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**The accumulation of Ecological debt towards Latin America  
and the role of Payment for Ecosystem Services (PES)  
mechanisms**

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Dissertation

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## PREFACE

This work is the result of a learning process in the Master of Globalisation and Development, along with professional experience in climate change and environmental issues, and personal interests in environmental and social justice.

The Ecological debt brings together aspects of environmental justice and globalisation and international trade. The process of unravelling the two aspects has been intense, not only in an academic way but also in a personal. The review of colonisation history of Latin America and other regions leaves different sensations. First, a tremendous pain to discover some details of the history I did not know. Second, is the conviction that colonialism in all its forms and shapes needs to be observed and unlearned to move forward into a different global society.

In addition, on the practical and academic level, I look forward to contributing with this work to the reflection, analysis, and further research, in Latin America and Peru, about: international trade under the ecologically unequal exchange approach; climate change proposals considering the ecologically unequal exchange; political reflections about globalisation and ecological debt.

I am very grateful to my supervisor Professor Gert Van Hecken for letting me find a pathway with kind and challenging guidance. It has been important to express my thoughts and reflections with some clarity and coherence. I also want to thank Professor Vijay Kolinjivadi for accompanying this process with important comments and inputs. Both of your classes have been a discovery of new topics and approaches, which I will take to reinforce my future contributions.

I also want to thank my family and friends in Peru that have supported me from a distance, with ideas and care. And last but not least, to my IOB classmates from whom I have learned all this year, and to my friends, who are a marvellous gift from this year in Belgium.

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## LIST OF ACRONYMS

PES	Payment for Ecosystem Services
REDD+	Reducing Emissions from Deforestation and Forest Degradation
IMF	International Monetary Fund
SAP	Structural Adjustment Programs
WTO	World Trade Organization
MER	Market Exchange Rates
PPP	Purchasing Power Parity
HI	High Income
UNFCCC	United Nations Framework Convention for Climate Change
UNCBD	United Nations Convention on Biological Diversity
SDG	Sustainable Development Goals
OCMAL	Observatorio de Conflictos Mineros en America Latina
IPCC	Intergovernmental Panel on Climate Change
GHG	Greenhouse gases
NDC	Nationally Determined Contributions
ETS	Emissions trading systems
COP	Conference of Parts
ICAO	International Civil Aviation Organisation
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
AFOLU	Agriculture, Forestry, and other Land use
GFC	Green Climate Fund
VCS	Verified Carbon Standard
FCPF	Forest Carbon Partnership Facility
GFANZ	Glasgow Financial Alliance for Net Zero

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## EXECUTIVE SUMMARY

The present research aims to understand the role of payment for ecosystem services programs in Latin America, in the accumulation of Ecological debt from the Global North as debtors.

The Ecological debt is related with the historical debt due to the continuous plundering, people's exploitation, and contamination of Global South nations since the XVI century. In present times, the ecological debt is accumulating through international trade, due to the costs of the negative effects, or externalities of extractivisms. This ecologically unequal exchange puts Global North nations as big debtors, and the trend is not changing. Agribusiness and mining are related to the historical exploitation of Europe in Latin America as a colony, and at the same time, these activities are related to international trade responding to extractivism patterns. In addition, the Payment for Ecosystem Services (PES) programs replicate the agribusiness and mining patterns of extractivisms and the accumulation of Ecological Debt. This happens under the Green Economy narrative that requires maintaining economic growth and to protect nature from climate and environmental crises. The carbon sequestration PES is a central element of profit through the carbon market transactions.

The research involves a literature review of a theoretical framework which includes Marxist and Neomarxism analysis of international trade, capitalism, environment, ecosystem services, and their linkages. A comparative analysis between agribusiness, mining, and carbon sequestration PES programs considers some patterns and elements identified in commodities frontiers, plantations, extractivism, and green extractivism processes. In addition, the analysis of carbon sequestration's role concerning Ecological debt will be done through the review of REDD+ projects in Peru, Brazil, and Costa Rica. The research comes to the conclusion that carbon sequestration PES mechanisms in Latin America are contributing to the Ecological Debt. The reasons are related to the patterns and elements that extractivists processes as agribusiness and mining, which are also followed by PES programs. These elements are the following: i) expansion of the extractivism(s) over land and territories, as the three processes require more land to continue the extraction; ii) expulsion of local people, farmers, and indigenous people from their land and territories, as these extractivisms overlap; iii) the financial industry and speculation.

## INTRODUCTION

The Ecological debt is related to the historical debt due to the continuous plundering, people's exploitation, and contamination of Global South nations since the XVI century. In present times, the ecological debt is accumulating through international trade, due to the costs of the negative effects, or externalities of extractivisms. This ecologically unequal exchange puts Global North nations as big debtors, and the trend is not changing.

However, in the process of understanding the underlying reasons for this continuous logic of exploitation, some elements appear. One is the European Modern project along with capitalism during the XVI century, which drove Europeans to look for new territories. A second element is the Cartesian dualism with the separation of humans from nature. The last one is the power structure generated by colonialism. These three elements together and interlinked sustain the commodification of nature.

Agribusiness and mining are related to the historical exploitation of Europe in Latin America as a colony, and at the same time, these activities are related to international trade responding to extractivism patterns. Latin America is a net exporter of land because of agricultural goods and minerals provided to the Global North. Even though the exports of minerals and agricultural goods represent an important income for the region, if the ecologically unequal exchange is taken into account, the numbers would show a different story. First, is the fact of exporting products at prices that do not consider the local externalities caused by these exports or the exhaustion of natural resources, in exchange for goods and services from richer regions. Second, the ecological time necessary to produce the goods exported from the south is frequently longer than the time required to produce the imported manufactured goods or services (Martinez-Alier, 2020).

In addition, the process of commodification of nature has a long history, however, the more recent milestone is the launch of the Green Economy and the Sustainable Development Goals as the solution to maintain economic growth and save the planet from de several crises. This narrative is supported by international actors of the multilateral and corporative sectors that are already being implemented in the Global South.



For instance, the Payment for Ecosystem Services (PES) programs, are an important part of the selling nature to save it strategy (McAfee, 1999). Particularly in the case of carbon sequestration (or REDD+ programs and projects) green extractivism implies the appropriation, extraction, and transfer of emission rights, where local people are limited to using their land and resources (Bruna, 2022)

The present research aims to understand the role of payment for ecosystem services programs in Latin America, in the accumulation of Ecological debt from the Global North as debtors.

The document will be structured as follows. Chapter 2 presents the general aspects of the research, including the research questions and the methodology used for the comparative analysis between agribusiness, mining, and PES, as factors of accumulation of Ecological debt. Chapter 3 presents the review of the theoretical framework including the concept of Ecological debt and the ecologically unequal exchange, a review of colonial history, and the present situation under extractivisms. The Chapter also introduces the concept of the commodification of nature and the relation with ecosystem services and green extractivism. Chapter 4 will focus on the Latin American context, and presents a comparative analysis of agribusiness, mining, and carbon sequestration PES programs under some patterns and elements identify from extractivism processes. This chapter also presents the analysis of the REDD+ projects in Peru, Brazil, and Costa Rica to explain the relationship between these carbon sequestrations PES and the ecological debt. The final chapter presents the conclusions and key findings. In the end, some policy recommendations are outlined.

## **CHAPTER 2: OBJECTIVES AND METHODOLOGY**

The objective of the document is to understand the role of payment for ecosystem services programs in Latin America, in the accumulation of Ecological debt of the Global North as a debtor.

In order to reach the objective, the research is raising the following questions.

What is the role of payment for ecosystem services programs in Latin America, in the accumulation of Ecological debt from Global North to Global South?

In the context of Latin America, what are the similarities and differences between carbon sequestration PES programs, mining, and agroindustry?

Also, in the context of Latin America, to what extent do mining, agroindustry, and PES programs contribute to the Ecological Debt?

### *Relevance*

The academic relevance is to contribute to a better understanding of how carbon sequestration PES programs in two aspects. One is related to the recognition of PES as extractivist processes, as well as agribusiness and mining. A second aspect is related to PES's contribution to the ecological debt, precisely because it replicates the extractivism patterns, under the conservation and green economy narrative.

The research has also social and political relevance. The climate justice movement and the movement related to globalisation and international trade sometimes move in separated paths. It could be difficult to generate narratives that gather all challenges related to globalisation and climate change, however, the approach of Ecological debt linked with colonization dynamics and international trade uneven relations (North-South), can bring an additional element to the discussion and the collective construction of proposals. Concerning the indigenous peoples immersed in the PES mechanisms, this research could also bring an additional element to analyse their participation, and especially the negotiation process with other stakeholders such as the State institutions, NGOs, companies, and individual speculators.

### *Methodology*

The research will involve a literature review of a theoretical framework that includes Marxist and Neomarxism analysis of international trade, capitalism, environment, ecosystem services, and their linkages.

A comparative analysis between agribusiness, mining, and carbon sequestration PES programs will consider some patterns and elements identified in commodities frontiers, plantations, extractivism, and green extractivism processes. In addition, the analysis of carbon sequestration's role in Ecological debt will be done through the review of REDD+ projects in Peru, Brazil, and Costa Rica.

## CHAPTER 3: THEORETICAL FRAMEWORK

### 3.1. Ecological debt

The Ecological debt concept is part of an important narrative linked with environmental and climate justice. Environmental justice is a broader concept, focusing more generally on the unequal distribution of ecological burdens and benefits. It is now widely used by activists and academics alike to call attention to how the distribution of ecological burdens follows general patterns of power distributions. In addition, climate justice, which can be considered as part of a broader sense of environmental justice, is related to the historic overuse of the atmospheric budget or space by Industrialized countries, saturating it with greenhouse gases. At the same time generating drastic changes in the climate system, which is having negative impacts on the most vulnerable population (Warlenius et al., 2014). Consequently, the concept of ecological debt is the result of capitalist production and consumption, which have overrun the planet's space for waste, including the atmosphere (Ajl, 2021).

Furthermore, the Ecological debt concept considers several elements that are discussed by various authors. One element is the historical injustices. Ecological debt brings a historical dimension that is not solved and while it is not considered in international debates, any proposal of sustainability cannot be a just solution. A second element is the historical and present plundering of nature and exploitation of people in the Southern nations by Northern countries. Moreover, the consequences of this plundering have taken nature on the planet to a collapse situation, putting at risk long-term life. A third important element is a bottom-up process that has generated these original ideas and practices, not only from the thinking of concepts but most important by resistances experienced in different territories (Warlenius et al., 2014). For several years social movements have discussed and added new elements and details to the concept of Ecological debt. One is related to responsible actors, changing from only Global North or industrialized countries to companies, industries, banks, and institutions (Paredis et al., 2009).

The fact of claiming an ecological debt is related to the continuous appropriation and commodification process that started with the colonization, and at the same time, it gains strength with events that occurred in the 1980s. That decade was marked by the financial

debt accumulated by developing countries, which at the same time were conditioned by World Bank and the International Monetary Fund to apply structural adjustments to liberalize national economies and governance structures. Many countries started to privatize essential services and return to the primary economy of extractive activities (Warlenius et al., 2014). The anti-debt movement arose with campaigns against debt payment in the two continents most affected by indebtedness, mainly Latin America and Africa. They demanded the total annulment of the debt, defining it as illegitimate and immoral and considering that it had been overpaid. They also demanded its unconditional cancellation and rejected the policies imposed by the IMF and the World Bank (Economia Solidaria, 2008). There is a consensus that the Ecological debt should at least be recognised, and to do that, the external debt should be recognised as illegitimate (Paredis et al., 2009). This unjust reality reopened the discussion of who owes who and what, as the decade of 1990s brought to the collective memories of the arrival of Columbus to America, five hundred years before that time.

