Natural Resources and Policy Choices in Latin America

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editors

KONRAD ADENAUER STIFTUNG

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Preface

GIOVANNA FRANÇA, DANILO FREIRE, UMBERTO MIGNOZZETTI

Natural Resources and Policy Choices in Latin America is the result of a renewed partnership between the editors and the Regional Programme Energy Security and Climate Change in Latin America (EKLA) from the Konrad Adenauer Foundation (KAS). We are glad to work together once again, after our first collaboration, titled *Geopolitics of Renewable Energies in Latin America: A Survey Report* (Mignozzetti, Freire; 2019). The idea for this collection of essays came from the desire to further contribute to the knowledge on environmental governance in Latin America and provide the general public with accessible, yet insightful material.

We were particularly intrigued by how complex climate governance is in a region that, while so rich in natural resources, is also under the rule of fragile institutions. While we are political scientists, we hoped to move beyond the analysis of decision-making processes and explore different perspectives on environmental policy. Not only did we seek to understand how environmental risks affects the region, but also how policy choices may impact climate change. It was also important to take a few steps back and weigh the costs and benefits of domestically implementing the global agenda towards a low-carbon economy. Where does Latin America stand in the international community as it holds the most valuable biodiversity in the world? How can the region play the pivotal role in renewable energy it aspires to?

We could not take upon this task alone, as we posed ourselves quite the ambitious set of questions. Besides, it was clear a multidisciplinary approach would be highly advantageous to tackle the issue at hand. This is why we carefully selected and invited specialists whose careers had been dedicated to these subjects. We also aimed for the book to reflect different perspectives on renewable energies in Latin America, hence the diverse origins of our author body. In this book, readers will find both the information and the analytical tools to better grasp the relationships and strategies of Latin American actors towards climate mitigation.

The most pressing challenge we faced while writing this book was to undertake it during the COVID-19 pandemic. When we began this project, in January 2020, no one could foresee the unfolding of events we witnessed. Such a delicate, unpredictable situation made planning for the future nearly impossible. Unfortunately, our expectations to promote an in-person event, gathering all of the authors for a book launch, were frustrated. Yet, by acknowledging the hardship and coordinating our efforts towards a greater good, we take pride in saying, only one year later, that the final outcome is a success.

This publication could not have been complete without the help of some key collaborators. First, Anuska Soares, from the Konrad Adenauer Stiftung, had an essential role in guiding us through the process of editing the book, and in efficiently handling the administrative duties. Second, Gustavo Marchetti, from Bloco Gráfico, is responsible for the beautiful artwork and design you see in this book. Third, Jesue Pires, from Ipsis, was a fundamental advisor for printing this piece. Finally, our research assistants, Iago Rondello, Catarina Roman, and Heitor Borges offered immense support in tying the book together throughout the entire process. We would also like to thank the bright ideas of our former research assistants Letícia Santana and Larissa Santos, who participated in the conception of this project early on.

We sincerely hope you enjoy reading this rich collection of essays written by some of the highest academic authorities on renewable energies, climate mitigation, and environmental policy in Latin America. We divided the book into three parts. We start with a discussion on Latin America's commitment to international climate agreements and local governance. We then move to critical assessments of the region's energy matrix and the implementation of renewables, and finish the volume with some comments on the adverse social consequences these projects entail. We hope this collective contribution serves as an incentive for readers to more seriously consider the regional implications of this global crisis, and to incorporate climate mitigation into their political agendas.

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GIOVANNA FRANÇA is an international relations analyst with focus on political science. She holds a BA in International Relations from the University of São Paulo. She has studied at the *Institut d'Études Politiques de Lyon* (Sciences Po Lyon) and at the école of the *Institut de Relations Internationales et Strategiques* (IRIS Sup'). Giovanna França is a Research Assistant at the Getulio Vargas Foundation and a fellow at the Brazilian Centre of Analysis and Planning (CEBRAP). She also has working experience on democratic crises in Latin America, migration issues, and geopolitics. Her research interests include sustainable development, foreign policy, international political economy, and political behaviour.

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Introduction

GIOVANNA FRANÇA, DANILO FREIRE, UMBERTO MIGNOZZETTI

In the early 2000s, the discovery of offshore oil reserves in Brazil, shale gas in Argentina, and crude oil in Colombia led policy-makers to believe that Latin America could be the world's next energy frontier (O'Neil 2012). Governments embarked in large infrastructure projects to expand resource extraction capacities, increasing the role of state companies while courting foreign firms such as the China National Petroleum Corporation (Tissot 2012). The massive inflow of energy and commodity revenues opened fiscal space for progressive governments to implement new social protection programmes, which contributed to a significant reduction in poverty levels across the region (Gaylord 2020). Fast economic growth also boosted the optimism of local and international elites, who believed Latin America was about to enter a cycle of sustained social development and political stability (The Economist 2009; Casas-Zamora 2010).

These hopes did not materialise. The two global financial crises and state mismanagement of energy resources brought the ambitious infrastructure plans to a halt (Mazzuca 2013; Pappas 2019; Schamis 2006). At the same time, political tensions in Venezuela severely impacted its oil production and caused an unprecedented refugee crisis in South America (Page et al. 2019; Viscidi 2016). Moreover, governments faced a backlash as activists strongly opposed the move towards increasing reliance on fossil fuels. Non-governmental organisations stressed that investing in non-renewable energy sources was not only damaging to regional ecosystems, but also at odds with climate change agreements Latin American countries had already agreed to participate in (Hogenboom 2012; Vásquez 2011).

The failed attempt to boost economic development with fossil fuel revenues has exposed deeper problems in Latin American's management of natural resources. Although the literature points to several impediments to the implementation of sustainable energy policies in Latin America, three of them are particularly salient: inadequate environmental compliance, economic challenges in the transition to renewable sources, and the neglectful treatment of indigenous rights. While these issues are neither new nor unique to Latin America, they have become more acute in the past decades.

It is unclear how Latin American governments will resolve these questions. Regarding environmental compliance, countries are yet to present clear plans about how they are going to preserve their biodiversity in the face of rising energy consumption demands. The Inter-American Development Bank (IADB) estimates that by 2040 the primary energy demand in Latin America will be 80% higher than in 2016, while electricity requirements are expected to rise by 91% (Balza, Espinasa, and Serebrisky 2016). Meeting this demand would require an increase in supply equivalent to building 18 hydropower dams the size of Itaipu, the second largest power plant in the world (Balza, Espinasa, and Serebrisky 2016, 5). However, energy plants often bring considerable environmental degradation, and governments are under pressure from international organisations and the civil society to reduce the impact of massive infrastructure works. The construction of the Belo Monte dam in Northern Brazil exemplifies the challenges that lie ahead with regards to expanding Latin America's energy production without causing environmental harm. The project took eight years to complete after long judicial disputes, and it raised significant controversy due to its disregard for the preservation of local biodiversity and the emission of greenhouse gases (Fainguelernt 2016; Santos et al. 2012).

Latin America's troubled relationship with oil will also be under closer scrutiny in the next years. Despite the fact that Latin American countries are rich in renewable energy sources, the oil sector provides an important share of government revenues in Ecuador, Mexico, and Venezuela, so politicians have an incentive to invest in fossil fuels to balance public budgets or to distribute oil rents as patronage to allies (Monaldi 2020; Papyrakis and Pellegrini 2019). This stands in contrast with recent advances in renewable energy generation and storage technologies, which have decreased substantially in price over the last years (Griffith-Jones et al. 2017). Additionally, the sharp drop in oil prices from 2014 onwards indicates that renewables can be more cost-effective than they had been (Khan et al. 2017). In this respect, Latin America oil reserves are at risk of becoming stranded assets with little to no commercial value (Ansari and Holz 2020; Khan et al. 2017). As a result, disputes between groups who want a faster transition to renewable energy and those who argue for further investment in fossil fuels will continue to mark the near future of Latin America.

The third issue we believe will continue to impact the environmental debates in Latin America is that of social tensions surrounding extraction and construction projects. Land disputes have been remarkably violent in Latin America, and clashes between mining companies and indigenous communities have intensified in Argentina, Brazil, and the Andean countries (Haslam and Tanimoune 2016; Riofrancos 2017; Svampa 2015). Big miners often fail to comply with social and environmental standards, and local populations complain they have not received a fair compensation for the damages caused by extraction projects (The Economist 2016). These conflicts arise at a time when the covid-19 pandemic has badly hit poor communities in Latin America and the economic downturn has forced companies to temporarily shut down mining operations (Alexia Ash 2020; Attwood, Davalos, and Millard 2020).

This book provides an in-depth discussion of the challenges of natural resource management in Latin America. The contributors to this volume take a multidisciplinary perspective to the questions of resource governance, conservation, energy transition, and environmental conflict we have outlined above. Taken together, the chapters make a compelling case for scholars and policy-makers to put environmental problems at the top of their political agendas. While the authors do not claim to provide definitive answers to these complex issues, they do provide a useful guide for practitioners and newcomers to think rigorously about them.

The ten chapters included here are divided into three parts: (i) Governance and Compliance; (ii) Implementation: A Look into Renewable Energy Experiences; and (iii) Conflict and Social Tensions. In chapter 1, João Paulo Cândia Veiga and Miriam Lia Garcia analyse how Latin American countries comply with climate change mitigation agreements. On the verge of the United Nations Framework Convention on Climate Change Conference of the Parties 21 (COP21), they evaluate the progress of Argentine, Brazilian, and Chilean Nationally Determined Contributions (NDCs). The authors also describe the institutional

framework these countries designed to implement and review their NDCs, and discuss three challenges for NDC preparation process, namely agenda-setting, policy coordination, and knowledge and capacity.

In chapter 2, Benedicte Bull provides a theory to understand the behaviour of Latin American decision-makers with regards to resource exploitation. She proposes a typology of elite types based on how these groups interact with states and institutions, distinguishing between particularistic elites, national elites and institutional elites. Bull notes that Latin American elites have been notably pragmatic in regards to their relationship with China, who has played a major role in the current global order, and that the impact of Chinese investment in the region varies substantially. The author argues the elite type is a strong indicator of whether Latin American actors will try to balance the relationship with the emerging Asian superpower, but she highlights that elites seem not to be motivated by environmental concerns in the region.

Elites may also chance their behaviour given their incentives to invest in renewable energy and to enhance environmental compliance. In most Latin American countries, environmental legislation imposes rules for the conservation of natural ecosystems in agricultural areas, a stronghold of traditional elites in the region. In chapter 3, Rafaela da Silva, Gabriela Duarte, Julia Assis, and Fábio Barros study the strategies the Brazilian state has pursued to protect natural vegetation in private agricultural land. Since landowners often disrespect the legal limits to deforestation, the Brazilian state has developed alternative mechanisms other than command and control to enforce compliance. Authorities have tested, among other approaches, the creation of natural heritage private reserves, and the compensation of conservation efforts and of ecosystem services programs. The authors argue that the choice between these lines of action should take into consideration the size of the property in question, as well as the social and economic situation of each landowner.

Since agricultural activity is the basis for many Latin American economies, the sustainable use of land is an important concern. In chapter 4, Katerina Elias-Trostmann affirms that unhindered resource exploitation has led to the accelerated destruction of the Amazon rainforest in 2019. While the global community has pressured the Executive branch for immediate action against deforestation in the Amazon, the local private sector has enhanced their own capabilities to monitor supply chains and reduce environmental damage. The financial sector has also mobilised new funding streams to safeguard the Amazon, such as philanthropic foundations, government donations, and the creation of equity funds committed to forest restoration and protection. The author then assesses how public and private investors can do more to reduce deforestation. Lastly, she proposes several pathways to improve coordination across the financial landscape, drive long-term change, and mobilise large investments.

In the second part of the book, *Implementation: A Look into Renewable Energy Experiences*, the authors tackle issues related to the execution of climate mitigation measures. In chapter 5, Tatiana Bruce da Silva discusses the costs and benefits of transitioning to green economies. On the one hand, greener options may enable local producers to be more self-sufficient and decrease their dependency on oil as a primary source of energy. On the other hand, Latin America still lacks the technology to produce cost-effective renewable energies, such as solar battery panels and wind turbines. Other obstacles include the intermittent pattern of these energy sources, difficult storage, and only modest market interest due to the low profitability of the sector. The author also sheds light onto the Brazilian case, weighing the opportunities and limitations of adopting renewable energies.

In chapter 6, Luis Paulo Batista da Silva and Larry A. Swatuk further discuss how Brazilian policy-makers are treating renewable sources. Brazil benefits from an important degree of energy autonomy due to its hydropower plants and the country's pioneer development of sugarcane ethanol. Despite its energetic and climate security advantages, the expansion of sugarcane production raises several issues that are often masked behind a "greening" sustainability discourse. Thus, governments unintentionally harm local communities by promoting environmental policy. The authors' concept of "biofuel boomerang effect" describes such dynamics. This is more easily identifiable in projects with direct social impact,

such as displacing communities to build dams. Yet, these externalities may be left unadressed and grow in scale in the case of biofuel production, which has a history of tense dialogue and internal negotiation, but whose social impacts are less evident.

Despite its flaws, green strategies are still deemed the preferable alternative against fossil fuels. In chapter 7, Fernanda Delgado argues that after a long period in which oil, as any other commodity, was subject to the market forces of supply and demand, the current scenario suggests that geopolitical constraints have increasing power over oil prices. The author summarises the consequences of new renewable energy portfolios and shifts in oil price dynamics for the main global oil producers. She finds that modest prices favour countries with more than 50 years of production ahead, as they create incentives for alternatives to crude oil. For countries with smaller reserves and fewer future production years, the best strategy may be to accelerate oil production to advance the influx of financial resources.

In the third part of the book, titled Conflicts and Social Tensions, we dive deeper into the negative consequences renewable energies might entail. In chapter 8, Eduardo Viola and Matias Franchini explore the relationship between climate change and violence in Latin America under the novel perspective of the effect of crime on greenhouse gas emissions. They review different illegal activities, such as land grabbing, illegal logging and mining, arms and drug trafficking, and wildlife trade, suggesting they hinder the government's ability to monopolise the use of violence. This conflict dynamics is a major driver of emissions in the region. The authors also propose that climate vulnerability in the region will most likely worsen internal public security, but will probably not increase interstate or civil conflicts. A notable exception is Brazil, whose armed forces worry about threats to Brazil's territorial sovereignty over the Amazon, particularly from the North Atlantic states and China.

Resource extraction projects, especially mineral mining, are another important source of local-level conflict. In Chapter 9, Richard Snyder and Lucas I. Gonzalez discuss the problems with lithium extraction in Argentina. The authors outline the main stakeholders involved in the local lithium mining sector — extraction companies, the state, and local communities — and propose a typology to assess different modes of extraction, considering the interests and incentives of multinational companies and civil society. State behaviour receives special attention, both as a mediator between corporations and indigenous communities, and as an alleged perpetrator of attacks against minorities. After a comparative assessment of three mining projects, the authors present policy insights taking local and institutional factors into account.

In chapter 10, Roberto Llamas and Saleem Ali investigate the tensions created by hydropower superprojects. They compare two socio-environmental conflicts, one from Mexico and one from Colombia, analysing their negotiation and resolution strategies. Although hydropower projects foster economic development, they also reduce food supply and dislodge adjacent communities. Moreover, to fund these projects, governments usually incur substantial debt from international institutions such as the World Bank, the International Monetary Fund, and the Inter-American Development Bank. The authors argue that authorities often face shortcomings with regards to project implementation, and should thus use past success cases of conflict resolution as role models for problems they face today. Drawing from the conclusion of Mexican La Parota hydropower plant, the authors make recommendations as to how Colombia's Hidroituango project may improve its current coordination efforts.

Taken together, the chapters in this book offer a comprehensive view of the potential for renewable sources in Latin America as well as the considerable challenges associated with the transition to greener economies in the region. Two key themes that run throughout the book are the major role Latin American elites play in the successful implementation of renewable energy systems, and the need for governments to better protect local communities from the externalities generated by mining and infrastructure projects. In this respect, we hope this book serves as a call for readers to be more aware of these issues and engage actively into the discussions on renewables. They will shape Latin America's future in the years to come.

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Part I

Governance and Compliance

Latin America Climate Policy: an Analysis of the Nationally Determined Contributions (NDCs) from Argentina, Brazil, and Chile

JOÃO PAULO VEIGA, MIRIAM GARCIA

'We made sure that countries were not looking only at the global need but rather at their national interest and national development plan. And that is why the INDCs, the Intended Nationally Determined Contributions, are a very important part of the Paris Agreement, because they represent how each country will contribute to the global needs but from the national perspective'[1]

CHRISTIANA FIGUERES, former UNFCCC Executive Secretary

1. Introduction

Over the past 30 years, the multilateral decision-making process around the United Nations Framework Convention on Climate Change (UNFCCC) has defined unclear objectives, with low incentives for compliance by states and a high uncertainty about top implementation mechanisms and the targets to comply with. The intergovernmental political bargaining dynamic did not reverse the rise of greenhouse gas emissions which continue to accelerate global warming (Höhne et al., 2020; Wapner 2020). Finally, the intergovernmental multilateral system for the reduction of CO_2 emissions has aged, brought little effectiveness, and has not engaged non-state actors within the proposals of the UNFCCC Secretariat, the body with the greatest capacity for agenda setting in climate change negotiations.

1 Available on https://thepolitic.org/an-interview-with-christiana-figueres-the-uns-negotiator-on-the-paris-agreement/, accessed on 10, August 2020.

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MIRIAM GARCIA is a researcher at the Centre for the Study of International Negotiations (CAENI-USP). She is a PhD candidate in international relations at the University of São Paulo (IRI-USP), with partial completion of the programme at the German Development Institute. Ms. Garcia holds a Master's degree in international relations, focused on sustainable development and the environment, from the *Institut d'Études Politiques de Paris* (Sciences Po Paris). Her research focuses on global environmental governance, climate change, and non-state actors.

Actually, the Paris Agreement (2015) puts the intergovernmental, multilateral decision-making system 'upside down' with the most innovative and ambitious measures since the environmental agenda began to be discussed within the United Nations since the Stockholm Conference (1972). There are three kinds of innovations. Firstly, Nationally Determined Contributions (NDCs) bring the climate change agenda back into national public policies, making states the brokers of a public-private dynamic, allowing 'parties' to be closer to their constituencies and committing themselves to improve the effectiveness of the commitments made. In other words, climate change assumes, with more evidence, the role of a domestic public policy. Secondly, non-state and subnational actors formally became 'non-party stakeholders', recognised by sovereign states, and directly involved in emissions' reduction commitments as co-participants in programmes, actions and policies. Thirdly, the Paris Agreement introduces new tools in global climate governance, such as monitoring, as an 'enhanced transparency framework' to assess parties' implementation (Article 13), a non-sanction implementation and compliance mechanism (Article 15) and a 'global stocktake', starting in 2023 for assessing collective progress (Article 14) (SEI, 2016).

On this account, NDCs constitute a major innovation in international climate policy since the signature of the UNFCCC and Kyoto Protocol (1997) (Röser, 2019). Both were instruments of the multilateral and intergovernmental arenas. The NDCs are instruments of discipline where all parties were invited to submit the first round NDCs with targets for limiting global warming. The NDCs must be submitted in five-year cycles. The NDC preparatory and implementation process is expected to gradually raise the ambition levels of countries and thus lies at the heart of reaching the Paris Agreement's goals of 'holding the increase in the global average temperature to well below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels' (Röser, 2019).

In 2015, the Paris Agreement launched a new epoch for global climate governance, and, most importantly, a new approach for the design of governments' climate pledges. We argue that NDCs play the role of a transmission belt between the domestic and international levels. The domestic 'win-set' of constituencies and interest

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groups are key to understanding each of the party's climate pledges (Putnam 1988, 1993). The NDCs consolidate each country's commitments on climate actions embedded in an international architecture provided by the Paris Agreement and the UNFCCC. The drivers are no longer the UNFCCC Secretariat or a climate global leader or a coalition of countries. The NDCs mean the domestic 'win-set' of constituencies committed to emissions reduction are the pushers of the climate change agenda.

In this view, there is a critical need for a research agenda focusing not only on the pledges advanced in the NDCs, but also on how these commitments are elaborated in the national sphere. Based on an innovative framework proposed by Röser et al. (2019), we conduct an analysis to assess both the implementation and review process of the NDCs from Argentina, Brazil, and Chile against three criteria: agenda-setting, policy coordination, knowledge and capacity. The chapter is structured as follows. Section 2 provides brief literature about global environmental governance, focusing on climate change and the Paris Agreement including an overview of the path to the adoption of the voluntary pledge system. Based on the Röser et al. (2019) framework, Section 3 presents an analysis of the institutional framework in Argentina, Brazil, and Chile for the implementation and review of their NDCs, and Section 4 concludes.

2. Global Climate Governance in the Paris Agreement Era: Linking National and International Politics

In the scholarship on global climate governance, the Paris Agreement has been defined as 'the most important international treaty' (Held & Roger, 2018), 'the representation of a historic achievement in multilateral diplomacy' (Rajamani, 2016), 'a turning point for the climate regime' (Hale, 2016), and 'new ground in international climate policy' (Falkner, 2016). Also, several strands of the literature recognise that the Paris Agreement 'formalizes an institutional architecture based on national pledges' (Hsu et al., 2019) as the NDCs 'represent the principal instrument of the Agreement and form the ground for international efforts to limit global mean warming well below 2°C' (Bäckstrand & Kuyper, 2017). Keohane and Oppenheimer (2016) go even further by arguing that post-Paris climate politics is a 'two-level game', 'involving a combination of international strategic interaction and domestic politics'. Drawing on these authors, we will analyse in this section the development of global climate governance since the creation of the UNFCCC. Also, we will provide an overview of the governance mode under the Paris Agreement framework.

2.1. From Kyoto Protocol to Paris Agreement: States' Commitments and Pledges

Held and Roger (2018) provide a comprehensive analysis of the Paris Agreement within the climate regime. In order to achieve this, the authors propose a historical approach by outlining what they call three distinct models of global climate governance. The authors recall that the negotiations for a multilateral agreement aim to reduce emissions already stated in the first Conference of the Parties (COP) held in Berlin in 1995. Their models are built on governance mechanisms adopted by states under the auspices of the UNFCCC: the Kyoto Protocol (1997), the Copenhagen Accord (2009), and the Paris Agreement (2015).

The Kyoto Protocol, adopted in 1997, can be categorised as a multilateral treaty legally binding for the states in 'Annex I', or developed countries, which had individual reduction targets. In opposition, developing and least developed countries, non-Annex I states, did not have any emission reduction targets based on the UNFCCC's principle of 'Common but Differentiated Responsibilities and Respective Capabilities'. A new negotiation track for the period post-Kyoto Protocol started to be negotiated in 2007, and it was expected to be adopted at COP15 held in Copenhagen in 2009. However, COP15 'collapsed in acrimony' (Falkner, 2016) as states were not able to reach a consensus for the adoption of a new treaty. Despite some shared sense of failure, states adopted the Copenhagen Accord which sets the scene for national climate action pledges. In contrast to a top-down approach advanced by the Kyoto Protocol, and after 2009, global climate policy dialogue 'focused on improving the approach at the heart of the Copenhagen Accord' (Held & Roger, 2018), or in other words, based on a system of voluntary pledges. Table 1 presents a summary of the commitments or pledges states have been making in the three global climate governance models.

In the run-up to COP-21 in Paris, states agreed to present in advance their 'intended nationally-determined contributions' (INDCs) that become 'nationally determined contributions' once the Paris Agreement is individually ratified. Each party voluntarily pledged, registered and communicated into their NDCs, aims to contribute to the common goal of 'holding the increase in the global average temperature to well below 2°C and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels', (Article 2). According to Pauw and Klein (2020), NDCs are 'near-universal, medium-term, country-driven climate action plans under the Paris Agreement, formulated within the context of bounded self-differentiation'.

To offer a narrative of the history of NDCs in global climate governance, Pauw and Klein (2020) explain that the dichotomy between Annex I and non-Annex I countries embedded in the UNFCCC principle of differentiation of responsibilities regarding climate change, and later reaffirmed in the Kyoto Protocol, was a source of complication. This is because states' pathways, including the contribution to global emission, became more diverse. However, the COP 17 in Durban in 2011 was a turning point in the negotiations, with the agreement that the successor of the Kyoto Protocol would

be applicable to all. Then, the authors recall that the Warsaw COP in 2013 can be categorised as the beginning of this new voluntary system as all parties were invited to prepare their INDCs, but they did not receive limitations from the UNFCCC on how to conduct the elaboration process. The result is well documented in the literature emphasising the diversity and the enormous task of comparing NDCs (Hsu et al., 2019; Weikmans et al., 2019; Pauw et al., 2019).

Table 1
Comparison of the three global climate governance models
Source: (Held & Rogers, 2008)

Dates	Governance Mechanisms	Legal status	Commitments/targets and pledges
1997: adoption	Kyoto Protocol	Legally binding	Annex I parties — developed countries had individual reduction targets with no particular domestic approach prescribed
2008—2012: first commitment period			
2013-2020: second commitment period			
2009: adoption	Copenhagen Accord	Non-binding	States pledge their climate actions. Annex I states were expected to pledge quantitative Kyoto-style targets. Non-Annex I states were expected to pledge 'nationally appropriate mitigation actions (NAMAs)'.
2015: adoption	Paris Agreement	Hybrid	All states pledge their climate actions in advance of 2015 (COP-21/Paris) by presenting 'intended nationally-determined contributions' (INDCs). Each party shall submit NDCs every five years (legally binding), but states are not obliged to meet their pledges nor are they sanctioned in case they do not meet their NDCs (non-binding).
2016: entry into force			

2.2. NDCs: Understanding the Pledge and Review Approach

Keohane and Oppenheimer (2016) define the Paris Agreement as a 'two-level game' logic to global climate governance. On this account, they argue that states elaborate their pledges answering to the interests and views of domestic actors; and, at the same time, states are involved in international negotiations and interaction within the Paris Agreement framework. Moreover, Keohane and Oppenheimer (2016) defend that two features attracted states to commit to climate action in a 'pledge and review' process: discretion and vagueness. As for the discretion, they argue that the lack of requirements or speciation about the content or format of the INDCs, agreed on COP19 in 2013, led to 'a variety of levels of ambition and types of action'. In a similar vein, Falkner (2016) advances that each state's pledges refer to 'how much they wish to contribute to the collective mitigation effort'; Keohane and Oppenheimer characterise vagueness as the will on the lack of a binding obligation for the implementation of the NDCs. They conclude that domestic politics is an important variable for the outcome of the climate change policy building on the pledge and review system as states need to regularly update their NDCs.

In fact, the Paris Agreement, Article 4 states that 'each Party shall prepare, communicate and maintain successive nationally determined contributions that it intends to achieve' (Article 4.1). Moreover, 'each party shall communicate a nationally determined contribution every five years' (Article 4.9) which will be 'recorded in a public registry maintained by the secretariat' (Article 4.12). An enhanced transparency framework was agreed to provide an understanding of climate change action, clarity and tracking of progress towards achieving parties' NDCs, among others (Article 13.5). Finally, a periodic stocktake of the implementation of the Paris Agreement to assess the collective progress towards achieving the agreement goal, also known as the global stocktake, should take place every five years starting in 2023 (Article 14.2).

More clarity on NDCs and other mechanisms from the Paris Agreement was expected to be negotiated in a framework commonly called the 'Paris Agreement's rulebook' that was adopted in COP-24 as the Katowice Climate Package. By applying a vocabulary that rec-

ognises the different emission pathways and contributions to face climate change, 'in light of the national circumstances', countries now have a framework for guidance on NDC formulation to facilitate clarity, transparency, and understanding (Pauw & Klein, 2020). Finally, the authors claim that NDC was not officially on the COP-25 Agenda in Madrid 2019 but led by the Chilean presidency; the conference was 'an opportunity to encourage countries to update and strengthen their NDCs in 2020'.

Also, Falkner (2016) defends the role of domestic politics within the Paris Agreement model. In other words, the author describes the bottom-up logic of each country's pledges that are directly connected to the Paris Agreement model of transparency and review, or 'ratchet', of climate action commitments based on the premise of progression of ambition. Falkner emphasises the growth of transnational initiatives, such as the engagement of companies and investors. According to him, these initiatives fostered the domestic agenda for climate change with a number of climate policies increasing worldwide such as climate change laws. Noting this tendency, Bäckstrand et al. (2017) suggest that the Paris Agreement cements a hybrid architecture in which NDCs are the states' 'backbone of mitigation, adaptation, and, finance' and are combined with the acknowledgment of non-state actors' role as 'pursuits as governors, implementers, experts, and watchdogs'.

Figure 1
The Paris Agreement Pledge and Review Model Timeline

2015	2016	2018	2020	2023
INDC Submission	Paris Agreement Entry into Force	Facilitative Dialogue	NDCs review	Global Stocktake

3. An Overview of Argentina, Brazil, and Chile NDCs and their Progress So Far

Röser and colleagues (2019) argue that the investigation of the political process for both developing and implementing NDCs can be supportive to explain the level of ambition of a state climate commitment, and it can also reveal some institutional challenges that can affect the implementation process. Even if it is not the case for the three countries analysed in this chapter, it is critical to acknowledge Röser and colleagues' mention of potential issues of financial, human, and technical resources that some developing countries might face when developing their NDCs, or even other communications to the UNFCCC. In order to answer the question under what conditions countries develop ambitious pledges aiming at the achievement of the Paris Agreement goals, the authors advance an analytical framework drawing upon three challenges for the NDC preparation process derived from the political science and policy analysis: agenda setting, policy coordination, knowledge, and capacity building. The authors argue that agenda-setting demonstrates how climate change is perceived in a country that can affect the preparation process especially to gain 'sufficient buy-in from the public and private stakeholders'. As climate policy is multi-faceted and requires the engagement of various sectors such as fiscal, energy, agriculture, among others, policy coordination is required in a country to achieve its NDC. And, designing climate policies demands the analysis of a great amount of data in addition to financial and human resources to assess policy options; thus, an analysis of a country's knowledge and capacity can provide evidence for more ambitious NDCs.

Röser et al. (2019) have conducted four surveys with representations varying from fifty-two to seventy-two countries before and after the adoption of the Paris Agreement, and aggregated results are presented as lessons from the first cycle of NDCs (2015-2020). These indicate that climate change is high on the political agenda, and policy coordination across line ministries seems to have been at a good level, but that knowledge and capacity on the technical aspects of preparing and implementing NDCs could be improved, including access to and quality of the data. In summary, the authors (2019) conclude that the 'cyclical nature of the ratchet mechanism in the Paris Agreement provides an opportunity to further institutionalize climate policy planning processes'.

Having said this, it is fundamental to highlight that parties are engaged to submit their reviewed NDCs by the end of 2020. Here, it is important to stress that the ambiguous language on the COP-21 decision about the five-year cycle and the rapid ratification of the

Paris Agreement creates confusion about the date for submission of reviewed NDCs (Pauw & Klein, 2020). However, and as recalled by the authors, the majority of parties are requested to submit their NDCs by 2020. Another interesting aspect to be pointed out is that due to the COVID-19 pandemic, 2020 will be the first year, since 1995, without a UNFCCC COP. COP-26, is under the United Kingdom presidency, and the UNFCCC Secretariat announced that the conference would be postponed until 2021. However, and regardless of the COP postponement, the UNFCCC Secretariat recalls to all parties that 2020 is still the deadline for the submission of the new NDC round.

Finally, Table 2 shows the key questions we have retained from each of the three components identified and the criteria by Röser et al. (2019), and to assess the NDC implementation and review process for the three countries.

Table 2
Adapted analytical framework for assessing the elaboration of NDCs
Source:
(Röser et al., 2019)

Analytical component	Question	Criteria
Agenda-setting	How do you describe the political support to review the NDC?	High-level political support of mandate for the preparation and implementation of the NDC
		Climate change mitigation and adaption has high priority on the political agenda
Policy Coordination	How would you describe the institutional process to review the NDC?	Climate change mainstreamed in plans and sectors
	Do you plan to involve the private sector and civil society stakeholders in the review process?	Involvement of non-governmental stakeholders
Knowledge and capacity	How the review process can enhance the capacity and knowledge — such as technical options, financial needs, and economic impacts — to identify and design climate policies?	Technical or financial resources are available and adequate

3.1. Institutional Framework for NDC Implementation and Review Process

This section aims at providing an analytical description of the institutional and legal framework in which the three countries are both implementing and reviewing their NDCs. Even if the domestic architecture is not sufficient to ensure that countries will deliver their pledges or enhance their climate ambition, it does unveil features that could support or hinder the possibilities of countries' contributions to the Paris Agreement goals. Firstly, Argentina is an interesting case study due to the fact that the country was the first one to submit a revised NDC in 2016. Secondly, Brazil is a major player in global environmental governance and, due to its continental size and mega biodiversity, it attracts research attention. Thirdly, Chile held the presidency of COP-25, and it has led the establishment of the climate ambition coalition throughout 2019. Even if the COP was not held in Chile due to social protests the country faced throughout the month of October 2019, the country kept its presidency role in a COP held in Madrid. At the time of the book publication, Brazil has not yet submitted its new NDC, therefore this chapter does not provide a fully comparable assessment of the three countries' review processes. But, it does assess the Brazilian case against the three criteria advanced by Röser et al. (2019). Based on the Climate Action Tracker (CAT)[2], Table 3 illustrates the main points for NDC revisions for Argentina and Chile. Also, CAT rates government NDCs against their fair share contribution towards reducing emissions from fossil fuel combustion, industry, agriculture, and waste sources in accordance with the Paris Agreement goals of holding warming to below 2°C.

