The coloniality of green transformation: decarbonisation and extractivism in South America

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Angaben zur Veröffentlichung / Publication details:

Backhouse, Maria, Jakob Graf, and Anna Landherr. 2025. "The coloniality of green transformation: decarbonisation and extractivism in South America." The Sociological Review. https://doi.org/10.1177/00380261251391002.

Article

The Sociological Review

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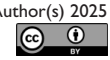
The Sociological Review
1–18



DOI: 10.1177/00380261251391002
journals.sagepub.com/home/sor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Abstract

The 'green transformation', with its focus on renewable energies and decarbonisation, has been criticised for intensifying resource exploitation in the Global South. In this article, we argue that a Latin American decolonial perspective is necessary to understand the historical continuities that allow these ecological modernisation projects to exacerbate (neo)colonial socioecological inequalities. It is also essential to understand why ecological modernisation is inherently linked to the extractivist, fossilist economy rather than putting an end to it. Our concept of the 'coloniality of green transformation' focuses, on the one hand, on the colonial continuities of ecological destruction linked to the unequal global division of labour and, on the other hand, new forms of commodification of nature in the context of 'green transformation'. We illustrate this perspective using two case studies: mining in Chile and carbon offsetting in the Brazilian Amazon Basin.

Keywords

coloniality of nature, decolonisation, ecological modernisation, modernity/coloniality

Introduction

In the ongoing 'green transformation' towards decarbonised societies, the demand for raw materials and carbon sinks is currently increasing. China has consolidated its position in South America and is now the most important trading partner for countries such as Brazil and Chile (Banco Central Chile, 2024, p. 7; Franco, 2025). At the same time, China, the US and the European Union (EU) are competing for the region's natural resources. While the US, under the Trump administration, is trying to push back against China's influence in the region, the EU, after almost 20 years of negotiations, concluded

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the Mercosur–EU Agreement in 2024 and is now seeking suppliers of raw materials (Jütten, 2025). These developments underscore Latin America's geopolitical significance in times of war and climate crisis, while also consolidating its role as a supplier of raw materials to the world – a function it has fulfilled since colonisation in the 16th century. The exploitation and commodification of the natural riches of the Americas have since been characterised by the progressive destruction of their ecosystems and the civilisations interconnected with them (Moore, 2000). Decolonial scholars from Latin America have therefore argued that, for centuries, coloniality represented the other, 'dark' or 'hidden' side of modernity (Alimonda, 2019; Escobar, 2007; Quijano, 2000). In doing so, they draw attention to the fact that, as hallmarks of modernity, technical progress, economic development and civil rights are entangled with the colonisation and racist devaluation of 'non-white' life and the capitalist exploitation of non-European societies.

In this article, we argue that the 'green transformation' in the core countries does not erase this 'dark' side of (ecological) modernity but rather it remains, as a 'hidden' counterpart of the promises of 'sustainable development'. In contrast to approaches that frame these developments as instances of 'green extractivism' (e.g. Dunlap et al., 2024), we contend that they are not a novel phenomenon, but rather an intensification of longstanding global extractivist relations (Gudynas, 2015). What is new, however, is the discursive framing of resource extraction as contributing to climate protection and ecological modernisation – something that is evident in the expansion of mining for materials such as copper and lithium, which are essential to the energy transition. There are also new types of commodification of nature, such as carbon sinks, used for offsetting purposes. At the same time, the *neocolonial* dimension of commodification and exploitation of people and nature in Latin America, or the dark side of ecological modernisation, is obscured. Consequently, the 'green transformation' is unfolding within – and perpetuating – the colonial structures of extractivist growth-dependent capitalism. To analyse these dynamics, we introduce the concept of the 'coloniality of green transformation', drawing on Latin American discussions on the 'coloniality of power' (Quijano, 2000) and the 'coloniality of nature' (Alimonda, 2019). Our conceptual goal is thus to expand critical transformation research in environmental sociology (e.g. Atzmüller et al., 2019; Brand et al., 2020) by adding a decolonial perspective to demonstrate that the intensification of existing and the emergence of new forms of commodification of nature can only be understood if (ecological) modernity and coloniality are viewed as two sides of the same process – which we describe as '*neocolonial* commodification'.