Besides the issue of responsible actors, there have been some efforts to calculate the Ecological Debt. Quantification has always been understood as monetisation of nature's services. In the beginning, the calculations were based on the carbon emissions fair share, which is more related to carbon debt. However, to calculate a more exact amount would need to put a price on human lives, biodiversity damage, and other losses (Paredis et al., 2009) which clashes with ethical issues. The word "debt" does not always express a monetary liability, sometimes debts are paid with money and are skipped; other times the payment in money is a symbol of repentance of guilt, and in other cases, debts exist but a payment in money is inappropriate and even insulting (e.g. the lost deities of a river, because of pollution) (Martinez-Alier, 2005). Social movements and organizations are clear in differentiating the efforts for Ecological debt recognition from other efforts of putting a price on nature or placing "ecosystem services" on the market, or even putting a price on the "right to pollute" (Paredis et al., 2009).

### **3.1.1. The starting point of the Ecological debt and capitalism**

Historians mention that Europeans had several reasons to expand and look for other territories. First, is the competition between the European nations to control trade with Asia. The Venetians had control over overvalued goods like spices, a situation that other

European did not appreciate. Second, the advanced shipping industry and the use of new tools like the compass gave an impulse to explore other areas (Nowell et al., 2020).

In parallel with these facts, internally Europe was going through a social and economic restructuring. In the latest Middle Age, the feudal economy could not reproduce itself, and neither a capitalist society could evolve from it. With feudalism breaking down, and no new social-economic system shaping, elements of a capitalist society started showing. The concept of "transition" let us think about a process of change in which capitalist accumulation coexisted with political formations not yet predominantly capitalistic (Federici, 2004). The feudal structure could no longer last, as it not only required a growing population to produce food but also to reproduce lordly power. However, the Black Death hit very hard, killing "one-third and one-half" of people in Europe (Patel & Moore, 2018).

Besides the needs and ambitions, Europeans brought to the "New World" a mindset that would be the beginning of an exploitation process. According to Patel & Moore (2008) the construction of "cheap nature" is based on different elements. First, the way that colonizers like Columbus looked at Nature in the "New World", always thinking about the value it would have in Europe, and this value had to be taken by cheap or free work. Under this logic two continents, Nature and people were put to work using, for example, mechanisms like "encomiendas" or plantations. Secondly, philosophical thought pushed further the separation of "humans" and Nature. The Cartesian dualism, with Descartes making a distinction between mind and body (*res cogitans* and *res extensa*), makes interpret reality composed of discrete "thinking things" and "extended things". Setting the tag of thinking things to "Humans (but not all humans) and to Nature the tag of "extended things". Here women, people of colour, and indigenous people were (are) considered extended, not thinking beings. In addition, Descartes's philosophical abstractions were practical instruments of domination, "*Nature was something to be controlled and dominated by Society*" (Patel & Moore, 2018). Moreover, according to Quijano (2000), this mindset relates all non-Europe with the past, so everything moving far from it was related to modern. Along with Descartes, Francis Bacon who is considered one of the most important contributors to the scientific method, and called the father of empiricism, developed a clear conception of domination over nature and its relation to the new sciences of nature (Leiss, 2011). Furthermore, it is relevant to add the analysis of Carolyn

Merchant concerning *the female imaginary of the earth as nurturing mother* that needed to be gradually transformed, subdued, controlled, and mastered by the man. This imaginary was coupled with new values of scientific progress, human control and power over nature, and the use-value of the Earth for improving human well-being (Warren, 1998).

Most historians mention the 16th century as the beginning of Western capitalism (Lanchmann, 1989). Capital assumed a major role not only in the economic organization but also in political life and international relations. Moreover, looking back on time capitalism can be considered an “intersection space” where coloniality and other dimensions of modernity feed off each other. It is now understood that coloniality ended up being a condition that strengthened the success of the European Modern Project. Coloniality had an important ideological meaning, domination over non-European regions allowed the moderns to conceptually elaborate the division between "civilization" and "barbarism", managing to establish the legitimacy of their project not only in temporal terms but in geopolitical terms (civilized Europe versus the barbarian peoples to dominate) (Maquet, 2019).

Furthermore, to understand the evolution of capitalism, it is necessary to review its relation to patriarchy, its influence on power relations between women and men, and men over others (women, nature) (Federici, 2009). According to Mies (1986), the social origin of the sexual division of labour dates to prehistoric times, as history relates women to fertility leaving aside other characteristics. As mothers, they must feed their children and themselves gathering and collecting plants and small animals, making women the first providers in history. Besides the gathering activities, the experience of women with plants led to the invention of agriculture, the first productive relationship with nature. On the other hand, men cannot experience their bodies as being productive in the same way as women. The male self-conception as human, as being productive, is closely linked to the invention and control of technology. Man's relation to nature as “man-the-hunter” is different from that of “woman-the-gatherer or cultivator”. Therefore, the hunter can be characterized by using their instruments (or arms) to destroy life, their tools are not means of production, and they can be used as means of coercion. Consequently, this gives hunters power over living beings, both animals and human beings. They can appropriate not only fruits and plants, and animals, but also other (female) producers. Hence hunters

can appropriate life, but they cannot produce life. For instance, man-hunter's relation to nature mediated through arms constitutes a relationship of dominance, which has become an integral element in all ways of men's relation to nature and others (Mies, 1986). This description and analysis made by Mies (1986) bring very revealing considerations that are, conveniently or not, ignored in the present gender relations in capitalism. First, women's provider role, their productive relation to nature, and the social relations that come from that cultivation process. Secondly, the fact that man's relation to nature is conditioned by the invention and control of technology, generates an anthropological question, what kind of relation do men have with their bodies, and in consequence with nature? Thirdly, the relation between "women-cultivators" and "man-hunters", and their relation to nature, in both cases guided by man-hunter's domination. The constant process of dominance and subordination from man-hunters over women and nature brings clear signals of the expansion and hegemony of philosophies like Cartesian dualism, and its influence in the actual capitalism era.

The historical development of the division of labour in general, and the sexual division of labour, has always been a violent process, rather than evolutionary or peaceful. This process allowed certain categories of men, using arms and warfare, to establish an exploitative relationship between themselves and women, and other peoples and classes. In such a predatory mode of production, which is intrinsically patriarchal, warfare and conquest become the most "productive" modes of production. While in the old patriarchies this separation could never be total, in the modern western patriarchy this separation has been extended to a separation between man and nature. With the rise of capitalism as a world-system, based on large-scale conquest and colonial plunder, and the emergence of the world-market, it becomes possible to externalize or ex-territorialize those whom the new patriarchs want to exploit (Mies, 1986).

### **3.1.2. Latin America's role in Capitalism**

Latin America was forged in the heat of the commercial expansion promoted in the XVI by nascent capitalism. It was the colony producing precious metals and exotic goods that contributed to the increased flow of goods and the expansion of the means of payment, which allowed the development of Europe's commercial and banking capital (Marini, 1973).

With reference to Quijano and Ennis (2000), Latin America represented a new model of global power as the first identity of modernity. This new model of power was associated with two historical processes. One was the codification of the differences between conquerors and conquered in the idea of “race,” a supposedly different biological structure that placed some in a natural situation of inferiority to the others, and as a result of this the relations of domination. The other process was the constitution of a new structure of control of labour and its resources and products. This new structure was an articulation of all historically known previous structures of control of labour, slavery, serfdom, small independent commodity production, and reciprocity, together around and upon the basis of capital and the world market. A remarkable reflection of Quijano in his article “Coloniality of Power” (2000), relates the ensemble of all these forms of control of labour to the configuration of capitalism. In his words “*capital existed long before America. But capitalism came into history, for the first time, with America*” (Quijano, 2000. pp-219).

Later in history, the Industrial Revolution corresponds in Latin America to the independence period, conquered in the first decades of the 19th century. This will give rise, based on the demographic and administrative structure woven during the Colony, to a group of countries that will gravitate around England. Ignoring each other, the new countries articulate directly with the British metropolis, trying to satisfy their requirement through the production and export of primary goods or commodities. At the same time, these countries will receive manufactured goods and debts (Marini, 1973). Considering these elements, some academics base the notion that Latin America becomes dependent on industrialized countries. However, this notion is contradictory to history. The creation of the large modern industry was possible because of the availability of agricultural goods from Latin America, which allowed industrial specialization. In consequence, the strong growth of the industrial working class and, in general, of the urban population employed in industry and services, would not be possible with the subsistence agricultural goods, provided considerably by Latin American countries (Marini, 1973). With these facts, it is important to switch the idea about dependency relations between the South and North.

In addition, it is important to highlight the different processes of Latin America and Europe with Capitalism. As mentioned before, while Europe was able to carry out its phase of primitive accumulation with the added stimulation of colonial plunder, Latin



America did not have this source of colonial wealth and was, on top of everything, now subject to imperialist plunder. Capitalism in Latin America was stimulated from the outside, developed to complement the dominant capitalist countries, not to industrialize Latin America (Dietz, 1979). Moreover, Latin America has not experienced any separation or time sequence between slavery, feudalism, and capitalism. From the beginning, all of them have been articulated within the same power structure (Quijano, 2000).

### **3.1.3. Ecological debt and trade: the ecologically unequal exchange**

The theoretical background of Ecologically Unequal Exchange has received several contributions from Latin-American academics. To mention some of the contributions, we start with the structuralist approach from Raul Prebisch in 1949, explaining that during that time Latin American economies were trying a transition from the primary growth model (exports to the core) to an inwards industrial model. Prebisch examined the structure of trade and concluded that periphery nations exported their production of primary goods to the centre at decreasing prices, in relation to the prices of manufactured goods imported from the centre, a situation that continuously reproduced the underdevelopment of the periphery. Secondly, from a sociologic perspective, Cardoso and Faletto 1969 started with the dependency theory, mentioning that the region's dependency was conceived in concrete historical situations that were characterized by three phases: outward development, inward development, and internationalization of the domestic market (Vallejo, 2006). The evolution of the dependency theory started with Andre Gunder Frank in 1971, arguing that developing nations have failed to develop not because of internal barriers to development, but because the developed nations have systematically underdeveloped them, keeping them in a state of dependency. For Frank the industrialization taking place in Latin America was a new form of worker exploitation, thus, the accumulation process was inseparable from international capitalist expansion, which only enriched the developed countries and the small local ruling elite that represented them. Dos Santos followed Frank's dependency model, arguing that the bulk of dependency occurred only after the Second World War when huge multi-national corporations heavily invested in Latin America, and their role was to supply the more developed countries with raw materials (Warner 2008).

Although this set of approaches did not result in further research, they questioned economic orthodoxy. Their main contribution was a vision of the periphery and trade relations, recognizing that international trade does not necessarily converge in profits for all. However, these theories ignored the ecological aspects, fundamental for economies whose commercial exchange is based on the export of primary goods (Vallejo 2006).

In addition, other academics, and organizations such as Accion Ecologica, have linked the Ecological debt to trade and geopolitical dynamics. *“The current system of neo-liberal globalised market economy maintains and augments the ecological debt through such mechanisms as the structural adjustment programs (SAPs) imposed by the international financial institutions, foreign investments, unequal terms of trade, forcing countries to produce export products to redress financial debts; and through the trade-related Intellectual Property Rights within the WTO which protect the patenting of genetic material for agriculture and pharmacology by transnational companies without compensation for the original guardians of the biodiversity of the South”* (Raina, 2005).