2 The Climate Action Tracker (CAT) is a collaboration of the Climate Analytics and New Climate Institute to provide an independent science-based analysis 'that tracks government climate action and measures it against the globally agreed Paris Agreement'. The tool was designed to quantify and evaluate government commitments related to climate change mitigation, and assess whether countries are on-track to meet their voluntary commitments. The tool also provides an aggregated analysis to assess the total global efforts of NDS, pledges, and current policies on warming consequences, emission gaps, comparisons of NDC and current policies for emission reduction potentials and to national and sectoral decarbonisation. https://climateactiontracker.org/, accessed on 10 August 2020

Country	First NDC revision	Main points of the revision
Argentina	Yes, submitted in November 2016	The revised NDC is more ambitious compared to Argentina's first NDC partly due to the updated methodologies for GHG inventory that results in a lower level of emission in 2030. Also, the new NDC has a section on adaptation. CAT rating: thanks to the enhanced NDC, Chile had an upgrade of its current rating, from 'highly insufficient' to 'Insufficient' but it is still considered not enough to be considered compatible with efforts to limit global warming to either 2°C or 1.5° C.
Brazil	Not yet.	Not applicable *CAT rating from Brazilian first NDC: Insufficient
Chile	Yes, submitted in April 2020	The revised NDC is more ambitious compared to Chile's first NDC as it includes new conditional target and links the 2030 targets to the 2050 carbon neutrality goal. CAT rating: critically insufficient

Table 3
Revised NDCs
Source: (Climate Action Tracker, 2020; Climate Watch Database, 2020)

In summary, our analysis for the three countries draws on academic publications, official documents from both the countries and international organisations, reports from civil society organisations, and platforms designed to track the implementation of NDCs such as the CAT Climate Watch Database[3].

3.1.1. Agenda-setting

In the scope of this article, we have selected two criteria from Röser et al. to assess the agenda-setting component. Firstly, we will investigate the high-level political support of the mandate for the preparation and implementation of the NDC based on a survey experiment conducted with Latin American elites (Freire et al., 2020) and data available on the Climate Action Tracker and Climate Watch Data platforms. Secondly, we will investigate whether climate change mitigation and adaption has a high priority on the political agenda based on the premise of national laws on climate change.

3 Led by the World Resources Institute, the Climate Watch is an online platform with the open climate data, visualisations and resources they need to gather insights on national and global progress on climate change. https://www.climatewatchdata.org/ accessed on 10 August 2020

Freire et al. (2020) propose an innovative contribution to climate policy literature by assessing Latin American elites' preference for local climate mitigation initiatives. The authors argue that elites can advance or constrain climate agreements as they play several roles such as capacity building and rule setting. Through a survey experiment, the authors find that elites prefer international organisations to design local climate policies and that both international and subnational institutions should play a role in local climate policy design. Based on this view, the 'two-level game' launched by the Paris Agreement model is welcomed by elites in Latin America that 'support multiple governance simultaneously' (Freire et al., 2019). When investigating the results across countries, both Argentina and Brazil elites prefer international organisations to design the rules for climate policy, and Chilean elites favour local community members followed by local governments. When delving further into the results, Argentinean elites second favour the federal government followed by local governments to design climate policy. Regarding the resolution of conflicts, all three countries favour both the United Nations and local courts, especially in comparison to informal rules. This engagement of the elites from the three countries for supporting the design of climate policies at different governance levels could be positive for the implementation and revision of NDCs. Despite the multilateral framework provided by the Paris Agreement, countries are now on an implementation phase which means delivering their pledges at the domestic level. Elites' recognition of the role of the domestic level will be critical for the progress of climate commitments.

Considering climate change as a high priority on the political agenda, we have adopted a premise to investigate each country's status for law on climate change. According to the Chilean Observatory for Laws on Climate Change, currently, eight Latin American countries have specific laws for this topic, namely: Argentina, Brazil, Ecuador, Peru, Paraguay, Honduras, Guatemala, and Mexico. Moraga and Meckievi (2016) understand that law on climate change differs from legislation that could include action plans, strategies, or national development plans. The authors affirm that, to be considered as a climate law, the following criteria should be fulfilled: general, mandatory, directly related to climate change, and sanctioned

in accordance with the constitutional mechanisms of each country. Arguably, a country law on climate change demonstrates a more rigorous approach to analysing the priority on the climate agenda. For instance, and according to the Chilean Observatory for Laws on Climate Change, eight Latin American countries have specific laws for this topic, namely: Argentina, Brazil, Ecuador, Guatemala, Honduras, Mexico, Peru, and Paraguay.

Argentina has shown two positive trends in 2019. Firstly, the country was the first in Latin America to declare a climate and ecological emergency in July 2019[4]. The declaration partially results from an advocacy alliance between youth movements, inspired by Greta Thunberg, and environmental civil society organisations. Even if the declaration is more a political symbol than an implementation pathway for climate action, it has put Argentina is a very selected list of countries with the United Kingdom, France, Canada, Ireland, and most recently the European Union. It is also interesting to emphasise the political timing as Argentina has approved its declaration prior to the European Union and in the year that the Oxford Dictionary named 'climate emergency' as its 2019 'word of the year'[5]. Secondly, also in 2019, Argentina approved a law on climate change (n27250 — Law on Minimum Budgets for Adaptation and Mitigation to Global Climate Change) making provision for the institutionalisation of the National Climate Change Cabinet and placing the fight against climate change as state policy[6].

Brazil has a remarkable legal framework for the climate change agenda. The country adopted a national policy in 2009 on climate change embracing several themes such as a reduction of GHG emissions, socio-economic development, adaptation and conservation, recuperation of biomes, and action plans for deforestation prevention and control for the Amazon and Cerrado biomes. The country also has a specific law for the land-use sector commonly known as the Forest Code. Another important component of the climate change legal framework in Brazil is the law on national biofuels policy (RenovaBio by its Portuguese acronym). Speranza et al. (2017) assessing the Brazilian national climate policy on climate change point out that there is clarity in the role, and the responsibilities and hierarchal structure of the bodies responsible for its implementation. However, the authors also emphasise the lack of monitoring and verification systems for public actions and policies. Brazil is an interesting study case to demonstrate that a well-established institutional and legal framework is not sufficient for climate action. High priority criteria on the political agenda are key to ensure climate change policies at the domestic level. On this account, Bolsonaro's government has been vigorously criticised by national and international actors for its handling of environmental policies. The unprecedented peaks in 2019 for Amazon fires[7] have called the attention of the international community including the declaration by the French President Emmanuel Macron[8]. Stuenkel (2020) points out that the establishment of a broad alliance of environmentalists, European governments, international and national investors and companies to face deforestation is facilitated by the recent systematic dismantling of Brazil's environmental regulatory framework. The Brazilian government responses, such as a decree to ban Amazon fires and the establishment of the Amazonian Council, have not yet impacted the deforestation rates that continue to grow rapidly.

As for Chile, the country is currently debating a law on climate change that embraces a goal of carbon neutrality by 2050 in accordance with one of the Paris Agreement goals, with goals for adaptation, including the concept for water security and strengthening resilience. The law has overcome the first hurdle in July 2019 as its first constitutional procedure was approved by the Chilean Environmental Commission at the Senate. According to Moraga (2020), the law has positive aspects such as the establishment of a scientific committee that will build bridges between scientific evidence and public policies, expansion of the Ministry of the Environment's role in climate change, and the engagement of other ministries in the theme. But, still in accordance with Moraga (2020), there are also setbacks such as regarding the inclusion of public consultation, instead of more engaging participatory standards. According to the author, the law is not sufficient for the country to achieve its carbon neutrality due to the need to ensure the content of the public policy instruments and the reform of legal bodies. For instance, she points out that the creation of a sectoral report is not enough for effective monitoring of climate actions due to the lack of follow-up and sanctions.

4 https://www.lanacion.com.ar/sociedad/argentina-declaro-emergencia-climatica-nid2268872, accessed on 08 August 2020

5 https://www.nytimes.com/2019/11/20/arts/word-of-the-year-climate-emergency.html, accessed on 08 August 2020

6 https://www.argentina.gob.ar/noticias/se-oficializo-la-ley-de-presupuestos-minimos-de-cambio-climatico, accessed on 08 August 2020

7 https://www.businessinsider.com/amazon-rainforest-fires-breaking-records-2019-8, accessed on 08 August 2020

8 https://www.liberation.fr/planete/2019/08/23/l-amazonie-brule-macron-s-enflamme_1744969, accessed on 08 August 2020

3.1.2. Policy Coordination

Drawing on Röser et al., one of the criteria to assess policy coordination is the involvement of non-governmental stakeholders. Hsu et al. (2019) emphasise that aligning national policies with non-state actions can benefit the enhancement of NDC's ambitions thanks to increasing buy-in from private stakeholders, subnational authorities and civil society, leveraging technical expertise and capacity, stimulating sector-specific actions for decarbonisation, improving transparency, demonstrating the feasibility of climate actions, and building political support. In fact, several strands of the literature argue that in the Paris Agreement model, and non-state actors, also mentioned in COP-21 decisions as non-party stakeholders, can increase climate action (Hale, 2016; Hsu 2019; Falkner, 2016; Chan et al., 2017). Furthermore, Hsu et al. (2019) argue that the revision of the NDC is an opportunity for countries to leverage non-state actors' actions. Having said this, we investigated the non-state and subnational authorities engagement based on the information displayed at the UNFCCC platform 'The Global Climate Action Portal'[9]. This UN-led initiative was established in 2014 in partnership with the Peruvian and French Presidencies of COP-20 and COP-21 to provide momentum for the climate negotiations. Non-state and subnational authorities can display their individual, cooperative and transnational initiatives, and climate commitments according to seven themes: land use, ocean and coastal zones, water, human settlements, transport, energy, and industry. As for the three countries studied in this chapter, Argentina and Brazil demonstrate a considerable level of non-state actor engagement. For instance, Argentina has a total of 416 actions, both individual and cooperative, and a total of 282 actors. Argentina itself is member of eleven transnational initiatives such as the Global Fuel Economy Initiative (GFEI). Among the thirty-five registered individual actions, thirty-one are commitments from cities and regions engaged in reducing city-wide emissions from energy, transport and waste. The Brazilian case also demonstrates a great engagement from non-state actors in a total of 453 actions and 276 of the actors registered. As a country, Brazil is part of eight transnational initiatives as the International Solar Alliance. Individual actions are taken by investors, companies, and subnational authorities. As for the cooperative actions, for example, nine Brazilian cities and regions are part of the 'Under 2 Coalition' which aims at keeping global temperature rises to under 2°C. Moreover, the national policy on climate change in Brazil set up the Brazilian Forum on Climate Change aiming at raising awareness and mobilising society to contribute to the debate about climate change, including the preparation of the country INDC in 2015.

Chile is the most remarkable case for the involvement of non-state actors' criteria due to an action taken during the country's presidency of COP-25. Even if the Global Climate Action portal registers only 112 actions and the engagement of ninety-two actors, Chile has led the establishment of a cooperative initiative called the 'Climate Ambition Alliance' launched during the United Nations Climate Summit in September 2019. The alliance, gathering seventy-three countries, has the main goal is to commit nations to be more ambitious in their NDCs and to include actions. The Alliance also encompasses almost 1000 non-state actors and subnational authorities committed to achieving net-zero CO_2 emissions by 2050.[10] Considering, Chilean domestic climate policy, environmental and social movements were engaged in the NDC review process through a process called '*dialogos ciudadanos*'.

Finally, we could also remind ourselves that, as further demonstrated by Chan et al. (2016), there is a geographical imbalance between the developed and developing countries regarding the implementation of climate actions from non-state actors. The authors find that there is an implementation gap in developing countries compared to OECD countries. Our analysis for the three countries presents a positive tendency for the involvement of non-state actors considering their climate commitments officially registered at a UN-platform. However, this can be nuanced by the extent to which non-state actors are engaged and are fostering climate policy. Despite the commitment of some representatives from the private sector and subnational authorities, there is a need for a national robust framework for the achievement of each country's NDC pledges that ensures private authority is leveraged by public action.

Considering the criteria on the extent climate change is mainstreamed in plans and sectors, we have drawn on evidence collected in the database 'Climate change laws of the world' from the

9 https://climateaction.unfccc.int/, accessed on 10 August 2020

10 https://unfccc.int/news/climate-ambition-alliance-nations-renew-their-push-to-upscale-action-by-2020-and-achieve-net-zero, accessed on 08 August 2020

Grantham Research Institute on Climate Change and the Environment at the London School of Economics and from the previously mentioned databases. The Argentinean case shows recent progress for sectoral plans adopted under the supervision of the National Climate Change Cabinet. Established in 2016, the Cabinet gathers representatives from twelve ministries, articulates climate change policies, and was responsible for preparing national plans for climate change. In October 2019, the country adopted national action plans for energy, transport, agriculture, industry, health, infrastructure, and forestry[11]. According to the analysis provided by CAT, '...the institutional framework regulating Argentina's governmental and ministerial processes is robust', and the National Climate Change Cabinet effectively coordinates high-level government climate policy. However, the CAT report also points out the lack of long-term targets and of a formalised ratchet-up mechanism for scaling up the national climate pledge ambition. According to Speranza et al. (2017), Brazil has eight sectoral plans for climate change mitigation and adaptation including transport, industry, agriculture, mining, energy, and action plans for the Amazon and the Cerrado biomes. Brazil has also two financial mechanisms for the implementation of its policies and sectoral plans namely the National Climate Change Fund and Amazon Fund that have been undervalued by the Brazilian government. For instance, four politicians filed a 'Direct Action of Unconstitutional Omission' to the Federal Supreme Court to compel the Ministry of the Environment to resume the activities of the Climate Fund. Regarding the Amazon Fund, the Brazilian vice-president has announced his willing to re-establish a dialogue with Norway and Germany who have blocked their financial resources to the Amazon Fund in 2019 due to the increase of deforestation rates in the biome[12].

As the Law on Climate Change is not yet adopted in Chile, the Climate Action Plan 2017-2022 is the overarching instrument for all the policy sectors. As energy is an extremely important aspect of the climate change debate in the country due to coal, it is also important to acknowledge the country's national plan called 'Energy Route 2018-2022'. Finally, the CAT analysis points out that Chile could peak its emissions in 2023 — instead of the proposed peak in 2027 — in the case of all planned polices being implemented.

11 https://www.argentina.gob.ar/ambiente/cambio-climatico/agro, accessed in 08 August 2020

12 https://congressoemfoco.uol.com.br/legislativo/ao-vivo-vice-presidente-fala-a-senadores-sobre-desmatamento-na-amazonia/, accessed on 08 August 2020

3.1.3. Knowledge and Capacity

The setup of effective institutional mechanisms to enhance the interface of science-public policies is crucial to ensure both the implementation and monitoring of climate actions. For instance, Brazil carries weight with a National Panel of Climate Change considered to be the scientific advisory body for the national policy on climate change. And, as previously explained, Chile is debating the creation of a permanent scientific committee.

However, the current institutional framework is considered insufficient. Based on the *Latino Adapta* research project, Ryan and Bustos (2019) propose an analysis of the implementation of climate adaptation policies for six Latin American countries by conducting a survey with government officials to identify their perceptions and views related to knowledge gaps. The authors adopt the United Nations Environment Program Adaptation Gap Report (2014) with the definition of the knowledge gap as the 'production, integration, transfer and uptake of knowledge needed for adaptation', and expand the approach by the integration of an assessment about the monitoring and evaluation of adaptation policies. In contrast to mitigation actions, the authors argue that adaptation policy requires a deep understanding of the context, including geographic locations and specific topics such as water, agriculture, among others. Taking into account that this 'knowledge gap' definition relates to the criteria advanced by Röser and colleagues for the 'knowledge and capacity', this chapter appropriately reports some of the results found by Ryan and Bustos for Argentina, Brazil, and Chile.

One of the main interesting findings presented by Ryan and Bustos is the fact that government officials from the three countries perceive knowledge available for climate adaptation policymaking, including climate data, impacts studies, social-environmental vulnerability assessments, among others, as fragmented and dispersed (Argentina: 85%; Brazil: 70%; Chile: 73%). Moreover, a significant number of government officials reported that government agencies lack resources to analyse and evaluate available information (Argentina: 90%; Brazil: 74%; Chile: 82%). In summary, the authors conclude that there is a need for institutions, mechanisms and actors that 'can act as translators and integrators of the different types of

Analytical component	Criteria	Argentina	Brazil	Chile
Agenda-setting	High-level political support of the mandate for the preparation and implementation of the NDC	In general, support multiple governances simultaneously favouring international organisations to design the rules for climate policy.	In general, support multiple governances simultaneously favouring international organisations to design the rules for climate policy.	In general, support multiple governances simultaneously favoring local community members to design climate policy.
	Climate change mitigation and adaption has a high priority on the political agenda	The country is the first in Latin America to declare a climate emergency and it has recently adopted a law on climate change (2019)	Bolsonaro's government has not established a climate change agenda, or environmental agenda, as a priority for its mandate. The government has been suffering social and economic pressure from domestic and international actors on this matter.	The country hosted UNFCCC COP-25 which has mainstreamed the debate in the political agenda. Also, Chile is currently debating a law on climate change with a long-term vision of carbon neutrality by 2050.
Policy Coordination	Climate change mainstreamed in plans and sectors	The Climate Change National Cabinet effectively articulates several sectoral plans that were adopted in 2019.	Brazil has eight sectoral plans including key themes regarding the country's domestic scenario such as deforestation and energy. Also, the Brazilian NDC implementation relies on another important legal instrument: the Brazilian Forest Code.	Sectoral plans should be adopted after the approval of the law on climate change.
	Involvement of non-governmental stakeholders	Good level of engagement based on the analysis of the UNFCCC Global Climate Action Portal. Also, youth movements and civil society organisations advocating for the adoption of a climate law	Good level of engagement based on the analysis of the UNFCCC Global Climate Action Portal. Also, Brazil has different states of the federation committed in climate actions such as Acre, Mato Grosso, and São Paulo. At the federal level, it is currently more nuanced as the environmental agenda is not a political priority for Bolsonaro's government.	As a player in the international arena, Chile demonstrates leadership for the establishment of the Climate Ambition Alliance. Considering the domestic scenario, the government has engaged civil society organisations for the NDC review process and the law on climate change called "diálogos ciudadanos".
Knowledge and capacity	Technical or financial resources are available and adequate	Government officials perceive knowledge available for climate adaptation policy-making, including climate data, impacts studies, social-environmental vulnerability assessments, among others, as fragmented and dispersed	Government officials perceive knowledge available for climate adaptation policymaking, including climate data, impacts studies, social-environmental vulnerability assessments, among others, as fragmented and dispersed	The Law on Climate Change aims at establishing a Scientific Committee to build bridges between scientific evidence and public policies. However, government officials reported that government agencies lack resources to analyse and evaluate available information on climate change adaptation.

Table 4
Analytical Framework for assessing the institutional structure of NDC implementation and review

knowledge available in order to strengthen adaptation policy making and management.'

3.1.4. Summary

We outline our analysis for assessing the institutional structure of NDC implementation and review in Argentina, Brazil, and Chile against the criteria previously debated in Table 4.

4. Conclusion

Several strands of the literature emphasise the role of domestic politics for the success of the Paris Agreement goals. For instance, Bang et al. (2016) argue that the Paris Agreement falls short in providing incentives for avoiding the 'free riding' effect due to its Achilles' heel of compliance. The authors point out the need for both domestic and international norms for states and non-state actors to engage on climate action. In a similar vein, Pauw et al. (2019) emphasise some developing countries needs for capacity building and financial resources to fully deliver their pledges. One of the authors' suggestions is for developed countries to outline plans to mobilise support in their NDCs and reassure developing countries to enhance their NDC ambition. Also, Keohane and Oppenheimer (2016) suggest that the impact of the Paris Agreement on effective measures to face climate change depends on domestic groups favouring climate action as a point of leverage in domestic politics in a 'two-level game' involving international and domestic politics. Finally, Held and Roger (2018) recall the role of transnational actors for the adoption of enhanced domestic climate actions.

In this chapter, we argue that NDCs act as a transmission belt between the two levels. NDC implementation and review are political opportunities to foster the debate on the domestic political agenda. As the Paris Agreement enters in its implementation phase, the multilateral level also plays a crucial role in providing guidance, transparency and incentives for national deliverables. The three case studies from Argentina, Brazil and Chile show that an established institutional framework is not a sufficient condition for climate action. Climate change must be a high political priority to mobilise the different sectors of the society for both mitigation and adaptation policies. On this view, the Chilean leadership, more a 'Climate Ambition Alliance' is a welcomed initiative to engage parties onto a path compatible with a temperature increase of 1.5°C compared to the pre-industrial level. And, more importantly, it has been successful with the recent announcements of Japan[13] to be carbon neutral by 2050 and China by 2060[14]. The achievement of the Paris Agreement goals will only be possible if parties enhance and deliver their promises to ensure climate-resilient societies.

13 https://www.theguardian.com/world/2020/oct/26/japan-will-become-carbon-neutral-by-2050-pm-pledges, accessed on 08 August 2020

14 https://www.theguardian.com/environment/2020/sep/22/china-pledges-to-reach-carbon-neutrality-before-2060, accessed on 08 August 2020

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A new Global Resource Order, Elites and the Environment in Latin America

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1. Introduction

There is an emerging consensus that we are in a process of a global order upheaval with deep environmental implications. This is driven by a combination of environmental changes, shifts in global leadership and power balance. Part of the reason is the rise China, the weakened leadership of the US, and a subsequent shift in the distribution of capabilities and norms underpinning the global system (Ikenberry, 2018; Allan, Vucetic, & Hopf, 2018; Serbin & Grabendorff, 2020). It is an often heard argument that this will have a significant impact on democratic, in addition to environmental governance, since China is an authoritarian state and is deeply involved in environmentally damaging infrastructure and resource extraction (Bader, 2015). However, there is less consensus about the *mechanisms* through which these changes influence governance, or how Chinese involvement will differ from that of other great powers.

The hypothesis explored in this chapter is that the impact of the increased role of China and the accompanying shift in the role of multilateral organisations depends on the relationship between elites, institutions and non-elites, including civil society defending nature. Thus, the purpose of this paper is to open a way of studying the impact of global changes on environmental and democratic governance through the lens of elite theory. I first develop a typology of elites based on their relationship to institutions and society.

It distinguishes between *particularistic elites* that engage in institutions and policymaking as a means to serve the interests of their particular group, and *national elites* that seek to serve interests of a national project, based on a certain degree of consensus between different elite groups, and also *institutional elites* that emerge from broader political settlements embedded in institutions that also incorporate a role for non-elites.

Based on this typology, I outline how these can be expected to react differently to the opportunities and constraints that the shifting global order presents. Particularistic elites can be expected to embrace a particular project or policy if it involves direct benefit for themselves without much consideration for broader environmental or democratic considerations; national elites can be expected to embrace a project or policy induced by Chinese investments if it suits their political project, and does not benefit competing elites more than themselves. When institutional elites are dominating, we can expect a more consistent response based on a thorough political process in which attitudes and interests by elites, in addition to other groups, are mediated by norms and institutional procedures.

This approach seeks to complement two other approaches to the study of the development/environment nexus in the context of a shifting global order. These are, on the one hand, those that study environmental conflicts 'from below' — seeking to map the actors in the conflict and their strategies (Silva, Akchurin, & Bebbington, 2018). On the other hand, there is a burgeoning literature that takes a global focus, and seeks to understand China's global strategies and how they change the context for the development strategies of individual countries (Breslin, 2013; Zhang, 2017). In between, this paper argues, are elites that mediate between global pressures and local demands.

The paper as structured is divided into three: After a brief introduction to the global order upheaval and the changing role of China in Latin America, the first half of the paper outlines an approach to studying elites and draws up a typology for the understanding of elite interests, distinguishing between particularistic elites, national elites and institutional elites. The second half seeks to apply this to examples of elite approaches to global changes in Latin America.

2. Global Order Upheaval, the Rise of China and Latin American Development

There is rather widespread agreement that we live in a time of upheaval of the world order (Acharya, Estevadeordal, & Goodman, 2019). An order can be considered as structural and material, and provides the fundamental upon which rules and norms for interaction between states are based (Malkin, 2020). However, an order is also economic, and in the current capitalist order, where profit seeking and expansion are the main global driving forces, norms and institutions are established to justify and legitimise capitalism (Zhang, 2017; Harvey & Paik, 2017).

The current order upheaval is one of challenges to a liberal world order, led by the US, but institutionalised after WWII with the rise of the US hegemony. Its subsequent fall is not just expressed in the increased competition from illiberal states (principally China and Russia) but also the withdrawal of the US from international organisations and responsibilities, and its frequent direct violations of the very norms the system defends (Boyle, 2016; Ikenberry, 2018). However, the shift also has other dimensions.

Firstly, it signifies a partial change in the control of global capitalism (Lee, Heritage, & Mao, 2020).

Secondly, it can be understood as a process of the making of a 'multiplex order' with broader and a more diffuse form of leadership (Acharya, 2018), leaving more space for regional orders and domination, including a role for Latin America, otherwise often largely ignored in studies of the international liberal order (Long, 2018), in addition to studies of its transformation and decline (Maull, 2019).

Thirdly, and important here, we see a changing role for natural resources. Natural changes may change geopolitical relations, as for example, when China gets access to strategic trading routes in the Arctic due to melting of the polar ice (Brady, 2017). Technology may also give new value to natural resources, as when, for example, widespread adoption of the twin technologies of horizontal drilling and hydraulic fracturing (together known by the shorthand 'hydrofracking' or simply 'fracking') transformed the US into the world's largest oil producer, surpassing even Saudi Arabia. However, of the strongest importance at the moment are the implications of a green

transformation. Oil and coal assets may lose value, while natural resources generating 'green energy' may become more important, and companies contributing to transforming renewable resources more active participants in global politics (Overland, 2019). For Latin America's position in the world, it means that its vast opportunities for producing solar, hydro, and other green energies, increase its strategic position.

There are several approaches to the study of the impact of these changes on Latin America. Some have approached it from a dependency perspective focusing on how, China's increasing role as a lender and investor, traps developing countries into a new dependency relationship (Jenkins, 2012; To & Acuña, 2019; Stallings, 2020). Others analyse this from a zero-sum realist perspective, looking at China's entry as a direct challenge to the position of the US, in addition to the future of liberal democracy in the region (Ellis, 2017). A third approach considers Chinese engagement as part of a move towards a multipolar order that rather expands the policy space of Latin American countries, partly through a transformation, not a zero-sum change of norms, institutions and forms of leadership. This has led to a diversification of foreign ties, rather than new dependencies (Serbin & Grabendorff, 2020; Heine, 2019).

However, what is increasingly clear is that the impact of these shifts on policy in the different countries depends on the institutions and strategies of the Latin American countries (Wise, 2020). Here host countries have strong institutions, China playing a role similar to that of other countries — no single investor dominating. In Latin American countries with weak infrastructure institutions, however, China plays the lead role in designing, financing, planning, constructing (with Chinese labour, engineers, and equipment), and maintenance of a given project (Bersch & Koivumaeki, 2019).

Institutions certainly play a key role. However, as Hodzi (2018) argues with reference to Africa, much literature on the role of China in Africa, deprives domestic elites with urgency. He argues that it is the interests and strategy of those elites that decide how China's role translates into policy choices (Hodzi, 2018). In most African countries, he argues, the elites are *non-transformative*, and mostly preoccupied with their own particular interests.

In an earlier comparative study between China's role in Africa and Latin America, we suggested that while it is true that state institutions partly shape the impact of Chinese investments, it is also the case that the Chinese presence tends to strengthen the incumbent elites. In Latin America, it is more common that projects are being held up, precisely due to the existence of opposition and social movements, and elites with different interests and relations to non-elites (Banik & Bull, 2018). Therefore, in the following sections, I will seek to elaborate how looking at the global changes through elite theory can help us better understand different approaches by Latin America to global shifts.

3. An Elite Perspective on Latin America and Global Shifts

There is no simple answer to how this shift in the global order will affect policy choices across the world. World order perspectives, as those discussed above, often assume that there exists a national state order, mirroring the global orders. However, most countries in the world lack states that order societies in a meaningful way for the majority of the population (Chowdhury, 2017). Political institutions are often governed by particular groups that ignore rules and laws; bureaucracies may be merely facades with little other functions than creating employment and distributing spoils, and to the extent that security is provided for, it is by a range of often competing armed actors.

Especially, after the turn of the millennium, increased attention was paid to the quality of state institutions as a prerequisite for the provision of security and services across the territories. Progress has been made on measuring the strength and weakness of institutions (Grassi & Memoli, 2016). There are also significant attempts made at trying to understand the implications for the politics of institutional weakness (Brinks, Levitsky, & Murillo, 2020). However, there is still relatively little attention paid to the question of 'what is strong when institutions are weak' (Bull, 2014).

One answer to that in the Latin American contexts is 'elites'. Indeed, the first comprehensive study of elites in Latin America was

It is still necessary to study the relationship between elites, institutions and non-elites in order to understand the national and local consequences of global changes, such as those we are witnessing now.

justified precisely on that they were assumed to govern in the absence of strong institutions, including large-scale bureaucracies and mass political parties (Lipset & Solari, 1967). I will argue that it is still necessary to study the relationship between elites, institutions and non-elites in order to understand the national and local consequences of global changes, such as those we are witnessing now.

3.1. Definition of Elites

In much public debate, in addition to academic literature in Latin America, 'elites' are not defined but used interchangeably with 'the upper middle and upper classes', or as including business, landholding and political elites, considered to operate in close alliances, and often allied with global political-economic elites (Cortés, 2012). While elites may have different interests on specific issues under specific circumstances, they are essentially considered to have joint interests in capitalist development, often allied with global political-economic elites. However, although control over capital (money) is of key importance, in modern societies, elites can also emerge around other kinds of resources. An 'institutional approach', following Mills, defines elites as the groups populating the 'upper skeletons' of important social and political institutions (Mills, 1956, p. 2-3). Such an approach has been used to study bureaucratic (including technocratic) and parliamentary elites in Latin America (Ai Camp, 2002; Alcántara Sáez, 1995; Joignant & Güell, 2011; Monteci-

nos, 1996). A third approach, the often called *Italian school* based on the writings of Mosca, Mitchels and Pareto (Mitchels, 1962; Mosca, 1939; Pareto, 1997) define elites rather based on their influence, as a distinct group within a society which enjoy privileged status and exercise decisive control over the organisation of society. Elites potentially emerge from their control of organisational resources (control over organisations), political resources (public support), symbolic resources (knowledge and the ability to manipulate symbols and discourses), and personal resources (such as charisma, time, motivation, and energy) (Etzioni-Halevy, 1997, xxv). These go beyond both positions in state hierarchies and capital. Such a multi-resource approach opens the focus on multiple elites, based on the control over different resources. Elites may thus be defined as: 'Groups of individuals that, due to their control over natural, economic, political, coercive, social, organizational and/or symbolic (expertise/knowledge) resources, stand in a privileged position to influence in a formal or informal way organizations and institutional practices' (Bull, 2015).

A main point of the Italian schools is to highlight the idea that there will always be a governing elite. Governing elites are exchanged by slowly ascending families and groups from lower classes, and would thus be replaced in a slow process of elite circulation (Pareto, 1997). Indeed, it is this *elite circulation*, not the construction of political subjects among the dispossessed classes that will lead to change. Related to the discussion of a global order upheaval above, we could ask whether a change in the global order will produce elite circulation, or a more profound change in elite society relations. This, I would argue, depends on the pre-existing relations between elites and institutions.

3.2. Elites and Institutions

Elites stand in a particular position to influence institutions. In most literature on institution building, elite interests, ideas, strengths and weaknesses, division or unity, are among the main variables used for understanding whether state apparatuses, with the capacity to extract, control and provide services to the population emerged in

Latin America (Centeno, 2002; Saylor, 2014; Soifer, 2015). Also, generally, elites and elite choices are decisive for the kind of state institutions that emerge (Amsden, Di Caprio, & Robinson, 2012; Dahlström & Wängnerud, 2015; North et al., 2013). In turn, elites, not only shape states; states and other societal institutions also contribute to the shaping of elites (North & Clark, 2018).

Different elites may also have different interests related to institution building. Marxist literature considers the main interest of elites is to establish institutions that support profit seeking in the short or long run. What kind of institutions that emerge depends on the needs to support the key activities of the elites. Historically, industrial elites have favoured a more extensive state than landholding elites, due to their more extensive need for infrastructure and services. Neoliberal globalisation led to the emergence of elites associated with transnational capital, which favoured a 'transnational state', or one that regulates and de-regulates society in accordance with transnational capital interests (Rey, 2012). It is too early to conclude the consequences of the more recent changes in global capitalism associated with the ascent of China and state-led development as discussed above. However, it is likely that this also encourages the emergence of elites that profit, and favour institutions that facilitate a development in partnership with China.

However, across countries, elites not only differ regarding their profit seeking motives, but also the extent to which they have united behind a project of 'nation building', and the extent to which such a project includes or excludes non-elite groups. In the extreme case, we can think of an elite that manages to take control over the state, but essentially as a means to serve the interests of that group. This could be called *particularistic elites*. This would be equal to a situation of 'state capture' as defined by Durand and others (Crabtree & Durand, 2017). One example are the elite families of Central America that built the states in Guatemala, El Salvador and Nicaragua around a set of narrow elite interests focused on supporting the privileges and the sectors (coffee, sugar) that they controlled (Paige, 1998; Casaus, 1992). In a slightly better case, one can imagine elite-compromises that lead to a degree of elite unity around a project to build a state around the ideas of a particular national project that serves the elite interests. The elites may be no less 'self-serving', but they have developed an identity as a *national elite*, and not as leaders of a particular clan, class or political faction, and as a support for generalised institutional rules. One example of this may be the Venezuelan elites agreeing to back the return to democracy and the division of power in the 'punto fijo' agreement of 1958 (Coronil, 1997).