The article is structured as follows. After a theoretical section in which we develop our approach to the coloniality of 'green transformation', we analyse its two central dimensions: the expansion of mining for the energy transition and carbon offsetting. Methodologically, we present our argument by demonstrating that there are two 'interrelated strategic case studies' (Walton, 1992, as cited in Santos, 2025, pp. 18–19), which refer to each of these dimensions: specifically the commodification strategies applied to raw materials and carbon sinks. We examine the mining sector in the Chilean context, as Chile is the leading global supplier of copper and lithium, which are key resources for the energy transition in Europe. To explore carbon offsetting, we focus on the REDD+ mechanism, using the Brazilian Amazon as a case study due to Brazil's significant role

in shaping international emissions trading frameworks. Although we focus on the specific historical and regional contexts of these cases, we aim to illustrate the broader contradictions inherent in the 'green transformation' across the entire Latin American region, including the Caribbean. Thus, these are not conventional country case studies. This is reflected in our use of geographical terminology: in the context of the two case studies, we refer specifically to regions in South America. When we use terms drawn from decolonial theory, we refer to a perspective developed in Latin America that seeks to conceptualise the region's particular colonial experience, especially that of Latin America and the Caribbean. In the last section, we summarise our main findings.

The coloniality of 'green transformation'

Modernity/coloniality

The decolonial perspective of the modernity/coloniality (M/C) project, similar to the postcolonial debate, focuses on the continuities of colonial power and domination after the formal end of colonialism (Escobar, 2007; Hall, 2021). The common starting point is the critique of Eurocentrism, which universalises the development and perspective of Western Europe and fails to recognise the entangled relations of the 'West and the Rest' (Alimonda, 2019, pp. 103ff.; Bhambra, 2014; Dussel, 2000; Hall, 1992). Modernity must always be understood in the plural and placed in a global context of 'entangled modernities' and (neo)colonial inequalities (Boatcă, 2015; Conrad & Randeria, 2002; Therborn, 2003). However, the M/C project is rooted in Latin American theories such as the dependency debate, as well as the world-systems approach, and also takes into account a political-economic perspective (Boatcă, 2015, pp. 81–84; Quijano & Wallerstein, 1992), which is crucial for our purposes, as we are examining neocolonial commodification processes in the capitalist world system (Wallerstein, 2004).

The concept of the 'coloniality of power' developed by Quijano (2000) exposes the largely ignored 'dark side of modernity'. The coloniality of power is a global power matrix established through the conquest of the Americas. It is based on the racialisation and hierarchisation of different societies that have been unequally integrated into capitalism's division of labour and, with their labour, have made a significant contribution to the development of the modern world system (Quijano, 2000). At the same time, the coloniality of power established a Eurocentric system of knowledge, not only in the emerging capitalist core but also in the colonies or peripheries. This 'coloniality of knowledge' is based on the universalisation of Western knowledge and the marginalisation or repression of the knowledge of the colonised (Escobar, 2007). Furthermore, the (post)colonial reality within the countries of the Global South is characterised by the simultaneity of modernity and coloniality (Quijano, 2000). The central thesis is that (post)colonial reality and modernity continue to be intertwined to this day. In other words, at the cultural, political, ecological and economic levels, they are two sides of the same coin. At the cultural level, 'Western civilisation' has emerged as the counter-image to colonial 'barbarism'; at the social level, 'free' wage labour is the counterpart to slavery in the colonies; on the economic level, the industrial mode of production in the core countries corresponds to the extraction of raw materials in the peripheries; and on the

political level, modern liberties in the core countries are the counterpart of disposable lives in the peripheries (Alimonda, 2019, pp. 103–101; Quijano, 2000; Santos, 2025). However, this dark side of modernity is often ignored and repressed in European discourses on the subject. We argue that the 'green transformation' should also be viewed from this decolonial perspective. Taking this approach allows us to distinguish the visible side of the developmental promises of ecological modernisation of sustainable development from the dark side of the commodification of nature and its implications, as manifested in socioecological conflicts.

The visible and invisible sides of the 'green transformation'