Regarding trade, according to Martinez-Alier (2002), the first cause of Ecological Debt is the ecologically unequal exchange (EUE) considering the following aspects. First, is the fact of exporting products from poor regions and countries, at prices that do not consider the local externalities caused by these exports or the exhaustion of natural resources, in exchange for goods and services from richer regions. Second, the ecological time necessary to produce the goods exported from the south is frequently longer than the time required to produce the imported manufactured goods or services. As the north has profited from an ecologically unequal trade, it is in a debtor position. Ecological debt shows that has not been mutually beneficial in monetary terms or ecological terms, which requires analysing trade from a different perspective, which is missing in the neoclassical trade theories or the trade policies (Paredis et al., 2009). Apart from this, the socio-ecological subsidy indicates that Southern countries have historically sustained Northern production and consumption through the illicit appropriation of the environmental space, in consequence, this appropriation allows Northern countries to live beyond their means, and at the same time constrains the possibilities in the South. This becomes a vicious circle of debt against the accounts of the North, and the monetary value of the continued degradations results higher than the financial debt owed to the North (Rice, 2009; Warlenius et al., 2014).

Apart from these theoretical aspects, academics have made the effort to deepen the analysis and quantification of ecologically unequal exchange.

First, Samir Amin that calculated in 1966, the South's revenues from exports to the North were over \$152 billion, considering the rewards of labour as equivalent to what they are at in the North, with the same productivity. Later, Gernot Köhler 1998, using the distortion factor between market exchange rates (MER) and purchasing power parity (PPP) as a proxy, calculated how much higher Southern export prices would be if valued in Northern prices. The results showed that the South lost \$134 billion in unequal exchange in 1965, a figure which rose to \$2.586 trillion in 1995 (updated to constant 2011 dollars). In 2003 Köhler also employed a simplified version of his formula to construct annual estimates of unequal exchange from 1960 to 1998. His data showed that the South lost \$27.7 trillion (updated to constant 2011 dollars) over that period (Hickel et al.,2021).

Furthermore, Hickel, Sullivan, and Zoomkawala (2021) made a calculation for the year 2015 considering material elements and labour. Their results showed that 10.1 billion tons of embodied raw material equivalents (accounting for 50% of total consumption in high-income nations), and 182 million person-years of embodied labour (28% of their total consumption) from low- and middle-income nations. These numbers represent resources and labour embodied not only in primary commodities but also in high-technology industrial goods such as smartphones, computer chips, cars, designer clothes, etc., which over the past few decades have come to be overwhelmingly produced in the South. "Advanced economies" rely on the unequal exchange to facilitate their economic growth and to sustain high levels of income and material consumption. In recent years, the drain has reached around \$2.2 trillion per year (constant 2011 dollars) in Northern prices, or \$1.3 trillion per year in global average prices, when calculated according to exchange rate differentials.

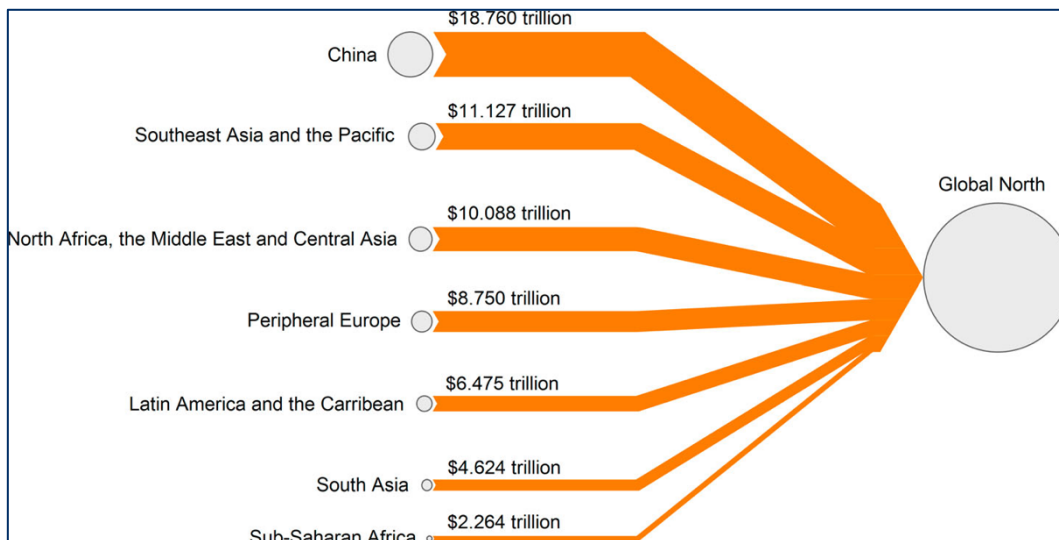


Figure 1. Drain from the Global South (1970 – 2017).  
(From Hickel et al., 2021)

The latest analysis is done by Doring et al. (2022) quantifying the ecologically unequal exchange on a global scale, for 170 countries, between 1990 – 2015. The results pointed out that across the embodied flows of materials, energy, land, and labour, the group of HI (high-income) countries used more resources from a consumption perspective than they provided through production in the year 2015. While acting as net appropriators of embodied resources, the group of HI countries was able to accumulate a monetary trade surplus of approximately 1200 trillion USD over the 1990–2015 period. Their conclusions, besides the quantified results, stated that the economic growth model of industrialization requires the appropriation of resources from poorer regions. It is not realistic that all low-income countries will be able to catch up, as the requirement would be to appropriate resources from poorer regions. Global industrialization as experienced by the world’s wealthiest countries, and some emerging economies, cannot become universal.

### 3.2. Commodification of nature: commodities frontiers, plantations, extractivism, and green extractivism

Since the beginning of capitalism, nature has been commodified, but through processes and socio-natural relationships mediated by their times, histories, and localities. While the conditions under which nature’s commodities are being trademarked today may be new, their potential for commodification is not (Peluso, 2012).

According to Castree (2003), the process of commodification draws attention to the fact that a thing, object, idea, creature, or person, does not naturally possess the commodity status, it is allocated to it. Moreover, to examine commodification is to view capitalism-nature relationships through an especially illuminating window.

In addition, some contemporary Marxist academics have identified principal elements of commodification. First, privatization is the assignment of legal title to a named individual, group, or institution. The title essentially grants the owner the sole right to dispose of the item. The rationale is that it is impossible to swap things for money or in exchange for money unless the objects in question belong to various parties who have the freedom to detach them. Thus, privatization is not only about ownership in the formal, juridical sense but also about control over commodities before, during, and after exchange. A second element is an alienability which refers to a commodity and a particular class of commodities' ability to be morally and physically separated from its sellers. A third element is individuation, a process of separating a commodity from its supporting context through legal and material boundaries. Fourthly, abstraction is a process whereby the qualitative specificity of any individualized thing is assimilated to the qualitative homogeneity of a broader type or process. This entails treating each uniquely identifiable thing found in one location as identical to a seemingly related thing found elsewhere. In the fifth place, the valuation element gives to any particular thing a value in numerous ways simultaneously, however, in capitalist societies, these and other expressions of value are manifested in the peculiarly colourless, contentless medium of money. Finally, displacement is a separation of origins and relations embedded in the production (Castree, 2003).

Considering the approach of commodities frontiers, the following analysis will focus on plantations to understand the physical and social transformation related to agricultural commodities. In addition, the extractive mining activity, is another form of territorial and social transformation in Latin America. Lastly, as a relatively new process of commodification of nature, this part will explore the elements of green extractivism as a component of the green economy.

### 3.2.1. Commodities frontiers

Capitalism expanded to the occupied lands in America and other regions, through the commodification of nature and exploitation of people. The theoretical approach of commodity frontiers is useful to better understand the implications of the installation of these production systems in colonized territories. Commodity frontiers are defined as historical processes of dynamic incorporation of new sites of natural resources in the world economy. These processes pertain to the cultivation of commodities like wheat, sugar cane, tobacco, cocoa, coffee, and cotton, as well as the extractive frontiers of forests, marine zones, and mines (NIAS, 2019). With reference to Beckert et al. (2021), the concept of commodity frontiers is a “powerful lens” to analyse capitalism’s history. It is possible to notice how their expansion to other territories needed to secure access to labour, land, and nature for globalized commodity production.

Furthermore, the cyclical nature of extractive economies, along with the depletion of nature, requires a further expansion of new frontiers. The driving forces behind this process are a reduction of costs and an increase in productivity. Therefore, the process of appropriation, exploitation, dispossession, and disruption, is identified as a commodity frontier (Joseph, 2019). According to Moore (2000), land and labour are central to this process of expansion and extraction, leading to the exploitation of new resources, which in consequence also expands capitalism.

Although the form and dynamics of socio-ecological degradation, as a consequence of frontier expansion, may vary across different frontier zones, it nonetheless characterizes capitalist expansion in agricultural frontiers across different regions and countries. Within a particular geographical area, this degradation often intensifies and transforms as the shift is made from one commodity to another. Moreover, several research cases have shown how the commodification of land involves not only direct exploitation through farming or mining, but exploitation through appropriation, segregation, and separation for the mutually related purposes of conservation and economic growth. On some occasions, the delineation of land as a reserve or protected area provides a market-based solution to deal with conservation issues, given that it involves the separation of humans from nature and tends to embrace an ecosystems services approach, which in practice usually results in monetary valuation and commodification (Joseph, 2019).

### 3.2.2. Plantation

The first wave of colonialism, dominated by the Spanish and Portuguese, introduced plantations in the Americas, long before large-scale productive property became the norm in Europe. There were plantations before the modern era, however, only in the last 500 years, has the plantation logic become a way of organizing the world (Wolford, 2021).

With reference to Tomich (2011), it would be important to rethink the concept of plantation within the analytical framework of the capitalist world-economy. This framework allows to include important elements. First, is the historical process. Secondly the world division of labour as relations of production, exchange, distribution, and consumption, all of them organized by economic and political relations of the market and interstate system. Thirdly, this division of labour as social, material, and spatial. In consequence, considering this approach, the plantation is an institution of the capitalist world-economy. Moreover, the logic of the plantation is not only related to staples production but the social and material production of the plantation itself.

The expansion of the world-economy and the expansion of plantation regimes transformed luxury goods, consumed only by a few people, into mass consumption goods. Therefore, additional food crops were added to the plantation production. However, some crops, such as coffee, cotton, and sugar, were produced in specific locations due to climate and environmental conditions. For this reason, monocultural production becomes so relevant, as it produces its conditions, and at the same time deforestation, soil depletion, and erosion. Besides land and nature, plantation requires a cheap and abundant labour force under specific social relations such as slavery, indenture, or sharecropping (Tomich, 2011).

Sugar cane plantations represent the main case of the commodification of nature and exploitation of people. The sugar plantations, or commodity frontier, were one of the main sectors of early modern capitalist expansion for two main reasons. First, the world sugar market growth throughout the modern period was due to existing land under cultivation and over-exploitation. Because of depletion, new lands were always needed, to replace worn-out lands and to expand production. Secondly, the sugar frontier promoted complex

economic activities such as slave-trading, cattle-ranching, shipbuilding, and foodstuff agriculture (Moore, 2000).