In other cases, elites may emerge from broader political settlements that also incorporate a role for non-elites. Political settlement 'refers to the balance or distribution of power between contending social groups and social classes, on which any state is based' (Di John & Putzel, 2009). Such a settlement distributes opportunities and costs in society, and provides a form of stability. This both allows and requires stronger institutions to regulate the relationship between different social actors and such elites may thus be called *institutional elites*. These compete with other elites, but within the framework of a set of generally accepted rules and norms. An example of this is the elites associated with the two centre-left coalitions ruling Chile after the return of democracy: Concertación (1990-2010) and the New Majority (2014-2018). A distinct elite emerged there in leading positions in business, the state apparatus and political parties, controlling a wide set of resources (media, economic resources, networks etc.) (Joignant & Güell, 2011). However, it was operating in an institutional context considering the participation of and a certain distribution to, non-elite groups.

While there is an ascending degree of stability from a situation with particularities from one with institutional elites, particular elites may be sustained over long periods of time if the economic and international situation allows for it. One example of this is Guatemala, where elites with roots in the fortunes amassed during colonial times and the agro-export boom of the 19th century, still persist as a strong political force (Knight, 2011). There is also no necessary automatic correlation between the forms of elites and the durability of formal democracies. Consider, for example, the case of Colombia, which has been an electoral democracy since 1830 and has long-standing political parties and significant political institutions, but has mostly been ruled by a combination of particularistic and national elites in the context of widespread violence, war and human rights abuses (Castillo, 1967; Robinson, 2012).

3.3. Elite Shifts

Many factors may lead to a shift of elites, including the ascent of new groups or a shift in attitudes among elites (Bull, 2015). Major political disruptions may lead to a change of balance between different elites. This may have its roots in domestic movements and upheavals. For example, the major social unrest in Chile that started in October 2019, is likely to result in a new political settlement and the emergence of new elites. The transformation of Bolivia under the rule of the MAS (Movement Towards Socialism), may be considered partly a result of long-term indigenous political mobilisation, and generalised discontent with neoliberal policies in the early 2000s. It has subsequently led to the emergence of a new political and partly economic elite (Wolff, 2016; Salman & Sologuren, 2011; Farthing, 2019). In many cases such shifts are related to international changes. For example, the ongoing elite shift in Venezuela emerges out of the Bolivarian revolution that started in 1999 (Bull & Sánchez, 2020). Yet, the consolidation of this elite, is related to a global shift that has given the new elites of Venezuela vital support from China and Russia, and allowed them to disregard opposition from the US (Rosales, 2018). However, what we see is not the emergence of new institutional elites, but rather, a particularistic elite that essentially focuses on their own consolidation of economic and political resources.

Also environmental and technological changes can generate shifts in elites. Latin America's history is full of examples of the emergence of economic sectors around a particular natural resource that has increased its value due to technological changes, and has formed the basis for the emergence of new elites. This occurred for example during the Brazilian rubber booms (1879-1912 and 1942-1945), which occurred as a result of the increased demand for rubber, mainly related to the invention of the automobile in the second period, during World War II; also around the production of guano and saltpetre in Peru, Bolivia and Chile, during the late 19th century, driven by technological advances and development in European agriculture. Yet, both booms ended equally quickly due to new technologies (synthetic rubber and artificial fertilizers). In other cases, the depletion of the natural resource has led to a subsequent elite shift. This occurred in El Salvador, when cotton

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growers conducted what has been called an 'environmental suicide' (Hecht et al., 2006) which led to the descent of several important elite families (Paniagua, 2002). As discussed above, climate change and the transition towards a non-fossil-fuelled based economy are interlinked with global political changes and may produce new economic and political elites.

A second type of shift, results from a new settlement between different elite groups (Highley & Burton, 2006). This is a process of negotiation between competing elite groups that may have fundamental and lasting consequences for a common elite acceptance of a new code of political conduct. Thus, although the most important effect of such elite settlements is the transformation of institutions, this process may transform not only who the elites are, but also the views and behaviours of those elites. The most common example studies of this are the elite settlements leading to transition from authoritarianism to democracy in the Southern Cone during the 1980s and 1990s that created a new 'value consensus' (Higley & Gunther, 1992).

A third form of elite shift may result from what could be called 'elite-reorientation', i.e. that the dominating ideas of an elite changes. Historically, there are various examples of such elite-conversion in Latin America: one is the neo-liberal transformation during which groups that had previously promoted state-led development policies became firm believers in market-driven, export-oriented models. In

some cases, this was a result of the ascent of new groups of 'technocrats' (such as the (in-)famous Chicago boys in Chile (Silva, 1998), while elsewhere it was the combined result of intellectual influences, and economic reorientations (Bull, 2005). New ideas achieved influence due to a crisis or the exhaustion of prior models, and a gradual shift of interests. Currently, one could imagine that the seriousness of the environmental and climate crisis could open the space for new ideas brought about by new elite groups, the conversion of old groups or a new dynamic interplay between different elite groups.

4. Latin American Elites and Approaches to Global Shifts

Based on the typology of elites suggested above, in the following, I will outline how these can be expected to react differently to the opportunities and constraints that the shifting global order presents. Particularistic elites can be expected to embrace a particular project or policy if it involves direct benefit for themselves without much consideration for broader environmental or democratic considerations; national elites can be expected to embrace a project or policy induced by Chinese investments if it suits their political project, and does not benefit competing elites more than themselves. When institutional elites are dominating, we can expect a more thorough political process in which attitudes and interests by elites, as well as other groups, are mediated by norms and institutional procedures. Yet, as will be evident in the following, in many cases, the situation is one of transition between different groups of elites.

4.1. Competing National Elites and the Rise of China During the 'Pink Tide'

Between 2003 and 2014, Latin America went through a period of strong economic growth. In the same period, twenty-two out of forty-nine presidential elections were won by centre-left candidates. With the exception of Mexico and Colombia, all the large economies in Latin America were governed by centre-left governments in most of this period. These parallel developments created the conditions for elite shifts: both the ascent of new elites; changes in elite orientation and changes in their relations to institutions. While the dynamics differed strongly between different countries, in many countries we saw the emergence of groups with the potential of becoming a new national elite. As several of these came to power, with the support from social movements that had rejected neoliberalism, inequality and environmental destruction (Bull, 2013; Machado & Zibechi, 2017), many hoped that environmental issues would also be put higher on the agenda. However, it did not take long until their hopes were quashed. Resource extraction continued to increase, in spite of the overwhelming evidence of the devastating loss of biodiversity, leading to pollution, the deterioration of livelihoods for large groups of people, and the resulting rise of environmental conflicts (Gudynas, 2010).

A part of the backdrop to this was the rise of China with the associated increase in demand for and prices of commodities. The oil price increase from around 2003 benefited the oil-producing Latin American countries generously. It also fuelled expansionist regional integration led by oil-producing Venezuela and Brazil (Riggirozzi & Tussie, 2012)). Brazil found enormous new oil fields and entered the world oil market around the same time and saw a major expansion of its regional role. Soy production had taken off, particularly in Argentina and Brazil in the 1990s, due to the introduction of genetically modified seeds, the use of glyphosate, and 'no-till' planting. The boosting of Chinese soy demand led to a steep price increase from the early 2000s (Bräutigam & Gallagher, 2014). The same happened with copper, tin, and other materials.

Consequently, in less than two decades, China went from being an insignificant actor to becoming a major investor, lender, and trading partner, in addition to a close strategic ally of several Latin American countries. Chinese-Latin America trade increased from a mere 1% of the total trade volume of Latin America, equal to $ 12 billion in 2000 to $ 289 billion in 2013. The exports from Latin American countries to China are completely dominated by raw materials. They accounted for 73% of total exports in 2019, up from 64% in the 2000s. This pattern is very distinct from the trade patterns with other regions.

Moreover, Chinese finance to the region went from being insignificant (less than US$ 1 billion annually), to outcompeting the World Bank and the Inter-American Development Bank (IDB) combined.[1] From China, Latin American countries acquired larger loans directed towards infrastructure projects and raw materials, directly benefitting income generation (Küblböck, Tröster, & Ambach, 2019).

This facilitated what Maristella Svampa called the 'commodity consensus' that arguably replaced the neoliberal Washington consensus in the 2000s (Svampa, 2013). While state involvement and redistribution was reintroduced, there were few limits to the natural resource exploitation. As argued by McKay: 'from Washington's neoliberal conditionalities to Beijing's south-south cooperation, it appears that among political and economic elites the consensus remains the same: resource control' (McKay et al., 2016).

This made environmentalists such as Eduardo Gudynas pose the question of 'if you are so progressive, why do you destroy the nature'? (Gudynas, 2010). An elite perspective suggests three different answers to that question. The first is that the commodity-related investments and income from commodity sales were important for the new elites to keep the opposition from old elites at bay. The 'old elites' retained much of their control over the economy forcing the left-wing governments to pull back from plans for radically restructuring the economies (North & Clark, 2018). In Brazil, where the PT governments of Luis Inacio Lula da Silva (2003-2011) and Dilma Rouseff (2011-2016) retracted on policies to protect the environment on many accounts, partly as a result of political negotiations with old elites, but also as a result of their general rejection of making a break with global capitalism. This could be understood as one of the conflicts between specific elites (e.g. the agricultural lobby, including landholders and agri-business-interests, strongly represented in congress by a diversity of one-man parties), national elites (e.g. the political 'centre' of traditional political elites emerging out of the process of democratisation in the 1980s) and an emerging 'institutional elite' (composed by the PT and institutional allies).

The rapidly expanding presence of China as an investor and trading partner, was a part of the backdrop of this. This was initially facilitated and brokered by the PT governments, partly in the context of the BRICS and 'south-south cooperation schemes', and particularly focused on the energy and extraction sectors. From 2003 to 2018, more than 85% of the confirmed investments went to these sectors, with energy accounting for 46% (Becard, Lessa, & Silveira, 2020). The background was not only China's need for raw materials, but also its energy strategies, focusing on optimising energy products, interconnecting plans and capitalising on Chinese technological capabilities within the energy sector (ibid.). Environmental issues have to a very limited degree been a part of the China-Brazil dialogue. Sceptical voices came from Brazilian business elites that experienced the relationship to be highly asymmetrical (Revelez & Raggio, 2020). While these found a voice in the government entering power in 2018, this further alienated environmental movements, and over time, the new right wing government of Jair Bolsonaro also accommodated Chinese interests.[2]

On a different scale, the left-wing government supported by the FMLN in El Salvador (those of Mauricio Funes and Salvador Sánzhes Cerén) sought to pursue more sustainable policies in the midst of dramatic environmental and climate crises. The Funes government (2009-2014) initially had support from and strong connections with environmental movements, and launched an ambitious plan for tackling the multiple crises that the country suffered from: economic, social, security and environmental issues. It also initially went to lengths to establish good relations with the old elites, associated with the conservative ARENA party (Bull, Cuéllar, & Kandel, 2015). In spite of widespread illicit enrichment among the elites, the situation could still be interpreted as a competition between two national elites, with competing national projects, and power bases in the ARENA and FMLN parties. While it was the old elites associated with ARENA that controlled most economic resources, some business elite groups, mostly of Arab origins, supported Funes. These grew stronger with the new government, while the relations between the government and the old elites gradually deteriorated (Robles Rivera, 2018; Bull, 2019).

The Central American countries, was and still are, much more dependent on the US than South America, and have been among the last supporters of Taiwan in international relations. However, the FMLN led Sánchez Cerén government (2014-2019) explicitly sought investments from China, which would not only drive national devel-

1 In total, the China Development Bank and China Export-Import Bank have provided more than $137 billion in loan commitments to LAC, according to the China Latin America Finance database. https://www.thedialogue.org/map_list/ The OFDI China in Latin America and the Caribbean database reports that 60% of FDI have gone to the raw materials sector since 2000. If energy is included, 80% flows into natural resource sectors (Küblböck, Tröster, & Ambach, 2019).

2 https://foreignpolicy.com/2020/05/15/chinas-diplomats-are-going-on-the-offensive-in-brazil/

opment and create much needed employment, but also would serve to strengthen new elites at a point where cooperation from old elites seemed unlikely. In August 2018, El Salvador announced its intent to establish diplomatic relations with China, amidst protests from the US.[3] This immediately prompted promises of large infrastructure investments, some of which generated strong concerns from environmental groups. Two years later, the investments are far from what they were promised to be. Yet the new government of Nayib Bukele (2019-2024), still pursued the plans for Chinese involvement in the long-planned upgrading of the port of La Union that promised to transform El Salvador into an infrastructure hub, with large business opportunities also for El Salvadorian counterparts.

3 https://www.nytimes.com/2019/09/21/world/americas/china-el-salvador-trump-backlash.html

4.2. National Elites, Natural Resources and the Electoral Imperative

While the so called 'pink-tide' governments differed on a large number of accounts, they had in common their focus on poverty reduction and the reduction of inequality (Cameron & Hershberg, 2011). One means to achieve that was to introduce broad-based social programmes that required quick and stable funding. Increasing resource extraction was the easiest solution to that challenge, particularly as commodity prices rose (de Castro, Hogenboom, & Baud, 2015). Thus, the second answer to Gudynas' question was that the new elites needed resource income to ensure support, particularly from the urban poor and lower middle classes.

This dynamic was evident in, for example Ecuador, where the ambitious social and state-building project of Rafael Correa (2007-2017) required both direct funding and new investments. The Correa government rose to power based on broad support from indigenous, environmental and other movements in the so-called 'citizens revolution'. However, in spite of the strongly progressive and environmentally radical new constitution, initial plans for protection of vulnerable nature were shelved, environmentalists alienated, and indigenous and other social movements repressed, while electoral support and approval ratings for the government increased among the poor and middle classes, particularly in urban areas (Sánchez & Polga-Hecimovich, 2019). State expansion and social policies were funded and increases in the speed of oil extraction, and expansion of mining concessions, requiring new investments, that came, from a.o the Chinese (Andrade, 2015). At the same time, Ecuador froze the relationship with the traditional international financial institutions with a debt moratorium of 2008, and replaced that source of funding with loans from China, partly to be repaid through oil. This 'extractive pact' made China Ecuador's most important oil customer by far, and tied it to an extractive policy for years to come (Rodriguez, 2020).

A somewhat similar story can be told about Argentina. Argentina may be argued to have been dominated by two competing national elites, associated with the Peronist and conservative parties respectively. The faction of the Peronist elites that dominated during the Kirschner and Fernández de Kirschner governments, benefited from the rise of commodity prices and inflow of Chinese loans and investments. This allowed them to expand social policies and confront old agricultural and business elites. However, it also led to a 're-primarisation': a general move away from industrialisation in the overall economy, and within the dominating soy-sector, as China increasingly demanded raw materials rather than finished soy products. This has linked Argentina in a dependency relationship to China, one that has been given part of the blame for the return of a deep debt crisis, also with far reaching environmental implications. This in turn, has made it more urgent to exploit other natural resources and use unsustainable practices such as oil fracking and the exploitation of lithium with a vast use of water. As argued by Bernal-Meza & Zanabria, (2020): 'the deepening ties and the growing role of China in the political economy of Argentina has resulted from two processes: the core-periphery trade relationship and the political decision of the Argentina governments of Néstro Kirchner and Cristina Fernández de Kirchner to remove Argentina from the sphere of relations and influence so of the United States, the European Union, and the organizations led by them: the IMF and the Paris Club' (p. 135). While it achieved increased independence from these western actors, it established a firm dependence on China.

Most of the new elites associated with the 'pink tide', gave new representation to formerly politically-marginalised groups, including indigenous people, people from low-income groups and wom-

en. Bolivia, Ecuador and Venezuela also adopted new constitutions that sought to institutionalise this representation. Yet, the degree to which representation from non-elite groups was institutionalised varied a lot. One of the results of the elite nature of decision making was the upsurge of environmental conflict related to the increase in natural resource extraction.

China's activities in Latin America are shown to have a larger environmental footprint than investments and exports from/to the rest of the world, in terms of carbon emissions, water use and impacts on biodiversity (Ray et al., 2015). As a result of this, environmental conflicts with Chinese companies or other agencies are on the rise, related to mining, hydrocarbon extraction, and infrastructure in addition to renewable energies, including hydropower dams and wind parks. An overview from 2018, shows that 27% of the Chinese mining project resulted in conflicts between 1996-2015, compared to an average of 12% for other investors (Shapiro et al., 2018). Part of the reason is the magnitude of the Chinese investments. In the northern Argentine province of Jujuy, a Chinese company built Latin America's largest solar plant (Cauchari) with Chinese technology and finance. This is expected to cut both energy costs and carbon dioxide emissions. The latter, by some 325,000 tonnes, yet it is also provoking protests and conflict.

Major efforts by NGOs in Latin America and globally to hold Chinese banks and companies accountable, have also led to meagre results, in spite of China's promises to the contrary. For example, in their contribution to the third Universal Periodic Review (UPR) of China, members of the Colectivo sobre Financiamiento e Inversiones Chinas, Derechos Humanos y Ambiente (CIHDA), provided evidence of human rights abuses in eighteen Chinese projects in Latin America. According to the report, negotiations with China about large-scale projects have been opaque, social participation has been neglected, and Chinese companies and banks exhibit a lack of responsiveness and openness when confronted with the adverse effects of their investments on human rights. China accepted 82% of the recommendations that resulted. However, two years later, little had changed. A May 2020 letter sent by seventy-three Latin American NGOs to Chinese authorities (MOFCOM and the Commission for Administration and Supervision of State Assets in China) identified six companies that had violated labour rights, also got no response.

4.3. Particularistic Elites and the Role of China in the Concentration of Power and Resources

While the results of the 'pink tide' elites use of Chinese investments and trade is to support national political projects, in parallel, particularistic elites have sought to establish alliances with new economic forces as a means to enrich themselves, in addition to securing their political positions. In Banik and Bull, we argued that close relations with the Chinese have a tendency to strengthen incumbent elites (Banik & Bull, 2018). Two cases in which the relationship to China has strengthened incumbent elites and, where these have moved from being national to particularistic, are Nicaragua and Venezuela. In these countries, China facilitated the strengthening of the particularistic aspects of elites, as it allowed for foreign financing without the requirements of transparency. In Venezuela, 'chavismo' originally sought a broad refunding of the Venezuelan state with the socialism of the 21st century. It promised a route away from a situation with an elite that had moved, from being national and partly institutional after the 1958 return to democracy, towards a situation where the elites were partly national (with a division of power and spoils between supporters of two dominant parties) and partly particularistic, seeking to pocket a maximum amount themselves (Karl, 1997). For a while, chavismo, appeared to be in the process of forming a new institutional elite in a model completely dependent on the continuation of resource extractivism, but also based on the inclusion of formerly marginalised groups (Ellner, 2008). Within the broad 'chavista' movement, there were also social organisations that advocated for more environmentally sustainable models, although they gradually became marginalised, and debates about the environment were drowned by the all-dominating polarisation of Venezuelan politics (Lander, 2019).

With the Maduro government, elites became gradually more particularistic, focusing more narrowly on a combination of political survival and personal gain, rather than a national project of develop-

ment. This occurred in a context of a shift from a strong dependency on the US as an oil customer and dominant political force, to a situation in which China and Russia became main lenders, investors and beneficiaries of oil supply (Rosales, 2016). This rested partly on the political considerations of reducing dependency on the US in order to create a broader policy space. It was partly a necessity, as the US introduced ever harder sanctions but it was also eventually a result of the evolution of personal illicit relations between chavista elites and a.o Russian actors (Uzcátegui & Mijares, 2020). The resulting approach by the Maduro government has been one of, not only seeking to rescue the oil sector, but also opening vast environmentally vulnerable areas to mining, inviting among others, Chinese investors.

Also in Nicaragua there has been a remarkable process of elite transformation. The government of Daniel Ortega (2006-) initially established close alliances with the local private sector. This depended to a significant extent on a combination of Ortega's pragmatism in spite of a strong ideological discourse, and being the recipient of funds from Venezuela that allowed for new investment opportunities for local business (Spalding, 2017). Yet, it also depended on actual and promised Chinese investments, particularly after the onset of Venezuela's crisis, and the subsequent reduction in its funding for neighbouring countries. Some of those investments were related to the Nicaragua Canal. The reinvigoration of old and forgotten plans for digging a canal across Nicaragua and challenging the monopoly of the Panama Canal, started in 2012 by the son of Daniel Ortega and a Hong Kong Chinese telecom billionaire. When the Hong Kong Nicaragua Development Group (HKND), owned by the Chinese billionaire, gained the US$ 55 billion concession, speculations were rife that it had the backing of the Chinese government, which had a strategic interest in challenging the US monopoly of the Panama Canal. Although the construction of the Nicaragua Canal has begun, the initial ambitions have been severely scaled down, and the Hong Kong company owning the concession has gone bankrupt. Moreover, with improvements in China-Panama relations and subsequent Chinese investments in the Panama Canal, it is increasingly unlikely that the Nicaragua Canal will ever materialise.[4] What the canal project did produce was a number of side projects with investment opportunities for business groups associated with Daniel Ortega's family and the rest of the inner circle (Thaler, 2017). This strengthened Ortega significantly, and allowed him to brutally repress the various protests from local farmers and environmentalists against the devastating impact of the planned canal. This was, however, only the prelude to his extremely brutal crushing of the 2018 social uprising that consolidated the concentration of political and economic power in the hands of a small elite among his closest allies (Martí i Puig & Serra, 2020).

It was, of course, not only in the countries with left-leaning governments that particularistic elites benefited from China's increased role. The Peruvian state has long been deeply influenced by particularistic elites (Crabtree & Durand, 2017). Chinese investments in Peru recently surpassed US$ 30,000 million.[5] This makes it second only to Brazil as a recipient of Chinese FDI in the region. Most of the investments have occurred in the mining sectors, which are replete with environmental conflicts and violations of human rights, particularly in the four large projects, Las Bambas-MMG, Toromocho-Chinalco, and Marcona-Shougang y Río Blanco-Zijin.[6] While the government of Peru consistently argues for the national benefits of Chinese investments, Peruvian business groups are also deeply involved in the mining sector (Torres Cuzcano, 2014)[7]. As in other countries, local groups do not compete for control of the mines, as they normally do not count on the technology nor have sufficient resources to become owners. However, they often act as counterparts, providing services, goods, renting land, or joining-in in other forms of relations (Aguilar-Støen & Bull, 2016). While environmental conflicts involving Chinese investments have become particularly severe in Peru, Peruvian businessmen and elites associated with them, continue to dominate the debate, allowing their interests to be prioritised ahead of broad national interests.

4.4. Institutional Elites and China's Role in National Development Strategies

In some countries, we can also observe more established or institutional elites that have been able to develop a consistent strategy towards China within the framework of a national policy and insti-

4 Costanini, 'Strong winds are blowing'

5 'El tratado de libre comercio entre los dos países ha convertido a China en el primer socio comercial, el mayor destino de exportaciones y el mayor origen de inversiones para el Perú'

6 http://elgranangular.com/blog/reportaje/inversiones-chinas-mineras-en-el-peru-y-la-violacion-a-los-derechos-humanos/

7 http://www.scielo.org.pe/scielo.php?script=sci_arttext&pid=S0252-18652014000200006

tutions that distribute roles and set rules. This may allow for continuity and urgency when confronted with major changes in the global environment. Chile is one example of this. On most accounts it is an elitist country, with a high degree of inequality, concentration of ownership, close links between economic and political elites, and a number of mechanisms to exclude non-elites from power (Clark, 2018; Amarante & Jiménez, 2015; Joignant & Güell, 2011). However, it has managed to pursue a consistent foreign policy on most accounts, that has sought to align foreign relations to domestic goals. Its attempt at positioning Chile as the 'first Latin American country' in the eyes of the Chinese, has been combined with emphasis on multilateralism and trade diversification. This has mostly been explained as a result of pragmatism in the search for markets for Chilean commodities. Yet, some also point to the underlying influence of a neoliberal ideology that has influenced elites across the political divide between the centre-left and right/centre-right distinguishing Chilean politics since the return of democracy (Rojas, 2020).

A significant focus of the relationship between Chile and China has evolved around trade, as Chile was the first Latin American country to gain unrestricted access to the Chinese market with its 2005 FTA, and China since 2010 has been by far Chile's largest trading partner (Heine, 2016). Most of the Chilean export to China is copper, although the exports of other goods increase more. Natural resource extraction has, as in other countries, generated environmental conflicts. However, with its more institutional approach, Chile has also benefitted from China's investments in technologies contributing to climate change adaptation and mitigation. For example, in February 2019, 200 electric buses made by Chinese manufacturers BYD and Yutong arrived in the capital Santiago. This will give Chile's capital the second-largest fleet of electric buses in the world.[8] As of 2019, China had invested more than US$ 2500 million in Chile's renewable energy.[9] On various accounts, Chile has gained from the relationship with China (Wise, 2020). It is difficult to argue that Chile has become more dependent or worsened its environmental policies due to China, and shifts in the global resource order.

Throughout the period, there has been a public debate in Chile about the benefits and risks of the close ties to China. In the future, the relationship may change as a result of several factors. Firstly,

8 https://www.ft.com/content/78a4936e-28b9-11e9-a5ab-ff8ef2b976c7

9 https://www.eleconomistaamerica.cl/economia-eAm-chile/noticias/10048328/08/19/Inversion-china-en-energia-electrica-en-Chile-supera-los-2500-millones-dolares.html

Latin America has among the world's largest resources of lithium, niobium and coltan,[10] needed for, not only cellphones and laptops, but also vital in the transformation of transport systems based on electric vehicles. For these, 66% of the world's lithium is found in the so-called 'lithium triangle' between Bolivia, Argentina and Chile.[11] The largest share of this is found in Chile with 8,600,000 tonnes. The manufacturing of lithium batteries is dominated by China, producing 73% of the world's lithium batteries. The main Chilean lithium-producing company, SMQ, is partly Chinese owned (24%). However, it is causing significant strain on water resources, and may result in increased environmental conflicts in the north.[12] Secondly, Chile is in the midst of a process to re-establish its constitutional framework, after major protests displayed its elitist and exclusionary nature during the fall of 2019. This may also provoke a shift in the relations to China.

Also, Bolivia forms a part of the lithium triangle, and Chinese companies are among the key possible investors. While the governments of Evo Morales and his MAS initially met massive opposition from the traditional elites in Bolivia, it is perhaps the one example of a 'pink-tide' government that has come closest to the establishment of a new institutional elite (Farthing, 2019; Wolff, 2016). Over the course of the thirteen years (2006-2019) Evo Morales held power, an elite, controlling political, in addition to, economic and other resources, emerged among people associated with the MAS and associated social movements. This has pursued a project of national development with strong state participation and significant redistribution. The reactions to Morales' decision to ignore the constitution and the result of a March 2019 referendum, and seek his fourth re-election in 2019, while electing his associate, Luis Arce in 2020, testifies to the Bolivian majority's support of the essential MAS project, but the rejection of Morales' attempt to violate its institutional foundation.

Regarding China, Bolivia has been as equally pragmatic as Chile, although based on a development model with a stronger degree of state participation. Although Bolivia had to increase its borrowing from China after the 2015 economic crisis, it has generally avoided excessive indebtedness with China, as Ecuador and Venezuela, while attempting to attract investments from a variety of different

10 https://www.opendemocracy.net/en/democraciaabierta/lithium-niobium-coltan-technological-metals-destroy-latin-american-e/

11 https://dialogochino.net/en/extractive-industries/30612-lithium-puts-south-america-at-a-crossroads/

12 https://www.dw.com/es/chile-explotaci%C3%B3n-de-litio-deja-sin-agua-a-pobladores/a-52165228

sources; a result of this pragmatic development strategy. As a result, Bolivia has enjoyed among the strongest economic growth in Latin America. Bolivia's overall weak institutions have impeded sufficient investments, for example, to develop the exploitation of its valuable lithium resources (Lunde Seefeldt, 2020). Also in Bolivia, there are certainly elites that display features of being particularistic in addition to national elites. Yet, the elite emerging over the last fourteen years of MAS leadership has arguably displayed sufficient institutional features to be able to reap the benefits of changes in the global order. What has suffered in several instances here, as elsewhere, however, is the concern for the environment and the protection of native lands.

5. Conclusion

The purpose of this paper has been to open a field of research that seeks to analyse the impact of changes in the global order on the environment from the perspective of elites. In Latin America, the main direct consequence of the current global order upheaval has been the increased role of China and the reduction of the role of the US and traditional development institutions. However, the role of China is evolving, both in terms of the sectors and activities in which it is involved as an investor, trading partner and lender, and regarding the principles and standards of their engagement. A lot of research has focused on understanding the drivers of the changes in Chinese engagement, in terms of the strategies of the Chinese leadership, in addition to the Chinese actors that are involved (state institutions, banks, companies etc.). There is also significant research on the impact of Chinese engagement in individual countries and projects. However, we have little theory to lean on when trying to compare Chinese impact in different contexts.

The framework suggested here has sought to combine institutional theory, international relations and elite theory to develop hypotheses about how domestic institutions and politics conditions the impact of the changes in what I have called an 'upheaval in the global natural resources order'.

Although local elites to a significant extent influence and condition the role of China in local contexts, the picture is not quite as gloomy as argued by students of African political economics regarding the motivations and interests behind the elites' opening for Chinese activities (Hodzi, 2018). Latin American elites differ across countries and across different historical periods. While some elites act mainly on behalf of their own or their group's self-interests (particularistic elites), others may have developed a national project and compete for influence with other elite groups (national elites). Finally, some may be leading projects and institutions emerging out of a pact or consensus that also involves non-elite or subaltern groups regarding the basic principles for control over and distribution of resources, and other norms (institutional elites).

These different forms of elites have different interests and motivations for involving China. All, may end up opening up rather uncritically with dramatic environmental consequences. Yet, the kind of elites that exist influences the relationship that can be formed with civil society groups, in addition to how attitudes may evolve

In the years to come, we will surely observe increased conflicts with Chinese actors over natural resources and the environment. Yet, we may also observe processes of more restrictive attitudes from certain elites. During Covid-19, we have seen a more assertive China that also gets involved in political discussions in their host countries. Jointly with the control over new surveillance technology, this could lead to less debate over the different impact of Chinese activities. Yet, how this will evolve depends on institutions and elites and how they relate to various groups of non-elites.

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Alternative Incentives to Environmental Compliance and Maintenance of Ecosystem Service Provision

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1. Introduction

International organisations and governments are increasing their awareness of the challenges in securing human well-being and livelihoods in the face of current rates of population growth and environmental degradation. For instance, most scenarios considering no-interventions, or a business-as-usual perspective, project that food demand will increase by 59 up to 98% between 2005 and 2050 (Valin et al., 2013). Besides this socio-economic pressure, there is also a concern related to climate change effects on food, water and energy system's security, specifically caused by extreme events and natural disasters. These include more frequent droughts, floods, landslides, in addition to outbreaks of animal and plant pests and diseases (Wheeler & von Braun, 2013). As most of the food, water and energy production occur in rural landscapes, these particular areas are facing strong pressures to fulfil society's demands.

The intensification and acceleration of human activities, such as cropping and livestock farming, resulted in changes in the natural environment mainly due to the suppression and fragmentation of natural areas. This led to the decrease of benefits provided by natural areas to human well-being, known as ecosystem services (ES), such as clean water, pure air, food, coastal protection, spiritual values, among others (Braat & Brink, 2008). Indeed, currently it is estimated that 83% of the Earth's surface has already been af-

fected in some way by human pressures (Sanderson et al., 2002). In 2016, agricultural activity occupied approximately 38% of the land surface (World Bank, 2020), and its advance is mainly towards forest systems (Grau et al., 2003), the providers of most of ES (Burkhard et al., 2009). In this sense, it is important that rural regions, where most agricultural activities are carried out, are integrated into the process of environmental conservation, to ensure the sustainability and protection of multiple benefits obtained from nature, increasing society's well-being (Lescourret et al., 2015; Garbach et al., 2016).

Part of these demands will rely on Latin America (LA) as providers, since many of its countries are major food commodity producers and a significant fraction of the worlds' food international market depends on agricultural areas within this region. The Organisation for Economic Co-operation and Development (OECD) and the Food and Agriculture Organisation (FAO) predict that by 2028, LA and the Caribbean will account for more than 25% of the world's exports of agricultural and fishery products. To attend this purpose, there will be a 22% growth in crops and a 16% growth in livestock products between 2021 and 2030, seven and two percentage points above the world average, respectively. Currently, LA and the Caribbean represent 14% of the world's agricultural production, and 23% of agricultural and fishery exports. For instance, soy production will continue to grow, and further expansion of land use for soy is projected to the detriment of pastures (FAO, 2019). In a previous forecast, it was found that land for agricultural use will grow by eleven million hectares, more than 60% for soybeans, highlighting the contributions from Paraguay and Brazil. In fact, Brazil presents itself as a country that will play a key role as one of the main suppliers of food and ethanol to the world (FAO, 2018).

2. Law Enforcement in Latin America

Over the past 50 years, the intensification and acceleration of human activities in LA have brought changes in land-use dynamics, mostly promoting the degradation and unsustainable use of natural resources, the suppression of forests and habitats, a reduction of biodiversity, among other impacts (Millennium Ecosystem Assessment, 2005; Braat & Brink, 2008). These changes directly affect the provision of ES, as they modify the properties, processes and components of natural systems. However, although these changes have been happening for many years and are likely to continue to be driven by increasing social demands, there is still little knowledge about the effects of land-use change on the provision of ES on different scales (temporal and spatial) and on the different actors involved (DeFries et al., 2010; Van Oudenhoven et al., 2012). These regional dynamics over time depend on the decisions of governments and other social actors, such as rural landowners, who organise their properties based on economic, cultural or political aspects (Stickler et al., 2013).