The term 'green transformation' encompasses government policies such as the EU's Green Deal and China's decarbonisation strategy (Rodríguez, 2021), as well as scientific recommendations for a 'Great Transformation' in the German context (German Advisory Council on Global Change [WBGU], 2011). These strategies aim to decouple economic growth from its destructive consumption of resources and mitigate climate change. The ecological modernisation literature (Mol et al., 2014) has tended to focus on technological innovations and market-based approaches such as global emissions trading. However, the destructive compulsion for growth and global socioecological inequalities are not questioned (Backhouse et al., 2021). In sociology, a critical perspective on these transformation policies and theories has evolved in line with Polanyi (2001) (Atzmüller et al., 2019; Brand et al., 2020). Scholars adopting this perspective emphasise that, contrary to techno-optimistic interpretations of Polanyi's seminal work, intentional transformation does not automatically lead to green progress, but rather, as Polanyi argued in reference to Europe, to fascism and war (Atzmüller et al., 2019). Drawing on Polanyi, it can be shown that, contrary to the intention, the commodification of nature for its own protection exacerbates the ecological crisis and global socioecological inequalities (Brand et al., 2020). Polanyi contends that in capitalist economies, social relations and nature (like the labour force and ecosystems) are turned into 'fictitious commodities'. They are fictitious because their (re)production cannot be subordinated to the logic of capitalism, since human life and ecological cycles cannot be produced entirely according to capitalist principles. Their progressive commodification within capitalist relations of exploitation thus leads to their destruction (Polanyi, 2001, pp. 75ff.). However, Polanyi did not locate the processes of commodification in the unequal global division of labour and therefore failed to grasp its colonial dimension or recognise that the colonial context enables social relations, groups, regions and natural processes to be, in Jason Moore (2015) terms, 'cheapened' for capitalist appropriation. To understand today's neocolonial commodification as an internal mechanism of 'green transition' policies, we draw on Alimonda's (2019) concept of the 'coloniality of nature'. This perspective allows for a more detailed examination of the specific context and hidden mechanisms inherent in Moore's (2015) concept of 'cheapening' resources and social relations for the capitalist 'commodity frontiers'. Furthermore, it reveals the 'hidden' side of the narratives of 'green progress', which we aim to incorporate into critical sociological perspectives on 'green transformation'.

The extractivist focus on the export of raw materials with minimal processing, such as mining products, oil, gas and agricultural and forestry goods, has shaped Latin America's peripheral position in the global division of labour since the 16th century, when the European conquerors began appropriating Latin American nature and shipping it to Europe (Gudynas, 2015; Machado Aráoz, 2018; Svampa, 2019). The 'coloniality of nature' is evident from the fact that the conquest and colonisation of the Americas have since had a profound impact on the social and natural conditions across the entire continent (Alimonda, 2019). Silver mining and sugar cane plantations established forms of exploitation of people and nature that continue to this day and are now expanding in the form of soya cultivation and modern mining (Moore, 2000, 2015). This type of economic activity has not only had devastating consequences for local ecosystems, but also for the local population and the climate. Today, huge areas of soy, wheat, corn, sugar cane, eucalyptus and fruit monoculture plantations, as well as entire mining moonscapes, have replaced former ecosystems, decimated vast expanses of rainforest, and wiped out or displaced the populations living in these areas (Alimonda, 2019, pp. 111–116). Alimonda shows how modernity was based, from the outset, on the commodification of Latin American nature.

Thus, a decolonial perspective on 'green transformation' points to a long history of unequal but entangled development within the global division of labour (Quijano & Wallerstein, 1992) as well as political power asymmetries (Quijano, 2000). As explained above, Alimonda attributes the associated coloniality of Latin American nature to the process of commodification of nature since the beginning of the colonial division of labour in the 16th century. As recent studies have demonstrated (Andreucci et al., 2023; Dorn & Gundermann, 2022; Dunlap et al., 2024), the commodification of Latin American nature is currently entering a new phase in the context of the 'green transformation' and decarbonisation strategies pursued by both the old and new industrial centres. However, the two sides of 'green transformation' – ecological modernisation and intensified commodification of nature – are considered separately. In the following, we show that these two sides must be examined as one entity in terms of M/C. The inseparable connection between ecological modernisation with its policies of decarbonisation on the one hand, and the commodification of nature with its socioecological destructive effect on the other, is illustrated in Figure 1. Ecological modernisation represents the visible side of the 'green transformation', while the commodification of nature constitutes its invisible, colonial side. By bringing these two sides of M/C together, we seek to understand the paradox of why the destruction of ecosystems and dispossession of local peoples through 'green extractivism' and the commodification of the Amazon rainforest can be framed as green at all. At the same time, we aim to grasp why these two forms of commodification of nature as both resources and sinks must be understood as integral to the same 'green transformation'.

Neocolonial commodification of nature in Latin America

Intensified extractivism: Mining in Chile

Chile is currently a strategic supplier of raw materials for the production of 'green future technologies', particularly those for energy generation from renewable sources and for