Sugar cane plantations started in the Madeira Islands dominated by the Portuguese. The expansion of sugar cane and the requirement of wood for sugar mills consumed the forests. The expansion was favoured by the deforestation for wood, as it required clear land to expand cultivation. One pound of sugar represented 50 pounds of fuelwood. From that time, sugar means deforestation. In Madeira and North-eastern Brazil and the Caribbean, at the heart of early modern sugar dynamism, the tendency was to exploit forests beyond their capacity to recover (Moore, 2009). It is important to highlight that plantation logic includes slavery and violence as central elements. Between 1500 and 1867, from a total of twelve and a half million enslaved Africans who crossed the Atlantic, almost six million made this passage between 1750 and 1825. This is evidence of the negotiation that the Spanish Crown had to do with Portuguese, Dutch, French, and British traders through rigid contracts for the supply of slaves to its colonies. The Spanish Crown could only transform Cuba, Venezuela, and the Rio de la Plata into centres of production and trade with slavery (Borucki, 2011).

The history of sugar cane plantations does not end in Madeira, it moved to Brazil, Barbados, Jamaica, and Cuba, including slavery in all cases. At the same time, Dutch colonial administrators began turning Java into yet another major sugar producer. China did the same with Taiwan. Nowadays, sugar is not only a source of calories but is also an input to make ethanol, produced and sold as “green” or “sustainable” biofuel. Other commodities have gone through the same process such as soybean, cotton, and minerals (Beckert et al., 2021).

### **3.2.3. Extractivism and Neo-extractivism**

Extractivism is a conceptual framework that is being studied and debated across disciplines. In Latin America, this discussion has generated different theoretical approaches.

According to Gudynas (2015), the term extractivism has become popular in recent years, and its more common use is related to the appropriation of natural resources to export



them. Activities of that type have a long history. Some of them began in colonial times with the shipments of precious metals toward European metropolis. Since then, the export of natural resources has accompanied Latin American history, whether in their moments of an economic bonanza or in the crisis. But the remarkable increase, in what is currently extractivisms, is due to the high prices of raw materials and persistent international demand. Then, extractivism is defined as a type of extraction of natural resources, in large volume or high intensity, and that is essentially oriented to be exported as unprocessed raw materials, or with minimum processing. The most known examples are the great mining and oil exploitations. In the case of mining, in recent years the open-pit mega-mining has become the most usual. This kind of mining affects a tremendous surface of territory.

A more recent approach presented by Svampa (2019) is Neo-extractivism, which refers to a way of appropriating nature and a development model based on the over-exploitation of natural goods, largely non-renewable, characterized by its large scale and its orientation toward export. It is also characterized by the expansion of the borders of exploitation to new territories, including those considered not productive. These range from open pit mega mining, the expansion of the oil and energy frontier, the construction of large hydroelectric dams, and other infrastructure works, and the expansion of monocultures, the generalization of the agribusiness model, and over-exploitation of fisheries or forest monocultures. To sum up, neo-extractivism in comparison with extractivism includes in its analysis some new dimensions at different levels. First, at the global level, the expansion of the commodity frontier, the depletion of non-renewable natural goods, and a socio-ecological crisis of planetary scope. Secondly, at the regional and national level, the relationship between the extractive-export model, the nation-state, and the capture of extraordinary income. Thirdly, at the territorial level, with the intensive occupation of the territory, land grabbing, and ecoterritorial turn (Svampa, 2019).

In addition, extractivism is characterized by generating economic dependence, deterioration of social conditions, income concentration, unequal distribution of benefits, displacement of the local population with negative implications for livelihoods, resource (land) dispossession and concentration, and marginalization of local or national priorities. Concerning the ecological and social effects, degradation of the environment and the habitat of indigenous and peasant communities, pollution of water, global climate change,

depletion of the soil, deforestation, decline of biodiversity, and so on. One characteristic of extractivist economies not mentioned before is the enclave logic, whereas the extractivist stakeholders lack connections in economic structures in the area, and at the same time concentrate economic and productive forces on a few primary commodities and their respective economic sectors, which intensifies the vulnerability of the economy to global markets. Finally, financialization emerges as an important issue to be incorporated in the extractivism analysis, as it is crucial to the creation of new frontiers of exploitation and appropriation and the production of extractive space (Bruna, 2022).

### **3.2.3. Green extractivism and the Payment for Ecosystem Services mechanisms**

During the XVI century, Western Europe brought to other parts of the world a notion about nature. This idea of taking value from everything including nature and “others” has been the basis of capitalism at that time and the world-economy at present times. In this part of the document the analysis will focus on the logic of commodification of nature besides material components, instead, this part will cover nature’s services and the way capitalism has built narratives, institutional structure, and even markets to speculate and get profits from it.

Conservation of nature and environmental protection came into the international agenda around 1970. One milestone was the Limits to Growth report focused on the implications of continued growth (The Club of Rome). A second milestone was the Brundtland report in 1987, which became the basis for sustainable development, and also for the international spaces for negotiation about climate change and biodiversity. After these reports, several assessments, reports, and proposals have been made to maintain economic growth along with nature conservation. The alarming tone of this international narrative has maintained contradictions through the years. The Millennial Ecosystem Assessment (2005) is one of the biggest compilations of environmental impacts produced by humans on the planet. However, the recommendations rely on technology, protection of natural assets, and better decisions on trade and investments. As a result, the international structure built upon this emergency narrative is impressive. United Nations, World Bank, INGOs, investment funds, and some private initiatives, reinforced conservation programs in almost every country during the 1990s. After the Rio Summit and the creation of the UNFCCC and the UNCDB, these programs gained strength and funds, and at the same

time elements such as ecosystems value, market-based mechanisms, international compensation mechanisms, cap and trade, among others, enter the scene. Under the climate change negotiation process, the Kyoto Protocol not only established mitigation goals and commitments to industrialized (or core) countries but also the global market-based and carbon trade mechanisms. These mechanisms will be explained below.

### **Payment for ecosystem services mechanisms**

Before analysis the green economy and green extractivism, it is important to do a brief review of economic theory in relation to nature, nature services, and benefits. Classical economics (XIX century), referred to nature based on land and the more tangible production factor to generate rent. By the fall of the Classical economics period, some authors kept paying substantial attention to natural resources in physical terms. Later, the neo-classical economists replaced nature, or land, with monetary capital in the production function. The origins of the modern history of ecosystem services began in the late 1970s. It starts with the utilitarian framing of beneficial ecosystem functions as services to increase public interest in biodiversity conservation. Leading instruments within this logic are Markets for Ecosystem Services and Payment for Ecosystem Services (PES) schemes (Gomez et al., 2010).

An important next step is to understand how economists describe ecosystem services. According to Constanza et al. (1997), ecosystem services are the goods and services that benefit human populations directly or indirectly, and these derive from ecosystem functions (habitat, biological, or properties). In addition, ecosystem services consist of flows of materials, energy, and information from natural capital stocks which combine with manufactured and human capital services to produce human welfare. Following this logic, there are several ecosystem services and functions: gas regulation, climate regulation, water regulation, water supply, erosion control, soil formation, waste treatment, pollination, food production, and genetic material, among many others (Constanza et al. 1997).

Therefore, the Payment for Ecosystem Services (PES) mechanisms are defined as voluntary and conditional transactions over well-defined ecosystem services, between at least one supplier and one user. The basic idea behind this is that the beneficiaries of service provision compensate the providers (Gomez et al., 2010). Furthermore, there are

different types of PES mechanisms. First, the public payment schemes through which government pays land or resource managers to enhance ecosystem services on behalf of the wider public. Second, the private payment schemes, are self-organised private deals in which beneficiaries of ecosystem services contract directly with service providers. And the third is public-private payment schemes that draw on both government and private funds to pay land or other resource managers for the delivery of ecosystem services. There are also international, national, and local scales of PES (Fripp, 2014).

Besides this short description of the PES mechanism, there are important remarks done by different academics. First, PES are presented as a market-based solution to environmental problems originated by the market, which represents a contradiction. Second, ecological economists are trying to contribute to PES including a perspective of equity, justice, and sustainability, and consider the centre of any PES the social context carefully (Van Hecken et al. 2015). Even though the PES started as a mechanism to include some externalities and costs into the economic logic, it has taken different paths, generating negative impacts and contributing to capitalist accumulation.

Neoliberal capitalism constructs nature as natural capital, and a green economy values and invests in natural capital. Hence, international finance institutions argue that the goods and services provided by ecosystems need to be valorised and then integrated into environmental decision-making and public policy. Nature in the form of natural capital and the creation of markets for nature, and its products and services, in particular through payment for ecosystem services (PES) schemes, continues and extends the economisation or neoliberalisation of capitalist society–nature relationships without the need for a radical change of these relationships. (Wanner, 2015)

### **Selling nature to save it**

With reference to McAfee (1999), the commodification and international trade of ecosystem services is an ambitious strategy of selling nature to save it. The international environmental institutions are sites to produce global environmental discourse. The dominant voice in this discourse is a post-neoliberal version of environmental economics, applied on a world scale.

Even though the ecosystem services are several and diverse since the 1990's the international agenda has focused on greenhouse gas sequestration. The Kyoto protocol is well known for establishing an international PES mechanism based on the market. The protocol mechanisms are three: clean development mechanism and joint implementation, which are mechanisms that allow industrialized countries to get reduction certificates, from projects in developing countries or even in other industrialized countries. The third mechanism is directly called emissions trading. According to the UNFCCC, greenhouse gas emissions are a new commodity. Emissions trading allows countries that have emission units available, to sell them to countries that are over their targets. Thus, a new commodity was created in the form of emission reductions or removals. Since carbon dioxide is the principal greenhouse gas, people speak simply of trading in carbon. Carbon is now tracked and traded like any other commodity. This is known as the carbon market (UNFCCC).

An additional mechanism related to land and forests is REDD+. It refers to policies and incentives 'relating to reducing emissions from deforestation and forest degradation and the role of conservation and sustainable management of forests and the enhancement of forest carbon stocks in developing countries (Bali Action Plan, 2008). Moreover, REDD+ is a complex mechanism, of global scope, which aims to stop emissions of greenhouse gases that come from deforestation and degradation of forests. It was expected to have several benefits, such as reduction of poverty, better forest governance, and conservation of biodiversity. However, a global mechanism that is created to maintain the economic growth along forest conservation is contradictory. The case of REDD+ has also generated other negative effects on local people and indigenous people, such as expulsion from their territories, rights violation, speculation from brokers, and conflicts with organizations implementing REDD projects (Del Carpio, 2020).

### **Green Economy**

In the year 2012, the Rio+20 Summit reinforced the notion of sustainable development, producing the Sustainable Development Goals (SDGs), and presenting the green economy as the formula to achieve them. For the United Nations, a green economy is one of the important tools available for achieving sustainable development. It should contribute to eradicating poverty as well as sustained economic growth, enhancing social inclusion, improving human welfare, and creating opportunities for employment and

decent work for all while maintaining the healthy functioning of the Earth's ecosystems (The Future we want, 2012).

Nevertheless, after almost fifty years since the Brundtland report, is it possible to enjoy both economic growth and environmental sustainability? The supporters of green growth argue that technological progress and structural change will enable a decoupling<sup>1</sup> (separation) of natural resources consumption and environmental impacts from economic growth. Not surprisingly, the validity of the green growth discourse relies on the assumption of an absolute, permanent, global, large, and fast enough decoupling of economic growth from all critical environmental pressures (Parrique et al., 2019). This decoupling aspect has become a central issue in the SDGs and the National Contributions (mitigation commitments) that each country presents to the UNFCCC. However, with reference to Parrique et al. (2019), there is important evidence to be skeptical about the occurrence of decoupling in the future, as green growth will influence or be incurred by rising energy expenditure, rebound effects, problem shifting, underestimated impact services, the limited potential of recycling, insufficient and inappropriate technological progress, and cost shifting.