The implications of ES losses for the current and future human well-being have motivated some countries to create political guidelines not only to mitigate and prevent ES losses, but also to restore them. In Chile, for instance, while some regions suffer from water scarcity, metropolitan regions like Santiago have more frequent floods. These events have happened due to the loss of natural vegetation and an increase in mean temperature. As a result, the population has been facing landslides, floods in residential areas, cutting-off of water supplies and a difficulty to access public transportation (Herrera, 2019). To alleviate these problems, the Chilean government plans to implement new water management strategies through a report prepared in partnership with Adapt Chile. This report provides management guidelines for areas with risk of having droughts and floods, in addition to applying the experiences learned elsewhere in the world. The intensification of green infrastructures (based on natural elements) is also an approach considered in the report as they can increase soil moisture and water filtration (Herrera, 2019).

In Argentina, the Minimum Assumptions for the Environmental Protection of Native Forests (Argentina, 2007) was regulated in 2009 after intensive social movements of different environmental organisations. This law establishes that the different Argentine provinces must develop a participatory land-use plan for their native forests, determining its conservation, sustainable use, or allocation

to other uses, such as agriculture. In addition, the Native Forests Law, along with other legal national arrangements, such as the National Strategy for Biodiversity (Argentina, 2017), and the General Environmental Law (Argentina, 2002), are the main instruments for nature protection within private properties. Although these laws represent a great achievement towards ES maintenance, they are not fully implemented mostly due to financial limitations, resulting in continuous forest loss in key regions for ES provision. Indeed, despite the environmental legislation, the agriculture frontier is quickly expanding in Argentina. Native forests have been intensely deforested in the north of the country, where native vegetation occupies soils not naturally suitable for agriculture (Barral et al., 2020). With the advances in new agriculture technologies, and the increasing global demand for soy, the percentage of land conversion in that region from forests to cultivated lands has been rapidly increasing (Baldassini et al., 2020).

The Brazilian Law for the Protection of Native Vegetation (LPVN) is the main national regulation for the conservation of natural resources within private rural lands (Brasil, 2012). Since its approval in 2012, researchers and environmental activists make efforts to evaluate its consequences in practice (Soares-Filho et al., 2014; Stickler et al., 2013; Brancalion et al., 2016; Soares-Filho et al., 2016; Freitas et al., 2017; Vieira, et al., 2017). It establishes the protection of a certain percentage of natural areas inside a rural property, aiming to ensure the sustainable economic use of natural resources, along with the conservation and rehabilitation of ecological processes. Although in Brazil, approximately 53% of the existing native vegetation is found within rural properties, it is estimated that the environmental debt — i.e. natural areas within private rural properties deforested illegally — is around 19 Mha (Soares-Filho et al., 2014).

With these examples one can see that, although the number of environmental laws and agencies has increased in LA, poor enforcement is common and aggravates environmental problems. Governments' low capacity to implement and monitor legal compliance results in increased activities that contribute to climate change, pollution, and biodiversity loss. Without strengthening the global environmental importance, laws will fail and the fundamental human

Governments' low capacity to implement and monitor legal compliance results in increased activities that contribute to climate change, pollution, and biodiversity loss. Without strengthening the global environmental importance, laws will fail and the fundamental human right to a healthy environment will not be enjoyed

right to a healthy environment will not be enjoyed. The causes for the weakening of the rule of environmental law are the lack of coordination between government agencies, weak institutional capacity to monitor its implementation, the lack of access to information, corruption, and the stifling of civil engagement (UNEP, 2019). In addition, as mechanisms for law enforcement (coordination between government agencies, surveillance, and others) are usually costly and not always applied, some landholders choose not to comply with the rules due to the notion that no financial charges will be applied (Azevedo et al., 2017).

3. Incentive Policies and Alternative Strategies

In accordance with what has been stated and exemplified in the previous section of this chapter, researches have shown that command and control policies, based on sanctions and burdens alone, were not enough to solve the historical problems of illegal deforestation and other violations of environmental laws (Santos et al., 2012). As

stated previously, this is due to the lack of supervision, and the low economic impact of these sanctions. Thus, the adoption of incentive policies complementary to the command and control laws can assist in reducing or inverting environmental degradation. They aim to serve as alternative strategies that create private positive outcomes, monetary or not, for those landowners who maintain natural areas, encouraging more conservationist behaviours, and enhancing public benefits in the form of ES (Pagiola et al., 2012; Santos et al., 2012). Below, we describe and exemplify the main on-going incentive policies and alternative strategies in LA.

3.1. Payment for Ecosystem Services: a Common Alternative

The Payment for Ecosystem Services (PES) programmes emerged to encourage the improvement of natural resources management, and guarantee the provision of ES. Such programmes can not only assist the environmental legislation in preserving and conserving ecosystems (Santos et al., 2012), but they also represent an alternative or complementary economic activity (Pirard et al., 2010). These programmes are voluntary transactions, established in a contract, between a provider ('seller') of ES and a beneficiary ('buyer') of these services (Wunder, 2015).

The economic, social, and environmental contexts will determine the local demands for ES and the existing opportunities to implement this mechanism. Thus, PES approaches vary significantly in relation to the legal framework, compensation model, valuation method, and the scale of the programme. Salzman (2009) indicates water and biodiversity-related services, carbon sequestration for climate regulation, and scenic beauty as the main ES addressed by PES initiatives.

PES is predominantly associated with territorial management strategies and agricultural and social policies. Based on the four most common types of PES, service providers are generally rural landowners and local communities, while buyers are governments, and, sometimes, companies directly interested in provision or recovery of ES linked to their production processes. The economic foundation of PES programmes is, therefore, to remunerate landowners for the option to conserve and recover natural areas at the expense of the intensive use of their natural resources (Santos et al., 2012).

Before choosing or instituting a PES, it is mandatory to know the reality of the place where it is to be established. Thus, the elaboration of an environmental diagnosis helps in the definition of priority areas for restoration and conservation, and selection of the relevant ES to be conserved or recovered. It can also be the basis for the future monitoring of PES achievements, and thus justify the investments (Guedes & Seehusen, 2011).

In general, compensations with PES take place in three different ways: 1) direct payment (in-cash), which is the most common and attractive to providers, but its feasibility depends on available financial resources and the scope of the programme (area and number of properties contemplated); 2) indirect payment (in-kind), which reduces the PES costs, satisfactorily benefits participants, and involves the improvement of rural roads, installation of fences, construction of wells to collect water, etc. and 3) mixed payment (in-cash and in-kind), which encourages the producer with a certain direct amount of money that is complemented by the provision of services (Grima et al., 2016). Therefore, some PES programmes already overlap with the alternative of having the non-monetary subsidies described below.

PES programmes can be an interesting alternative to accelerate ecological restoration or sustain the provision of essential ES for a given location. For example, it allows rural producers who do not have available financial resources to recover the natural vegetation, an action that without this incentive would be unfeasible. However, there are some criticisms regarding PES programmes, since they often lack data to indicate to which degree environmental conditions have improved after the establishment of a programme.

Costa Rica, for instance, was the first country to establish a PES programme on a national scale and, since 1996, they worked on gradual adjustments to the programme incorporating lessons learned. The PES relies on four recognised ES provided by forests: carbon fixation, hydrological services, protection of biodiversity, and scenic beauty. The programme is an adaptation of the previous system of tax incentives for planted forests and it provides the legal

basis for compensating landowners for providing ES. The government manages the programme in collaboration with other organisations, seeking to expand its financing sources (Fonafifo, 2020).

In Mexico, an important PES programme is financed by the Mexican government and operates throughout the national territory. Its objective is to contribute to the conservation and protection of forest resources. Its strategy involves consolidating a PES scheme that favours the preservation of forests, developing the local ES market and supporting the insertion of environmental services in the international payment mechanisms (Conafor, 2016).

3.2. Environmental Offsetting

An environmental offset compensates for unavoidable impacts on natural areas of one site, by securing another site for conservation or restoration of its natural areas, managing that land over a period of time. Furthermore, environmental offsets must achieve a conservation outcome after the impact occurs. That is, the offset area should be selected and managed in a way that it secures or increases the environmental functions and assets that were impacted.

Allowing landowners to offset part of the environmental depletion resulting from the economic activities on their land can be an interesting mechanism when looking for conservation and restoration in some target areas. Within this strategy, the government would still need to play a role, indicating the regions where the offsetting should occur, mostly regions with high public interest, and ensuring that the offsetting is happening as planned. This alternative is very important for the conservation and restoration of natural resources, allowing the intensification of agricultural activities within the areas of high aptitude, and sparing some land to safeguard nature. However, offsetting mechanisms should avoid some regions that are composed solely of land uses of economic interest, compensating environmental degradation in other less profitable regions, in order to maintain natural areas that will contribute to the provision of ecosystem services and improve the quality of life of the people who live in these areas (Brancalion et al., 2016; Soares-Filho et al., 2016; Freitas et al., 2017).

In Brazil, for instance, the LPVN allows rural properties with less vegetation areas, than are legally required, to be able to finance the maintenance of vegetation in other locations, instead of within the property. This mechanism is called Environmental Reserve Quotas, and has an interesting aspect by valuing the offsetting through a quota market. This promotes the maintenance and enhancement of already conserved areas, being a more affordable alternative, when compared to restoration costs. This mechanism also has the potential to promote conservation of natural areas of public interest, as the government can prioritise where to locate the offsetting.

On the other hand, this may discourage restoration actions in highly disturbed areas (Freitas et al., 2017). For instance, regions with environmental deficits (i.e. not enough environmental protection complying with the law) greater than the vegetation surplus (within the region) are less likely to have areas restored if most landowners choose this mechanism to compensate their deficits. In a country of great territorial extension such as Brazil, offsetting without explicit regional boundaries may result in the permanent loss of biodiversity, ecological functions and ES in highly degraded regions with on-going intensification of agricultural activity, since landowners can choose to use as much of their land as possible for economic activity. Environmental Reserve Quotas are, therefore, a more recommended alternative in regions with properties with greater legal compliance (Vieira et al., 2017).

3.3. Environmental Certification

Among the mechanisms to achieve the goals of environmental policies, there is a variation in the dependency of state interventions. This dependency is higher in tributary interventions, such as environmental taxes and subsidies, and lower in the case of self-regulated or voluntary programmes (e.g. PES). Environmental certification and labelling programmes are market instruments that can be framed as final demand instruments, through which consumers can recognise certain characteristics of social responsibility or the environmental footprint of products or services

(Huber et al., 1999). These programmes enable the monitoring and verification of certain practices by third parties from a set of responsibility norms and social justice standards. Certification programmes are usually guided by the transition to more sustainable practices and rely on the implementation of an environmental management system, which has room for continuous improvement and adaptations.

A positive outcome of certification programmes is the clear establishment of social and environmental standards that enhance international competitiveness of products and enforce the compliance of standards and norms in regional markets. Certification programmes vary in their approaches to the quantification of impacts, participatory engagement, and the flexibility to be adopted by companies of any size. Environmental consciousness, cost-savings in energy, materials, and waste management are some of the motivations for companies to search these programmes. Additionally, another high-impact factor that influences companies to pursue certification and labelling programmes is the consequent improvement of their export performance. For these reasons, environmental agencies and non-governmental organisations in LA have joined efforts to further develop the criteria and norms for environmental certification and labelling processes.

There are several examples of well-established certification programmes in different areas, such as the Fairtrade, the FSC (Forest Stewardship Council; fsc.org), the Rainforest Alliance (rainforest-alliance.org), and the MSC (Marine Stewardship Council; msc.org). On the other hand, more regional initiatives can also present a substantial contribution to local development, for example the label that identifies products from organic agriculture. It is common for each country to have their own law and regulations: in Argentina there is the *Sello Orgánico Argentina*[1], in Brazil it goes as SisOrg[2], and in Chile it is the *Certificación de Productos Orgánicos Agrícolas*[3].

There are many challenges being recognised in certification systems. One of them is the establishment of standards or intended results. Instead, there has been a shift towards defining desired outputs, allowing some flexibility in how to achieve results (Dilley, Peyser & Kennedy, 2012). To ensure compliance with the certification, evaluating enterprises' performance is fundamental, but financially unfeasible in many cases. Also limiting, is measuring the impacts of certification programmes in the product supply chain as well as in overall sustainability (Waldman & Kerr, 2014).

3.4. Subsidies (Monetary and Non-Monetary)

Incentive policies can also occur through the provision of subsidies, which are fiscal or financial incentives that aim to promote the development of an activity that is economically interesting for society (Motta et al., 1996). In the case of the subsidies covered in this chapter, the subsidy would be provided to rural landowners or companies that adopt actions that are friendly to the conservation of biodiversity and ES.

Subsidies can be provided at different scales. In a more local perspective, the municipal government can promote a reduction of taxes and fees related to the marketing or transportation of agricultural products, for example. This type of action can also be incorporated into a PES programme with in-kind compensation. On a more regional or even federal scale, governments could provide subsidies for activities that are less degrading for the environment. For example, rural properties that adopt sustainable soil management practices or use cleaner technologies could get advantages in accessing credits designed by the government or even get some kind of bonus in the sale of their products, whereas more degrading activities would not have these benefits. The objective is to benefit those who changed their production systems in favour of the environment. Thus, their products may have greater added value or reach a lower cost to the final consumer, who would prefer the cheapest and most sustainable product (Motta et al., 1996).

In Colombia, income tax is deducted for companies that invest in forest recovery, in addition to an exemption for income generated by the sale of wind energy, ecotourism and the use of forest plantations. Costa Rica has developed a plan with specific incentives for the management of natural vegetation, such as an exemption from the payment of land tax and asset tax, and protection against invasion of areas dedicated to forestry activities (Juras, 2009).

1 http://rganicoargentina.magyp.gob.ar/

2 https://www.gov.br/agricultura/pt-br/assuntos/sustentabilidade/organicos/regularizacao-da-producao-organica

3 https://www.sag.gob.cl/ambitos-de-accion/certificacion-de-productos-organicos

4. Alternative Allocation According to Socio-Environmental Conditions

The rural area within LA encompasses a diversity of socio-ecological systems, with different environmental conditions, livelihoods, and cultures. These conditions go from very profitable lands, belonging to large properties with intensive monocultures and few natural areas remaining, to small-holder properties with agroforestry systems and several generations of the same family working on the land. Such social-environmental heterogeneity must play a role in the decision for which incentive policy or alternative environmental strategy should be taken. Here, we propose that 1) the choice for one or a combination of strategies should be context-dependent, and 2) this choice should be complementary to law enforcement, to effectively promote socio-environmental sustainability in the rural landscapes of LA. It is worth mentioning that the incentives and alternative strategies listed above can and should be adopted in an interconnected manner. In this way, it would be interesting if multiple types of incentives were combined in the same region.

There is a common recognition that watersheds relevant for water supply (with drinking and non-drinking purposes) are priorities for the establishment of PES programmes (Salzman 2009, Santos et al., 2012). To ensure continuous water provision, in quantity and quality, monetary PES schemes should ensure the conservation of natural areas buffering water bodies within these watersheds. Additionally, they should incentivise the cultivation of perennial crops or, at least, require the maintenance of vegetation covering the soil throughout the year, to avoid erosion. Another condition for the success of such PES schemes, would be to clearly associate their achievements with the landowners' preferences and concerns regarding water resources (Santos et al., 2012). Awareness of the benefits in maintaining the provision of water required both for their own consumption and for the functioning of their production systems, through irrigation of crops and water for livestock, can motivate the adherence to these schemes. On the other hand, non-monetary incentives could be used to improve environmental conditions. For example, the supply of fencing can prevent cattle or other livestock from degrading the vegetation buffering water bodies. Alternatively, the provision of seedlings to restore these buffer areas could contribute to the maintenance of the water provision without demanding further investment from landowners. In addition, the maintenance of unpaved roads and rainwater catchment points should also be seen as non-monetary alternative incentives, since many rivers are often silted-up by the poor quality of these roads and intensive rain.

Rural properties located within priority areas for biodiversity conservation, or near already established protected areas, should receive additional incentives for the implementation of environmental certification. They should get reduced costs to ensure that those properties transition to economic activities that are consistent with the protection of their nearby ecosystems and biodiversity. These certifications for the biodiversity-friendly activities within these properties will allow the products to reach new markets, leading to economic returns to the landowners, and at the same time safeguarding nature. Moreover, governments should encourage environmental offsetting programmes to target the conservation and restoration of natural areas within these rural landscapes, to favour landowners that have more natural areas within their properties.

In addition, properties with extensive areas with natural vegetation that also fall within priority areas for biodiversity conservation could also be the target of non-economic incentives, such as the creation of private natural reserves. For example, governments could increase investments in tourist infrastructure to promote ecotourism and environmental education activities in these regions (Souza et al., 2012). Moreover, as these private natural areas guarantee the maintenance of land ownership, there could also be an exemption from taxes for these landowners as their preserved natural areas would be assuring and providing benefits to society and people's well-being.

On the other hand, incentives for environmental adaptation aimed at large properties should be based on changing their management practices, such as the adoption of conservationist practices and the reduction or elimination of the use of pesticides and synthetic fertilizers, which improves the provision of multiple ES in the landscape (Garbach et al., 2016). In large production chains, such as soy, sugarcane, and livestock, it would be interesting to have local, national, or even international agreements, adding value to the product

for those properties that carry out activities that are environmental friendly, through environmental certifications (e.g. Fair Trade, FSC; Sebrae, 2015). Adding value to the product is a way of gaining the attention and commitment of landowners, as they will have direct economic benefits. Within regions of high suitability for agricultural activities, any monetary payments under PES schemes should only be done for small-holders, as they correspond to the portion of landowners with the lowest financial and material power to bear the costs alone of conservation and restoration of natural areas.

The proximity to roads and other infrastructure facilitates and reduces the cost of transporting agricultural production, in addition to accessing agricultural inputs, possibly increasing the profit in properties near them. Thus, areas close to existing infrastructure are preferable for intensifying agricultural activities, reducing the interest in their destination for the maintenance of natural environments. In this sense, although any monetary incentive to conserve natural areas is unlikely in these regions due to the high profitability of the lands, there is a need to ensure the sustainability of agricultural activities in these regions, which could also be done with green certification and non-monetary incentives.

There is no immediate solution to solve all the problems related to the loss of biodiversity and ES, but ensuring that the minimum established by law is met is a fundamental step (Strassburg et al., 2017; Vieira et al., 2017). The alternative actions mentioned here, which aim to create incentive policies for conservation considering the different profiles of rural landowners and the socio-environmental systems in which they are embedded, constitute pathways that can be carried out with social mobilisation, economic recognition, and political will.

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Geopolitics and Forestry Finance: a Look at the Amazon Rainforest

KATERINA ELIAS-TROSTMANN

1. Introduction

Climate change is one of the world's most pressing environmental problems today. Extreme weather events and the failure to tackle climate change have consistently featured in the top five risks of the World Economic Forum's Global Risk Report from 2016-2020[1]. Meteorologists have estimated with high certainty that 2020 is set to be a tenth top year in terms of global temperature records (NOAA, 2020).

Forests are an important regulator of global carbon levels, contributing to its stabilisation. Additionally, they provide vital ecosystem services and are a source of biodiversity, species habitats, in addition to livelihoods for forest communities (Pereira, 2019). Forests act as carbon sinks, as they sequester carbon. When cut, however, they are a key source of greenhouse gas emissions (IPCC, 2019).

The Amazon rainforest is the world's largest tropical forest, covering an area over six million square kilometres across eight countries: Brazil, Peru, Bolivia, Ecuador, Colombia, Venezuela, Guyana, and Suriname. The Amazon basin is home to 10-15% of the world's land biodiversity, contributes to 15% of the freshwater input into the oceans, and stores an estimated 150-200 billion tonnes of carbon (Nobre, 2016). As the world's largest rainforest, the Amazon is considered a global natural asset and its preservation and restoration is key for mitigating large-scale climate change (Pereira, 2019).

1 All World Economic Forum Global Risks Reports are available here: https://www.weforum.org/global-risks/archive

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Climate change impacts are already being observed; the average temperature over land for the period 2006-2015 was 1.53°C higher than for the period 1850-1900 (Pereira, 2019). The risks pertaining to climate change are therefore two-fold: the failure of global powers to mitigate climate change, and the failure to adapt to climate impacts.

Within this context, Brazil and Colombia have a globally significant role to play as custodians of 75% of the Amazon. Brazil is home to 65% of the Amazon, whilst Colombia covers roughly 10% of the rainforest. Both countries have seen sharp increases in deforestation recently, which was up 97% in 2018 from 2016 in Colombia, whilst deforestation rose to an eleven year high by over 30% in the Brazilian Amazon in 2019 (IDESAM, 2018; INPE, 2019).

In particular, the Brazilian government is considered a major agent for implementing deforestation protection measures, such as command and control policies, and promoting sustainable land use. Brazil has had success in these areas, having reduced deforestation in the Amazon by over 70% between 2004 and 2018 by launching comprehensive policies and developing world-leading deforestation monitoring systems (Stabile, 2020). Given the importance of reducing Amazon deforestation as a climate mitigation strategy, it is possible to argue that Brazil affects global geopolitical risks, since its ability or inability to control deforestation bears consequences for the global effort to address climate change.

Recent responses by governments, consumers, investors, and buyers would confirm this perception. In May 2020, over forty international companies and associations, including the British Retail Consortium and the UK's largest supermarket Tesco, signed an open letter urging the Brazilian Congress to reject Provisional Measure 910 (now changed to PL 2633/2020). The so-called 'land-grabber's law' 'would facilitate legalization of illegally occupied government land, and even allows titling on the basis of mere "self-declarations"' (Fearnside, 2020). The letter highlights the potential consequences of the bill that 'would encourage further land grabbing and widespread deforestation, which would jeopardise the survival of the Amazon and meeting the targets of the Paris Climate Change Agreement and undermine the rights of indigenous and traditional communities' (An open letter on the protection of the Amazon, 2020). Ultimately, however, such a bill would have economic and commercial impacts, destabilising trade relations for Brazil, since it would 'put at risk the ability of organisations such as ours to continue sourcing from Brazil in the future'.

Most recently in June 2020, European investors managing over US$ 2 trillion in assets threatened to divest from Brazilian beef producers, grains traders and government bonds if deforestation continues to rise at the current accelerated pace. Another, shortly followed this statement in the same month, when a group of twenty-nine global investment firms managing US$ 3.7 trillion in assets called for meetings with Brazilian diplomats to press for greater protection in the Amazon.

Furthermore, in an unprecedented move, three of Brazil's largest private banks Bradesco, Itau and Santander joined forces to collectively address Amazon deforestation. In response to domestic and international pressure, they proposed ten measures to incentivise sustainable supply chains and basic infrastructure in the region to the Amazon Council (chaired by Brazil's vice president). Also, in September 2020, The Brazilian Coalition on Climate, Forests and Agriculture, a movement formed by 200+ representatives from agribusiness, the financial sector, civil society and academia, submitted a set of policy proposals to the Vice President focused on strategic actions seeking fast, permanent reduced deforestation in the Amazon.

The above examples illustrate recent private and financial sector actions in response to Amazon deforestation. In prior years, concerns for halting deforestation in the Amazon had spurred action mainly from international NGOs and donor governments, influencing the establishment of philanthropic and public finance facilities. This is best exemplified by the creation of the Amazon Fund in 2004, which was set up as the largest REDD+[2] mechanism to specifically reward Brazil for its large-scale deforestation reduction, with Norway and Germany as it largest donors. However, with investors increasingly being held accountable for their ESG performance, this has prompted greater action from the private sector.

This chapter explores how the need to preserve and restore the Amazon rainforest shapes global flows of finance. First, we summarise the different development phases in the Amazon since the

2 Reducing emissions from deforestation and forest degradation (REDD+).

start of the 20th century. We then look at the largest and most traditional sources of funding for the Amazon, particularly global climate finance and philanthropy. Finally, we discuss new models of funding that have emerged recently, which presume a greater participation of the private sector.

2. The Amazon Rainforest and Geopolitical Interests

In this first section, we examine the development model of the Brazilian Amazon only, given that 60% of the biome is within Brazilian borders. What is more, Brazil's management of the Amazon has been the focus of international interest and model for tropical rainforest deforestation control policies.

The Brazilian Amazon has long been subject to competing interests and visions for land use and economic development from industrialists, the military and politicians — at local, regional and national scales. Within this context, deforestation is a complex phenomenon shaped by the geopolitical interests of land use and economics (Araujo, 2019).

In the Brazilian Amazon, early industrial economic development began in the second half of 19th century, with the expansion of rubber extraction and exportation of latex. Up until the 1910s, the Amazon was the global source of rubber production, supplying roughly 60% of the world's wild rubber (Barham, 1994). During this period, the region saw rapid economic development and accumulation of concentrated wealth in key cities such as Manaus and Belem (de Sartre, 2009; Barham, 1994). The Amazonian rubber boom collapsed after the British relocated rubber production to plantations in Asia (de Sartre, 2009).

This first phase of economic expansion marked the Amazon's characteristic of being guided by and depending on international economic interests. Thereafter, three further phases drive the development of the Brazilian Amazon (Toledo, 2017): developmentalism (1953-1989), socio-environmentalism (1990-2009), and post-environmentalism (2010-2019).

2.1. Developmentalism (1953-1989)

The Brazilian Amazon began to gain political prominence again after World War II. After the collapse of the rubber boom, the Amazon region had experienced sluggish economic growth; authorities and the local elite had not succeeded in distributing and investing rubber profits into long-term local development strategies (Barham, 1994). To place the Amazon firmly at the centre of an economic development plan, then-President Getúlio Vargas 'formalised the first narrative referring to colonisation of the Amazon in close connection with nationalist discourse' (de Sartre, 2009), thus associating the Amazon with economic opportunities and settlement.

Thereafter, the military government (1964-1985) pursued expansion into the Amazon with the aim to strengthen regional integration with national security (Pereira, 2019; de Sartre, 2009; Toledo, 2017). This expansion came at the expense of the protection of the environment and indigenous communities. The military government's interests were particularly driven by mineral wealth, energy security, and the need to establish a more firm state presence in the region. Several economic plans and incentives were implemented, such as the Operation Amazonia in 1966 and the National Integration Programme in 1969, which promoted aggressive colonisation and encouraged vast deforestation. Government therefore was the primary driving force of human occupation and thus also deforestation in the Amazon (Becker, 2005). This established a firm association between the Amazon region and security interests, contributing to 'forming the theoretical foundation of modern Amazonian geopolitics' (de Sartre, 2009).

2.2. Socio-Environmentalism (1990-2009)

This period is marked by the joining of forces between local and international players in their efforts to protect the Amazon, which leads to new socio-economic development models that integrate environmental protection measures.

The late 1980s saw the end of the military government in 1985 and the rise of socio-environmental concerns in the Amazon.

A number of factors resulted in Brazil becoming 'the emblematic case for discussion of third world environmental problems' (Keck, 1995). Deforestation was increasing, which threatened the livelihoods of communities who depended on forests, such as rubber tappers and indigenous communities.

These communities were not passive and began to respond, however. In the westernmost state of Brazil, deep in the Amazon rainforest, a growing rubber tapper movement started to organise in the state of Acre. Led by unionist Chico Mendes, this small group of rubber tappers marked the start of Brazil's environmental movement. Initially borne out of a labour movement to protect the livelihood of rubber tappers, Mendes was key in uniting forces with indigenous communities to mobilise support for the protection of the Amazon and tropical rainforests. With the support of the Environmental Defence Fund and the National Wildlife Federation, Mendes met with the World Bank, the US Congress, and the IDB in 1987, who endorsed Chico Mendes's proposals for 'extractivist' reserves[3] (Toledo, 2017).

Further action was taken in the late 1980s and 90s to 'impress upon the international community the image of Brazil as a world leader on environmental protection' (Perruci, 2007). The Rio 92 Summit further engrained the new 'socio-environmental model' as the development agenda for the Brazilian Amazon. The PRODES[4] deforestation satellite monitoring system was launched in 1988, large swathes of land for the Yanomami indigenous people were demarcated, the Brazilian Ministry for Environment was established in 1992, and the National Council of the Legal Amazon was created in 1995. Brazilian diplomacy played a delicate balancing act of addressing nationalist interests whilst meeting transnational environmental concerns (Perruci, 2007).

Deforestation peaked in 2004 and 'reducing deforestation in the Amazon was at the core of the Brazilian government's agenda from 2005 to 2009' (Viola, 2019). A series of land use reform policies were introduced to control forest destruction, including the highly successful Plan for the Protection and Control of Deforestation in the Amazon (PPCDAm). From 2005-2014, 'the area of sustainable use conservation units increased 77%, and the area of indigenous territories 46%. This period also saw an increase of 97% in the areas allocated to rural settlements, while total deforestation in Brazilian Amazon increased 14%' (Toledo, 2017). Annual deforestation in the legal Amazon decreased by 70%, 'while soybean and beef production increased by 130% and 72%, respectively' (Stabile, 2020).

3 Extractivist reserves, RESEX, are protected forest areas used by traditional and forest communities, whose livelihoods depend on forest products, such as rubber, nuts and oils.

4 PRODES is the Brazilian government's Satellite Monitoring Project of the Brazilian Amazon Forest project, which has monitored the loss of primary forest in the Brazilian Legal Amazon since 1988. It is the largest and most stable historical series for tropical deforestation monitoring data in the world.

2.3. Post-Environmentalism (2010-2020)

Finally, the post-environmentalist phase is marked by a return to large-scale infrastructure development, with the aim secure economic growth. The early 2000s saw 'the establishment of a network of hydroelectric power plants, and the rapid expansion of agribusiness and large-scale mining operations' (Toledo, 2017). These works affected local and indigenous populations, whose participation is limited to philanthropic programmes or public consultations (Toledo, 2017). Another key pattern that continued throughout the 2000s is the continued concentration of landholding in the Amazon (Toledo, 2017). Most recently, the Bolsonaro administration introduced a range of sweeping policy changes, which has resulted in undermining the government's ability to enforce deforestation control policies. As a result, Brazil is set to reach record-high deforestation in 2020.

Regardless of the division of the three economic development phases, 'deforestation rates were persistently high throughout the 1990s and the first half of the 2000s' (Pereira, 2019). Between 1985 and 2018, 65 million hectares of native ecosystems and vegetation had been cleared for agriculture and livestock use (MapBiomas, 2019). This conversion enabled Brazil to emerge as an agricultural powerhouse, allowing for improved social development in some regions, but increased inequality and environmental destruction in others (Stabile, 2019). As a result, deforestation today in the Amazon is largely driven by economics, land speculation, market forces, and private capital gains.

Currently, any willingness to 'impress upon the international community the image of Brazil as a world leader on environmental protection' has dissipated. The administration is focused on 'reclaiming sovereignty' in the Amazon, a resumption of a seventy

year old narrative. Environmental protection and controlling deforestation are regarded as a hindrance. With the suspension of the PPCDAm and significant public budget cuts, deforestation has rocketed. The official annual deforestation rate is set to be released by year end, but NGOs and specialists are already predicting that 2020 will have seen the worst deforestation, surpassing 14,000 square km. This would set Brazil's deforestation control back by years, comparable to deforestation levels in 2006, which were above 12,000 square km.

3. Sources of Forest Finance and Sustainable Development in the Amazon

The evolving development models described above impressed their mark on international interests in the Brazilian Amazon. This, in turn, influenced donors and philanthropists' sustainable land-use strategies to prioritise the Brazilian Amazon.

There is a plethora of analyses on the various financial flows for the Amazon rainforest in Brazil. In this chapter, we have used two main data sources: the ODI Climate Funds Update (ODI, 2020), which tracks multilateral funds only, and data from the Gordon and Betty Moore Foundation's project on conservation funding in the Amazon (Strelneck, 2017).

3.1. Who Provides Finance for the Amazon?

The Gordon and Betty Moore dataset examines '43 different funders who invested approximately US$ 1.07 billion for the 2013-2015 time period' in the Amazon biome (Strelneck, 2017). Bilateral and multilateral funders made up the majority of the funding sources, followed by foundations (Figure 1). The study finds that the top ten funders are Germany, Norway, US, GEF, Gordon and Betty Moore Foundation, CAF, UK, Fundo Vale, WWF, and the IDB. This indicates a preponderance of the international interests regarding protection of the Amazon rainforest, as mentioned earlier.

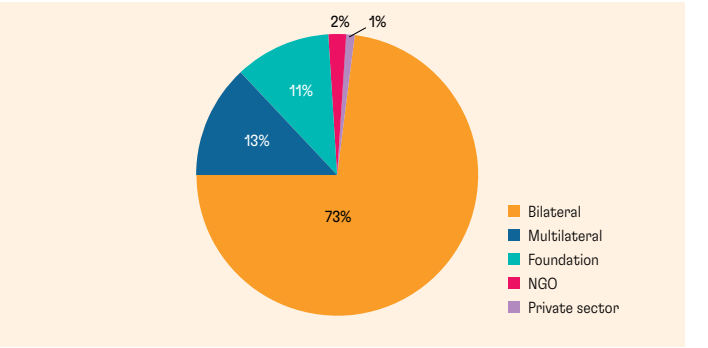

Figure 1
Total of funding by type 2013-2015.
Source: (Strelneck, 2017).

3.2. Brazil at the Heart of Amazon Protection Efforts

Brazil lies at the heart of donor interests in terms of Amazon protection, since over 60% of the Amazon is within Brazilian territory. According to the ODI Climate Funds Update, Brazil was the main recipient of the approved funding, with the overwhelming majority (81%) of total approved financing for forestry projects, followed by Peru (9%), and Ecuador (4.5%) (Figure 2).