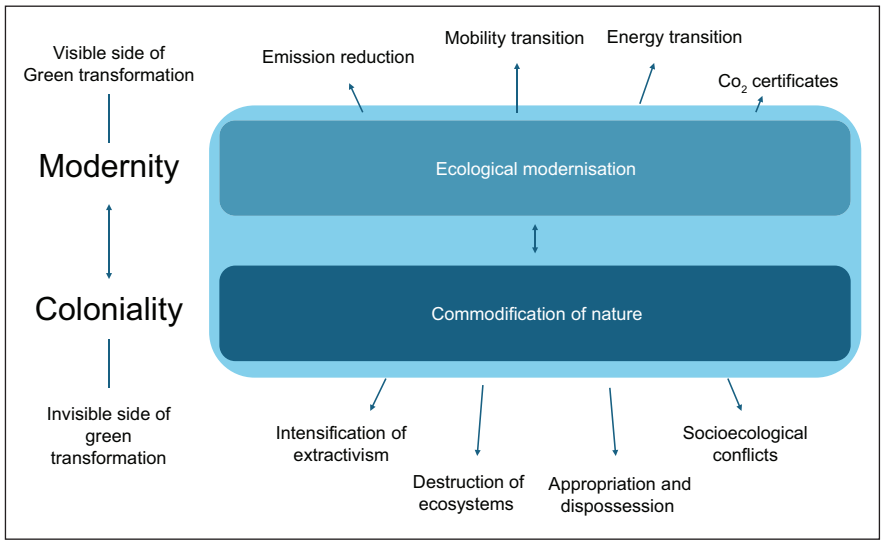

Figure 1. The two sides of the 'green transformation'.

the electrification of mobility, which are needed to decarbonise the core economies. In particular, Chile's large copper and lithium deposits, which are considered the 'red gold' and 'white gold' of the energy transition, consolidate its historic position in the international division of labour (Uribe Sierra & Panez Pinto, 2022). Today, 87% of Chile's exports consist of raw materials that are barely processed, if at all (Barriga et al., 2022, p. 5). The Chilean mining sector has accounted for over 50% of exports for decades (Banco Central Chile, 2024, p. 56), with almost 82% of this being copper exports, 60% of which go to China and 14% to Europe. Lithium currently accounts for just over 10% of mining product exports, with 65% going to China. Chile is the world's largest copper producer and second-largest lithium producer, holding 24% of the global market share of both products. The country has the largest global reserves of both minerals, with lithium reserves accounting for 33% of global deposits (Consejo Minero, 2024, pp. 10, 35, 38, 56). A lithium and copper boom is expected in the coming years, driven by rising international demand in the context of the 'green transformation'. The *Comisión Chilena del Cobre* (Cochilco), for example, expects production to increase by almost 21% by 2034, with a current annual increase of 6% (Nueva Minéria, 2024). In the case of lithium, the price rose by over 250% in 2021, due to demand increasing by around 15% per year during that period (Consejo Minero, 2024, p. 36). The European Commission (2025a) estimates that European demand for lithium will increase 14-fold until 2040, compared to 2020, mainly driven by domestic battery production for electric vehicles and energy storage. Continued expansion of Chile's mining sector is therefore anticipated.

The coloniality of 'green transformation' is evident, first, in the colonial continuity of an intensified extractivism, which has been politically embedded in the neoliberal model. Due to Chile's existing deposits, there is currently intense international pressure

on the country to maintain its extractivist role in the global division of labour to 'save the planet'. The core economies are presently being assured of this commitment through the signing of a series of new international agreements. Even before the massive deployment of 'green technologies' to decarbonise the economies of the Global North, Chile was considered a popular target of foreign capital. Chile's neoliberal orientation is secured by a total of 34 free trade agreements with over 65 countries, which studies have shown make the country the most open economy in the region and indeed the world (Barriga et al., 2022). These free trade agreements, together with the constitution, adopted in 1980 during the military dictatorship, perpetuate and institutionalise the country's extractivist orientation and the limited autonomy of governments such as the current left-wing administration under Gabriel Boric (Barriga et al., 2022, pp. 8–11). This path was also reinforced by the 1983 Mining Code and the 1981 Water Code, which allowed the free private appropriation of Chile's subsoil and water, as well as their subsequent commercialisation and speculation by private actors. In combination with an ever-leaner 'absent' state (Gudynas, 2011, p. 386), this has led to a situation in which predominantly private actors – mostly large transnational companies – dominate the extraction and export of raw materials. As a result, access to – and thus control over – raw materials and territories is now concentrated in a few hands, and there has been little redistribution of profits (Landherr, 2024, p. 176). In copper mining, 94% of production is controlled by the *Gran Minería del Cobre* (a small group of mostly transnational corporations); in the emerging lithium industry, 63% is currently in the possession of the large companies that make up the *Consejo Minero* (the leading mining industry association) (Consejo Minero, 2024, p. 40).

