid-nineteenth century. Beyond expanding the agricultural frontier, colonization aimed to contribute to the issues of civilizing and securing the national territories. Post-colonial states, in collaboration with European – and increasingly, at the beginning twentieth century U.S.-American – enterprises and scientists, sought territorial control. They opened up the last "white" unexplored spots, through cartographic and military ventures. This internal colonization was also explicitly directed against indigenous peoples, constituting a genuine second conquest (Gabbert 2019, Kaltmeier 2022, Topik and Wells 1998). The ruling elites elevated these processes to the level of universal history, invoking ideas of civilization and progress.

In Argentina the Conquest of the Desert, a military campaign directed against the Mapuche between 1878 and 1885, advanced across the Pampas practically as far as Cape Horn and placed Patagonia under state control. On the Chilean side, the military conquest of the Mapuche nation, known as the Pacification of the Araucanía, facilitated the agricultural colonization of large areas in southern Chile (Kaltmeier 2022). In the southern Patagonia region began large-scale sheep farming, which led to the genocide of the indigenous peoples of Tierra del Fuego and in the canals around the Strait of Magellan. The colonization of these conquered territories in Patagonia, the Chaco and southern Brazil was mainly carried out by Western and Eastern European settlers who immigrated to the Americas, often with the support from government programs.

The conversion of these apparently "empty" wastelands, often known as *baldíos*, and of indigenous communal land into private property was crucial for the establishment a liberal-capitalist regime of spatial control. In the 1850s, laws facilitating the privatization of communal indigenous lands were forcefully enforced across most countries in the plateaus and valleys of the central Andean highlands (Larson 2004). This led to a massive expansion of the hacienda and resulted in the formation of a neo-colonial hacienda state in Ecuador (Kaltmeier 2021a). The enforcement of

private property rights, the systematic introduction of new technologies and the rise of agrarian science served as central instruments of liberal, export-oriented capitalism. The factors led to a profound intensification and commodification of land use, accelerating the social metabolism of the agrarian capitalist system. This overarching trend was accompanied by a reduction in ecological complexity, notably evidenced by the loss of biodiversity, and the large-scale homogenization of agricultural landscapes, which made space technically controllable (Scott 1998). The beneficiaries of this intensive concentration of private landownership included not only the large Creole landowners but also capital, mining and railroad companies supported by European and, increasingly, U.S.-American capital. The Mexican Revolution stands out as a unique event that managed to mitigate land concentration through an agrarian reform and the (re)introduction of communal land ownership structures, through the *ejido*.

As early as the seventeenth century, plantations emerged as a central dispositive driving the fundamental transformation of land use and metabolic rifts (Machado Aráoz 2022). This development was rooted in a new spatial planning regime characterized by monoculture. The introduction of exotic plant species, initially focusing on sugar cane from Asia, and the enforced introduction of alien workers in the form of enslaved African populations, allowed plantations to combine agro-economic mass production in the Americas with the growing demand and new consumption regimes in Western Europe. In the nineteenth century, the plantation dispositive underwent a crucial change with the abolition of slavery and the advent of mass consumption in Europe. Sugar production played a pivotal role in the emergence of the transatlantic industrial age. Consequently, the circum-Caribbean sugar industry witnessed – especially in Cuba – an early adoption of steam engines in the sugar factories and steam-powered transportation, reducing the need for human muscle power and draft animals while increasing productivity (Funes 2008). The billowing industrial chimneys of southern England found their counterpart in the smoking chimneys of the Cuban sugar factories. However, the shift to fossil fuels had profound ecological impacts on the Caribbean islands, the southern states of the USA, the Guyanas, and the Brazilian Atlantic coast, where forests became the primary "fuel" for the plantation-based agro-industrial export model.

In the mid-nineteenth century, the agro-export model in Latin America triggered further diversification in cultivation products and techniques within plantations. Coffee, originally from the Middle East, was acclimatized in the mid-eighteenth century in southern Brazil. A century later, coffee cultivation experienced a massive expansion, leading to varied regional outcomes (Topik 1998: 37–50). In southern Brazil, this expansion resulted in massive soil erosion, prompting coffee barons to clear new areas for large-scale cultivation. Conversely, in Colombia and in large parts of Central America, coffee cultivation tended to promote a peasant land

use structure. It is noteworthy that coffee was probably the only important cash crop that was not affected by a major epidemic (McCook 2019).

The scenario differs in the banana plantations of Central America, Colombia and Ecuador from the 1880s onward. These plantations were affected by devastating epidemics, resulting in large deforested and contaminated agro-industrial wastelands (Soluri 2005: 104–127). This sector, particularly prominent in Mesoamerica, was heavily dependent on emerging transnational corporations such as the United Fruit Company (Viales-Hurtado 2001). Other agro-industrial export products such as cocoa, grapes, henequen, cotton, indigo, tobacco, nutmeg, vanilla, among others, also significantly influenced land use (Goebel Mc Dermott and Montero-Mora 2021; Topic and Wells 1998).The agro-export model in Latin America was characterized by its dependency on the international market, the concentration of capital and credit in the hands of agrarian oligarchies and transnational corporations along with their partners, and the tendency towards monoculture. This model resulted in a fundamental transformation of the landscapes and biomes in question. Most plantation systems developed enclave-like, expanding along easily accessible tropical and subtropical coastal areas, particularly in the Atlantic, but also along the Pacific realm.