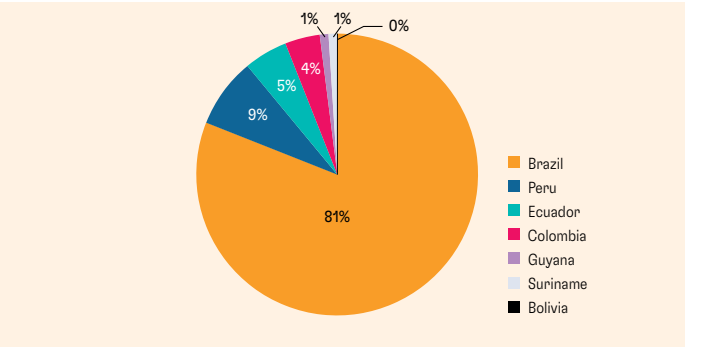

Figure 2
Totals of multilateral funding by country 2008-2018.
Source: (ODI, 2020).

According to the ODI Climate Funds Update, between 2008-2018, over US$ 1.8 billion dollars was approved through multilateral funding in total to the Amazonian countries Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, and Suriname. Of this, US$ 1.07 billion (59%) went to projects categorised as 'forestry', encompassing a range of strategies.

This pattern is also observed in the Gordon and Betty Moore data, which identified that Brazil was the largest recipient, with over 53% of the total funding, followed by Peru (16%), Colombia (8%), Ecuador (7%), and French Guyana 7%) (Figure 3).

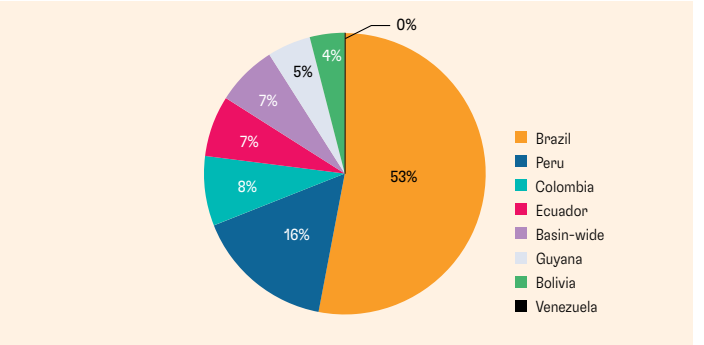

Figure 3
Total funding by country 2013-15.
Source: (Strelneck, 2017).

3.3. Government and Civil Society — Key for Implementation

According to the Gordon and Betty Moore Foundation data, the types of recipient institutions are mainly made up of government, NGO, private sector, and academic institutions. National and sub-national governments received 63% of the total funding. NGOs were the second largest recipient type, a third of all funding.

3.4. Priority Strategies

The data from the Gordon and Betty Moore Foundation also provides a time series analysis from 2013-2020. When analysing these data, we find that only eight strategies out of a total of twenty-three made up 72% of the total funding (Table 1). Protected Areas Creation and Management, REDD Programmes and Policies, and Integrated Landscapes Land Use Planning were the top three preferred strategies, receiving a combined 45% total funding for 2013-2020. This reflects funders' long-standing priority of protected areas as a key strategy (Strelneck, 2017). However, the share of total funding across the top eight strategies also varies over time.

Strategy	Total Funding	% of Total Funding	
Protected Areas Creation and Management	$ 447,654,111.9	18%	72% of total funding
REDD Programmes and Policies	$ 420,101,007.0	17%	
Integrated Landscapes, Land Use Planning	$ 252,966,504.2	10%	
Compliance/Enforcement	$ 230,906,451.9	9%	
Indigenous Peoples and Lands	$ 215,507,685.5	9%	
Other	$ 186,233,452.2	8%	
Rural Livelihoods	$ 124,025,402.3	5%	
Capacity Building, Education, Training	$ 114,702,668.3	5%	
Public Policy Development and Administration	$ 104,573,247.9	4%	
Timber/Forestry	$ 98,618,061.6	4%	
Analysis: Strategic, Economic, or Technical	$ 47,925,873.6	2%	
Commercial Agriculture	$ 35,984,123.3	1%	
Governance Systems	$ 30,378,865.7	1%	
Extractive Resources (Mining, oil/gas+)	$ 25,117,700.6	1%	
Climate Change Mitigation (non-REDD)	$ 24,333,197.2	1%	
Finance Mechanisms	$ 21,138,979.6	1%	
Big Infrastructure (roads, dams, etc.)	$ 20,393,124.4	1%	
Payment for Ecosystem Services (PES)	$ 16,534,810.3	1%	
Science Research and Analysis	$ 11,879,967.6	0%	
Upstream Markets and Value Chains	$ 11,597,504.3	0%	
Climate Change Adaptation	$ 10,870,647.9	0%	
Species Conservation	$ 10,623,664.9	0%	
Public Communications andTransparency	$ 9,522,989.2	0%	

Table 1
Total funding by conservation type.
Source: (Gordon and Betty Moore Foundation, 2017).

Notably, less than 6% of funding from 2013-2020 focussed on deforestation drivers (sustainable timber/forestry management, extractive resources, and big mining) and in terms of economic incentives, only 1.5% of total funding supported payment for ecosystem services.

3.5. The Amazon Fund: a Demonstration of Geopolitical Significance

The creation of the Amazon Fund was among one of the most significant geopolitical developments in terms of finance for the Amazon.

In 2006 at the 12th UN Conference of Parties, the Brazilian delegation proposed the Amazon Fund. The aim was to create an incentive for Brazil and other tropical-forest developing countries to continue implementing measures to reduce deforestation and contribute to avoid greenhouse gas emissions.

The Amazon Fund's development can be linked to the increased recognition of the role that forests play in climate mitigation, in addition to Brazil's success in having significantly reduced deforestation, it also signalled Brazil's recognition that it required external support to protect the Amazon. When created in 2008, the Amazon Fund was set up as the world's first large-scale, results-based payment, financing mechanism, with the intention to support Brazil's sustainable land-use policies. As such, it achieved a tricky balance of upholding national sovereignty, whilst addressing issues of global interest.

From a geopolitical perspective, the Amazon Fund cemented Brazil's recognition as a country with the technical ability and political leadership to not only control deforestation, but also to promote sustainable land use — strategies Brazil had been implementing since 2004. The Amazon Fund was designed in such a way that it integrated with Brazilian national policy; its set-up also recognised the credibility of Brazil's National Bank for Economic and Social Development, its world-class satellite monitoring systems, and a vibrant civil society to verify results and support project implementation.

For over a decade, the Amazon Fund channelled over $1 billion in funding from large donors such as Norway and Germany. To date, the Fund has supported 103 projects, increased regional GDP, and grown areas under conservation, protection, and held by indigenous communities. However, this is not to say that the Amazon Fund is a 'silver bullet'. Many studies have highlighted opportunities for improvement. One in particular expressed the need for the Fund to 'provide incentives to projects that deliver deforestation reductions within the timeframe of the project [...], as the political climate in Brazil [...] and other countries has become more hostile to environmental issues' (Correa, 2019).

In 2019, Norway and Germany decided to suspend their contributions to the Amazon Fund in response to the Brazilian's governments changes made to the Fund's governance structure. A presidential decree passed in April 2019 (Decree n. 9759/2019) extinguished all committees created by decrees or other administrative acts before January, 1st 2019, including the Amazon Fund's Guidance Committee and Technical Committee (Amazon Fund, 2020). The two Committees were responsible for project selection as well as monitoring and reporting. Their absence renders the Fund's governance structure unfeasible.

Together, Germany and Norway represent 99% of the total Fund's contributions. Without the Amazon Fund resources, a slash in government budget for deforestation policies, and spiking deforestation, Brazil has gone from deforestation 'hero' to 'zero' in the eyes of the international community.

4. Emerging Models of Forestry Finance

The above sections have demonstrated the important role that bilateral and multilateral donors have played in channelling billions of dollars of public finance for the protection of the Amazon rainforest. In terms of implementation, government and NGO actors are the most prominent, and have a central role in regional sustainable development.

The current suspension of the Amazon Fund and budget cuts for environmental protection by the Brazilian government, therefore, change this scenario entirely. With one of the largest international funding mechanisms on hold, this has put a strain on available resources for subnational state governments, civil society organisations, and local community organisations.

The current suspension of the Amazon Fund and budget cuts for environmental protection by the Brazilian government, therefore, change this scenario entirely. With one of the largest international funding mechanisms on hold, this has put a strain on available resources for subnational state governments, civil society organisations, and local community organisations.

The financing scenario for protected areas and deforestation control is therefore in jeopardy. Within this new context, opportunities for new financing models that presume greater private sector involvement are emerging.

Overall, private climate finance accounts for a small portion of the overall finance climate, in addition to forestry finance. According to the latest figures from the OECD, private finance made up 18.5% of the overall US$ 78.9 billion climate finance mobilised between 2013-2018 (OECD, 2020). During 2016-18, 3% of the private finance mobilised went towards agriculture and forestry, whilst the majority focused on energy (averaging 60% per year) (OECD, 2020). A recent report by Kois Invest identified the potential barrier for deploying large-scale private capital: 'one of the biggest challenges to private sector investment in sustainable land use is identifying currently-investable projects or projects at the "tipping point" ' (Kois Invest, 2018).

To overcome this barrier, two financial models are evolving that are already demonstrating significant results in the Amazon: blended finance instruments and impact investing.

4.1. New Models of Forestry Finance: a Geopolitical Response to Amazon Deforestation

4.1.1. Blended Finance: the Case of Partnerships for Forests

Blended finance is a financial mechanism that can help bridge the climate and development finance gap. By using public climate finance, the aim is to de-risk investments to mobilise additional private capital that traditionally would not invest in development or climate outcomes (OECD, 2020).

One example developed and funded by the UK government is Partnerships for Forests (P4F). The programme's purpose is to 'support a private-sector-focused intervention to help transform agricultural supply chains and build sustainable business models in Latin America' (UK BEIS, 2018). By injecting an initial £19.3 million of public climate, overseas development assistance (ODA), the expected outcomes include reduced deforestation by bringing 3 million hectares of land under sustainable management and developing a portfolio of bankable projects to unlock £90 million of private capital into sustainable land-use investments.

To achieve this, P4F is designed to leverage a 'bottom-up, business-focused approach' that will strengthen the enabling environment to create replicable and scalable business models that enable forest protection and native ecosystem restoration. P4F selects projects in four areas: sustainable soy supply chains, sustainable cattle intensification, non-timber forest products, and forest restoration. Through grants and technical assistance, the aim is to incubate and accelerate sustainable land-use business models in these four, thematic-priority areas.

P4F's investment strategy focuses on a four key pillars:

1. SUPPORT PARTNERSHIPS AND INVESTMENTS: foment collaboration between the public, private, civil society and local communities to promote sustainable land use business models.
2. ENABLING CONDITIONS: invest in projects that help overcome barriers in policy, technical capacity or access to finance, to improve the business environment and unlock financing for sustainable land-use models.

3. DEMAND-SIDE MEASURES: stimulate demand for the four, thematic-priority areas.
4. LEADERSHIP, COLLABORATION AND LEARNING: positioning P4F as a thought leader, disseminating lessons and promoting replication of results.

The programme results to date are very positive. Rated an A+ in the UK government's annual reviews of 2018 and 2019, P4F is delivering results ahead of expectations. As of 2020, the programme had mobilised £333,363 in private finance and is on-track to meet its target to bring 3 million hectares of land under sustainable land use management.

P4F has developed a portfolio of investments across Brazil, Colombia, and Peru with a diverse range of project partners, including from the private sector. The facility has chosen investments that 'pose challenges that are unique to the relevant value chain or region. But when those challenges are successfully addressed, these initiatives can then be replicated elsewhere under similar circumstances' (Partnerships for Forests, 2019).

For example, P4F is supporting PECSA in the Amazon region of Mato Grosso to promote sustainable cattle intensification. By supporting the company to transition to a new production system, enhance operational efficiency and prepare for scale-up, the aim is to support PECSA's expansion to drive sustainable cattle farming at scale. This is a key strategy to limit deforestation, as sustainable cattle intensification is considered a potential solution to reduce emissions. This could be achieved by increasing beef productivity in the Amazon from 60 kg/ha/yr to 150 kg/ha/yr on just 21% of existing rangelands (21 million hectares), freeing-up and allowing crop expansion without any new deforestation into 4 million hectares of land (Stabile, 2020). Sustainable cattle intensification in Mato Grosso State has already resulted in increased cattle production using 80% less land (Costa, 2018).

The programme's ability to attract a diverse range of partners along the entire value chain, from producers and large traders to supermarkets, underlines that blended finance can be an effective tool to private sector actors in sustainable land-use investment.

In this case of Partnerships for Forests, the financial instrument leveraged is grant financing. However, blended finance can leverage other financial mechanisms to mitigate risks, provide direct funding and results-based incentives (Table 2).

Instrument	Description	Examples
Risk mitigation	Mechanisms to protect private investors from specific risks at business, programme and/or country level	Guarantees Insurance Securitisation Derivatives
Direct funding	Concessional direct investment into a company or project delivering social or environmental benefits, through the provision of equity, debt and/or grants	Equity Debt Grants
Results-based incentives	Instruments that incentivise private investors or companies to invest in high-impact sectors	Performance-based contracts Impact bonds Advanced market commitments

Table 2
Blended finance instruments to attract private investment.
Source: (Kois Invest, 2018).

In their 2018 report, Kois Invest identified nineteen blended finance facilities focused on forestry and sustainable land use. Of these, eleven channelled investments into 'mainstream asset classes, whilst eight funds focused on forest protection model through carbon credits and payment for ecosystem services' (Kois Invest, 2018). The facilities focused on the mainstream asset classes tend to mobilise large ticket sizes into well-established natural resource management industries, such as sustainable timber. The expected returns range from 6-15%. The other eight funds tended to be smaller than those focused on mainstream asset classes, focusing more on early-stage investment, generating returns between 6-10% (Kois Invest, 2018).

However, significant gaps remain for blended finance to achieve transformative, systemic outcomes. Some of the factors that need to be addressed include:

1. Better coordination between financing actors (multilateral development banks, bilateral donors, philanthropic foundations) to support a 'financial value chain' that can help accelerate projects and support their scalability.
2. Deploying technical capacity or readiness programmes, to increase and overcome the lack of a pipeline of bankable projects.
3. Engaging investors and raising their awareness on sustainable land use and forestry, helping them to adapt their investments and due diligence processes for forestry investments.

The future demand for food and natural resources will need to be met through sustainable production and land management models that prioritise zero deforestation and sustainable intensification strategies (Stabile, 2020). The Business & Sustainable Development Commission has estimated that such systems could unlock a trillion USD market for new products and services (BSDC, 2017). Blended finance mechanisms are viable opportunities to engage the private sector in systemic shifts towards sustainable production models that reduce deforestation and increase the value of standing forests.

4.1.2. Forests as an Emerging Asset Class

As the aforementioned, throughout 2020 asset managers and investors emerged as crucial stakeholders urging the Brazilian government to increase their efforts to control and reduce deforestation. In addition to exerting pressure, investors also have a crucial role to play in terms of channelling finance.

According to a Vivid Economics report, forests are emerging as a potential new asset class as part of the next investment frontier of 'negative emissions technologies'. 'Forest-related Nature-Based Solutions (NBS) could generate US$ 800 billion in annual revenues by 2050, worth US$ 1.2 trillion today in NPV terms, surpassing the current market capitalization of the oil & gas majors' (Vivid Economics, 2020).

The near-term opportunities include investing in projects that reduce deforestation and promote forest restoration. Long-term, viable investment opportunities focus on technical solutions, such as Direct Air Carbon Capture, Use and Storage (DACCS) and bioenergy with Carbon Capture and Storage (BECCS) (Vivid Economics, 2020).

Private sector commitments to meet net-zero targets aligned with the Paris Agreement are driving much of these investment opportunities. Given that many companies will need to offset any remaining CO_2 emissions, forests and other carbon sink ecosystems become a viable mitigation strategy. Various actors are already investing in forest-related NBS, such as Apple, who are protecting an 11,000 ha mangrove ecosystem in Colombia (Vivid Economics, 2020).

Further, asset managers specialising in sustainable investing are emerging. Mirova Natural Capital Ltd is the natural capital investment arm of Natixis Global Asset Management's affiliate, Mirova. The asset manager aims to promote investments in nature-based solutions, leveraging real assets, debt, and growth equity (Mirova Capital, 2020). Mirova Natural Capital has 380 million EUR of assets under management, across a range of geographies including Latin America (Table 3).

Table 3
Mirova Natural Capital's dedicated funds
Source: (Mirova Capital, 2020)

Fund	Size (target) in millions	Tenure (years)	Geography
ACF — Althelia Climate Fund	101 (EUR)	8	Latin America; Africa; South East Asia.
SOF — Althelia Sustainable Ocean Fund	132 (USD)	9	Latin America, Caribbean, Africa, Asia, Pacific
LDN - The Land Degradation Neutrality Fund	200 - 300 (USD)	15	Developing Countries
ABF — Althelia Biodiversity Fund Brazil	400 (BRL)	11	Legal Amazon of Brazil
AGRI3 Fund	150 (USD)	open	Middle to Low income Countries.

Similar to P4F, Mirova Natural Capital deploys a strategy whereby it supports projects through different phases, ultimately aiming for increased maturity and enabling scale-up. For the Amazon, their aim is to improve biodiversity by targeting investments into four main themes:

1. Conservation and community livelihoods.
2. Smallholder production systems (cocoa agroforestry).
3. Sustainable agriculture and reforestation.
4. Innovation in biodiversity-linked services, technology and finance.

Results to date are positive. For the Althelia Climate Fund, 44 million tonnes of CO_2 emissions have been avoided, 2 million hectares of critical and high conservation value habitat are under protection, and over 2,000 livelihoods have been directly supported in forest communities and economies.

5 Conclusion

Finance for forestry is evolving. New private-sector focused financing mechanisms are emerging to complement public climate finance funds. These mechanisms are less exposed to political risk or conflict. They have emerged in direct response to increased pressure on the private sector to act on zero deforestation in the Amazon engagement, allowing actors across entire commodity chains, from traders to investors, to engage in such efforts. It can be argued that they present resilience to political conflicts, since it is unlikely that consumer and investor pressure for zero deforestation will wane.

Whilst public climate finance and philanthropic funds focus much of their financial resources on area protections, blended finance mechanisms and sustainable investment are mobilising resources into transforming key commodities and production models. In doing so, they address some of the drivers of deforestation through market mechanisms, with the aim to support the large-scale transition to sustainable production methods. In addition, private capital can act as a key economic incentive for producers and smallholders not to deforest, by increasing the value of standing forests.

Blended finance mechanisms, in particular, are an emerging solution that can help attract more private capital to forest protection and reforestation. Some models are already proving successful and are generating results, such as Partnerships for Forests. However, key barriers need to be overcome to ensure greater capital can be leveraged at a faster pace, such as better coordination amongst private capital financiers, increased awareness and knowledge amongst investors of how to invest in forests, and supporting pipeline development.

Private sector climate action is set to continue, galvanizing the continuous development of forestry finance. As more and more companies set their net zero carbon targets, achieving these will require large-scale offsets. Forests and other carbon sinks therefore become a viable investment strategy for many companies to hit their targets.

However, it is important to underline that private finance for forestry and Amazon protection should complement existing public climate finance — not replace it. Despite the potential for private finance, its share of total climate finance still remains small and tends to focus on energy investments. In addition, as the above sections have shown, the role of government and civil society in contributing to zero deforestation is fundamental. Public policy and command and control efforts remain crucial solutions in combating deforestation and should continue to be prioritised. Leveraging the private sector to support these efforts can help meet international climate targets and accelerate the pathway to zero deforestation, starting with the Amazon.

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Part II

Implementation: A Look into Renewable Energy Experiences

Geopolitics of Renewables: a New Dawn is Coming. Will Brazil be a Pioneer?

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1. Introduction: The Dawn of Renewable Energy

During the past decade, renewable energy has flourished. According to the International Renewal Energy Agency (IRENA), solar photovoltaic (PV) module prices have fallen by around 80% since the end of 2009, while wind turbine prices have fallen by 30-40%. This decreasing trend spills over from technology to overall costs, which include investment, operation and maintenance costs. As seen in Figure 1, in the 2010-2019 period, solar PV experienced the sharpest cost decline (82%), followed by concentrating solar power (CSP, 47%), and onshore and offshore wind (40% and 29%, respectively). Figure 1 also portrays cost trends for more mature renewables (biomass, geothermal and hydropower), which, although not experiencing the deep cost declines seen by solar and wind, still present competitiveness in face of fossil-fuelled electricity. IRENA's analysis covers around seventeen thousand renewable power generation projects from around the world, in addition to data from approximately eleven thousand auctions and power purchase agreements for renewables (IRENA, 2020c).

Batteries, which are important for electric vehicles and to store electricity generated by intermittent renewables such as wind and solar, also present this downward cost behaviour. The price of batteries for electric vehicles fell 87% in the 2010-2019 period, from more than USD 1.100 per kilowatt-hour (kWh) to an average price of USD 156/kWh (BNEF, 2019). The same analysis predicts a price of USD 100/kWh in

2024 — which is considered to be the value around which electric vehicles will start to reach acquisition cost parity with internal combustion engine vehicles. Batteries for application in the power sector have also become cheaper, with costs falling by around 60% in some markets in the past few years. Moreover, total installed costs could fall between 50% and 60% by 2030 given that stationary battery storage benefits from the economies of scale and consequent cost reductions of electric vehicle batteries (IRENA, 2017). In addition, electric vehicle batteries can be used as stationary storage in the power sector before they reach the end of their useful life. Battery recycling is also a possibility being pursued by many governments — China has already enacted battery recycling and reuse regulations, while California and the European Union are currently developing such policies (IEA, 2020b).

Note: For CSP, the dashed bar in 2019 shows the weighted average value including projects in Israel.

Figure 1
Global weighted average levelised cost of electricity from utility-scale renewable power generation technologies, 2010 and 2019[1]
Source: (IRENA, 2020c).

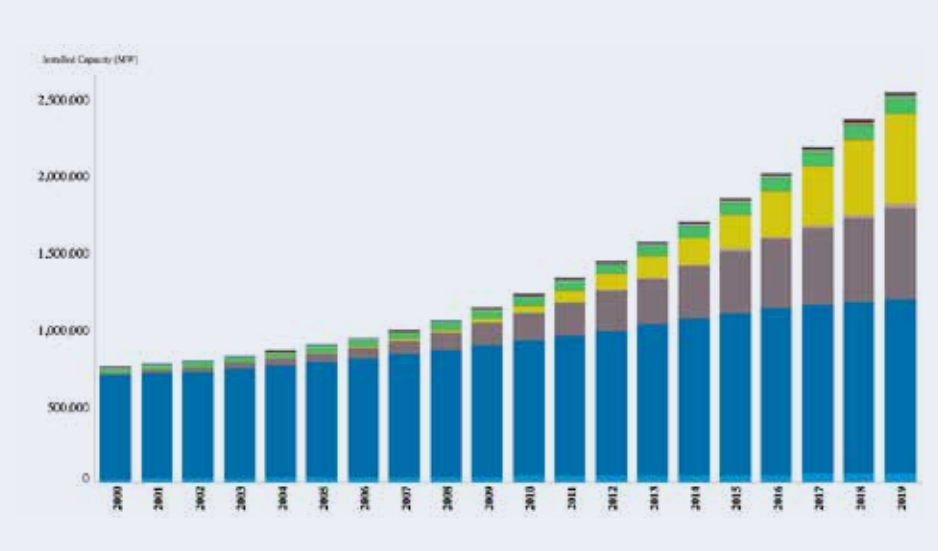
1 'For CSP, the dashed bar in 2019 shows the weighted average value including projects in Israel. These data are for the year of commissioning. The thick lines are the global weighted-average levelised cost of electricity (LCOE) value derived from the individual plants commissioned in each year. The project-level LCOE is calculated with a real weighted average cost of capital (WACC) of 7.5% for OECD countries and China, and 10% for the rest of the world. The single band represents the fossil fuel-fired power generation cost range, while the bands for each technology and year represent the 5th and 95th percentile bands for renewable projects'. (IRENA, 2020c)

As a result, renewable energy installed capacity has more than doubled and renewable electricity generation grew by 57% in the 2010-2019 period (IRENA, 2020b). Figure 2 and Figure 3 display this development.

What were the factors that caused such a development of renewable energy? For solar PV, the downward trend in costs is explained by economies of scale in the production process, which is highly influenced by increased expenditure in research and development from both the government and private sectors (Kavlak, McNerney, & Trancik, 2018). As seen above, economies of scale also play an important role in the cost reductions experienced by batteries. In addition, research and development that led to a better understanding of solar and wind patterns have contributed to the greater development of these sources and their employment in electricity generation. Finally, renewables have profited from a growing interest from the demand side. In order to limit global temperature increase to levels that improve the odds of decelerating climate change, governments have increasingly procured carbon-neutral energy technologies. This interest has encouraged policy support in the form of incentives and subsidies, which have greatly benefited consumers, who, in turn, respond by demanding more renewable energy technologies, thus perpetuating a virtuous cycle.

All this development experienced by renewable energy has raised concerns regarding the reliability of electricity systems with a high renewable penetration. Solar power is only available during the day and also depends on the absence of cloud cover. Wind power production is more unpredictable, but great advances have been achieved in predicting wind patterns with some anticipation, especially when considering longer timeframes. In summary, wind and solar power already present annual and seasonal characteristics that make it possible to integrate them into electricity dispatch and planning.

In fact, a literature review of 181 studies on the status and perspectives of 100% renewable electricity systems concludes that they are technically possible (only four argued otherwise): 'The studies conclude that 100% RE is possible within the electricity sector, while other studies find that it is technically achievable for all sectors in a long-term perspective' (Hansen, Breyer, & Lund, 2019). Such 100% renewable electricity systems balance a mix of several technologies:



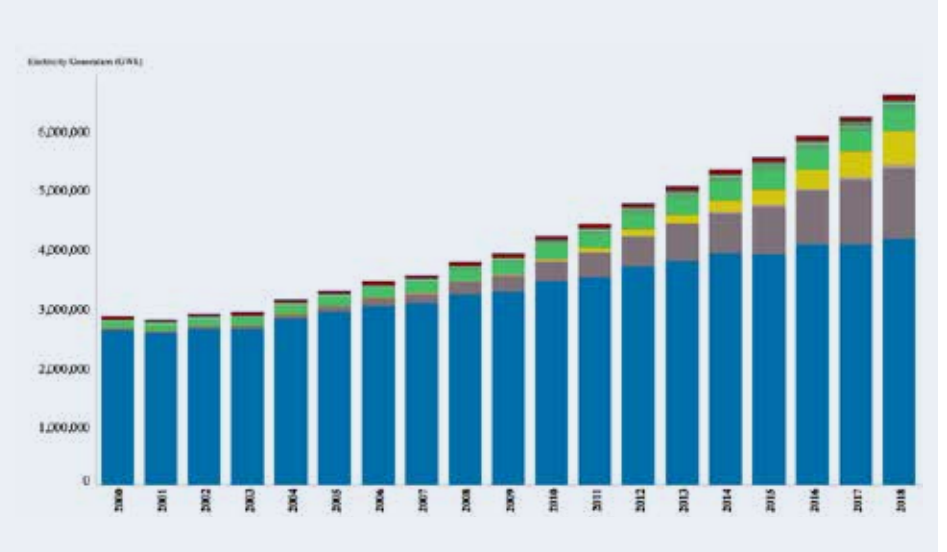


Figure 2
Renewable energy installed capacity (MW) in the past two decades.
Source: (IRENA, 2020a).

Figure 3
Renewable electricity generation (GWh) in the past two decades.
Source: (IRENA, 2020a).

- Marine
- Geothermal
- Renewable Municipal Waste
- Liquid Biofuels
- Biogas
- Solid Biofuels
- Solar Thermal
- Solar Photovoltaic
- Offshore Wind
- Onshore Wind
- Renewable Hydropower
- Mixed Plants

Solar power is only available during the day and also depends on the absence of cloud cover. Wind power production is more unpredictable, but great advances have been achieved in predicting wind patterns with some anticipation, especially when considering longer timeframes. In summary, wind and solar power already present annual and seasonal characteristics that make it possible to integrate them into electricity dispatch and planning.

wind, solar, storage (batteries and hydro dams), bioenergy, grid extension and energy integration with other regions, and demand response solutions. Another study deconstructs arguments against 100% renewable electrical systems, such as reliability, security and accessibility, concluding that the main barriers to these systems are 'neither technological nor economic, but are mainly political, institutional and cultural' (Diesendorf & Elliston, 2018). Indeed, implementing a 100% renewable energy system requires large capital investment and the adaptation of existing businesses models and regulation — which, per se, also require great effort from policymakers. Assuming, however, that these challenges are insurmountable barriers is an overstatement.

An innovation that can contribute to the implementation of 100% renewable energy systems is clean energy portfolios (CEP).

Table 1
Resource options for clean energy portfolios.
Source: (Dyson, Engel, & Farbes, 2018).

Energy efficiency	Physical measures, software controls, or other strategies to reduce the amount of energy required to perform a given service (for example, thermal insulation and smart thermostats to reduce energy for heating and cooling).
Demand flexibility	Load controls to enable electricity consumption to shift through time (for off-peak hours) without reducing overall energy use or service quality (for example, smart charging of electric vehicles). Furthermore, technological advancements have increasingly allowed the use of demand response in providing flexibility and integration of renewable sources.
Variable renewable energy	Behind-the-meter and front-of-the-meter distributed and utility-scale solar photovoltaics (PV) and wind turbines that provide weather-dependent, non-dispatchable energy. Recently, however, the use of smart inverters has allowed these sources to provide flexibility and ancillary services to the power grid.
Battery energy storage	Dedicated battery storage assets, either in front of the meter or behind the meter, providing energy balancing and flexibility via controlled charging and discharging.

They combine renewable energy (such as solar and wind) and distributed energy resources (DER, such as battery storage, electric vehicles, energy efficiency, demand response and distributed generation) in a group of resources that are used to assist the fulfilling of the electricity load in real time. When they are employed, electricity supply does not lose its flexibility requirement: all the technologies participating in the CEP contribute for such. Furthermore, CEPs are balanced and diverse — not being limited to only one technology, and combine emerging and mature resources. This way, clean energy portfolios contribute to diversify electricity supply while promoting zero-carbon electricity. Table 1 lists the options of technologies included in these portfolios.

According to Dyson et al. (2018), in some locations, a combination of CEP technologies are able to provide the same level of services as those provided by natural gas thermal power plants, and at a competitive cost. The study developed a model that minimised the cost of building and operating either a natural gas power plant or implementing a CEP. The technologies were required to not only generate electricity, but also offer capacity, reliability, flexibility, stability and system peak demand management. The authors concluded that clean energy portfolios are more cost-effective than the construction of three natural gas power plants in the United States (one combined-cycle thermal power plant on the West Coast and two gas 'peaker' plants in Texas and in the country's Mid-Atlantic region). This result is already being experienced in California: instead of building a new natural gas peaker plant (which is activated a few times per year to fulfil peak load), the state opted for batteries instead. This alternative proved more cost-efficient given that peaker plants are more expensive to operate. In addition, batteries have no emissions and better performance, dispatching electricity faster than natural gas peaker plants (Neuhauser, 2019).

In summary, renewable energy development in the past decade has transformed the energy world. Cost declines and addition to installed capacity has shown that renewables have been developing according to their own dynamics, dictated by economic forces and a desire, from the demand side, to limit the emission of greenhouse gases that cause climate change. Moreover, such development is increasingly sustainable from a technological perspective. This transformation, however, is not affecting only the way energy is demanded and supplied. Thus far, energy and geopolitics have had an intrinsically close relation in a world dominated by fossil fuels. As energy supply and consumption shifts to renewable energy, so will power relations in the energy world. These matters are discussed in the next section, while the role Brazil will play in the energy transformation is conferred in Section 3.

2. The Renewable Energy Transformation and Geopolitics

All the development experienced by renewables is disruptive to the current geopolitics of energy. First of all, one must bear in mind that, *ceteris paribus,* energy consumption is 'energy source agnostic': consumers demand the services that energy provide, such as lighting a room, cooling or heating a house, being able to travel from one location to another in their cars, by airplane, and so on. They want these services to be provided well and at a reasonable price, regardless of which fuel is a vector for such. Lately, however, consumers'

decision-making regarding energy has incorporated an additional variable besides cost and efficiency: cleanliness. Nowadays, a consumer not only seeks to light a room, or travel a distance, but also wants that the energy that supply these services does not harm the environment, nor exacerbate climate change. As a result, consumption of energy services is not completely 'energy source agnostic' anymore — at least until energy sources that release greenhouse gases are still being offered.

Up to a few years ago, in a time when greenhouse gasses did not matter, fossil fuels had an advantage in providing the energy services demanded by consumers. They were able to fulfil energy demand cheaply and well. In the past decade, however, as seen in Section 1 above, renewables are giving fossil fuels a run for their money. In many markets, they are cheaper, and renewable energy portfolios paired with effective energy management — such as the clean energy portfolios seen above — are able to compensate for intermittency. The cost and performance advantages of fossil fuels are then dwindling. Add to that the emission of greenhouse gases and internalisation of this negative externality through a carbon price, and fossil fuels are not so attractive anymore.

This way, in order to fulfil energy demand, the variables to determine energy supply would be based on costs, efficiency of production, and environmental impacts, *ceteris paribus*. There are other factors, however, that influence energy supply worldwide. Because access to energy sources consumed so far by humankind has been unequal, location has played an important role in the supply of energy; and that is where the geopolitics of energy becomes relevant.