In order to explain the reasons the green economy continues as the main development strategy, besides its deficiencies to achieve sustainability, Wanner (2015) relies on a passive revolution approach. First, green growth is a form that capitalism is using to adjust to crises arising from contradictions within itself (the global financial and economic crises; the global environmental crisis of climate change, and the increasingly frequent food crises). Secondly, is not a mere policy goal at national and international levels, but a strategy to cover the contradictions between economic and ecological sustainability. Thirdly, the commodification nature continues because of the capitalist market. Fourthly, the green economy reshapes interaction between civil society, state, and market in the form of green consumerism. This citizenship through sustainable consumption and green consumerism does not challenge the dominant power structures of the economic and political system. Finally, the structural causes of global poverty, global economic

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<sup>1</sup> Generally speaking, two variables are said coupled if one is driven by the other, making them evolve in proportion (for instance, more of A means more of B); and they decouple when they cease to do so. When coupled, both the driven (environmental impacts) and driving (GDP) variables move in step, which means that they evolve over time proportionally.

inequality, and global ecological unsustainability are not addressed. On the contrary, the discourse further intensifies the commodification of nature and perpetuates the myth of limitless growth.

### **Green extractivism**

The concept of green extractivism is recent and has been discussed in the context of the green economy and climate change. Thus, it is mainly positioned as a form of resource extraction to justify the requirements of raw materials for the energy transition based on renewable energy such as wind, solar, hydrological, and bioenergy (Voskoboynik & Andreucci, 2021).

A remarkable distinction is made by Bruna (2022). First, considering extractivism as an important theoretical framework since it is a process of appropriation of nature and labour through asymmetric and exploitative social, economic, and ecological relations. Then, the identification of two main patterns of extractivism, the efficiency-driven extractivism, and the green-driven extractivism. ‘*Variations of extractivism*’ refer to different mechanisms of commodities’ extraction and transferred from peripheries to industrialized centres.

For instance, efficiency-driven extractivism is linked to mining, oil extraction, plantations, fisheries, and forestry, among others. Moreover, green-driven extractivism is related to “nature services” or ecosystem services (Bruna, 2022).

In the case of carbon sequestration, in the form of REDD+ programs and projects, green extractivism implies the appropriation, extraction, and transfer of emission rights, where the expropriated are being deprived of resources determinant for their social reproduction as well as their right to emit. This transfer of the right to emit, from periphery or poor communities participating in these programs to main polluters located in the core or Global North, brings the opportunities to further pollute elsewhere by the buyers of carbon permits. Consequently, global policies are creating local adversities, feeding external industrialization and accumulation, in the name of climate change challenges (Bruna, 2022).

## **CHAPTER 4: GLOBALISATION AND THE ECOLOGICAL DEBT IN LATIN AMERICA**

This section presents a comparative analysis between agribusiness under the logic of plantation, mining under the logic of extractivism, and payment for ecosystem services mechanisms under the logic of green extractivism, in the context of the Latin American region. In addition, explains to what extent the three extractivism mechanisms contribute to the accumulation of ecological debt.

### **4.1. Ecological Debt and Latin America – the ecologically unequal exchange**

In most Latin American nations, an economic structure historically specialized in intensive natural resource production strongly oriented towards international markets still prevails. The income of some nations still depends largely on the export of commodities, and as in colonial times, Latin America continues to be a net exporter of food and minerals.

Recent research done by Rivera-Basques, Duarte, and Sanchez-Chóliz (2021), estimates the ecological exchanges between Latin America and the other regions of the world. They consider biophysical indicators for the exploitation of the land, the consumption of water, the exchange of raw materials, and the carbon emissions embodied in international trade, in the period from 1990 to 2015.

The results show a generalized inequality to the detriment of Latin America in the ecological exchange with developed regions. First, in relation to land, the results position the Latin American region as a net exporter of intensive land use products worldwide. This intensive use of land is also generating deforestation to expand the agricultural frontier. Secondly, concerning water, international trade shows inequalities against Latin America with the world developed regions, which concentrate 97.5% of Latin America. Thirdly, trends in trade in raw materials show the increasing intensity of exploitation of renewable and non-renewable natural resources in Latin America through exports of fossil fuels and minerals. Finally, carbon emissions during the period 1990 to 2015 almost doubled, however, Latin America results in a net importer through different manufactured goods from Europe, North America, and East Asia. Therefore, these results are evidence of the unbalanced trade relations between developed or industrialized regions and Latin



America. Moreover, between North and South. This research, among previous ones, signifies the Ecological debt accumulation since colonial times in relation to the traditional material exports.

Latin America is a net exporter of land through agricultural exports, and through intensive exploitation of minerals is also a net exporter of raw materials. These two sectors already have accumulated a historical ecological debt, and the ecologically unequal exchange has quantified the actual ecological debt due to international trade. However, the commodification of nature generates different forms of appropriation, and nature services or ecosystem services have become an additional commodity that responds to the same patterns and conditions that agriculture or mineral commodities. Thus, the following part will analyse how the agricultural, mining exports sectors and payment for ecosystem services mechanisms contribute to the ecological debt.

The analysis will be based on some indicators already identified in agriculture and mining as commodities frontiers: expansion, the expulsion of people (farmers, indigenous people, campesinos, women), externalities/costs, financial industry participation and speculation, labour exploitation and slavery, contamination and nature depletion, state mechanisms (institutions), power relations linked to colonization.

#### **4.2. Agribusiness and the food system**

Plantation worlds, both past, and present offer a powerful reminder that environmental problems cannot be decoupled from histories of colonialism, capitalism, and racism that have made some human beings more vulnerable than others to warming temperatures, rising seas, toxic exposures, and land dispossession occurring across the globe (Sapp Moore, 2019).

European colonialism was unique from other periods of state-level imperialism and expansion because of its two-pronged model of political economic and religious conversion efforts. Agriculture was a central component of colonialism all over the world, not only as a subsistence pattern, but also as imposed beliefs and practices that generated profound social, political, and cultural changes for both colonizers and colonized. During colonial times agriculture was organized around export-oriented, cash-crop production, ushering in centuries of plantation economies to export commodity products such as

sugar, coffee, chocolate, tea, and cotton. In fact, very few of the cash crops were native to these regions, and one effect of the colonial era was an increase in the globalization of foods (Hippert, 2018).

Earlier models of empire-building, like the Inca, often allowed communities to maintain their subsistence patterns and other cultural distinctions. However, European colonialism was based upon changing modes of production, which included modifications to land tenure, social relations, and forms of subsistence. Under British, French, Spanish, Portuguese, Danish, Dutch, Russian, Belgian, German, and Italian administrations, no matter which pattern of colonial administration, the transition to agricultural production was not viewed as a way of improving the quality of life for colonized peoples, it was used to unite the expansion of the empire (Hippert, 2018).

In present times large-scale agriculture still responds to the logic of plantations. The food system does not necessarily prioritize the main objective which should be food provision based on food sovereignty. How does the food system, based on agribusiness, increase the Ecological debt in favour of Southern regions such as Latin America?

First, the world food system is oriented to production, not for people, but for profit. Modern agriculture uses artificial fertilizers contributing to the poisoning of human health and groundwater, and the erosion of soil. On the other hand, this modern agriculture maintains the exploitation of labour as central, there is the imperial division of labour. Hence, mass imports of tropical food, such as out-of-season fruits and vegetables, are intensive in cheap labour from the periphery. This labour is made cheap through vast labour farm areas for export crops (Ajl, 2021). Latin America and the Caribbean have reached expansion of their agricultural trade surplus for the last twenty years. The exports raised from USD 26 billion in 2000 to nearly USD 138 billion in 2019. Both crops and livestock products contribute to the trade surplus with products such as meat with 15.8%, oilseeds and oilcakes with 41.6%, and coffee 33.3% of global exports. Fruit and vegetable exports have also contributed to the region's trade surplus. Many countries in the region have a high rate of dependency on agricultural exports and even rely on two or three products. In addition, most countries have only three destinations for their exports (FAO, 2020).

Secondly, the expansion of agribusiness requires land to maintain its profit. Land concentration and land grabbing are two main consequences of this agricultural and food system. With reference to Ajl (2021), on a world scale, 84 percent of farms are smaller than two hectares, but they only operate around 12 percent of farmland, while the largest 1 percent of global farms operate over 70 percent of global farmland. The rush for land since 2000 is a well-observed trend, which has primarily affected agrarian economies in Africa and Asia. Moreover, an Oxfam analysis of 15 Latin American countries shows that the largest 1% of farms, with an extension over 2,000 hectares, hold more than half of all agricultural land, however in countries like Argentina the average size of farms could reach 22,000 hectares. The most extreme case is Colombia, where farms of more than 500 hectares, representing 0.4% of all farms by number, occupy 67.6% of productive land (Oxfam, 2016). Besides land concentration, there has been a process of land acquisitions with different patterns. These acquisitions are responding to, in the first place, growing demand for industrial crops, such as palm for biofuels, and food crops. In the second place, due to the rise in global food prices in the 2000s, land became a desirable investment, even for speculative reasons. After the 2008 crisis land surged as a destination for investment capital, both because of its materiality and as a means of access to an expanding range of commodities (Sassen, 2014). Characteristics of land grabbing are large-scale displacement of the rural poor without proper compensation and the destruction of the local ecology to make space for industrial agriculture and biofuels (EJOLT, 2014).

Consequently, the food system based on agribusiness, supply chains, land grabbing, and financial industry speculation puts in evidence that Ecological debt is increasing each year. Agricultural goods, industrial crops, and food are continuously exported from Latin America, at prices that do not consider the local “externalities”: labour exploitation, pollution and soil degradation, land grabbing along with farmers' and people's expulsion from their lands. In practice, there is no economic tool or mechanism that is considering these “externalities” in exchange terms.

### **4.3. Mining**

Historians of mining in Latin America have raised several questions about its relationship to the development of capitalism as a historical system. They have shown the highly

modern aspects of mining enterprises since the sixteenth century, their social and environmental impacts in places like Potosí, and the importance of bullion flows to the development of the Old World. Mining did not emerge with capitalism, but there is a clear difference between capitalist mining and pre-modern versions of the practice (Marques, 2020). According to Arboleda (2020), the cultural, artistic, and political efflorescence that characterized the Golden Century of the Habsburg would never exist without the wealth generated by the silver of Potosí, among other commodities.

The constant mention of the silver mines of Potosí throughout history is impressive, as the tremendous volume of minerals that were exploited to maintain the Spanish crown for several centuries. Potosí's ascent was enabled by the crisis of Central European mining. New commodity sectors moved to regions where the commodification of land and labour was low, and where indigenous capacities for effective resistance were minimal. Two conditions were important to extend the mining commodity frontier: rich ore deposits and accessible sources of cheap labour power (Moore, 2010).