In public discourse, mining has long been seen as the 'engine of the Chilean economy' and a necessary sacrifice for the sake of 'progress' and 'development'. However, the increase in mining has failed to create any relevant employment for the Chilean labour force. The few permanent jobs in the sector are rarely filled by locals (Landherr, 2024, pp. 201, 308). For most Chileans, mining is more likely to threaten their livelihoods and is largely responsible for local environmental and health problems. Although the water consumption of the mining industry appears rather low nationally, it accounts for an extremely high percentage in mining regions. This is because most mines are located in the Atacama Desert – one of the driest regions in the world – and are therefore in strong competition with other sectors, such as agriculture, and the remaining subsistence economies. In recent years, there has been a sharp increase in water consumption in copper mining, with a rise of 31% recorded since 2022 alone. This is something the mining industry is trying to compensate for through the costly and energy-intensive desalination of seawater, which it is using to present itself as an environmentally friendly sector (Nueva Minéria, 2024).

Second, the coloniality of 'green transformation' is linked to ongoing processes of colonial sacrifice of 'non-white' life and ecosystems in Chile, as mining leads to massive destruction of local livelihoods. Particularly dramatic is the contamination of vast tracts of land by large quantities of mining waste. This highly toxic legacy, usually stored in what are known as 'tailing ponds', pollutes the local environment, endangering human health and ecosystems for an indefinite period. To date, 758 tailing dumps have been created over time, and the copper industry alone currently produces 537 million tonnes

of this industrial waste annually. The chemicals and heavy metals the waste contains spread undetected on and through soil, water and air, polluting entire landscapes, water reserves, and even marine zones (Landherr, 2024, pp. 213–220). These chemicals can also penetrate plants and the human body, become part of entire food chains, and cause a range of serious diseases in humans, as well as increased rates of cancer and mortality (Cortés Alfaro, 2014). Despite all the industry's promises and efforts, it is likely that even larger quantities of these 'tailings' will be produced in the future, since, as the purity of the deposits declines, ever-larger quantities of ore have to be extracted to produce the same amount of metal. In recent decades, many of the mining regions exposed to these severe environmental and health impacts of mining, refining and industrial production processes, as well as waste storage, have been declared 'sacrifice zones' (Bringel & Svampa, 2023): that is, irreversibly contaminated mining enclaves.

The negative effects of the lithium industry have been less researched, and what we know so far mainly relates to high water consumption and groundwater pollution, as well as the intervention in and commodification of salt lakes previously designated as protected areas (Dorn & Gundermann, 2022). That said, the severe environmental pollution caused by the complex industrial process of concentrating lithium is also slowly coming to light, particularly given its negative impact on the CO_2 balance and its need for large-scale energy projects.

Third, the coloniality of 'green transformation' is accompanied by a new discourse of legitimising extractivism using terms such as 'green mining' or 'green extractivism' and the argument that it contributes to ecological modernisation on the other side of M/C. Indeed, Chile's entire mining industry is increasingly presenting itself as engaging in 'green mining'. Of course, in practice, the situation is quite different. Copper mining alone consumes 35% of the country's electricity and 20% of its diesel fuel (Consejo Minero, 2024, pp. 93, 95). Electricity consumption is expected to increase by 41.2% by 2029 due to rising demand for this metal. The associated industry, which is often only partially included in these calculations, is also based primarily on fossil fuels and, as such, generates high CO_2 emissions. Overall, 21% of Chile's greenhouse gas emissions are attributable to the mining sector, which in turn is almost exclusively export-oriented (Universidad de Chile, 2021). Contrary to the 'green mining' discourse, the intensification of extractivism prevents real socioecological transformation. In recent years, despite the many socioecological crises caused by Chilean extractivism, neither progressive governments, nor local movements, nor even the great wave of protests that began in 2019, have so far managed to change the 'Chilean model' or initiate an alternative socioecological transformation. All that seems to have changed is the narrative and the way in which the 'sacrifices' made by the population are legitimised. Instead of the promise once made that today's 'sacrifices' would lead to a long-term 'harvest of development and progress', which for most Chileans never materialised, Chile's 'propertied classes' (Landherr & Graf, 2017) and international corporations now present themselves as key actors in combatting the climate crisis: the 'sacrifices' must now be made in the name of 'saving humanity' (Reporte Sostenible, 2022). However, this 'sacrifice' is as much of a historical continuity as is the Chilean economy's focus on mining and the country's extreme social inequality. At the same time, these extractivist industries are increasingly

triggering socioecological conflicts that hinder their further expansion (Uribe Sierra & Panez Pinto, 2022).