Geopolitics can be broadly defined as 'the connection between geography, space and the power of states' (Vakulchuk, Overland, & Scholten, 2020). This connection is very clear when considering non-renewable energy resources, whose extraction and production are location specific. This restriction of access thus provides great political and market power for those countries that possess these sources in their territories.

On the other hand, renewable energy is, by definition, available everywhere. They are 'continually replenished by nature and derived directly from the sun (such as thermal, photo-chemical, and photo-electric), indirectly from the sun (such as wind, hydropower, and photosynthetic energy stored in biomass), or from other natural movements and mechanisms of the environment (such as geothermal and tidal energy)' (Ellabban, Abu-Rub, & Blaabjerg, 2014).

As a result, the geography and space aspects of the geopolitics of energy, so essential to fossil fuel resources, become much weaker. Renewable energy is produced locally, and all countries have access to sun, wind, and, to a lesser extent, the sea, bio, geothermal, and hydroenergy. Compared to a system based on fossil fuels, access to resources become less important than distribution and infrastructure management in a system based on renewables ((Scholten & Bosman, 2016) *apud* (Vakulchuk et al., 2020)). Both these components have potential to be developed locally and not to be dependent on geopolitics.

Scholten & Bosman (2016) *apud* Vakulchuk et al. (2020), however, state that the future energy system will most likely be a mix of both of the two scenarios — a 'continental' scenario and a 'national' scenario. This 'continental' scenario involves the development of *supergrids* [2] for the transmission of renewable energy among countries, especially for those with excess renewable generation. Such spare electricity can be exported, which would reduce curtailment and increase energy integration and the reach of renewables across borders, particularly for regions in different time zones (for instance, solar power generated on a summer day in Portugal, where the sun sets around 9pm, can enter the grid and contribute to supply the night load in France).

In this situation, some concerns have been raised regarding the cybersecurity of these *supergrids*. This argument, however, is overstated because cybersecurity does not apply only to renewables, but to all infrastructure that is connected to the internet and works through digital platforms — which is essentially the norm nowadays. Vakulchuk et al. (2020) give some examples: the control of oil and gas platforms and pipelines, subsea technology, oil and liquefied natural gas (LNG) tanker navigation, refineries and nuclear power plants, thus questioning whether renewable energy would incur 'any cybersecurity implications beyond those of other sectors'. Overland (2019) goes further by arguing that 'some of this literature [on renewable energy's vulnerability to cybersecurity] comes across as sensationalist and/or seeking to denigrate renewable energy'. Finally, cyber-attacks are much less probable to happen to decentralised,

2 *Supergrids* are high-capacity transmission cables that use direct current at very high voltages (HVDC) to minimise transmission losses when connecting power plants that are located far from electricity consumption centres (for instance, offshore wind farms located at the sea).

small-scale renewable infrastructure, which is the area where great renewable growth is expected to take place. The advent of 'prosumers'[3] supplying electricity 'actually make the system more resilient, as many different units will have to be hacked to destabilise the system as a whole' (Overland, 2019).

This decentralised component of electricity generation also allows for greater consumer engagement and active participation in the economy — a trend that is not unique to the power sector. At the same time that consumers are becoming prosumers, supplying their own electricity demand, they are also becoming active members of the 'sharing economy', supplying services such as hospitality, transportation, and other personal skills and services on online platforms (in the case of distributed generation, the customer and service provider are the same agent). This proactivity indicates that the age of the 'captive consumer' is coming to an end, including in the power sector. Moreover, the sharing economy has a strong environmental aspect by promoting less waste, which goes hand in hand with the advent of renewables and the need to reduce our carbon footprint.

Besides prosumers, greater participation of local actors on energy production, such as local municipalities and regional entities, is thus expected. Community solar is a growing trend in the United States and Europe, being also a possibility in Brazil. Brazilian regulation allows for consumers to engage in solar condominiums, in which the electricity generated is shared among participants as long as they live next to each other; and shared generation, in which consumers create a consortium or cooperative to share the electricity produced (ANEEL, 2016). The more community solar projects develop, the greater will be the participation of local groups on electricity supply and, as a result, increased energy security within a country's borders.

In addition to the topics already discussed, much of the debate surrounding the geopolitics of renewables gravitates around the role played by critical materials (metals and industrial minerals used in the production of renewable energy technologies, such as cobalt, lithium, among others). Vakulchuk et al. (2020) explain that indeed these materials are critical, but to call them 'rare' is an exaggeration given that their availability in nature is not such. 'Rare' earth elements, however, have a high cost of mining, separation, processing and capital intense production, which, nowadays, mostly takes place in China. Indeed, with growing demand, prices for critical materials will increase — prices are, after all, determined by the law of supply and demand. There is not enough evidence, however, that such dynamics will lead to the creation of cartels or other market concentration practices. As Lovins (2017) *apud* Overland (2019) states, critical materials 'are simply another commodity—unusual, significant, but unable to transcend the realities of economics, innovation, and trade'.

Moreover, the energy transformation that took place in the past decade has been innovation and technology based. O'Sullivan et al. (2017) *apud* Vakulchuk et al. (2020) affirm that '[d]emand for minerals is a function of the prevalent technologies at any moment. Advances in engineering often make it possible to replace one material with another within a technology. In addition, entire technologies are sometimes replaced once scarcity develops or innovation creates viable alternatives'. For example, Tesla has been looking into decreasing the cobalt content of its batteries (Morris, 2020) given that 60% of the world's supply of cobalt is produced in the Democratic Republic of Congo, which is a politically unstable country. In addition, the role of recycling is oftentimes overlooked when expansion of renewable technologies is being discussed. Overland (2019) explains that 'most critical materials for renewable energy technologies can be recycled'. In addition, although current recycling costs are high, technology development will lead to scaling of production, which will spill over to recycling.

In summary, given all the development experienced in the past few decades, being 'techno-optimist' about renewables development — that is, believing that technological innovation will continue to come through — is not an overstatement. After all, tech innovation in the energy sector has happened before, with unexpected consequences: improvements in fracking technology that led to the rise of shale oil in the United States have contributed to weaken the argument of peak oil happening because of scarcity of supply (Overland, 2019).

In fact, much of the anxiety and assumptions made about renewable energy development fail to account for the role played by innovation and other societal trends — such as the shared economy and a greater environmental awareness, which were already mentioned above. When focusing on the geopolitics of renewable energy, this lapse repeats when some specialists analyse it through the static lens

3 Prosumers are those consumers that locally generate electricity for their own consumption through, for instance, rooftop solar panels. They are, therefore, both producers and consumers of electricity (hence the term *prosumer*).

of the geopolitics of fossil fuels by simply applying concepts of the latter to the realities of the former — which are not, in most situations, the same. That is a misconception. For example, some analysts have raised the concern that *supergrids* among countries may lead to electricity disruption as a geopolitical weapon. This analogy is oftentimes made while citing historical examples of past situations in which energy disruption was used as such — the oil crisis of the 1970s, the Russia-Ukraine conflicts of the 2000s, which interrupted natural gas supply to Europe, among others. This argument, however, is misleading because renewable energy is not location specific, as previously mentioned. It can be generated in any location. Therefore, as Overland (2019) very well explains: 'if the political risk premium on imported renewable energy becomes too great, it will lose its competitive edge over domestic alternatives. In other words, renewable energy exporters will often be competing against their own customers and will have to treat them with care'. That is, a situation in which an electricity exporter country 'A' decides to cut supply to an importer country 'B' is not sustainable because 'B may react by developing its own supply and, furthermore, deciding not to trade with 'A' anymore.

This disruption of supply argument is sometimes applied to renewable technologies such as solar panels. Nowadays, however, manufacture of such technologies is well established and widespread. Another example is assuming that countries that explore critical materials will organise in economic cartels, like oil producer countries. Although reserves are indeed concentrated in certain countries, there is no indication that critical materials will not behave as regular commodities, as previously explained. In fact, the International Energy Agency (IEA) suggests a series of actions that governments and companies can take in order to prevent market concentration and other practices that may affect the supply of these elements (IEA, 2020a). Moreover, recycling of materials and technological innovation must be accounted for when analysing such future scenarios. Critical materials are not oil, gas or another regular fuel, which are constantly demanded by consumers. They are needed for the manufacture of new technologies, not for the functioning of existing ones — a shortage of lithium, for instance, will impact the production of new electric cars, but will have no effect over electric vehicles

The study of the geopolitics of energy must evolve to account for two distinct fields: the geopolitics of fossil-fuelled energy, in which resource scarcity and control, location aspects, and international competition and interdependence are determining factors; and the geopolitics of renewable energy, in which consumer engagement and local supply are substantial, and technological development becomes the underlying factor determining the influence of countries.

already on the roads (IEA, 2020a). Moreover, critical materials can be replaced with suitable alternatives developed by engineers. Even gasoline got a substitute when it was necessary — Brazilian ethanol, which was developed in response to the oil crisis of the 1970s.

In summary, the geopolitics of energy and the geopolitics of fossil fuels are not synonyms anymore. Renewable energy is today an important energy source and will develop further in the coming years. Therefore, the study of the geopolitics of energy must evolve to account for two distinct fields: the geopolitics of fossil-fuelled energy, in which resource scarcity and control, location aspects, and international competition and interdependence are determining factors; and the geopolitics of renewable energy, in which consumer engagement and local supply are substantial, and technological development becomes the underlying factor determining the influence

of countries. Trying to apply the concepts of the former to the latter is not accurate — and not pragmatic either. Renewable energy has its own characteristics, dynamics and growth tendencies, which are not dependent on those of fossil fuels anymore.

In fact, given that 'geography' and 'space' are not that relevant for renewable energy production, one wonders whether the term 'geopolitics', which is 'the connection between geography, space and the power of states', is actually adequate when applied to renewable energy. In a world where energy access is democratic — that is, any country has access and is able to produce sun and wind power to fulfil its own energy needs, and in which energy production and consumption becomes increasingly decentralised, concentration of power and energy will no longer have such a symbiotic relationship.

3. Will Brazil be a Pioneer of the Energy Transformation?

Although geography will no longer play such an important role in energy relations among countries, innovation and technology will become the key variables to determine which nations will have more influence in a world dominated by renewable energy. Brazil has many competitive advantages concerning renewables. The country is a pioneer in the development of alternative automotive technologies, first with ethanol vehicles in the 1980s, flex-fuel vehicles in the 2000s, and is now developing hybrid flex-fuel vehicles, which will be able to operate using gasoline, ethanol and electricity. Increasing installed capacity of such vehicles will be key in the transition to zero-carbon transportation. Biofuels production in Brazil already is one of the highest in the world (Figure 4). Continuing to be a front-runner in the sector will assure influence in the new energy landscape.

Moreover, when compared to other countries, Brazil is ahead in the transition to a zero-carbon economy, already having one of the cleanest energy mixes in the world (Figure 5). Figure 6 shows the participation of energy sources in the country's energy supply. The share of renewables such as hydropower and sugarcane products — which include the raw materials used in biofuel production (juice

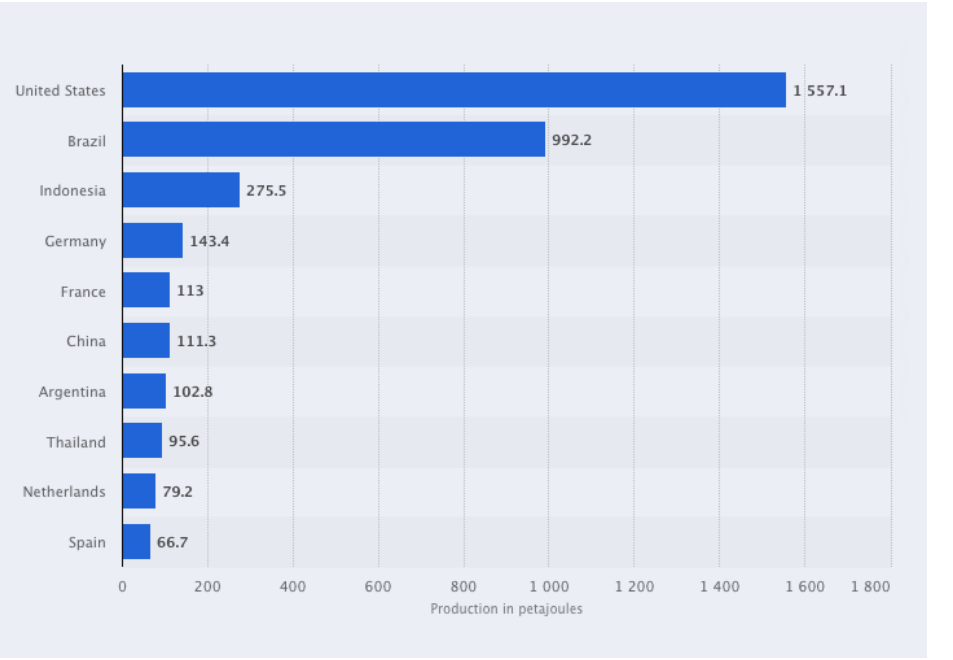


Figure 4
Biofuel (ethanol and biodiesel) production by country (petajoules) — 2019.
Source: (Statista, 2020).

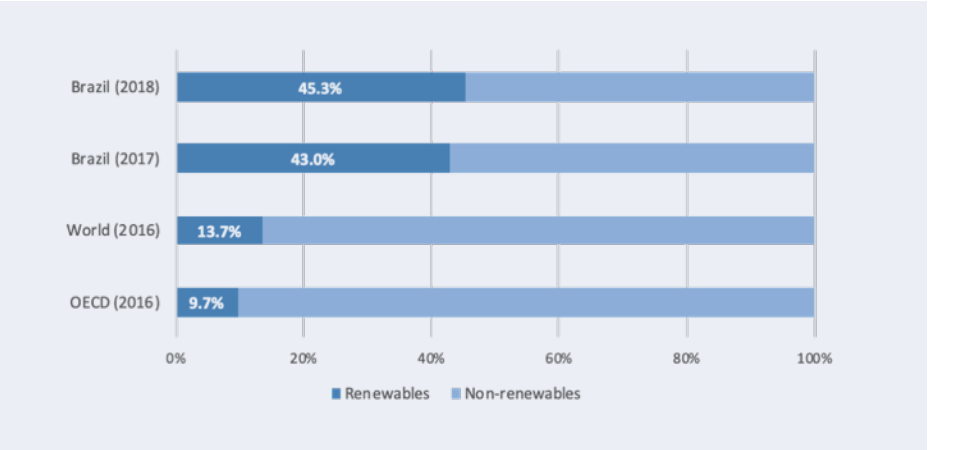


Figure 5
Renewables participation in the energy mix.
Source: (EPE, 2019).

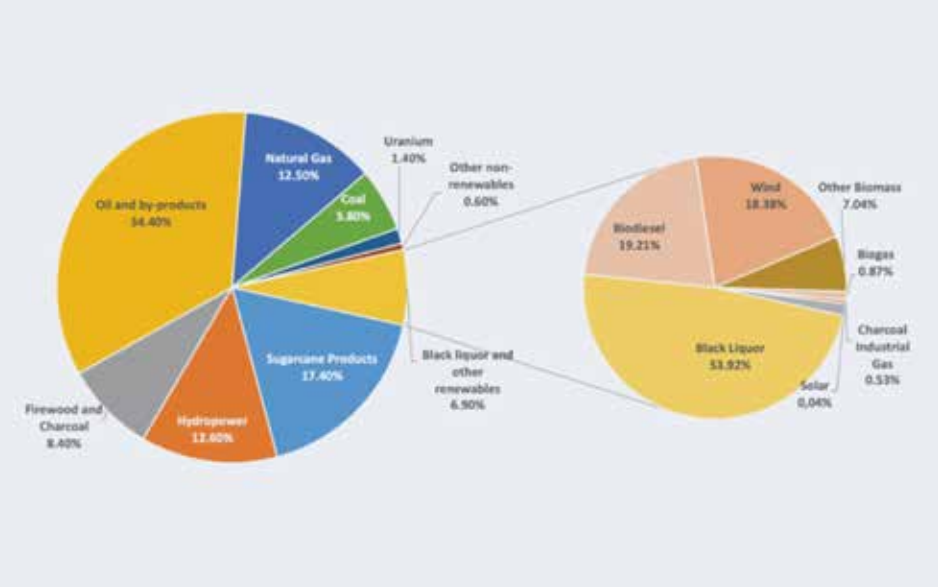


Figure 6
Internal energy supply with renewables participation.
Source: (EPE, 2019).

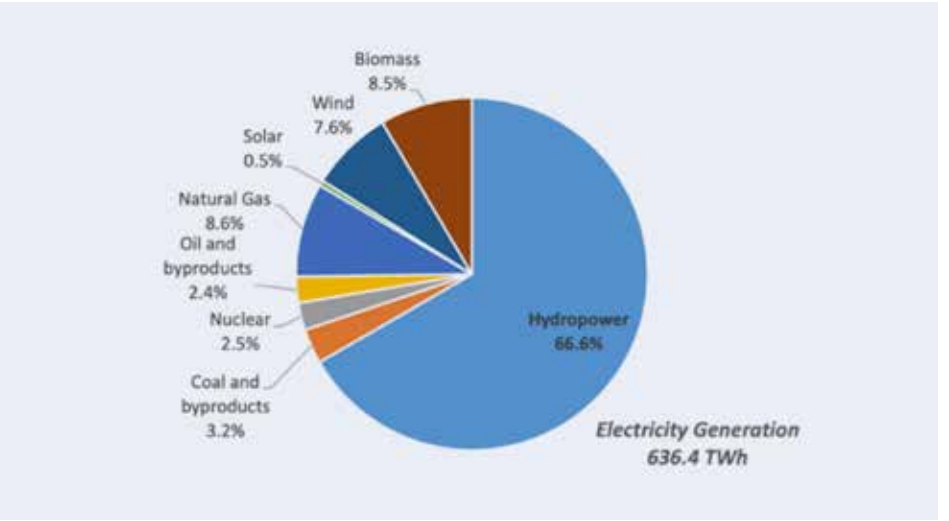


Figure 7
Electricity generation by source.
Source: (EPE, 2019).

and molasses), is a unique feature of the country. Figure 7 details electricity production in Brazil — renewables accounted for 83% of the 636 TWh produced in 2018.

Even after considering all this capacity, Brazil still has immense potential to develop renewable energy even further. The country is home to one of the best solar potentials in the world, being able to, in the future, increase solar power's current installed capacity from 2 GW to 307 GW[4] (EPE, 2018). For distributed solar generation, the capacity has the potential to increase from the current 0.6 GW to 33 GW, which could generate 288 TWh of electricity (EPE, 2018, 2019). The offshore solar potential is 258 thousand GWp, which can generate 424 thousand TWh/year, and CSP's are up to 413 GW (depending on the CSP technology to be developed), which accounts for up to 733 TWh of electricity production (EPE, 2018).

Analogously, onshore wind power, whose current installed capacity is 14 GW, could potentially grow to 143 GW (EPE, 2018, 2019). For offshore wind, Brazil's potential could produce 6150 TWh of electricity (EPE, 2018). Brazil's ocean energy potential (tidal and waves) is 114 GW (EPE, 2018). Bioenergy potential — to produce biomass for thermal power plants, biofuels, and biogas — can also increase from the current 205 million tonne of oil equivalent (toe) to 530 million toe (Table 2). In addition, Brazil is home to one of the largest interconnected electricity grids in the world, the National Interconnected Transmission System (SIN), which serves 99% of the country through 142 thousand kilometres of transmission lines (ONS, 2020). In this way, extra renewable electricity generated in a part of the country can be transmitted to fulfil the electricity load elsewhere, when needed.

Developing all this capacity can potentially generate jobs and economic growth. A report from the Inter-American Development Bank (IDB) states that the transition to a low carbon economy in Latin America can create 23 million jobs in several economic sectors such as agriculture and plant-based food production, renewable electricity, forestry, construction, and manufacturing. More than half of these jobs are in the medium-skill category (14 million), one-third in the low-skill category (8 million), and 1 million in the high-skill category (Saget, Vogt-Schilb, & Luu, 2020). Therefore, investing in renewables not only serves the purpose of transition-

4 Actually, 307 GWp, which is the maximum electrical output that solar panels can produce under Standard Test Conditions (STC): solar power of 1000 W/m² at 25° Celsius. According to the source (EPE, 2018), however, this potential is conservative because it considers only areas with the best irradiation in the country. When all areas fit for solar generation are considered, capacity increases to more than 28 thousand GWp, which can generate 44 thousand TWh of electricity.

Table 2
Bioenergy potential in Brazil: 2015 and 2050.
Source: (EPE, 2018).

Bioenergy source (million toe)	2015	2050
Agricultural waste	48	165
Conventional Forest Biomass	38	68
Sustainable Forest Management	—	32
Fats for Biodiesel	17	27
Sugarcane bagasse	32	57
Straws and Sugarcane Tips	37	95
Sugarcane Juice for Ethanol	17	56
Livestock Waste	14	28
Urban Solid Waste — Biodigestion of organic fraction	2	1.7
Urban Liquid Waste — Sewage	0.5	0.8
Total Bioenergy	**205**	**530**

ing to a low carbon future — which is needed to slow down climate change, but also causes economic development — much desirable today given the economic crisis caused by the COVID-19 pandemic.

Renewables already account for more than 80% of electricity production in Brazil, but, as seen above, there is much potential available for this number to reach 100%. In 2018, electricity consumption was 636 TWh. This demand could be easily supplied by developing just a small percentage of the renewable sources discussed previously. Expanding solar, wind and biomass power production, while using existing hydropower and its reservoirs to counteract for variability and intermittency, is the answer to achieve carbon neutral electricity production in Brazil. In addition, energy efficiency measures can rationalise electricity consumption — if less electricity is consumed, less additional capacity is needed[5]. In the transportation sector, a mix of renewable electricity and ethanol to fuel light-duty vehicles, and biodiesel to supply heavier vehicles, will make it possible to decarbonise the sector. In order to achieve such deep decarbonisation, much investment is needed, but the moment for such is right now.

Brazil has thus far been a pioneer in the development of renewable energy. That translates in the country's energy mix, one of the cleanest in the world. In order to position itself as a front-runner in the current energy transformation, Brazil must continue to play this role by further developing renewable energy in the country.

5 For instance, a 10% improvement in the efficiency of electricity consumption could lead to savings of up to R$ 44 million in avoided installed capacity expansion at the 2030 horizon (Ministério do Meio Ambiente (MMA) e Banco Interamericano de Desenvolvimento (BID), 2016).

4. Conclusion

Renewables' development is here to stay. For a very long time, energy was considered to be either 'cheap' or 'expensive', and renewables were the latter. Nowadays, however, they have levelled the cost playing field. Moreover, energy picked up yet another attribute: either it is 'clean' or not — and, in this case, renewables have always had an advantage over fossil fuels. Furthermore, in the near future, when carbon pricing fully internalises the negative externalities of producing and consuming fossil fuels, renewable energy will consolidate itself as the cheapest energy source available.

Before the COVID-19 pandemic, it was expected that renewable electricity costs would fall by 26% for onshore wind, by 35% for offshore wind, by at least 37% for concentrating solar power (CSP) technologies, and by 59% for solar photovoltaics until 2025 (IRENA, 2016). These projections are now being updated: IRENA (2020c) reports that, despite the pandemic, renewables will continue to grow in 2020, at a lower rate, however, than previously anticipated. Notwithstanding, investing in renewables such as solar and wind, which have low roll-out time, is a valuable tool to accelerate the economic recovery post-pandemic by creating jobs and overall economic activity: 'crucially, boosting investment in renewables can align short-term recovery measures with medium- and long-term energy and climate sustainability goals' (IRENA, 2020c). Therefore, it is too soon to tell whether renewables' growth predicted for 2025 will be reviewed down or up, depending on how governments include them in their recovery plans.

Moreover, the IDB reports that the transition to a net-zero carbon economy may cause the loss of eight million jobs in the fossil fuel industry (in fossil fuel electricity, extraction, and animal-based food production) (Saget et al., 2020). The same study, however, also reports all the twenty-three million new employment opportunities that

renewable energy development will bring. For a country such as Brazil, positioning itself as a developer of renewable energy will help to counteract for all the losses incurred during the energy transformation.

This hypothesis is validated by Overland, Bazilian, Ilimbek Uulu, Vakulchuk, & Westphal (2019), who develop the GeGaLo index of geopolitical gains and losses of the energy transformation. They conclude, among other things, that geopolitical power will be more evenly distributed after the energy transition — as expected, given that renewable energy access is more democratic. In addition, the authors state that 'the main geopolitical changes and drama brought on by a transition to renewables will therefore be related to the winding down of fossil fuels, not the introduction of renewables'. For Brazil, this scenario will not be as troubled because of the country's vast renewables resources, which will contribute to place Brazil among the winners of the transition. Therefore, by developing renewable energy and spearheading the energy revolution, Brazil has it all to not be a loser and consolidate its role as front-runner and winner of the energy transformation.

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From Biofuels to Boomerangs: Critical Reflections on Latin American Approaches to Energy and Climate Security, the cases of Brazil, Argentina and Colombia

LUIS PAULO SILVA, LARRY SWATUK

1. Introduction

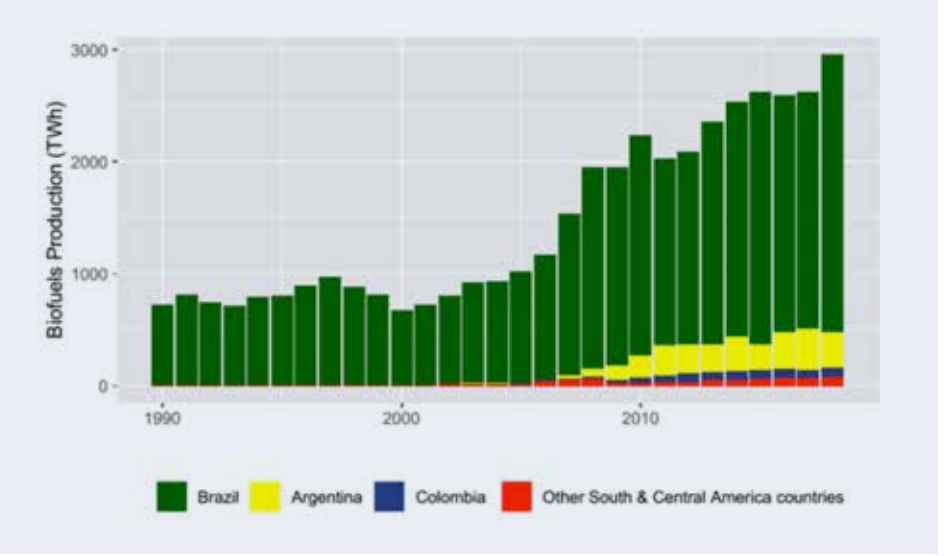
South America has a pioneering and prominent role in the production of biofuels. According to the British Petroleum Review of World Energy, in 2019, 28% of the global production of biofuels was in South and Central America, and Brazil alone is responsible for 24% of world production. Regional edaphoclimatic conditions explain much of the productivity of agricultural crops used in the production of biofuels. In addition, throughout the 2000s, several countries in the region have begun to enact development policies aiming to expand the production of biofuels. Among the justifications for implementing these policies are: guaranteeing energy security, developing rural economies and recovering degraded areas. More recently, justifications related to the reduction of greenhouse gas emissions have been added to the previous ones, assuming that the increase in the production of biofuels would add to the strategies to achieve the goals set out in the NDCs (Trindade, Nogueira, & Horta, 2019).

Among the political measures adopted to encourage the production of biofuels are the adoption of bio/fossil fuels blending

mandates, thus seeking to increase consumption in the domestic markets; tax incentives for the entire biofuel production chain, including its agricultural and industrial stages, thus seeking to guarantee the supply of biofuels, and the development of new technologies, such as flex engines and the production of second generation biofuels (Antunes, Chantel, Terán-Hilares et al., 2019; Acharya & Perez-Pena, 2020). It is worth noting that policies for the use of biofuels in large world markets, such as the European Union and the US, also provided incentives for the production and export of biofuels in South American countries, such as Argentina and Colombia, as can be seen in Figure 1, the incentive to export biofuels brought these countries to the forefront of world's producers (Bailis, Solomon, Moser et al., 2014).

Given the current path of growing incentives to implement biofuel policies in South and Central America we argue that better information regarding the likely and potential positive and negative effects of these actions can help the decision making process of the various stakeholders. Hence, this chapter aims to show how the 'Boomerang Effect' approach can shed light in the assessment of unintended and unanticipated negative side effects of the actions taken in order to reduce greenhouse gas (GHG) emissions. Section 2 presents the postulates and analytical tools developed to address intended climate mitigation and adaptation policies and actions and their possible consequences for state stability (Swatuk & Wirkus, 2018).

Figure 1
Production of biofuels in South and Central America (1990-2018).
Source: (BP Review of World Energy, 2018).



Section 3 explores the national policies enacted to foster production, internal consumption and the export of biofuels for the three main regional biofuel producers, in order: Brazil, Argentina and Colombia (Figure 1). Currently, South and Central America's biofuel production is strongly linked to global production chains, and its economic viability and sustainability is intertwined with the fossil-fuel market, through incentives to blending mandates, but also with its nexus with food production. The political and economic opening that resulted in biofuels production and export as a strategy for regional commercial insertion was built through governments with pronounced ideological differences. The 2000s marked a transition from governments influenced by the postulates of the neoliberal political economy to governments that sought developmentalist policies in order to extract natural resources, which resulted in several environmental impacts and socio-environmental conflicts in the region, many of them linked to the production of biofuels (Svampa, 2016).

Therefore, Section 4 analyses the local-level side effects of the incentives to produce biofuels. Strategies for expanding biofuels are inserted in different national territorial arrangements, either in their agrarian structure or in the internal distribution of power. Hence, the introduction of biofuels has specific effects in each of the case studies presented here. Finally, Section 5 will discuss the argument supported by the Boomerang Effect approach, that is, that the set of local-level negative effects of biofuel production can unfold into destabilising effects at the state level in different spheres, both political, economic and environmental. The Boomerang Effect of activities related to the introduction and expansion of biofuels in South America is associated with the particular conditions of each case; however, the connection of this activity with global markets, whether through the biofuels or food markets, generates other forms of interdependencies with repercussions on national politics and the economy.

2. The Boomerang Effect: Climate Action And 'Clean' Energy Production

With regard to climate mitigation, the Boomerang Effect may be defined as 'the emergence of largely unanticipated and unintended consequences of policies and programs on domestic non-state actors that result in negative feedbacks on the state' (Swatuk et al., 2018: 2). A significant body of scientific evidence shows that climate interventions (through state or state-authorised private actors) often result in negative (social, political, economic and/or ecological) effects that impact local communities on various spatial and temporal scales (Mirumachi et al., 2019; Schipper, 2020). In our theoretical framework, we label these 'local-level side effects' (LLSEs). Our research also shows that LLSEs sometimes — but certainly not in all cases — negatively feed back to the state on multiple levels (e.g. local, regional, national), on various scales (e.g. watershed, forest, landscape, ecosystem), thereby creating (economic, political, societal, environmental) risks to state sustainability (Silva & Swatuk, 2019; Swatuk & Wirkus, 2018). It is this feedback element that we label 'state-level Boomerang Effects' (SLBEs) or 'the Boomerang Effect' in short. Given that states are eligible to claim nationally determined contributions (NDCs) for actions taken in other states (e.g. through carbon trading) it is also possible that state-level Boomerang Effects may impact the state where the intervention takes place, but not impact the initiating state. Thus, there appears to be a disjuncture between hypothesised benefits (i.e. decreased national carbon footprint) and actual costs, particularly at the point of intervention (e.g. displacement of local people from hydropower development, expansion of land under commercial biofuels production or restriction of access to communal forest). The (state-level) Boomerang Effects tend to be more diffuse, often impacting local government at the point of the intervention (e.g. through sporadic instances of violent confrontation) but rarely coming back on to the national government (Swatuk & Wirkus, 2018). That LLSEs are deemed tolerable by national actors does not mean that they are right. In our view, it is important to reflect in a comparative way on existing and planned mitigation activities in order to lessen the likelihood of zero-sum outcomes whose long-term impact may be state instability.

In our view, it is important to reflect in a comparative way on existing and planned mitigation activities in order to lessen the likelihood of zero-sum outcomes whose long-term impact may be state instability.

3. Biofuels Production in South America: Climate Action And Energy Policy in Brazil, Argentina And Colombia

3.1. Brazil

Brazil is the second largest producer of biofuels in the world, in addition to being considered a successful case for policies aiming to create a national market for biofuels. The highest proportion of production is concentrated on bioethanol made from sugarcane, which started to be produced on a large scale in the 1970s as a response to the global oil crisis. From the 2000s onwards, bioethanol started to be associated with the environment and climate change policy, being recognised as a clean alternative to the use of fossil fuels used in the transport energy matrix. Biodiesel has a much more recent history in Brazil, starting in 2004. For this reason, Brazilian policy changes on biofuels and on the clean energy matrix are closely linked to the performance of sugarcane bioethanol.

The most recent milestones in the connection between biofuel production and climate action were the promulgation of the new National Biofuel Policy (RenovaBio), in 2017. This policy encourages the implementation of mechanisms for decarbonisation targets, certification of production and decarbonisation credits emission, the CBIOs (Grassi & Pereira, 2019). In this way, RenovaBio has sought to detach from traditional mechanisms — tax and credit favours — to subsidise biofuels, to focus on pro-market tools in order to increase

production and ensure its environmental and economic sustainability. The decarbonisation target for the transport energy matrix is 10.1% by 2028. However, the COVID-19 pandemic has hampered the implementation of CBIOs, given the drop in fuel demand and the impossibility for producers to reach carbon emission reduction targets.