Furthermore, there are important details in history that increased the silver extraction in Potosí. First, the introduction of the amalgama technique which included mercury to extract the silver. This reduced the requirement of fuel to be used in the mills. Secondly, the inclusion of the mita or encomiendas, a well-known mechanism of Indian abuse in which Indian groups were entrusted to Spanish proprietors, to take care of them physically and spiritually in return for rights to tribute and labour, but who in practice often abused and enslaved them. The mode of organizing labour through coercive, but short-run, labour drafts intensified the exploitation of the mitayo, perhaps even beyond that of African slaves (Moore, 2010). In consequence, the rhythm of extraction of silver reached a revolutionary increase in 1572 from a production of 1,748 million maravedíes (Iberian coin of gold and silver) for five years (1571-1575), to 12,218 million for the five years 1581 - 1585. At the same time, a similar process of demographic concentration is given, from a little more than 3,000 inhabitants in 1543 to 120,000 in 1580 and 160,000 in 1650. (Sempat, 1982).

The course of events in Potosí reflects the pattern of metallurgical commodity frontiers in the early modern period. In the early stages, high-yielding ores translate into high wages and decent working conditions. But sooner or later ore quality declines. When this

happens profits will require two things: rising capital intensity (infrastructure and deepening in the ore) and lowering the wage bill for labour power (Moore, 2010). The situation of mining in colonial times is replicated in the present mining activity.

Resource extraction has been one of the fastest growing economic sectors all over the world and particularly in the Global South. Encouraged by the international financial institutions, many governments promote the extractive sector as a driver for national development. However, resource-rich states do not necessarily feature a higher level of economic development than others, nor better living conditions for the population. The extractive sector has significant economic, social, and environmental impacts that are far from being just positive as the loss of agricultural land and pasture, scarcity and pollution of surface and groundwater, soil degradation, and noise. Moreover, the rising cost of living in mining areas impacts large parts of societies and particularly poor and marginalized social groups as it is common to find that mining areas are among the poorest. In addition, the extractive areas are commonly accompanied by conflicts and the mobilization of civil society actors (Engels, 2020).

According to extractivism and neo-extractivism characteristics, how does mining increase the Ecological debt?

First, it is a common trend in the region to find out that mining permits are placed over indigenous or peasant territories. In the case of Peru, the legal permits to extract minerals or hydrocarbons are called concessions, and in the year 2000, they covered around 2,300 hectares of territory, however, in the year 2010 they reached 20 million hectares (EcologiaPolitica, 2010). At the same time, these mining concessions overlap with 38% of the indigenous and peasant territories in the Andes and Amazon (Cooperaccion, 2017). Somehow these permits mainly affect people located in peripheries, and the extractive activity requires them to be “relocated”.

Secondly, as the number of extractive projects and the territorial areas affected has expanded, the conflicts they cause have continued to grow. In the case of mining, social conflicts are extensive and complex. Each mining project triggers a conflictual process that begins with exploration activities and does not cease even when it is momentarily stopped, or when the life cycle of the deposit has been exhausted. The initiative OCMAL

registered in 2010 120 conflicts affected 150 communities, not surprisingly, in January 2019, there were 256 conflicts, 5 cross borders, involving 274 projects, 192 cases of criminalization, and 37 inquiries. The countries with the greatest number of conflicts are Peru (39), Mexico (46), Chile (44), Argentina (29), Brazil (26), Bolivia (10), Colombia (16), and Ecuador (8) (Svampa, 2019). Along with these conflicts, the criminalization of protest is a set of strategies applied by state and non-state actors to intimidate, inhibit, and delegitimize protests. These strategies could be political, legal, and media. At the same time, murdering defenders appears as the starkest form of stopping protests (Alvarado, 2019).

Thirdly, the different impacts of mining on people's health and environment. In Latin America, mining is strongly promoted as a source of economic advancement. Governments tout extraction as a source of employment and funding. However, the impacts are not openly and sincerely treated. Environmental damage can persist for centuries or even millennia as severe landscape modifications such as open-pit mines, or contamination of water sources. Promoters of large mining projects often fail to understand that the long-term costs of these mega-projects far outweigh their benefits and extend far beyond the mine's active life cycle. In addition, many countries in the region lack specific laws and procedures for monitoring and repairing damages. In Chile, environmental deterioration is largely the product of abandoned legal metal mines. In Bolivia, it is most often the result of artisanal mining and cooperatives. In Colombia, illegal and small-scale mining spills mercury into the rivers. In Peru, gold mining causes serious damage to human health and the environment (AIDA, 2018).

It is a fact that mining during colonial times left several severe impacts, however, just around 2000 governments in the region started to register environmental liabilities, as they are formally called now. Bolivia collected information from 2005 to 2008 and 2011, registering a total of 973 mining environmental liabilities. Chile did the collecting process in the period 2003-2014, registering 492. In Colombia in 2015 inventoried a total of 449 mining areas were in a state of abandonment. Peru, where annual inventories have been carried out since 2006, inventoried 8,854 liabilities up to 2016 (ECLAC, 2019).

Fourthly, the region is very dependent on the export of minerals, which represents a vulnerability. This sector has historically had a great weight in the basket exporter of

several countries in the region, especially in South America. Since 1990, the sector's share of world goods exports has ranged between 9% and 13%. Moreover, in 2017, exports of minerals and metals from Latin America and the Caribbean reached an equivalent to 17% of the value of their total shipments of goods, and 8% of world exports of minerals and metals. Also, regional shipments of minerals and metals show a high concentration by country, since Brazil, Chile, Mexico, and Peru account for 85% of the value total exported. Is not a surprise that Chile and Peru are the only countries in the region where mining and metals represent more than half the value of total exports of goods (ECLAC, 2018).

Finally, the transition to a “cleaner” energy through renewable sources could increase the demand for key minerals such as lithium, cobalt, and graphite, by around 500% by 2050. Growing demand for these materials could escalate all the aspects mentioned before (conflicts, criminalization, dependence) in the Global South. Although, in this case, the intensification of extractivism comes under the narrative of the urgent necessity to transition to a greener economy (Voskoboynik & Andreucci, 2021).

Overall, mining generates several costs to Latin American countries, which in the logic analysed in this document, also generates an increase in Ecological debt.

#### **4.4. Carbon sequestration PES programs**

In this part, a similar analysis done with Plantation-Agriculture and Extractivism and Mining, will be developed to answer the central question: what is the role of payment for ecosystem services programs in Latin America, in the accumulation of Ecological debt from Global North to Global South?

First, it is important to bring here the concept of ecological debt, described in the theoretical framework, as memory assistance. According to Accion Ecologica (1999), it is the debt accumulated by northern industrial countries towards southern countries on account of 1) historical and present resource plundering and 2) the use of environmental space to deposit wastes. This part of the analysis is related to both elements, the extractive logic and its effects on people and nature.

Secondly, as mentioned before, due to commodify nature functions they have been characterized as ecosystem services. According to the Millennium Ecosystem Assessment (2005), there are five types of services: provisioning (food, water, resources), regulating (carbon sequestration, pollination), supporting (habitats, genetic), and cultural (non-materialistic). Although this approach to nature is merely anthropocentric, the analysis will consider the regulating ecosystem services, and concretely the carbon sequestration, as the whole institutional and market structure, central to the research, is based on it.

#### **4.4.1. Carbon markets**

The Intergovernmental Panel on Climate Change (IPCC) has shown the evolution of climate change, its serious impacts, and greenhouse gas (GHG) emissions for several years. Each year the tone becomes more alarmist due to the severe effects observed of global warming on the ecosystems and people. This year, its last report states that there has been an increase in total anthropogenic GHG emissions since 2010. Despite a slower pace of economic growth than the decade preceding it, annual average GHG emissions from 2010 to 2019 were higher than in any previous decade (IPCC, 2022).

Therefore, to reduce GHG emissions and achieve the Paris Agreement goal (1.5C° global temperature), international stakeholders call for effective action and sufficient investment. It has been calculated that Developing countries will need up to US\$6 trillion by 2030 to finance not even half of their climate action goals presented in their National Contributions (NDC). Moreover, all countries are falling with financial flows three to six times lower than levels needed by 2030, with differences between regions of the world (UNDP, 2022). Consequently, the carbon markets have reinforced their role as an important piece in this climate emergency and the financial requirements to solve it.

As mentioned in the theoretical framework, the foundations for global market-based climate policies began with the Kyoto Protocol. This treaty required developed countries to adopt binding commitments to reduce emissions. However, it allowed these commitments to be achieved through emissions trading systems. A key concept and logic in the carbon market is “cap and trade”, which was promoted by the Kyoto Protocol. Cap-and-trade was presented as a way to limit emissions with a cap and allow corporations to



trade permits among themselves while being regulated by a government. Under a cap-and-trade system, polluters and investors looking to make a profit can buy, sell, and bank allowances given for free or auctioned by the government. Polluters can emit more than their allotted amount (cap) by purchasing allowances from other participants in the market (Indigenous Environmental Network, 2021).

In addition, there are two different types of carbon markets such as cap-and-trade schemes (or emissions trading systems, ETS) and baseline-and-credit which we will call offsetting mechanisms. In the case of ETS, companies trade pollution permits (allowances) to emit a unit of CO<sub>2</sub> in the future. In an offsetting mechanism, countries, or companies trade offsets, which are emission reductions already done. Offsets should only be used to compensate for emissions that cannot be avoided or reduced (CMW, 2021). Besides these two types, there are two other carbon markets according to the presence or absence of regulation. On the one hand, the compliance markets are created as a result of any national, regional, and/or international policy or regulatory requirement. The ETS is a compliance market, like the European Union's ETS or a recently launched ETS by China. On the other hand, the voluntary carbon markets in which carbon credits are issued are bought and sold voluntarily. The current supply of voluntary carbon credits comes mostly from private entities that develop carbon projects or governments that develop programs certified by carbon standards that generate emission reductions. Demand comes from private individuals that want to compensate for their carbon emissions, corporations with corporate sustainability targets, and other actors aiming to trade credits at a higher price to make a profit (UNDP, 2022).

A recent and additional milestone in this carbon market story is Article 6 under the Paris Agreement, which consists of several principles for how countries can cooperate to reach their climate targets. At COP 26 in Glasgow in 2021, countries agreed on a package of rules to govern and implement international carbon market mechanisms under the UNFCCC. (CMW, 2021). This has intensified the interest in participating in carbon markets, as the 83% of National Contributions (NDC), out of 140 NDCs presented to the UNFCCC, are open to use carbon market mechanisms to achieve their reduction targets (WRI, 2021).

For instance, in 2016 member countries of the International Civil Aviation Organisation (ICAO), the UN body responsible for civil aviation, agreed to establish the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), a carbon market specifically designed for airlines. The objective of this market is to compensate for the growth in emissions from international flights above 2020 levels. In order to compensate for their emissions, airlines have to buy carbon credits. With an estimated demand of almost two billion credits, airlines are a significant source of demand (CMW, 2021).

Under the carbon market transactions there are different kinds of allowances or offsets being negotiated, a good part of them come from the energy sector, however, the carbon offsetting from Agriculture, Forestry, and other Land use (AFOLU) is increasingly significant. So, in the next part a brief revision of the Reducing of Emissions from Deforestation and Forest Degradation (REDD+) mechanism and the link to carbon markets.

#### **4.4.2. Carbon markets and REDD+**

REDD+ was conceptualized as a mechanism to incentivize forest conservation in tropical developing countries by providing them access to carbon markets. The supporters of REDD+ see it as a tool to mobilize financial resources for forest conservation and monitor deforestation and forest degradation. Others have been skeptical about its ability to contribute significantly to climate change mitigation. Since the creation of the mechanism, more than 350 REDD+ projects across 53 countries have been established with a price tag of more than 24 billion euros in public finance (Bragg et al. 2020).