New forms of commodification of nature: Carbon offsetting in the Brazilian Amazon Basin

The EU has committed to reducing its CO_2 emissions by 90% by 2040. This goal is to be achieved, on the one hand, by expanding renewable energies, which, as the example of Chile illustrates, is neither 'climate-neutral' nor socially and ecologically just in a context of global inequalities, as extractivism is intensified in Latin America. On the other hand, emissions trading via the 'cap-and-trade' mechanism is intended to create a market-based incentive for CO_2 reductions: those who do not comply with the binding limits must purchase carbon credits from companies or countries that have reduced their carbon dioxide emissions. So far, this binding emissions trading system has been limited to EU member states. That could change in the future, as the EU Commission proposed an amendment to the EU Climate Law in July 2025 that would allow the purchase of 'international carbon credits' (European Commission, 2025b). In doing so, the European Commission is creating a link to voluntary carbon trading, which has so far been limited to voluntary savings by companies or individuals (e.g. carbon offsetting for air travel). The assumption is that for climate protection, it does not matter where CO_2 is emitted or sequestered. Polluters in the core countries could thus offset their emissions by purchasing carbon credits from peripheral regions that protect tropical forests, for example. According to the triple-win narrative, everyone, including forest and climate protection, can benefit from this voluntary market approach.

A prominent carbon offsetting mechanism, introduced at the UN Climate Change Conference in Montreal in 2005, is REDD+ (**R**educing **E**missions from **D**eforestation and Forest **D**egradation in developing countries, where the '+' stands for 'additional forest-related activities that protect the climate, namely sustainable management of forests and the conservation and enhancement of forest carbon stocks'; see United Nations Framework Convention on Climate Change [UNFCCC], n.d.). The basic idea of REDD+ is to create financial incentives for forest and climate protection, especially in the tropics, by issuing carbon credits for that purpose. Brazil is not only an important player in international climate negotiations, but also in REDD+ initiatives. The focus is on the Amazon Basin, the largest tropical rainforest on the planet. For decades, this peripheral region has been involved in international material flows through mining (e.g. iron ore for the automotive industry or gold) and agribusiness (e.g. beef and soy), which has led to deforestation and high carbon emissions. In the context of the climate crisis, forest protection has become increasingly important and is now at the heart of Brazilian climate policy (Observatório do Clima, 2024).

However, current research suggests that voluntary carbon offsetting is not a climate justice mechanism for mitigating climate change, but rather a new form of commodification that underscores the coloniality of 'green transformation'. First, commodification approaches for CO_2 are based on simplistic calculations and equations involving climate-damaging gases. These fail to factor in the unequal global power relations in the context

of carbon emissions, which permeate resource flows and socioecological relations of exploitation (Carton et al., 2020; Lohmann, 2006). The global extractivist structures of exploitation, as elaborated in the Chilean case above, are thus obscured by the abstraction of carbon accounting. This fundamental problem affects both the voluntary and mandatory carbon markets.

Second, commodifying nature to offset emissions in this way reproduces old socioecological inequalities in a new guise. Bachram (2004) refers to 'carbon colonialism', shifting not only the environmental damage but also its supposed repair through compensation measures onto marginalised groups in peripheral regions. This means that those who contribute the least to climate change are now expected to produce the offset and limit their land-use practices to achieve the best possible CO_2 savings. Simultaneously, carbon credits are affordable for buyers, as the local communities and their practices can be, to use Moore's (2015) term, 'cheapened' in the context of continuous marginalisation and peripherisation.

The available data and research on the impacts of REDD+ projects in the Amazon Basin conclude that REDD+ has so far contributed neither to forest and climate protection nor an improvement in the economic situation of the largely marginalised Indigenous peoples and local communities such as smallholders, forest dwellers or maroons (e.g. Osborne et al., 2024; Paim & Furtado, 2024; Santos Rocha da Silva & Correia, 2022; West et al., 2020). In documented cases, REDD+ has led to the land-use practices of Indigenous and local communities being restricted to increase the carbon savings for buyers – mostly multinational companies (Cabello & Gilbertson, 2012; Paim & Furtado, 2024). Even in projects where there has been no restriction on Indigenous territories and forest use, disappointment regarding the little to no perceived benefits prevails (Paim & Furtado, 2024; Santos Rocha da Silva & Correia, 2022). Thus far, hopes for additional financial income and sustainable local development have not been fulfilled. In addition, carbon offsetting can exacerbate land conflicts, the causes of which can be traced back to the distribution of land among a small elite during the colonial era and land-grabbing practices since land was privatised in the independent state of the 19th century. Land speculators have discovered carbon credits as a way of covering up land grabs or laundering illegal logging operations. The background is that land titles and ownership in public areas of the Amazon Basin – covering an area the size of France, Germany and Spain combined, or about 143 million hectares (Brito et al., 2021, p. 16) – remain unclear, and resolving this issue will take decades. In some municipalities, the area subject to land claims is four to seven times larger than the respective municipality (Torres, 2018; Treccani, 1998). One strategy of land grabbing is, therefore, to give 'claims to encroached lands a cloak of legality by involving them in what appear to be legitimate transactions' (Holston, 2008, p. 138). In this context, carbon certificates provide an opportunity for greenwashing land grabbing, which often entails the dispossession of local communities. In 2024, for instance, a criminal organisation attempted to launder the theft of half a million hectares of land by participating in a carbon offsetting project (Federal Police, Brazilian Government, 2024). Hence, land grabbing is made possible because carbon offsetting is an ahistorical scheme and ignores context-specific circumstances, such as conflicts surrounding land access and use.