RenovaBio is being instituted in the wake of decades of incentives for the production of biofuels and after the consolidation of a renewable energy market that has grown in recent years. According to the National Energy Balance, in 2019, sugarcane was responsible for 16% of the internal energy supply. In the transport sector, the national energy matrix has 25% of its composition from renewable sources, be it bioethanol or biodiesel (EPE, 2019). This participation is the result of a sustained growth in the area of sugarcane production, which has grown 45% since 2005, especially in the long-standing, central-south production states[1]. Another factor that has strengthened the growth of bioethanol production is the increase in the price of this fuel in relation to the price of sugar on the international market, which makes the transformation of sugarcane into bioethanol more attractive than sugar (CONAB, 2019).

Therefore, Brazilian biofuels policy has recently undergone important changes. Between the 1970s and 1990s it was strongly oriented by the state subsidising the sugar and alcohol sector, exempting the production chain from taxes, controlling the market prices, enacting blending mandates and encouraging R&D, both in production (dropping the costs of production and increasing the productivity) and consumption (adopting flexible-fuel engines technology). Since the 2000s, the state has assumed the role of regulator of the biofuels market and the sector has undergone an opening to private and external actors (Moraes, Rodrigues, & Kaplan, 2017; Antunes, Chantel, Terán-Hilares et al., 2019). The role of the state is still important in controlling the expansion of sugarcane production areas, by banning the yield of sugarcane in environmentally sensitive regions, such as the Amazon and Pantanal; in guiding the blend in the transport sector, which in the case of gasoline, reaches 20% alcohol and 11% biodiesel to make diesel; and creating decarbonisation instruments. Overall, these regulatory actions are milestones of the Brazilian State's strategy to use biofuels in its climate change actions, however they have been going through acute changes recently.

1 São Paulo, Goiás and Minas Gerais states are responsible for more than 70% of the sugarcane production area.

3.2. Argentina

Argentina has used the production of biofuels as an opportunity to take advantage of the mid-2000s commodity boom and, thus, expand its exports of the large output of soybeans. The first normative measure to encourage the production of biofuels is the regulation law of 2006, which instituted the blend of bioethanol with gasoline and biodiesel with diesel. Initially in the proportion of 5%, it has been increasing over the years until reaching the current proportion of 12% of bioethanol and 10% of biodiesel (USDA, 2019a).

In a short period, Argentina became one of the biggest exporters of biodiesel from soy oil, due to external conditions, such as the high demand for biofuels in the European Union; and internal incentives, such as special rates for biofuel exports in relation to other soy products and the low cost of production in Argentina. Over these years, the Pampa region, especially around the city of Rosario, was where most of the plants for the processing of this fuel were concentrated (Falasca, 2017).

On one hand, the dependence on exports for the viability of the biodiesel market has resulted in production instabilities over the past 20 years. Whether due to increasing taxes on soy exports, which varied constantly over the period, or due to the anti-dumping measures implemented by the European Union and the US against Argentine biodiesel, the country's biodiesel sector has faced difficulties to maintain its level of production of previous years. Since the peak achieved in 2017, biodiesel exports have dropped by a third (USDA, 2020a).

On the other hand, bioethanol from corn and sugarcane is consumed in its entirety by the Argentine domestic market. Its production has grown steadily since the beginning of the 12% blending mandate. Unlike soy, these two crops are grown in warmer areas of Argentine territory, in the northern provinces of the country, in areas of the recent agricultural frontier. Given that the production of bioethanol to supply the mandatory blend demand was already achieved in 2017, there is no forecast for an increase in production. This would happen only if the proportion of bioethanol mixed with gasoline increases or if Argentina starts to export (KPMG, 2019).

In the short-term, changes are expected since the current biofuel incentives regime issued in 2006 will expire in 2021. Ongoing

political debates over the new regulatory policies are marked by a lobby of producers to expand national blending mandates, reaching up to 15% for biodiesel and 25% for bioethanol; and incentives for adopting flexible-fuels engines, the same as those used in Brazil, in order to guarantee the expansion of the domestic market. Another element that is likely to benefit Argentina's biofuel market is the approval of the trade agreement between Mercosur and the European Union, which would open this biofuel market again for Argentine biodiesel. However, the deadlines for implementing this agreement would benefit the country's producers only in the long run, and if the agreement is approved by national governments in Europe. In order to organise the lobbying, farmers, mill owners and governors of producing provinces have joined forces to pressure the central government, in what has been organised as the 'Bioenergetic League'. Instead of increasing economic incentives, the position stated by the central government seeks to reduce the dependence of producers on state regulation and fiscal benefits, then creating a salient political challenge for the next year.

Finally, the production of biofuels is part of the strategy to reduce GHG emissions enacted in Argentina's 2015 policy to incentivise the use of renewable energy. This plan's stated objective is to increase the total of renewable energy used for electricity from 8% to 20%. However, given the expansion of fossil-fuel production in Patagonia, it is unlikely that the country will achieve these goals. At the same time, the production of biofuels is not subject to social and environmental sustainability criteria, therefore the most important regulations are imposed by international buyers, who require certifications for imports (USDA, 2019a).

3.3. Colombia

Colombia started in 2001 to adopt strategies to encourage the production of biofuels. That year, the country created the first regulation to implement the 10% blend of bioethanol in gasoline, valid only for cities with a population over 500,000 inhabitants. In 2008, biodiesel was added, also at a rate of 10% of diesel. Nowadays, the blending mandate remains at 10%, both for bioethanol and biodiesel, but the obligation has been extended to almost the entire national territory, with the exception of the departments bordering Venezuela (Federación Nacional de Biocombustibles de Colombia, 2019).

Regarding bioethanol, Colombia's domestic production is, in its entirety, distilled from sugarcane. The country has one of the best agroclimatic conditions for the production of this crop which guarantees two harvests a year and one of the highest yields on the planet (Dússan, de Melo, Floriam et al., 2019). However, these conditions are located in a very specific region, in the Valle del río Cauca[2], in the south-west of the country, where more than 80% of the country's sugarcane is harvested. In this region, the production of sugarcane is carried out in more than 2750 properties and is where the seven refinery units of bioethanol are located (ASOCAÑA, 2020).

2 The geographical region of Valle del río Cauca is located at the Cauca river valley, along the departments of Cauca, Valle del Cauca and Risaralda.

Unlike the sugar market, in which Colombia already has a consolidated position as one of the largest producers and exporters in the world, the production of bioethanol is still not consolidated. In terms of price and production capacity, Colombian bioethanol is strongly linked to the sugar market, which remains sometimes more attractive to producers (USDA, 2020b). A factor that favours the domestic production of bioethanol is the great capacity of sugarcane production; however, in the domestic market there is still a great competition with bioethanol imported from the US, whose prices in the international market are subsidised. In 2019, Colombia imported 269 million litres of bioethanol, which corresponds to 38% of its domestic market (ASOCAÑA, 2020). This is one of the largest dependency proportions among countries that adopt a bioethanol blending policy, thus undermining one of the main objectives of the biofuels policy stated in 2001, that is, guaranteeing energy security. In this regard, in 2020, the Colombian government approved the imposition of countervailing duties for bioethanol imports from the US.

Parallel to the production of bioethanol, Colombia has adopted the production of palm oil biodiesel as an instrument to fill the deficit of diesel in the country. African palm is the most used crop for the production of biodiesel, due to its dispersion throughout the country, which is the result of more than 50 years of incentives for its cultivation as a rural development strategy (Mur, 2019). For this reason, palm oil processing refineries are also found in different areas of the country, but mainly in the north and east regions. Unlike

bioethanol, biodiesel from palm oil fills the national demand given the current blend of 10%. However, to increase the proportion of biodiesel in the national market, Colombia would have to expand its installed production capacity or import it.

Initially focused on rural development and energy security, the biofuels sector in Colombia has recently adopted the environmental argument as a justification for seeking production incentives. In 2008, the Colombian government enacted a resolution that sets the parameters for biofuels policy in a sustainable and long-term manner. More recently, given the commitment to reduce GHG emissions in COP 21, the Colombian government has instituted technical regulations for the sugar and alcohol industry that, according to the Ministry of the Environment, intend to reduce emissions in this sector by 20% when compared to the base year of 2016, thus attaining national goals to reduce GHG emissions (USDA, 2019b).

4. Local-Level Side Effects and Biofuels Production in South America

This section analyses the negative local-level side effects (LLSEs) of biofuel production projects documented in academic, news and grey literature publications in Brazil, Argentina and Colombia.

During the past decades, the Brazilian sugar and alcohol industry has undergone substantial changes in its agricultural and industrial techniques which strengthened the support of biofuel production as a socially and environmentally responsible activity. Despite the gains in productivity with the use of sugarcane milling residues to produce bioethanol, then improving sugarcane's energy balance — even more compared to bioethanol produced from soy in the US — harvesting processes remain controversial in terms of socio-environmental responsibility. Traditionally, the burning of sugarcane straw and manual harvesting were practices that had a great impact on air pollution, leading to an increase in reports of respiratory and cardiovascular diseases, both among workers and residents in cities close to the plantations (Leite, Zanetta, Trevisan et al., 2018). This harvesting technique was also linked to work routines analogous to slavery, as each worker had their earnings determined by strenuous productivity goals. This scenario has changed considerably in recent years, both by the adoption of fire reduction protocols — and, thus, meeting international certification criteria — and by the mechanisation of the different stages of cultivation. It is estimated that in the 2018/2019 harvest, the rate of mechanisation of farming in the state of São Paulo reached 95% (APTA, 2020). However, the recent changes in Brazilian labour regulations and the farming out of feedstock production, which are then purchased by bioethanol plants, are making it more difficult to guarantee good working conditions and to manage the crops; so much so that new cases of exploitation of rural workers have been reported again (Penha, 2018).

One of the biggest concerns related to the increase of sugarcane cultivation is the land-cover change from forest to crops. Research has established that the expansion occurred in areas previously occupied by pastures committed to livestock production. This land use change would make the production of biofuels more sustainable, even more if appropriate management practices are adopted to reduce GHG emissions from crops (Bento, Filoso, & Pitombo, 2018; Alkimin, Sparovek, & Clarke, 2015). However, the supportive, progressive government policy regime is currently in jeopardy of being rolled back. For example, the 2009 ban on sugarcane plantations in the Amazon rainforest and Pantanal wetlands, agreed between stakeholders and the government, was revoked in 2019, thus opening a new frontier for biofuels. Moreover, other researchers have stressed the fact that the indirect land cover change, which is the most difficult to measure, is being caused by commitments to 'green energy' production. This dynamic is characterised by, first, the displacement of livestock in favour of high-value crops, followed by the re-territorialising of livestock in native forest areas leading to widespread forest degradation (Karp, Artaxo, Berndes et al., 2015).

Finally, other environmental negative side effects, either from agricultural and industrial activities, still need to be mitigated to ensure that bioethanol is a sustainable fuel alternative (Filoso, Carmo, & Mardegan, 2015). In environmental and public health terms, the use of pesticides in monoculture crops generates contamination problems in workers and general populations, which are being exposed by the soils and waters that carry contaminating substances

(Carneiro, Augusto, Rigotti et al., 2015; Pignati, Lima, Lara et al., 2017). Thus, while being reported as an ecologically sustainable and socially responsible activity, the Brazilian bioethanol industry has harmful effects in regions influenced by their activities; in addition, governance mechanisms and public policies that led to a 'greenwashing' of national biofuels, effectively reducing fires and labour exploitation, are under regression in the recent years.

In Argentina, the term *sojización* refers to the process of expanding soybean production to replace other traditional food crops in the Pampean region[3], including corn, wheat and sunflower, in addition to cattle and sheep farming. This expansion of soy has also resulted in an increasing concentration of land in business conglomerates that manage much of the production of soybean for export (Reboratti, 2010). The process of *sojización* is occurring during governments aligned with neoliberal policies throughout the 1990s, and in the post-neoliberal period, marked by the governments of Néstor and Cristina Kirschner (2003-2015). Although there is a strong negative impact on peasant agriculture by *sojización*, the revenue generated from commodity exports contributed to the wealth redistribution policies that had a demonstrable impact on the fall of Argentine poverty during the 2000s. Moreover, the soy agroindustry was able to take ownership of Argentine Pampa lands through the implementation of advanced cultivation techniques, such as the incorporation of no-till, genetically modified seeds and agrochemicals (Cáceres, 2015; Lende, 2015).

A consequence of this process is the increase of land concentration for the production of a few commodities. The 2018 Agricultural Census showed that annual crops, such as soybeans and corn accounted for 69% of national production, while in 1988 they were 23%; at the same time that the number of producers has consistently decreased over the same period, even though in the case of soy there are large proportions of land on lease (Repetto, 2019).

Over the past two decades, the agricultural frontier of soy has expanded northward, in the Chaco biome. This biome is the second largest in South America and has one of the biggest land-cover change rates in the last 20 years. According to a report from Greenpeace (2020), the expansion of transgenic soy plantations and cattle ranching in north-eastern Argentina are responsible for about 80% of the clearing of native forest throughout the country. In addition to cheaper land, what has attracted the agricultural frontier to the Chaco is the improvement in road connections, such as the construction of highways and ports; the slight increase in precipitation, which has made soybean cultivation more profitable; and the consolidation of agricultural techniques that allow the cultivation of soy in this region, which is hotter and drier than the Pampa (Magrín, Marengo, Boulanger et al., 2014; Lende, 2015). This agricultural frontier has also expanded beyond the Argentine territory, through purchases of Bolivian and Paraguayan lands by Argentine and Brazilian companies (de Waroux, 2019).

The third country assessed, Colombia is heavily affected by the negative effects of land concentration. There are many analyses that point to the agrarian issues as one of the fundamental factors to explain the trajectory of armed conflicts and violence in the country during the second half of the 20th century. (Thomson, 2011). The concentration of land by an agrarian elite also has negative effects on the distribution of wealth and power in several regions of Colombia (Faguet, Sánchez, & Villaveces, 2020). Additionally, the main biofuels producing regions in Colombia are also some with the highest concentration of land-holding in the country. For instance, the geographical valley of the Cauca River, regional core of the country's sugarcane production, has undergone, especially since the 1980s, a great productive specialisation in sugarcane, which led to the expropriation of peasants, afro-descendants and indigenous communities (Ayala-Osorio, 2019).

A large part of this population became employed on sugar and alcohol production facilities or migrated to cities, turning the Cauca department into one of the poorest in the country. These conflicts among different social groups lead to increasing violence and resistance strategies when coming to grips with the degradation of social conditions. In 2010, one of the biggest strikes of employees at the sugar and alcohol plants led to the stoppage of 18,000 cane cutters, who claimed better working conditions. The protesters associated with indigenous community movements, locally called *minga*, who, in turn, claimed the recovery of expropriated land and reparations for violent acts perpetrated by paramilitary groups (Fajardo Montana, 2012; Cespédes, 2015).

In terms of environmental impacts, the expansion of sugarcane area has increased the pressure on water resources in the Cauca val-

3 Region that includes the provinces of Buenos Aires, Santa Fé, Córdoba, San Luís and La Pampa, in central Argentina.

ley, both in terms of the volume available for multiple users and the quality, affected by the contamination through agricultural and industrial activity. Sugarcane agriculture accounts for roughly 64% of water grants throughout the region. This situation has led to an upsurge in distributive conflicts, especially during the summer, when the demand for water for caniculture rises and it is the driest period in the Cauca valley (Pérez, Peña, & Alvarez, 2011; CVC, 2017).

Regarding the African palm plantations, used for the production of biodiesel, negative effects have been reported in several departments of the Colombian territory, among them: Nariño, Chocó and Bolivar. During the 1990s and 2000s, association among paramilitary groups, businessmen and state agents were responsible for land appropriation and the implantation of African palm monoculture. The engagement of these groups in the palm oil industry occurred at the expense of the expropriation and displacement of peasant and indigenous communities (Ávila Gonzalez, 2015; Lizcano, 2018; Castaño, 2018). Valencia (2009), analysing conflicts in the departments of Chocó and Nariño, argues that a large extent of land is necessary for profitable cultivation of African palm. At the same time, paramilitary groups are equally interested in palm production as it facilitates control of territories and people, laundering money from the production of cocaine, and making a reserve of value. Another strategy towards the control of the territory is the extortion of farmers, which causes their expulsion, then making the undervalued land available for palm farmers. Finally, the conflicts have caused the degradation of large areas of Colombian territory, with a loss of biodiversity in tropical forests and the replacement of traditional food agriculture with palm oil, which has led to the emergence of pests, especially in Nariño (Lizcano, 2018).

5. Discussion: The SIbe From Climate Action

From the above, it is clear that state support for biofuels production and expansion is embedded in policy, law and practice across each of the three states under examination. We summarise the findings in Table 1 below:

Country	Climate Action-Oriented Policy	General Comment	Local Level Side Effect (LLSE)	State Level Boomerang Effect (SLBE)
Brazil	RenovaBio 2017	Marked a shift from state control to market forces (with state as regulator)	Environmental impacts (air, soil and water pollution). Land cover change with increasing land price; peasants driven to deforest land having been pushed off their traditional lands	Deregulation on land cover and labour standards jeopardise the warrant on socio-environmental sustainability certifications. International NGO undermines 'green energy' claims pushing government into confrontational position
Argentina	Blending Mandate; Policy on renewables	Biofuels grow from 8% to 20% of the energy matrix, but fossil fuel use expands in Patagonia	Land concentration in commodity production and capitalised producers. Deforestation and expansion of soy frontier towards the Chaco biome	Lobbying by agrobusiness stakeholders on economic and social policies often antagonising national government, thus fostering conflict among federal levels. Social protests against Kirchner government re. taxation and currency
Colombia	Extension of biodiesel blend mandate; counter-vailing duties on US biofuel imports	Distinct shift in discourse to the language of COP	Expropriation of peasant, Afro-descendant and indigenous communities' land holdings. Impacts on food and water security in regions where sugarcane and palm-oil crops were implemented.	Use of land as a reserve of value and money laundering mechanism for paramilitary groups embeds regional instability. Loss of biodiversity and upsurge of pests in plantation regions so impacting yield and government revenue generation.

Table 1

As shown in Table 1, both the local-level side effects and state-level Boomerang Effects are significant. Seemingly, logical policies devoted to biofuel expansion in support of climate mitigation actions and socio-economic development have resulted in quite typical negative impacts at the local level, defined by Barnett and O'Neill (2010) as 'maladaptation', but most trenchantly articulated by Homer-Dixon (1991) almost thirty years ago as the social dynamic of resource capture (by elites) and ecological marginalisation (of local people). At the same time, the impacts at the local level extend beyond the social, as energy policy driven land use change is having significant negative impacts on the natural environment.

The impacts at the local level extend beyond the social, as energy policy driven land use change is having significant negative impacts on the natural environment

As shown in column 5 of Table 1, in terms of state-level Boomerang Effects, the impacts are more diffuse and so seemingly tolerable, or deemed to be manageable, by state actors. Two questions arise: Firstly, why should states willingly replicate the well-chronicled mistakes of past developmental practice in the name of climate action? Secondly, what might be done to drive influential state, private sector and civil society actors toward better climate action policy?-

6. Conclusion

In Table 2, we focus in on real and potential Boomerang Effects across the integrated economic, social, political and ecological landscape. Here, we show that continuation with poorly informed mitigation policies, emerging out of 'normal' political and economic processes may increase instability within and across states.

It is therefore imperative that future climate mitigation actions take a more nuanced approach to policy making and implementation. This might include the establishment of national and regional round tables on climate and the environment wherein states, private sector actors and civil society organisations can come together to thoroughly consider the likely LLSEs and SLBEs that result from climate action. Certainly, the desire at state level to show progress on climate action in line with NDCs pushes states toward ill-considered interventions. While acknowledging that the climate crisis requires concerted action now, it is our hope that careful analysis through frameworks such as the Boomerang Effect will assist in improved policy, practice and outcomes.

Country	State-Level Boomerang Effects (SLBE)		
	Economic and Social Stability	State Authority	Ecological Sustainability
Brazil	Changes in labour regulation and techniques can lead to rising unemployment and the abasing of work conditions.	De-regulation of the land-use governance agreements and liberalisations to yield sugarcane in sensitive regions can trigger new conflicts and reinforce others already in place.	Indirect land-cover change by deforestation on the agricultural frontier can put in jeopardy the new Brazilian biofuels policy targeting certification and emission of CBIOs.
Argentina	Dependency on commodity export incomes to guarantee social policies have effects on its stability and conditions of national well-being.	Increase of taxes and withdrawal of subsidies for soybean exporters threaten political and rural elite alliances that are important to sustain the national government.	Threatening of Chaco biome and the dependency on unsustainable environmental conditions in the agricultural frontier are changing regional climate, with transboundary effects.
Colombia	Energy security is vulnerable to dumping policies enacted in biofuel production leaders, especially European Union and the US.	Violence and conflicts between 'campesino', indigenous and Afro-Colombian communities against paramilitary and state-supported actors have been consistently affecting human security in many Colombian regions	Substitution of traditional foodstock for biofuel crops have affected food security, biodiversity and the ecological equilibrium with the upsurge of pests in food agriculture.

Table 2

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The Fundamentals of Oil Market Geopolitics

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1. Introduction

Some say geography is the backdrop to history itself. And yet an artificial, man-made frontier, which does not coincide with a natural frontier, is something particularly vulnerable.

What can we say then about the border power relations that involve, in the territories in question, the most coveted energy of recent times: oil? Power relations among countries involving hydrocarbons have provoked revolts, wars, indigenous movements, and the rise and destruction of various economies around the world. This paper aims to create keys to understanding, from elements of political science, international relations and energy policy, to give the reader input on how the current Covid-19 pandemic destabilised the international and national oil systems, leading to the collapse of prices and the collapse of various power relations between states, and even OPEC+ itself.

The protection of the markets that emerges in a tautological way in this critical moment is configured in the maxim of Delfim Netto that 'the world, in fact, is an archipelago of countries that hate and envy each other'.

This work is divided into five sections. The first part brings the concepts of geopolitics and petropolitics into the light of the contemporary oil industry, in addition to the tensions generated by the world energy trade. It also discusses how market fundamentals, the laws of supply and demand, have given way to issues related to pet-

ropolitics when it comes to the price of crude in the international market. The second part raises the discussion about resources and reserves, their distribution across countries, regarding these definitions as essential tools for measuring the size of companies' assets and demonstrating how much of future production the country (or the company) still has. By the way, future oil production equals economic power and political influence. The third section concerns the main producers and oil consumers in the world and their global dynamics for power balance and price influence. In recent years, the US' shift from being the largest consumer to one of the world's largest producers is an issue to be discussed. The fourth stage of the document comprises the main historical moments of oil shocks from the first one in 1973 to the shale revolution in 2015, analysing periods of high prices, behaviours of the main actors on the international scene, impacts on international relations and the most dramatic economic effects of some of the shocks. Finally, the last section presents the 2020 crisis of excess supply and shortage of demand, analysing the behaviours of the responsible actors, Saudi Arabia and Russia, and the behaviour of the world's leading producer, the US. It also brings some keys to understanding the economic recession impacts on the post-pandemic energy world.

2. The Concepts of Geopolitics and Petropolitics

Geopolitics means the set of actions and practices carried out in the sphere of power, generally involving national states in order to promote the management and control of their territories. Often these relations go beyond the very notion of state, and slip into tensions between the intergovernmental and the supranational, such as the constitution of regional organisations and international mechanisms, following the example of the UN (United Nations Organisation) and NATO (North Atlantic Treaty Organisation), which constitute clear stages to the above-mentioned tensions.

Petropolitics, in turn, is understood as the contemporary set of geopolitics that combines two types of problems. On the one hand, the abundance of hydrocarbons generates asymmetric relations among countries and is consistent with the appearance of hegemony and subordination relations among states, due to the dependence of importers on exporters and of exporters on oil revenues. On the other hand, the revenue received by the government of a petrostate can be used to exert pressure on other governments and manipulate opposition groups in other countries.

Both concepts are deeply related to the energy field. In this sense, energy is increasingly important in contemporary economies, always stirring a new world order and establishing criteria and positions, within which some countries have relatively opposing positions: some as major producers and some as major consumers. Today, the US stands out as the great producer of energy, at a time when Asia, in turn, stands out as the great consumer. However, it has not always been the case, revealing how geopolitics is constantly changing.

Energy geopolitics change as a result of the discovery of energy sources, which raises the level of development of certain regions more than others. It is influenced by the changeable positions of producers and consumers on their way to development.

2.1. The Energy Industry

With the prediction of a decline in oil, the US intensified its search for new resources, discovering in its territory several sources of natural gas — less of an emitter of CO_2 and of greater abundance — that could turn the country into the main geopolitical influencing nation against the backdrop of a new era in this century: the era of natural gas.

Research, discovery and exploitation of energy resources move the indices of industry and launch new players, at each new time, in the global producer and consumer scenario, through the large amount of resources in their soil, as with the rise of Arab countries. Other situations alternate each day, such as: the use of bituminous rocks, which put Canada in the spotlight due to the exploitation and use of its large amount of resources; Venezuela surpassing Saudi Arabia in its quantity of natural reserves, and, at the same time, being surpassed by Canada as the largest supplier to the US; China appearing with the world's largest unconventional oil and gas reserve, and considering it an option of independence and transformation from a great consumer into a great producer, or even

into a great supplier. The pre-salt reserves in Brazil, for example, are another example of change in the world energy panorama. The country, with a potential deep-water exploration tradition, began exploring in ultra-deep waters and announced the discovery of these reservoirs in 2006. This Brazilian discovery, after the gigantic oil field in Kazakhstan, was the largest discovery made in the last twenty years in the world. But the current concern is how to plan and manage the country's energy sector by leveraging multiple uses among the various energy sources: hydroelectric, fuel oil, natural gas, solar, wind and biomass, which are still under development, as has happened with ethanol.

2.2. The Political Nature of Energy

The political nature of energy, linked to sources of supply and demand, comes to the public's attention in times of crisis, especially when oil markets are unstable and raise prices, or are too low and affect producing economies and their production chains. But energy policy has become even more complex. Transport systems have become largely dependent on oil, so market disruptions can bring them to a standstill. Access to energy is critical to sustaining the economic growth of countries such as China and India — not only to lift these countries out of poverty, but to maintain the economic pace with accelerated population growth rates. Thus, energy issues affect the political decision-making, regarding the survival of political regimes and their legitimacy to both domestic society and the international community.

2.3. The Hard Geopolitics

Geopolitics is also known as the battle for space and power in a geographical configuration. So, as there are military, diplomatic and economic geopolitics, there is also energy geopolitics. To understand the dynamics of natural resource use and the trade routes that bring these resources to consumers, the study of geography is fundamental.

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Asia has become the global base for the growth of energy consumption. It is expected that, over the next 20 years, 85% of the growth in energy consumption will come from the Indo-Pacific region. Currently, at least a quarter of the world's liquid hydrocarbons are consumed by China, India, Japan and South Korea. According to the World Energy Outlook, published by the International Energy Agency (2019), China will account for 40% of the growing consumption by 2025, when India will emerge as 'the largest source of increased demand'. These were the forecasts so far.

The energy consumption growth rate for India is expected to increase by 132%; in China and Brazil the possibility of demand growth is 71%, and in Russia, 21%. The increase in demand for gas is expected to exceed oil and coal combined. Part of the story here is that the Indo-Pacific region may become more dependent on the Middle East's oil: by 2030, 80% of China's oil will come from the Middle East whilst the Indian one will reach 90%. In turn, Japan and South Korea remain 100% dependent on oil imports. It appears that China's dependence on the Middle East will also be underpinned by

its concomitant and growing dependence on energy from the former USSR countries.

While the Indo-Pacific region is becoming more dependent on energy from the Middle East, in the other hemisphere, the US has emerged as a global energy producer for its own benefit. US production of shale gas and tight oil has more than tripled. Within a decade, shale gas has increased from 37% to 50% of US natural gas production. The US has already overtaken Russia as the world's largest producer of natural gas.

2.4. Territorial Tensions and Developments in the World Energy Market

The Indian Ocean and South China Sea have become the world's largest energy highways, therefore, the maritime tensions in these regions have been frequently perceived. The territorial tensions over which country has the geographical control in these waters are not only driven by potential energy reserves and marine ecosystems, but also by the fact that these sea routes and bottlenecks (choke points) are of growing geopolitical importance.

Economic importance often leads over time to cultural and political ones. Thus, the current tension between an economically and demographically stagnant European Union and a troubled and autocratic Russia — wealthy in energy — may actually bring about the decline of Greater Europe, while North America and the Indian Ocean areas may strengthen themselves as the pulsating new centres of trade in the world. It might rescue a possible bipolarity of the international system, considered by neorealist scholars as the most stable systemic distribution of power.

2.5. The Global Economic Dynamics of Energy Trade

From there, power in Eurasia tends to move to southernmost latitudes, while the US would have its own energy reinvigorated by an even closer economic relationship with Canada and Mexico. The world centred on Europe over the past millennium may finally be changing, with North America and the nations of the great Indian Ocean in the spotlight.

In this scenario, the US is seen as the world's major power; at least as long as its natural gas exploration and marketing policy works well. In addition, it is noticeable that with China and India strengthening as economies, and given their extremely large populations, trade routes will become increasingly tougher in the Pacific, making this region the most relevant in the current and coming decades, not only in terms of energy, but also in the entire world economy.

3. Resources And Reserves

Oil represents about 40% of the world's energy matrix. This is due to its unique combination of attributes: sufficiency, accessibility, versatility, ease of transport and, in many areas, low costs. The reasons highlighted above are complemented by a list of practical benefits that can be gained from an infrastructure established from decades of intensive exploration and use in industrial, commercial and domestic areas. Advances in technology have made oil a cleaner, safer and more efficient fuel.

The expectation is that there should be an abundance of oil in the coming decades. The world's oil resource base is not a constraint on meeting future demand. In addition to proven reserves of crude oil, there is still an abundance of undiscovered oil in regions whose geological structures suggest a high probability of commercially viable reserves.

Proven world reserves alone — of around 1,100 billion barrels — will be enough to meet demand for about 45 years at current production rates. In practice, however, the situation is more optimistic than that. To begin with, production will not suddenly stop at a finite point: instead, a gradual transition phase is likely to occur that will last many decades, as occurred when the world switched from coal to oil.

In addition, while on the one hand, annual production should steadily increase at the beginning of the 21st century, on the other hand, recovery rates will also improve through advanced technology, improved infrastructure and better accessibility. In addition,

there is 'unconventional oil' such as tar sands, oil shale and heavy oil, its exploitation is expected to increase steadily in the future. Concerning these variables, the peak oil theory's statements of scarcity and peak of production do not comprise technological progress.

For this discussion it is important first of all to define the concept of reserves. In general, several authors define the concept of reserve as an economic technique, corresponding to a part of the resources that can be technically and economically extracted or produced, at the time of its determination, with a certain degree of certainty. This degree of certainty is implicit in the determination of the concept, being:

1. proven reserves — 1P — the volumes whose certainty is at least 95%;
2. probable reserves — 2P — are the volumes for which certainty is at least 50%; and,
3. possible reserves — 3P — for which certainty is at least 5%.

In other words, proven reserves are those quantities of oil that, by geoscience and engineering data, can be estimated with reasonable certainty of being commercially recoverable, from: a given date, known resources and under economic conditions, methods of operation and government regulations previously defined and known. If deterministic methods are used, it is understood that the term 'reasonable certainty' expresses a high degree of reliability that the quantities will be recovered. If probabilistic methods are used, there must be at least a 90% probability that the quantities recovered will equal or exceed the estimated ones. Probable reserves are those additional reserves, which, from geoscience and engineering data, are less likely to be recovered than proven reserves, but more certain than possible reserves. In this context, when probabilistic methods are used, there should be at least a 50% probability that the current quantities recovered are equal to or greater than the estimated 2P. Possible reserves are those additional reserves that, due to geoscience and engineering data, are less likely to be recovered than probable reserves. The last quantity recovered has a low probability of exceeding the sum of the most probable proven reserves (3P), which is equivalent to the highest estimated scenario. When probabilistic methods are used, there should be at least a 10% probability that the quantities recovered will be equal to or greater than the estimated 3P.

Differently from reserves, resource is the total stock of a mineral in physical terms, with no associated economic value, or estimated probability of extraction. There may be large quantities of oil that will never be used because of the high cost or impossibility of recovery. Thus, reserves are also known as the recoverable resources, which involve an economic evaluation about the possibility of producing a part of the total resources.

Current production methods use natural depletion and secondary recovery techniques (water or gas injection), which usually recover one third of the so-called oil in place. However, the technological advances used in some countries can provide recovery of more than 50% and, under favourable conditions, it can reach 70%. Thus, more optimistic calculations are based on future uses of high efficiency recovery techniques, assuming that high technological development will further promote oil recovery, and may be implemented in the future. According to Maugeri (2004), 'the field had not changed, but knowledge had (...)', recovery technologies have advanced, allowing greater use of field resources, without necessarily incurring higher expenses.

In this way, the volumes and classifications of the reservations are subject to continual review. The variations in reserves are not only on account of new discoveries, but also related to oil prices in the international market. For example, the increase in prices leads to higher possible reserves, to the point that a substitute technology — backstop technology — is made. Then, reservations are on grounds of the progress of geological knowledge and technological advances, including even the redefining of conventional and non-conventional oil concepts. Finally, they are also related to oil refining, either directly by increasing the conversion capacity of refineries in general, or indirectly, by differentiating oil prices on the international market and specific refining capacities.