Currently, REDD+ finance flows come from bilateral and multilateral agencies, with public sources being the largest contributors. Much of this funding has been directed towards REDD+ readiness activities. The five largest projects approved in the region in 2020 were through the Green Climate Fund (GFC). Forestry and agriculture sectors supporting climate actions in Brazil (USD 99.5 million), Argentina (USD 82 million), Nicaragua (USD 64 million), and Costa Rica (USD 54 million) (Watson & Schalatek, 2021).

Table 1. Approved funding across themes (2003 – 2020). (Watson & Schalatek, 2021).

Theme	Amount approved (USD millions)	Projects approved
Mitigation	1,580	132
REDD+ (reducing emissions from deforestation and forest degradation, forest conservation, sustainable forest management, and the enhancement of forest carbon stocks)	1,541	159
Multiple	557	143
Adaptation	480	71

On the other hand, the volume of carbon credits in voluntary carbon markets has increased from the year 2020 to 2021. Forestry and Land use accounted for 46% of traded volume in 2021, up from 28% of market share in 2020. While REDD+ remained the most dominant project type traded in the category (65%), this is up from 62 % in 2020. Forestry and Land Use “removals” were priced at around \$7.90 for both 2020 and 2021 (Forest Trends, 2022).

The financial situation of REDD+ in carbon markets presented in this part reflects different aspects. One is the expected result for the international actors and investors of different narratives (climate emergency, green economy, and extractivism). The numbers show that commodification of nature’s services is a good business. The number of REDD+ projects is continuously increasing, along with the number of funds and carbon market transactions.

#### 4.4.4. Analysis of REDD+ projects in Latin America and ecological debt

REDD+ projects are a mechanism of payment for ecosystem services, in which carbon and forests' capacity to sequester that carbon has a price. However, these projects are not only about carbon, but also people, territories, and power dynamics. What do these elements mean in terms of ecological debt? In this part, some of the indicators identified for cases of agriculture and mining will be analysed in some REDD+ project cases in Latin America: Peru, Brasil, Colombia, and Costa Rica.

## A) REDD+ projects in Peru

Even though REDD+ implementation procedures were not clear around the year 2008 in the UNFCCC, there were already two initiatives in Peru starting the implementation: Alto Mayo and Cordillera Azul. Although there are 32 REDD+ projects registered in Peru (International Data Base on REDD+), the analysis will consider these two initiatives since they are early implementations.

First, it is important to clarify that these two projects are part of the National System of Natural Protected Areas (SINANPE). The national authority of SINANPE is the National Service of Natural Protected Areas (SERNANP). Thus, the administration of some natural protected areas is done by SERNANP and private actors such as NGOs. In the case of Alto Mayo, the NGO Conservation International (CI) shares the administration, and in the case of Cordillera Azul the NGO Center of Investigation, Conservation, and management of protected areas (CIMA). The shared administration of the protected areas is established by contracts of 20 years. In this framework, a REDD+ project is considered part of a financing strategy. The funds that can be generated by the sale of carbon certificates are fully used in the implementation of the natural protected area master plan (Del Carpio, 2020).

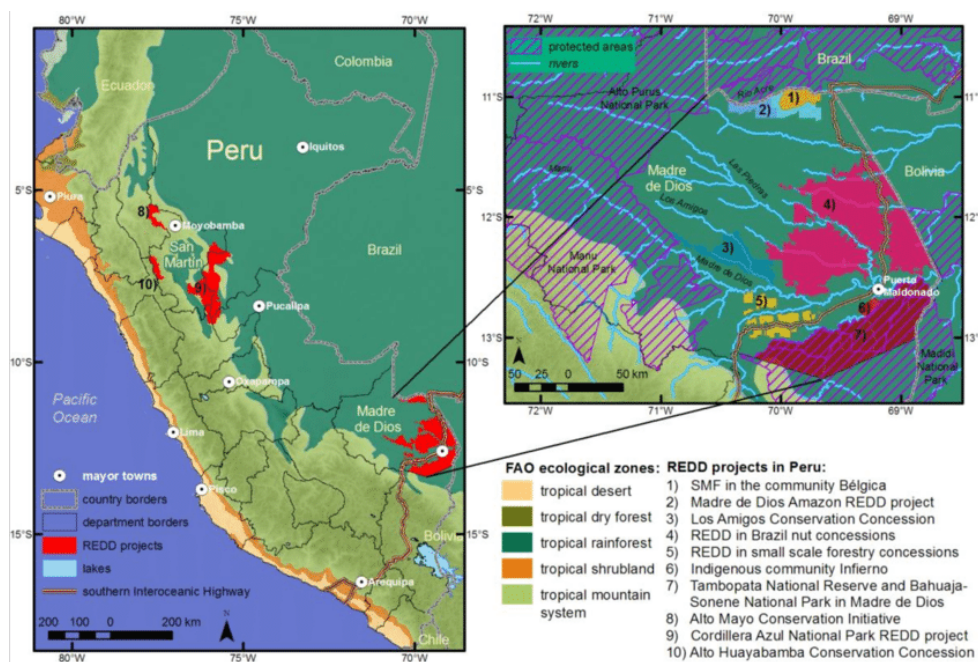


Figure 2. Location of REDD+ projects in Peru (Schmidt et al. 2013)

## **REDD+ projects Alto Mayo and Cordillera Azul**

The Alto Mayo protected natural area was created in 1987. It covers the territories of the provinces of Rioja and Moyobamba, in the department of San Martín, in the Northwest Peru. Its extension is 182,000 hectares. *“The objective of its creation is to protect hydrographic basins, forest vegetation, wildlife, and landscape values of the area to promote tourism, recreation, education, research, in order to generate benefits for local people”* (CI).

The REDD+ project in Alto Mayo started in the year 2008. Like many other projects, this has been certified by Verra company, which gives different certifications. The most know is the Verified Carbon Standard (VCS). In 2013, the entertainment company Disney bought 437,000 VCUs (Verified Carbon Units) issued by Alto Mayo (Verra, 2013). This was one of the first transactions on carbon credits done by a big company. Throughout 15 years, the Alto Mayo REDD+ project has sold a significant number of carbon units to several companies such as SC. Johnson, Toyota Motor, Microsoft, BHP mining group, and United Airlines (International Data Base on REDD+).

As well as the previous project, the Cordillera Azul National Park is a public-private partnership between CIMA and SERNANP. Located in San Martín, Loreto, Ucayali, and Huánuco, CIMA *“has designed an intervention model that incorporates the ecosystem or landscape approach, adaptive management and sustainable development, integrating the planning principles land use and stabilization of land use, strategic planning and coordination with value chain systems”* (CIMA). The REDD+ project started in 2006 and was certified by Terra Carbon and Verra. Cordillera Azul has sold carbon units to Delta Airlines and several Peruvian banks and insurance companies. However, the more delicate case is related to petroleum company Shell, as the company has included the Cordillera Azul project in its “carbon neutral” strategy: *by protecting and replanting forests and natural areas at risk, the natural process [of carbon sequestration] can be maintained and used to offset the carbon emissions from driving your car* (Shell).

Furthermore, Alto Mayo, and Cordillera Azul, among other Peruvian REDD+ projects have sold carbon units to compensate for the emissions of several events such as

UNFCCC COP20 held in Lima in 2014, the Dakar race in 2019, and the Panamerican Games held in Lima (CI, 2019).

After the brief description of both REDD+ projects, is it possible to compare this kind of projects with agriculture and mining extractivism? Do these projects contribute in the same way to the ecological debt?

First, the natural protected areas established by the State, Alto Mayo in 1987 and Cordillera Azul in 2001, generate the “enclave” dynamics, just as agribusiness and mining. The disarticulation of the territory at a local level, but the integration into the global level linked to other nodes of power, as international networks. Moreover, there is a transfer of control and management to private entities, which under the conservation logic, facilitates the capital accumulation of tourism companies and international conservation NGOs (Kroecker-Maus, 2014).

Secondly, as in the mining or oil exploitation, these protected areas and REDD+ projects are close to or overlap with indigenous people’s territories and farmers, leading to conflicts. The Ombudsman office in Peru has registered a conflict in the Alto Mayo project since 2011, between farmers and the administrators of the Alto Mayo protected area. The farmers demand that SERNANP and administrators recognize their economic activities in the protected area (Defensoria del Pueblo, 2022). In addition, local authorities pointed out that an area of Alto Mayo is being taken over by illegal loggers (El Comercio, 2017).

In the case of Cordillera Azul, an Indigenous Kichwa community started a legal procedure against SERNANP and CIMA for three causes: i) SERNANP has not carried out a Consultation process previous to the creation of the Cordillera Azul protected area; ii) since the Cordillera Azul area overlaps with Kichwa community, SERNANP and CIMA should include kichwa people in the activities and share the benefits; iii) park rangers should allow kichwa people to access the Cordillera Azul area, that way they can continue with their traditional subsistence activities; iv) SERNANP and CIMA should recognize indigenous kichwa community as an administrator of Cordillera Azul, as this protected area overlaps with their ancestral territory (IDL, 2021). This conflict has not been solved yet, however; dialogues have been held with all parties.

Afterwards, the participation of Alto Mayo and Cordillera Azul in the carbon markets is putting in evidence the green extractivism and supporting the green economy. Both projects have sold carbon units to several diverse companies and organizations. In the case of the aviation sector, as mentioned before, the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) established its target in 2017. Companies such as British Airlines, Delta, Easy Jet, and United Airlines, have been getting carbon units from these two projects, however, the logic behind offsetting aviation GHG emissions is distracting the important actions such as reducing the use of fossil fuels. For instance, these companies have settled their net-zero targets, relying mainly on carbon offsetting. Delta announced its intention to invest US\$1 billion over the next 10 years to help compensate for its emissions. EasyJet is opting to buy offsets to compensate for its emissions but at a lower price. Then, the United Airlines plan does not detail any specific action it will take to reduce its emissions time before 2030 (Bragg et al., 2021).

Lastly, Alto Mayo and Cordillera Azul publicise all the different programs and actions related to conservation with a social and economic approach, that way people engaged in the programs receive part of the benefits. As part of the strategy, they support agricultural projects to produce coffee and cocoa for exportation, along with labels and certifications accepted abroad. In addition, implement projects to support handicrafts made specially by indigenous women (CI, CIMA, 2022). The people participating in these projects are not necessarily aware of the perverse logic in carbon markets. The coffee and handicrafts produced by indigenous peoples are contributing to the goal of avoiding deforestation of the Amazon Forest, while at the same time sustaining a mechanism that allows companies to pollute and extract resources.

## **B) REDD+ projects in Brazil**

Brazil, which has a third of the world's rainforests, has received more REDD+ funding than any other nation. Brazil has received almost USD1,000 million of climate funds in the 2003-2020 period (Watson & Schalatek, 2021). These flows of funds have complimented the support to reinforce the capacity and GIS technology to monitor the Amazon Forest.



Since the creation of the National Institute of Spatial Research (INPE) in the mid-1970s, the federal government has invested in developing institutional capacity to monitor forests, especially in the Amazon region, based on remote sensing. The improvement accelerates the time for data analysis and several technical aspects that place Brazil in a different position to develop REDD+ projects (May et al., 2011) Due to national and international investments, Brazil is in a different situation from other Latin American countries in relation to monitoring technology and capacities. This is an additional element in the quantity of REDD+ carbon units sold in the markets.