Third, the new role of Indigenous peoples and local communities as stewards of nature in the context of this market-based version of the 'green transformation' is

proving to be ambivalent (Li, 2007). The fact that the importance of Indigenous peoples and local communities for global forest and climate protection has been recognised and that there is thus a demonstrable link between territorial land rights and forest and climate protection is a hard-won achievement (United Nations Development Programme [UNDP], 2024). However, there is a risk that Indigenous practices will only be seen in terms of their usefulness for sustainability goals and will be separated from complex forms of knowledge, ways of life and modes of production. Once again, Western experts will determine which knowledge and practices are accepted and which are not (Fairhead & Scoones, 2005). Therefore, the commodification of specific practices or aspects of those practices for climate or forest protection might lead to the introduction of new forms of (private) ownership and territorial access rights, which, in turn, could undermine the collective ownership and practices that they intended to protect. Further, these new forms of ownership might trigger conflicts within or between communities over territorial access and use rights or distribution issues (McAfee, 2016).

Nevertheless, many decision-makers and NGOs in Brazil and worldwide continue to advocate for adjustments to this mechanism, calling for the revision of the governance structures of REDD+ and the underlying CO_2 calculations (Schulz, 2020). They believe that the well-known socioecological risks can be minimised through better models and state monitoring. The hope of an inexhaustible source of finance arising for Brazil for both the voluntary and mandatory carbon market is too great to abandon this mechanism. The controversial case of a new REDD deal between the Amazonian state of Pará and the international LEAF coalition (**L**owering **E**missions by **A**ccelerating **F**orest finance) of foreign governments and transnational companies reveals that social movements and their supporters are divided on this issue (Higgins, 2025). Though some expect new sources of income, others fear that Indigenous peoples and local communities will lose control over their territories (Cop do Povo, 2025). The latter camp complains about not being consulted on carbon credits and finds itself in an increasingly difficult position as it opposes both local development and global climate protection.

Discussion and conclusion

Based on our case studies, five main findings can be identified, all of which are components of the 'coloniality of green transformation'. The first comprises the continued commodification of Latin American nature, on the one hand, through the increasing resource extractivism in the region, and on the other, through increasing global access to its sinks. As we have seen from Chilean extractivism and the carbon markets in Brazil, the 'green transformation' is leading to a new wave of commodification of Latin American nature. Copper and lithium mining in Chile shows how strong the demand for these raw materials will be in the future, pointing to a significant expansion of raw material extraction, as well as the destruction of nature and livelihoods. At the same time, we have seen that previously uncommodified ecosystems in the Amazon Basin, which act as CO_2 sinks, are now being traded as commodities on international markets. This undermines local land-use practices, promotes land grabbing, and exacerbates local conflicts. Both case studies show the pitfalls of the current decarbonisation strategy, which, contrary to the green narrative of progress, is based on increasing neocolonial commodification of resources in peripheral regions and cannot be adequately offset by externalisation to tropical sinks.

Second, such unrestricted access to the region's natural resources is enabled by its entrenchment within colonial continuities associated with the modernisation of formerly colonised societies, as well as the enduring global division of labour established during earlier periods of colonial expansion. The growing resource flows to China do not change this (Rodríguez, 2021). This is partly because China is utilising existing extractivist structures and partly because it is mainly producing for the old core. The externalisation of nature commodification from the centre to the peripheries is only feasible because it is taking place in societies and regions and among populations that have been devalued since colonial times. Such 'sacrifice zones', with their severe environmental and health impacts, would be hard to justify in the core countries today.