While the plantation economy was dependent on the high availability of labor, extensive livestock farming spread in the savannah-like, sparsely populated areas, with deforestation also occurring due to the high demand for land (Ausdal and Wilcox 2018). Innovations in refrigeration and preservation technologies created new export opportunities, intensifying livestock farming, especially in the Argentinian pampas. This expansion was accompanied by the cultivation of new forage plants and pasture grasses, as well as the introduction of European cattle breeds. Sheep wool production spread in the central Andes and southern Patagonia. Methane emissions from grazing animals contributed already to the overall balance of greenhouse gas emissions in the region.

However, the exploitation of natural resources in the agro-export model was not solely based on the direct, comprehensive changes in land use and socio-ecological metabolism. In the mid-nineteenth century, there was also a massive peak of simple extractivism, where natural resources from peripheral, difficult-to-access regions were exploited and brought to national and international markets. This included the extraction of timber, particularly along the Rio Paraná (Zarrilli 2008), as well as medicinal or pharmaceutical products such as cinchona (*Cinchona officinalis*) and coca (*Erythroxylon coca*). Regional products such as mate (*Ilex paraguariensis*) in northern Argentina, southern Brazil and Paraguay, or rubber extracted from the rubber tree (*Hevea brasiliensis*) in the Amazonian lowlands, which experienced a veritable international boom in the last third of the nineteenth century without the development of a plantation form, should also be mentioned (Coomes and Bradford 1994).

Particularly, rubber played a crucial role in deepening of the industrial revolution, especially in the fabrication of tires and tubes (Pádua 2024: 51).

The transportation revolution, based on fossil fuels, served as a key prerequisite for all of these products. It resulted in an increasing compression of space and time (Harvey 1990), connecting the raw material regions of Latin America with the mass markets, particularly in Western Europe and the USA. Steam navigation expanded on the Amazon and Parana rivers, while simultaneously, railroad companies expanded their rail networks throughout Latin America. Deep-sea ports, especially those designates for export, also underwent expansion. In 1914, the construction of the Panama Canal linked the Pacific coast of the Americas more closely to world trade. Although the entire region was still predominantly agrarian in the nineteenth century, with large portions of the population tied to rural areas, urbanization processes began in the Latin American metropolises towards the end of the nineteenth century. This marked a departure from colonial urban models and a shift towards French modernism (Almondoz 2002). With these dynamics, a tendency towards the expansion of the modern-capitalist technosphere began, which intensified after the Great Depression of 1919 and the models of import-substituting industrialization.

To enhance production, agriculture became increasingly dependent on externally obtained or produced fertilizers. The *guano* boom on the Chilean-Peruvian Pacific coast mirrored the agro-export boom and the expansion of neo-European agro-ecological systems (Cushman 2014). The demand for fossil fuels also increased, resulting in an oil boom in Mexico and Venezuela, in particular (Brown and Linder 1998). The importance of oil was so huge that it gave rise to a distinct imagination of a magical national state based on oil (Coronil 1997).

These accelerated and expansive processes in the dynamics and forms of land use are also evident in massive deforestation processes. Between 1850 and 1920, an equivalent amount of virgin forest was destroyed worldwide as in the period from 1700 to 1850, which was twice as long (Williams 2006). From 1850 onwards, a rapid increase in the destruction of tropical forests can be observed, parallel to the increase of cultivated agricultural land, reaching its plateau value around 1950 (Steffen et al. 2015: 87). Forests are central elements of climate regulation and act as vital CO_2 sinks. In terms of planetary boundaries, they advocate for a cover percentage of 85 percent for tropical and boreal forests and 50 percent for temperate forests. This limit was surpassed in many Latin American forest regions in the mid-twentieth century (CEPAL 2021). Export-oriented agriculture stands out as one of the major drivers of excessive application of phosphorus and nitrogen as fertilizers, exceeding planetary boundaries. The exploitation of guano deposits and the development of the plantation system highlight these processes, and are evident in Latin America. The land-use changes described here, along with the exploitation of fossil fuels, serve as central vectors for the greenhouse gas emissions that are driving anthropogenic climate change in the Anthropocene.

The environmental and climate-damaging impacts of land use change, especially deforestation, were already clearly acknowledged and identified. At the beginning of the twentieth century, new environmental regulations were introduced for forest, soil, water, wildlife, and fishery resources. Argentina, a few years after the establishment of the world's first national park, Yellowstone in the USA, became an international pioneer in nature conservation by creating its own national parks (Kaltmeier 2021b). Prior to 1950, further national parks were established in Chile, Brazil, Bolivia, Venezuela, and Mexico, among others Latin American countries. Nevertheless, these efforts proved insufficient in mitigating the onset of the great acceleration of the Anthropocene.

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