Technology plays an important role in the extractivism process. Similarly, to mining and petroleum exploitation, technology is a key element to improve efficiency, which means extract the most resources as possible at a lower cost and maximizing profits. In relation to land and forests, digitalization is moving quickly to reach the international land restoration target (Urzedo et al., 2022).

In addition, the profound contradictions shown by companies in the cattle sector reinforce the logic of the green economy, at any cost. In the year 2021 in Glasgow, during the UNFCCC COP26, ten large agricultural commodities companies signed a corporate statement of purpose: *these global companies with a combined annual revenue of almost 500 billion USD and a major global market share in key commodities such as soy, palm oil, cocoa and cattle, have a shared commitment to halting forest loss associated with agricultural commodity production and trade* (UKCOP26, 2021). Furthermore, JBS, which committed to becoming Net Zero by 2040, already has zero tolerance for deforestation. The company's geospatial monitoring system uses satellite imagery to check farms against socioenvironmental criteria in every Brazilian biome where it operates. In order to guarantee this same control over the suppliers of its suppliers, JBS has set up its Transparent Livestock Farming Platform, which uses blockchain technology for security and confidentiality. By 2025, JBS won't buy from producers who are not part of this platform (UKCOP26, 2021).

Nevertheless, the cattle Brazilian company has been caught buying over one-third of its cattle from ranches responsible for illegal deforestation. Additional studies and reports also show how the beef companies are failing to stop buying cattle from ranchers that have been accused by Brazilian authorities of land-grabbing and human rights abuses



against indigenous peoples and land rights activists. Moreover, international financial institutions such as Deutsche Bank, BNP Paribas, ING, HSBC, the World Bank, and BlackRock continue supporting the cattle firms despite many warnings of their failures (Global Witness, 2020). These financial institutions are also known for disbursing great funds in climate change mitigation programs such as REDD+.

### **C) REDD+ projects in Costa Rica**

The case of Costa Rica is important to be considered because of its national PES program, which has allowed an easier transition to REDD+ projects. Costa Rica experienced high forest cover loss and one of the fastest deforestation rates in Latin America in the 1980s, however, today, almost half of the national territory is again covered with forest. In the mid-1990s, along with the Protected Area System (1950s), the PES Programme was introduced as a compensation measure for private forests, financed mostly through taxes on fossil fuels. PES program allowed forest owners to receive payments for protecting their forests, growing new forests, and managing standing forests for timber and non-timber products. To date, approximately 20 percent of Costa Rica's territory (one million hectares) has received funding through PES (Wallbott & Florian-Rivero, 2018).

Furthermore, Costa Rica considered REDD+ as the main financing option for the domestic PES programme. In 2013, Costa Rica and the World Bank through the Forest Carbon Partnership Facility (FCPF), signed an agreement to negotiate the purchase of carbon credits up to a value of US\$63 million. This agreement would also contribute to the national target of becoming carbon neutral by 2021. This year Costa Rica received the first of three payments for \$16.4 million for reducing 3.28 million tons of carbon emissions during 2018 and 2019. Costa Rica has become the first country in Latin America and the Caribbean to receive payments from the FCPF for REDD+ (World Bank, 2022).

The PES and REDD+ program in Costa Rica is an important example of how institutional support can make a difference in the “success” of these programs. Internationally, Costa Rica is well known for its constant economic growth along with a green image that relies on its ecotourism and conservation model. However, the Bribris, Terrabas, Ngobes, and Cabecares indigenous people call attention to structural problems of the elaboration and

implementation of national programs, which are embedded in colonial dynamics. This is not only a problem in Costa Rica, but it also replicates in every country, even so, it will be considered in this case's analysis.

In the year 2015, over 250 people from the 24 indigenous territories convened in the Costa Rican capital of San Jose, in order to express their opposition to REDD+ in their territories and all parts of the country. Since the REDD+ process started the different governments, with the support of the World Bank, have not considered indigenous people's rights such as consultation and to be well represented in dialogue and negotiation spaces (Porrás & Picado, 2016).

After the indigenous protests, in 2017 the government developed a consultation process about the National REDD+ strategy. Nevertheless, this consultation put in evidence the gaps between worldviews. For instance, for the Bribri and other indigenous cultures in the world, forests are of utmost importance; everything within them is considered sacred and therefore is respected and cared for. The Bribri people do not relate to the concept of the environment (Wallbott & Florian-Rivero, 2018).

Even though the consultation was made, it came after the PES and REDD+ projects were already implemented. This replicates the 500 years' story of domination, imposing governments and laws that have nothing to do with traditional leadership structures and forms of government. REDD+ is no different than any other tool of colonization, but simply a new twist on capitalism (Porrás & Picado, 2016).

## CHAPTER 5: CONCLUSIONS

The present research aimed to answer the following question: what is the role of payment for ecosystem services (PES) programs in Latin America, in the accumulation of Ecological debt of the Global North as a debtor?

Therefore, after a comparative analysis of carbon sequestration PES mechanisms, agribusiness, and mining, as forms of extractivism(s), the research concludes that carbon sequestration PES mechanisms in Latin America are contributing to the Ecological Debt. The reasons underlying this conclusion are explained below.

First, this is a description of the ecological debt over time to clarify basic ideas. The colonial history of exploitation of Latin America and its role in the formation of global capitalism is practical evidence of Ecological debt accumulation. Latin America or the “New World”, played a key role as a labour and nature provider to the Modern European project, and the subsequent Industrial Revolution.

Similarly, under international trade and global capitalism, the present ecologically unequal exchange replicates the provider role of Latin America. Due to the exports of agricultural goods, fossil fuels, and minerals, the region is a net exporter of land and raw materials (Rivera-Vasques et al., 2021). Hence, there is a growing accumulation of the ecological debt owed to this region and the Global South.

To some extent, due to the historical plundering and present ecologically unequal exchange, it is easier to understand the ecological debt in terms of material elements and tangible negative effects. However, in the present era of green economy and green extractivism, the commodification of intangible elements of nature or ecosystem services plays a role in the accumulation of ecological debt.

In the second place, the comparative analysis considered the patterns and elements identified in commodities frontiers, plantations, extractivism, and green extractivism processes. This analysis brought clear similarities and some differences between agribusiness, mining, and carbon sequestration PES mechanisms (or REDD+ projects).

The first element that results in a similar path for the three extractivism(s) is *the expansion of frontiers over new territories*. As mentioned before, agribusiness is anxious for concentrating and grabbing land to expand the cultivation of food crops and other commodities. This also reinforces the logic of a primary economy and a net exporter of land. Moreover, this expansion of agribusiness over new land and territories has also responded to speculative reasons since the financial crisis in 2008.

The PES are based in natural protected areas, which are also increasing in number and extension of controlled territories. The CBD established a clear target of 27 percent of planet territory conserved. By the year 2018, 238, 436 protected areas covered 46 million Km<sup>2</sup> (UNEP-WCMC, 2018).

An additional element for the expansion of extractivisms over land is the narrative of climate and environmental crisis. This is an urgent call to create more natural protected areas and PES. In the same way with mining and the demand for “green minerals” such as lithium and cobalt, are necessary for the energy transition from fossil fuels to renewable sources. The lithium triangle located in the territories of Chile, Bolivia, and Argentina is already the centre of attention for mining investments.

Furthermore, the enclave logic of expansion over territory is a common element among the three extractivism(s). These are economic activities focused on exports of resources and nature services, that do not necessarily participate in the local dynamics, but have a strong influence on national level policies, and have solid links with global networks.

The second element is the *expulsion of people from their land or territories*. As presented in chapter 4, the mining concessions in and natural protected areas in Peru overlap indigenous territories and land farmers. The legal procedures are constructed to support private investments, as they are the ones that contribute to economic growth and development. As a result, some of these overlapping cases will go through legal processes of negotiation and reallocation. However, in many other cases, indigenous people and farmers will be expelled from their lands or will have to coexist in continuous conflicts. In the case of mining and agribusiness, local people can be severely affected by contamination of water, soil, and air. In the case of PES projects, local people will lose access to resources for food and living. Unfortunately, this is not an exclusive reality of the Latin American region, this situation is repeated all over.

A third element analysed that goes through the three extractivism(s) is the *finance industry and the speculation business*. The dynamics in the financial industry are very complex and not necessarily straightforward. The neo-liberalization of the global economy brought other de-regulation for trade and financial flows. This has allowed the financial industry to move and accumulate with no limits (Sassen, 2014). Corporate sectors such as mining and agribusiness not only receive loans from investment banks, but also advice on how to find business partners in third countries, or how to export or import. Moreover, some corporations have even moved into providing their own financial and investment services. For example, Tesco and Carrefour offer various banking and insurance services, and commodity traders such as Cargill provide credit and derivatives services to farmers (Van Stichele, 2020).

In the case of carbon sequestration PES or REDD+ projects, carbon markets are a clear example of the financial industry “evolution”. In recent years, under the Green Economy narrative and climate crises, the corporate and finance sectors have become more transparent and aggressive. A recent case is the Glasgow Financial Alliance for Net Zero (GFANZ), an initiative of the global finance sector. Their main statement says “*every company, bank, insurer, and investor will need to adjust their business models, develop credible plans for the transition to a low-carbon, climate resilient future and then implement those plans. Private finance can help fund private sector initiatives and turn billions committed to climate investment through public channels into trillions of total climate investment*” (GFANZ).

In effect, the green economy is already functioning through green consumerism and calls for individual responsible behaviour. While the international and corporative apparatus are already reinforcing the extractivist logic through all sectors.

An additional element is the *women and nature’s exploitation*. Even though the analysis has not been done for the three extractivism(s), it is important to mention the relation between women’s exploitation through labour and nature’s exploitation. The circular relation between capitalism and patriarchy, reveals disadvantageous results for women. The role of women labour in the system has been identified as low-cost labour with the globalization of capitalization. Women's labour is considered a natural resource, freely

available like air and water (Mies, 1986). This last aspect of women's labour can also be differentiated into two, one waged labour and the other unpaid care work.

Further research is needed to explore the relation of PES projects as nature's care function commodification and women's care work.

Finally, in terms of ecological debt accumulation, the comparative analysis is showing how the three extractivism(s) are contributing to greater debt. The overuse of land and other nature resources and the continuous abuse of people respond to a colonial power structure that needs to be reviewed, unlearned, and forgotten. This is a basic first step to avoid repeating the historical cycle of exploitation, now the green economy cycle.

The next step is to move towards a reparation. There are different notions of reparation, even though its meaning is related to the *act of making amends, offering expiation, or giving satisfaction for a wrong or injury* (de Greiff, 2006). In addition, a reparation process because of "prejudice ecologique", refers to a restoration of Nature after humans have damaged it, however, it is unlikely to generate sufficient changes as the idea of a Nature that can be restored is retroactive and rests on a vision of pristine nature that developed through genocide and conquest. On the contrary, reparation ecology does not consider monetary compensation as the main issue, it is not a search for damages, the process of reparation involves active historical debate, recognition, redistribution, reimagination, and recreation (Patel & Moore, 2018).

As a policy recommendation for Global South actors from civil society and state, it would be important to include the notion of Global North dependency in debate of climate change. Northern economies depend on labour and resources provided by the South. The exports of resources from the South are contributing to reinforce economic growth and consumerism of the North, and as a result also contributes to climate change and nature depletion. Moreover, the natural functions such as carbon sequestration from the Southern forests, are contributing to the commodification of nature through market speculation. Even though the global narrative about power is established in favour to the Global North, it could be time to see the real dependency and power relations.

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