Third, 'green transformation' is once again associated with a hegemonic promise of progress and contribution to ecological modernisation propagated by the core countries. The commodification of Latin American nature that accompanies the 'green transformation' demonstrates colonial continuity, yet it also takes on new forms. This occurs because the exploitation of raw materials and the commodification of ecosystems as globally traded carbon sinks are now being greenwashed as a contribution to the fight against climate change. The social and ecological costs are no longer presented as sacrifices for the economic development of the country, but rather for the ecological salvation of the world. While colonial exploitation of Latin America was once legitimised as a civilisation and modernisation mission, the 20th century saw the emergence of a development discourse that promoted the exploitation of raw materials as a path to economic development and global integration (Escobar, 2012). In the 21st century, these discourses have been supplemented by those of 'sustainable development' and now 'green transformation'. Commodification is now legitimised not only as a way of integrating the peripheries into the global economy, but also as a means of saving the planet in the face of the climate crisis. In this discourse, humanity has the right to use Latin American resources and sinks to advance the ecological modernisation of its economies. Latin American researchers have therefore referred to 'green colonialism' (Lang et al., 2024) or 'energy colonialism' in the context of a global 'decarbonisation consensus' that 'condemns the countries of the periphery to zones of sacrifice' (Bringel & Svampa, 2023, p. 51).

This reveals why the coloniality of nature and ecological modernisation are just two sides of the same coin. This necessary unity constitutes the fourth finding of this article and our key research contribution and is clearly expressed by the term 'coloniality of green transformation'. As shown previously, a growth-driven 'green transformation' cannot be decoupled from its material basis. Accordingly, the neocolonial commodification of nature and externalisation of costs described above, as well as the resulting 'coloniality of green transformation', are not just an avoidable side effect, but an inherent component of ecological modernisation. Thus, 'green transformation' as a 'sustainable' growth model needs its dark side to exist, something that hampers the pursuit of a globally just transformation.

Fifth, 'green transformation' as a model of progress prevents populations of peripheral regions from pursuing their own paths of transformation, building on their own (Indigenous or local) knowledge. As we have seen in the case of Chile, the ecological modernisation that currently dominates in the core countries prevents the decarbonisation of the peripheral countries. These 'false solutions' thus act as hegemonic, political

and ecological barriers to alternatives from the South (Svampa et al., 2023, pp. 66ff.). In this regard, resistance to 'green transformation' also demonstrates colonial continuity. Then, as now, this resistance is deemed hostile to progress and modernisation, or – as is particularly evident in the Brazilian case – social movements are divided regarding market-based approaches and, therefore, weakened when it comes to pursuing alternative transformation approaches.

Overall, a path dependency can be observed in Chile and Brazil that is reinforced by the 'green transformation'. The socioecological consequences of these developments lead to 'sacrifice zones' where the livelihoods of the local population are destroyed. Not only are the local people massively exposed to the historical continuities of colonial exploitation, but any future prospects of them initiating their own socioecological transformation are also seriously impeded by the continued commodification and destruction of the local environment. This, in turn, severely limits the country's ability to pursue an alternative transformation. One response to the 'green transformation' has been local resistance to the ongoing commodification of Latin American nature and calls from Latin American intellectuals for a *Pacto Ecosocial del Sur*. The main criticism, in line with our arguments, is that 'green transformation' is a political discursive framework emanating from the core countries, which focuses on the reduction of carbon emissions but largely overlooks its global impacts. Many transformation policies in the tradition of ecological modernisation are based on entrepreneurial, technocratic and extractivist ideas, rather than a just socioecological transformation (Svampa et al., 2023). To achieve a more just transformation, the aforementioned intellectuals demand a ban on externalisation, which primarily concerns ecological modernisation in the core countries (Svampa et al., 2023). A just socioecological transformation proposed by the peripheral countries would therefore have to pursue a different approach if its goal is decolonisation. Such an approach would have to advocate the decommodification of nature and the strengthening of local economies in rural areas that can supply local markets in urban areas instead of producing for global markets. National and international policies would have to strengthen the popular economies instead of pursuing the ever-increasing commodification of all ecosystems and areas of life. Social movements would have to be bolstered and their struggle for redistribution and fair distribution of land supported to enable food sovereignty, social well-being and functioning ecosystems (Motta, 2021).

However, the recent political shift in the US and Europe towards right-wing governments or social movements, which are critical of 'green transformation', does little to help the situation. The impact of the current 'greenlash' (i.e. backlash against climate protection) in the EU and the US on the market-based decarbonisation approach remains to be seen. That said, a complete reversal of developments such as the expansion of electric mobility and the establishment of global emissions trading systems appears improbable as they are compatible with fossilist and extractivist power structures. Simultaneously, there is a growing concern that authoritarian regimes may increasingly suppress alternative transformation pathways, a trend that may well extend beyond peripheral regions.

Acknowledgements

We thank the three anonymous reviewers for their valuable comments.

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Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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