Any technique or level of production inevitably depreciates reserves and possibly depletes deposits, while successful exploration and prospecting add new reserves to resources. Figure 1 illustrates the dynamic nature of the reserve-resource relationship. Thus, before starting the exploration of a given reserve, an analysis of the eco-

nomic viability is needed to comprehend what kind of technologies will be required, if the oil ought to be obtained. Thus, technology and price, as well as demand, are very important variants with respect to what is the reserve within a given resource.

The estimated calculations of oil reserves are prepared for various reasons and for different purposes, the main objective being to serve the internal management of the country or company's reserves. However, these estimates are also necessary to meet some specific external objectives. Among them:

1. Compliance with regulations, requiring oil companies to report key aspects of their business;
2. Oil reserves are almost always used as collateral to obtain bank loans for oil companies;
3. Reserves held by international oil companies are used by newspapers and financial and business magazines to measure the size of the company's assets and thus establish a ranking of the largest ones;
4. Companies' internal reporting to their shareholders is usually impartial and even a little conservative, but they are not free from management intervention; and finally,
5. Figures used for budgets and planning tend to be exaggerated and optimistic when reported by explorers, but more conservative when reported by engineers.

Thus, one can observe the tendency that OPEC and non-OPEC companies and countries have to deliberately inflate or reduce their reserve reports in order to obtain political or financial advantages. For OPEC member countries, this seems to be common practice, since the higher their so-called proven reserves, the higher their production quotas will be.

For private companies, in turn, the advantage seems to come from the price their shares can reach on the market — the greater their reserve, the longer their oil production. On the other hand, the exploration company may tend to declare the minimum because it wants to ensure a considerable growth over time for the reserves to signal a more attractive image for investments. In addition, the minimum declared reserve intends to reduce the fees charged by local governments, which are levied on their oil revenues according to the declared volume of reserves. Also, the reduction in the size of the reserves may be linked to circumventing the legislation on taxes levied on the reserves (or the patrimony) in a given country, or, as in the case of non-OPEC countries, seeking the reliability of oil importers in relation to the continuity of production and export aimed at a part of OPEC's market share. It is also necessary to consider the aspect of political power intrinsic to large oil reserves: the more and larger the reserves, the greater market domination, and therefore greater power in the scenario of international relations with regard to the sale of oil.

As previously mentioned, for OPEC countries, the greater their reserves, the greater their production quotas, and these quotas were defined by individual countries from 1982 onwards, after the second oil shock, and whose reserves increased greatly from the late 1980s onwards.

From the analysis of the regional distribution of reserves, it can be concluded that the industrialised countries have few reserves in relation to their consumption levels. World supply to these countries (US, Japan and Western Europe) depends on the use of reserves located in less developed regions — Middle East and Latin America — which together have 62% of proven world reserves. In Latin America, the main reserves are in Mexico and Venezuela (BP, 2019).

In relation to Brazil, despite its proven reserves being, in the global context, modest (13 billion barrels, according to ANP data), the country still has unproven reserves from the pre-salt that can reach 50 billion barrels. Additionally, the country, for having a diversified energy matrix and being not so dependent on oil, is in a less vulnerable position than those whose economies have oil as their main source. According to the ANP, 13.2 MMbbl of proven reserves (1P) and 23,850 MMbbl of proven, probable and possible reserves (3P) were declared in 2018 (Figure 2). An increase of 3% and 1% respectively, if compared to the year 2017. Considering 2018 production, the replacement rate of proven reserves (IRR 2018/2017) was 143%. The current total oil reserves demonstrate that there were commercial projects for additional exploitation of approximately 1.28 the volumes already produced in Brazil up until December 31, 2018. Out of the total amount declared by the operators, approxi-

mately 632 MMbbl (1P reserves) and 2,723 MMbbl (3P reserves) are not yet formally recognised by the ANP.

4. Main Producers and Consumers

One of the most basic problems faced by oil producers is ensuring that production capacity is available at all times to meet demand. Investment is needed to meet the forecast increase in demand, to replace exhausted reserves and to ensure that oil producers always have sufficient spare capacity to deal with a sudden and unexpected supply shortage.

Producers need guarantees of stable and predictable markets just as much as consumers need security and consistency with sources — security of demand is as important as security of supply. The investment required would be greater and different in scale from that observed in the past. The cost of oil investment in OPEC countries is much lower than in non-OPEC ones. 50% of the time, US oil prices and world prices were below the oil price average of $ 24.58 per barrel (Figure 3). If long-term history is the guide, the oil industry should structure its business to be able to operate at a profit with a barrel price below $ 24.58 for more than half the time.

4.1. Main Producers

Among the world's major oil producers today are the US, Saudi Arabia and Russia. It is worth noting that until 2016 the position of largest producer belonged to Saudi Arabia, lead member of OPEC, which held almost 20% of world production. The shift caused by the US shale gas gives the country a position of self-sufficiency and energy security, changing power relations, since the US used to import around 60% of its oil consumption. The fact that they are practically self-sufficient eliminates a good part of their international trade, throws prices down, turns the country into a potential exporter (even exporting LNG to Brazil) and also reorders Saudi Arabia-US relations, from which Washington relied upon as part of its energy security.

Saudi Arabia, the world's second largest producer, has an oil-based economy with strong government controls over major economic activities. It has around 16% of proven oil reserves in the world, occupies the position of the world's largest oil exporter and plays a leading role in OPEC. The oil sector accounts for about 80% of budget revenues, 45% of GDP and 90% of export revenues. Although, Saudi Arabia is currently encouraging private sector growth in order to diversify its economy and employ more Saudi nationals. Diversification efforts are focusing on energy generation, telecommunications, natural gas exploration and petrochemical sectors, including oil derivatives. Riyadh (the Saudi capital) has substantially increased spending on professional training and education. As part of its effort to attract foreign investment, Saudi Arabia joined the World Trade Organisation (WTO) in 2005.

The world's third largest producer, Russia, has undergone significant changes since the collapse of the Soviet Union, moving from a

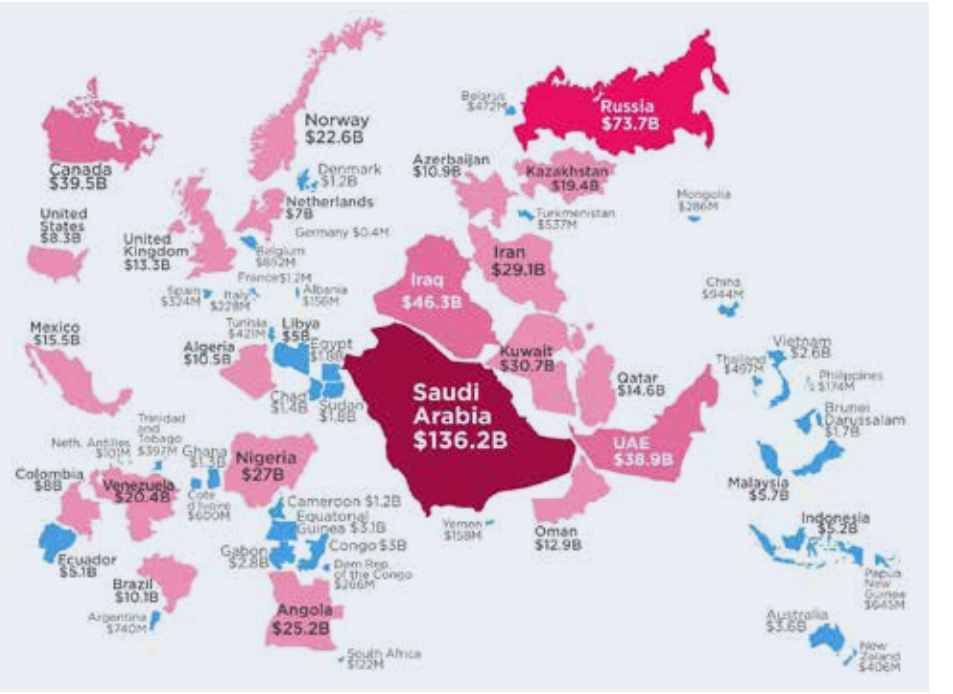

Figure 1
Main routes of oil international trade in the world
Source: One Map Shows the World's Biggest Oil Exporters. (2017). Retrieved December 8, 2020, from the website: https://howmuch.net/articles/world-map-of-crude-oil-exports-2016

centrally planned and globally isolated economy to a more globally integrated economy based on the open market. Despite this change, Russia is only partially reformed, remaining with a statist economy with a high concentration of wealth in the hands of state employees. There were economic reforms in the 1990s privatised industry, with notable exceptions in sectors related to defence and energy (Rosneft and Gazprom companies, for instance).

The Russian economy, which averaged 7% growth during the years 1998-2008, when oil prices rose rapidly, was one of the hardest hit by the global economic crisis of 2008-2009, when oil prices plummeted and foreign credits that Russian banks and companies took dried up. Slowly, the decline in oil prices in recent years and the difficulties in attracting foreign direct investment contributed to a noticeable slowdown in Russian GDP growth rates in recent years.

4.1.1. OPEC

OPEC was established in 1960 with five founding members: Iran, Iraq, Kuwait, Saudi Arabia and Venezuela. Two out of the representatives at the initial meetings had previously studied the Texas Railroad Commission's method of controlling price through production limitations. By the end of 1971, six other nations had joined the group: Qatar, Indonesia, Libya, United Arab Emirates (UAE), Algeria and Nigeria. Since the founding of OPEC, in 1972, a steady decline in the purchasing power of a barrel of oil has greatly affected member countries.

The cartel, which produces 35% of the oil consumed in the world today, knows only one instrument of market control, which is the adjustment of supply, and is not using other economic instruments such as tariffs and subsidies, exchange controls and import quotas (as they are major importers, their supplier countries could be coerced through the establishment of quotas).

In fact, it is an intergovernmental organisation. Governments respond to economic needs and forces, but they also have external policies, and are eager to protect 'national security', so economic models are usually not enough to explain OPEC's behaviour. Additionally, countries with smaller populations and huge reserves are called 'small absorbers', which puts them in a position to want an extended commercial life for their fields to the maximum as well as moderate prices. This is the case in Saudi Arabia, Kuwait and the UAE. The 'big absorber' countries, on the other hand, are those with large populations and smaller reserves, which lead them to always have urgent financial needs and to be 'hawks' in relation to prices.

4.1.2. NON-OPEC

Currently, the production of OPEC member countries represents approximately 35% of the total world production, leaving the other countries with 65% of world production. They are called non-OPEC producers, and include the US, Russia, Canada, China, Brazil, Mexico, Norway, among others, which have emerged as major players in the market.

It is worth noting that OPEC has lost strength and market share of production on the international market, and therefore its power to influence prices, since world production is increasingly spread over several other countries. This deconcentration of power draws strength from the OPEC countries to influence prices and the market upwards or downwards as they did until recently. Even so, it is noted that the shock caused by Covid-19 is a shock recession of demand, coupled with a surplus of oil, which has little to do with a cohesive movement of OPEC members.

It is clear, therefore, that the most desired energy source is still oil, the driving force behind the development of modern and contemporary society. However, the current dependence on the largest consumers, the so-called developed countries, brings considerable concern, since the largest oil reserves are located in the territory of developing countries (especially those with recent potential, such as Venezuela and Bolivia).

Thus, this relationship of dependence has two sides: on the one hand, the constant threat of a conflict for the control of the deposits; and on the other, the possibility of the countries that hold them, to take advantage of this fact for the planning of policies that benefit and insert them in the international scenario, avoiding even this threat.

4.2. Consumption

According to ANP data (2018), world oil consumption totalled 99.8 million barrels/day. Among the largest consumers, the US stands out with a consumption of approximately 20.5 million barrels/day (20.5% of the world total). The country's concern about energy security also makes it the world's largest producer as of 2015.

Followed by China, this averaged 13.5 million barrels of oil per day (13.5% of the total worldwide). Chinese oil imports come mainly from the Middle East and Russia. It is important to mention that the Chinese energy need leads the country to spread its investments in energy around the world with initiatives such as 'Belt and Road', investments in the exploration of the Brazilian pre-salt, and the abandoned project of the Nicaragua canal to replace the passage through the Panama Canal, among others.

In third place was India, with 5.2 million barrels/day (5.2% of the world total). The Indian government's incentives to use ethanol in its energy matrix should be highlighted, even though for most of the year, sugar reaches more relevant values in the international market. Four out of the twenty most polluted cities in the world are located in India, which highlights the prominent role that the incentives for ethanol production and use play in the country's energy matrix.

5. Wars and Conflicts

Energy security has always been on the agenda of all governments. So has the impact of energy on both foreign policies and the global economy. The greatest risk for producers in recent times has not been geological, but geopolitical. Changes in the location of demand, in addition to political and technological uncertainties, have altered market dynamics.

One of the factors that are closely linked to energy development is the dependence on a single energy source, which has a peculiar characteristic for oil and its derivatives. This brings with it various geopolitical obstacles, such as the particular interests of nations, social and political instabilities and religious wars.

Historically, the impacts resulting from dependence on oil as an energy source have been globally recorded as oil shocks, whose typical performances, either sudden, and continued increases in the price of oil, or excess supply with falling prices, and an imbalance in the supply-demand relationship, stem from the instability of the world political economy.

Given its economic and strategic peculiarities (among them the use in practically all regions of the world and the great concentration in conflicting regions of the planet), several strong manipulations occurred, resulting in the so-called 'shocks'.

The first shock occurred in 1973 after the Yom Kippur War. It is worth noting that the Organisation of Arab Petroleum Exporting Countries (OAPEC) began the embargo in response to the American involvement in the Yom Kippur War. Six days after Egypt and Syria launched a surprise military campaign against Israel to recover territories formerly lost in the Six Day War of June 1967, the US provided aid to Israel. In response, OAPEC announced an oil embargo against Canada, Japan, the Netherlands, the United Kingdom and the US. The Arab countries decreed a blockade on oil supplies to Israel's allies, mainly affecting the US, the Netherlands and Portugal. The Brent oil barrel jumped from US$ 8.00 to US$ 11.5, until it reached the level of US$ 38.00 a barrel, in 1974, due to the continuity of the blockade until March. It remained for a considerable period, even after the end of the blockade, at a level of US$ 36.00 a barrel.

6. Impact of the Crisis on International Relations

The crisis has had a major impact on international relations, creating a 'crack' within NATO, since some European countries and Japan have sought to detach themselves from US foreign policy in the Middle East. To resolve this, the Nixon administration began multilateral negotiations with the combatants. They organised for Egypt, Syria, and Israel to retreat to the Sinai Peninsula and the Golan Heights. On January 18, 1974, Secretary of State, Henry Kissinger, had negotiated a withdrawal of Israeli troops from parts of the Sinai Peninsula. The promise of a negotiated solution between Israel and Syria was enough to convince Arab oil producers to lift the embar-

go in March 1974. Independently, the OAPEC members agreed to use their influence on the oil pricing mechanism to establish their incomes by raising world oil prices after the failure of negotiations with western oil companies.

The embargo occurred at a time of rising oil consumption by industrialised countries and coincided with a sharp increase in oil imports from the world's largest oil consumer, the US. Following this, the countries impacted by the embargo initiated a wide variety of policies to reduce their dependence on crude oil.

6.1 Economic Effects

The 1973 'oil shock', with the subsequent stock market crash, was considered the first event since the Great Depression to have a persistent economic effect. The success of the embargo demonstrated Saudi Arabia's diplomatic and economic power. The Arab kingdom, politically and religiously conservative, was the world's largest oil exporter. After

Figure 5
Choke points — oil transport routes — Hormuz, Bab el-Mandab and Suez Straits, and percentages of the total oil transported worldwide
Source: Three Important Oil Trade Chokepoints are Located Around the Arabian Peninsula. (2017). Retrieved December 8, 2020, from the website: https://pgjonline.com/news/2017/08/three-important-oil-trade-chokepoints-are-located-around-the-arabian-peninsula

that, Arab nationalism was progressively swept away by an Islamic renaissance. Throughout the Islamic world, there was a great increase in Saudi Arabia's international wealth and prestige in the following years.

The second shock, between 1979 and 1980, arose as a result of the Islamic revolution in Iran, when Ayatollah Khomeini demanded a broad renegotiation of the exploration contracts of foreign companies, in particular, British Petroleum. The following year, the Iran-Iraq War began, triggered in 1980 by Saddam Hussein against the new Shiite regime in Iran (with the support of the US, which arms Iraq). The price of the barrel rose to US$ 78.00 between 1979 and 1980. The nominal prices stabilised around US$ 32.00.

The second major crisis, due to the decrease in oil production in the wake of the Iranian Revolution, in fact reduced the global oil supply by only 4%, but raised a generalised panic, leading the price of a barrel to be negotiated at a much higher price than was justified by the supply. As happened during the 1973 crisis, global politics and the balance of power were impacted.

In 1980, after the outbreak of the Iran-Iraq war, oil production in Iran almost stopped and Iraq's oil production was severely cut too. After 1980, oil prices began a twenty year decline, reaching a 60% drop over the years 1990. Oil exporters such as Mexico, Nigeria and Venezuela expanded their production, the former USSR became the world's largest producer and North Sea and Alaskan oils flooded the market. Then, OPEC lost its former influence.

'OIL SURPLUS'

In June 1981, the New York Times announced that there was a 'surplus of oil' and Time Magazine declared: 'the world temporarily floats on a surplus of oil'. In fact, while temporary surpluses had brought prices down slightly, they were still well above pre-crisis levels. The main cause of excess consumption was in decline. In the US, Europe and Japan, oil consumption fell by 13% between 1979-1981, due to the reaction to large increases in oil prices by OPEC and other oil exporters, continuing a trend that started during price increases in 1973.

The third shock, dating from 1990, occurred after Saddam Hussein's invasion of Kuwait, and immediately ceased the Kuwait's oil derivatives production. Considering the western blockade against

Iraq, conditions deteriorated, culminating in Operation Desert Storm in early 1991. Saddam responded by burning the oil wells, an action that removed from the market around 4.6 million barrels, while the nominal price exceeded US$ 40.00.

The fourth oil shock in 2001 was caused by the terrorist attacks on New York and Washington. This created a strong area of instability in the Middle East, with increasing pressure on producing countries. In contrast, outside the area of the major producers in the Middle East and of a strictly internal nature, stemming from social and political crises, one of the world's largest producers, Venezuela, was beginning to experience a strong institutional crisis, paralysing production several times over. In 2002, this culminated in a temporary and failed coup against Hugo Chávez and, between 2003 and 2004, in a long strike by the state company Petróleos de Venezuela S/A, leading the country to import gasoline. In addition to this case, Bolivia, Nigeria and Ecuador were also examples, having occasional production withdrawals due to serious social and political crises.

The fifth oil shock, which occurred in 2008, unlike the other periods of the crisis, occurred as a result of the speculative movement of the market around commodities. It was not a real devaluation crisis; since it was caused by the way speculative capital is currently organised.

In short, the international scenario, especially since the end of the 20th century, has become even more complex due to increased competitiveness through the possession of energy sources.

6.2. The Shale Shock

According to Gauto, the 2008 financial crisis associated with the North American real estate bubble, which culminated in the collapse of Lehman Brothers, had a strong impact on the world markets and put a brake on oil consumption, bringing the price close to US$ 60 in 2009. OPEC announced production cuts of around 2.0 MMbpd and, together with the global economic recovery and Asian economies performance, put pressure on supply and prices rose again. Between 2011 and 2013, average oil prices were above US$ 100. It was during this period that the 'shale revolution' in the US came on the scene.

High prices encouraged oil and gas production in reserves that had high extraction costs not only in the US, but across several world borders. In addition, the development of directional drilling technology (horizontal offset well drilling) and breakage of the rocks (fracking) to remove the hydrocarbons boosted North American production.

From 2011 to 2015, US production grew by 1.0 MMbpd each year, with domestic consumption remaining practically stable, i.e. there was a shift in oil imports due to the increase in own production. Approximately five million barrels of oil per day remained in the market in search of new consumers. The surplus of supply forces priced down. Thus, prices plummeted from 2014 onwards and the oil industry shook. The era of oversupply of oil had arrived.

7. The 2020 Crisis

After a period in which geopolitical issues governed prices, i.e. the balance of supply and demand was mainly the result of the dynamics of countries and their power relations, the fundamentals of the oil market and its economic aspects of supply and demand are resuming their relevance in determining prices. In other words, OPEC, more than ever, loses its discretionary power over the oil market. The Middle East is the epicentre of this conjuncture. These conditions would allow Saudi Arabia to intervene more strongly in the market imbalance, again giving it significant power in determining oil prices.

The recent dispute between Saudis and Russians within OPEC+5 has suspended their cooperation for a while. This is at least until the next ministerial meeting of the countries concerned. The Russians' refusal to adopt new production cuts to sustain the price of a barrel in the face of a declining demand scenario — caused largely by the effects of the new coronavirus on the world economy — led the Saudis to take a punitive stance towards Moscow. With the aim of returning to the negotiating table for the implementation of new production cuts, Saudi Arabia has adopted discounts on the barrels produced in its territory for the consumer markets of Asia, Europe and the US, additionally, it has increased its production capacity.

In this context, both the discounts and the increase in production are punitive measures because of the Saudis aim, on the one

hand, to take from the Russians a share of their oil market in strategic locations, such as the European continent, India and China (the world's largest oil importer for whom Russia is the largest supplier); and, on the other hand, to force the devaluation of the rouble and, at the same time, to weaken Russia's ability to react, by attacking its control of the above-mentioned strategic markets. However, it is important to emphasise that the strategy adopted by the Saudis has a validity period because it also has repercussions on their own economy, which is largely dependent on oil export revenues to be sustained and also to implement the commitments in various sectors presented in the SAUDI VISION 2030.

It also affects other economies in the Middle East. Iraq is in serious trouble as coronavirus-induced oil prices have cut the country's revenue by almost 50%. As in many countries, the continuous depression of oil prices is causing a new era of economic implosion. The country does not have a real government, it is exhausted by the fight against the Islamic State and the impact of a virtual conflict between the US and Iran. Baghdad hoped to rebuild the country this year — its initial budget for 2020 was the largest in history and was focused on rebuilding the country's degraded infrastructure — yet the drop in oil prices has reduced ambitious targets. The situation is so bad that a parliamentary committee recently recommended that foreign oil companies be paid for their services in crude oil and not in cash.

Iran, in turn, is struggling with the Covid-19 outbreak in a broken economy and a serious shortage of medical equipment, claiming that US trade sanctions are taking Iranian lives and asking the US to lift them for humanitarian reasons. Tehran says about 50,000 people have the disease and about 3,000 have died, but public health experts say the number is several times higher. Iran's appeal is gaining momentum with the European Union, the UN Secretary General, human rights groups and thirty members of Congress, calling on the Trump government to suspend sanctions while Iran fights the coronavirus. On the other hand, US-Iran grievances have favoured a partnership approach between Tehran and Beijing, regarding the potential cooperation in energy, infrastructure, technology and military fields. Exports of natural gas from Iran to Turkey have been halted following an explosion in the oil pipeline which crosses their mutual border. An authority from Turkey's Energy Ministry said that 'all necessary efforts' were underway to manage the situation, but that it is currently unclear when the line will be reopened.

The current crisis unleashed by the Covid-19 outbreak is therefore having a devastating impact on world oil demand. The social restriction measures, necessary to reduce the contagion, are reducing both the flow of people around the world and the demand for transportation and consequently for fuels. The expected drop in demand for 2020 is approximately 5% compared to 2019, which means a reduction of about two billion barrels in accumulation. The majority of this drop is expected to occur in the second quarter of this year, with an estimated drop of 14 million barrels per day, a figure that represents a higher daily consumption than that of China in 2019 (New York Times).

In an attempt to save the US oil industry and leverage his re-election, Donald Trump said he had aligned a production cut between the Russians and the Saudis, which led to the firing of futures contracts on the London Stock Exchange: a rise of 46%, with the possibility of a reduction of 10 million barrels/day. However, there was no official confirmation from the Russian and Saudi governments regarding this cut. On the contrary, Saudi Arabia announced an increase in its exports in May 2020, to 10.6 million barrels/day, adding 600,000 barrels/day. Even if the Saudis and Russians agreed to the drastic production cut mentioned by Trump, the impact on the market now would be limited because of the scale of demand destruction caused by the Covid-19 outbreak.

Combined, the increase in supply and the implosion of demand are triggering the largest oil tsunami of contemporary history. Demand may decrease by more than 16.0 million barrels/day in the second quarter, as well as a torrential increase of about 3.4 million barrels/day of new supply entering the market.

At some point, the collapse in oil prices will likely convince the Russian President, Vladimir Putin, to contribute to supply management again. It would not be the first time that Russia would shy away from contributing to later cuts. Russia also refused cuts in November 2014, triggering a market share battle among producers that made oil prices fall 75% from the 'new normal' of $ 100 a barrel.

As in the past, this drop in the price of oil has prompted requests from oil operators for aggressive federal and state intervention. According to the Financial Times, OPEC spoke with the Texas State

One day, electricity or biofuels, hydrogen or anything else, could replace the dominance of oil as a transport fuel - but energy transitions take decades, if not generations

Energy Regulator and US shale producers about coordinated cuts in oil production — an unprecedented initiative by some of the world's largest producers to combat the impact of the spread of the coronavirus on crude oil demand. Even as the Texan Commission was rushing to the free market, the pandemic, the collapse in oil demand and Saudi Arabia's actions made emergency measures necessary to try to stabilise oil markets as part of foreign policy efforts as counterparts to the oversupply crisis. Even though mimicking the type of OPEC operation with the imposition of quotas is a mistaken action, and detrimental to the most efficient operators, this is the action to be primed by the US regulatory agency at the moment.

By zooming out, it is hoped that the current oil calamity will help illuminate some hard truths and promote more rational thinking about the oil markets from now on. Among them, oil is, and will remain, the lifeblood of civilisation in the near future, because transportation depends almost entirely on it. The transportation sector is fundamental to all other sectors, from food supply to defence, industry and consumption. Oil cannot be disposed of without great economic and financial destabilisation of producer and consumer countries. Electric cars and biofuels have been competing with oil in transportation since the beginning of the automotive era and will continue to do so. One day, electricity or biofuels, hydrogen or anything else, could replace the dominance of oil as a transport fuel - but energy transitions take decades, if not generations.

Secondly, oil prices are naturally prone to strong fluctuations and price fluctuations. The extreme intrinsic and extreme volatility of oil stems from very low supply and demand elasticity and limited storage. Oil is an indispensable product for which there are not enough versatile and scalable substitutes. On the supply side, oil production requires long delivery times and large amounts of initial capital. Once fluid, operating costs are low and fixed costs are high. Storage can help mitigate temporary imbalances in supply and demand, but storage is neither unlimited nor free.

From these two realities comes the hard truth: even the countries of free market advocates cannot tolerate cycles of rising and falling prices of a commodity like oil. In other words, the violent volatility of oil prices has forced some of the world's strongest free market advocates to resort to OPEC-style central planning. History repeated itself and the free market called for quotas and production restrictions once again in 2020.

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Part III

Conflict and Social Tensions

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Climate Security in Latin America and the Caribbean: Crime, Social Unrest and, Interstate Conflict

MATÍAS FRANCHINI, EDUARDO VIOLA

1. Introduction

Over the past decade, studies of different disciplinary areas have focused on the relationship between climate change and violence, drawing attention to the potential for increased interpersonal and group conflict (inter- and intrastate) as global temperatures rise and extreme weather phenomena accelerate. The goal of this chapter is to discuss this relationship in Latin America and the Caribbean (LAC) for the next two decades. Our work then involves a reflection on the future impact of climate effects on LAC security, extrapolating some of the key elements of the region in relation to the issue, particularly its high vulnerability to climate extremes, low interstate conflict, and high crime. We thus study a causal — but exploratory — link between the effects of climate change and the worsening of violence in the region.

In this way, our work is inferential, oriented to anticipate or estimate risks that may not eventually become such. In this sense, there are still great uncertainties regarding the concrete global and local impacts of climate change, and even more uncertainty regarding its effects on social relations. This situation has been aggravated by the still unknown contours of the Covid-19 pandemic. This fluidity, however, should not be a reason to avoid substantial considerations on the social and political impacts of global climate change.

Our main conclusion is that the region's levels of climate vulnerability will, in the short and medium term, result in a worsening of the

domestic public security situation, rather than an increase in interstate or civil conflicts. This is mainly due to the fact that climate effects tend to act as catalysts for existing phenomena. Thus, the most immediate problem of violence and security in the region is crime, not confrontations between states or between civil groups (although there are exceptions, as in the Colombian case). We decided to focus on domestic security precisely because it is a highly relevant issue for the region where literature is scarce. At the same time, it allows for a necessary cutback in comparison with more comprehensive concepts such as human security.

Our reflection operates on two time horizons. The first is the short and medium term, that is, the effects of climate change on the security situation in the region in the next 10 years. The second time horizon is the long term, over 10 years. For the first cut-off we argue that the impacts of climate will be the drivers of increased crime. For the second, the potential for conflict between countries and civilian populations within states increases if there is no adequate mitigation measures at all levels of governance.

We use as primary sources the climate security literature generated from different disciplinary fields and diverse databases on climate vulnerability, government effectiveness, and crime.

To achieve our objectives, we have organised the chapter as follows. In the first part we summarised the findings from the literature on climate and violence; in the second, we detailed the climate vulnerability situation in LAC; in the third, we discussed the issue of violence and climate in the region, justifying our focus on the issue of criminality, including a list of major risks. In the fourth part, we presented the Climate Security Risk Index to measure the level of risk of each country in the region, and then finally we concluded.

2. The Impacts of Climate Change over Security Issues: Individuals, Groups, and Nations.

In the last decade, a variety of academic works have focused on the relationship between violence and climate change. Multidisciplinary in nature, this literature is usually divided into two major fields: one that focuses on the impacts of climate change on group violence (political and civil violence, land invasion, and wars) and one that focuses on interpersonal violence (crime against people and property). A third field can be considered, the literature that focuses specifically on interstate violence, which shares some basic elements with the literature on group violence, as we will see.

In all three cases, the body of work points to the potential for increased violence as a corollary of the effects of climate change, from hurricanes to temperature increases in both developed and developing countries. However, the causal mechanisms are not yet clear given the complexity of this type of social process (Burke, Hsiang, & Miguel, 2014; Hsiang, Burke, & Miguel, 2013; Heilmann & Kahn, 2019; Ranson, 2014; Crank & Jacoby, 2014; Plante, Allen, & Anderson, 2017).

This literature tends to be consensual in that climate conditions do not operate as isolated causes of conflict, but as the catalysts of pre-existing conflict factors. This conclusion is particularly relevant to our study, as it underpins our focus on the impact of climate on public security, given the high crime rates in most LAC countries. Additionally, part of this literature tends to highlight the importance of adaptive capacities (of the state and society) as mediators of climate impacts on violence (Burke, Hsiang, & Miguel, 2014; Heilmann & Kahn, 2019), a fact that becomes relevant for the construction of the mentioned climate security risk index. In this sense, Crank & Jacoby (2014) state that the effects of the climate can have profound impacts on the degradation of the security mechanisms of states, both in the intrastate dimension (security forces) and in the interstate dimension (armed forces).

In relation to the literature that focuses on group violence, there are some works that correlate climate effects with increased conflict. Burke, Hsiang, & Miguel (2014) conclude, after analysing fifty-five case studies, that deviations from moderate temperature and precipitation patterns systematically increase the risk of conflict in societies around the world, increasing the potential for civil confrontation and political instability. Hsiang, Burke, & Miguel (2013) have observed that the 'el Niño' phenomenon — which tends to worsen the incidence of climate extremes — is associated with a doubling of the risk of civil conflict in the countries most affected by this phenomenon between 1950 and 2004. One possible explanation is the scarcity of resources generated by el Niño, in contexts of populations dependent on agricultural production or fishing, a characteristic shared by

broad proportions of the LAC population. Furthermore, Burke et al., (2009) find a strong correlation between civil war and temperature in sub-Saharan Africa.

Regarding the literature that focuses on interstate conflict, it starts from the premise that climate change is beginning to change the security context among nation states. In August 2007, a Russian expedition placed a country flag on the bottom of the North Sea in a remote area made accessible by the anomalous retreat of oceanic ice in the area. The episode generated tension in the international community, especially among the other countries with territories in the Arctic Circle that claim economic rights over the area: Canada, Denmark, US, and Norway (Parfitt, 2007; McElroy & Baker, 2012). The case has become a reference among specialised analysts, the media, and political elites in the area of interaction between interstate security and climate change. But it is hardly the only episode of the kind: the Darfur conflict, which began in 2003 and left thousands dead, had as one of its main elements, a prolonged drought that drastically affected food security in the region (McElroy & Baker, 2012); similar claims have been made regarding the civil war in Syria.

According to Mabey (2008) and Youngs (2009) this change in the security context is produced by the expected effects of climate destabilisation on resource availability, environmental degradation and extreme climate phenomena. Wallace (2009) and Youngs (2009) point out that part of this production assimilates the climate as a 'multiplier of threats', especially in relation to food and energy issues.

CNA (2009) similarly analyses the destabilising effects climate change can have, exacerbating conflicts around: access to water, food and other basic resources; damage to basic infrastructure as a result of extreme climate events and/or sea level rise; massive internal and transboundary migration; delegitimised and potentially failed governments; and claims of climate equity that can lead to violent extremes, including terrorism.

Moreover, since the mid-2000s, relevant state actors in international relations have begun to incorporate the climate variable into long-term security strategies (Broder, 2009; Wallace, 2009). Official documents addressing the relationship between climate change and security risks have been elaborated in the US, United Kingdom, Germany, France, and Australia (Mabey, 2008). Conversely, both in China and Russia, climate change as a security driver has been less developed, China, for example, makes no mention of climate change in its latest military strategy white paper of 2015; while the Russian counterpart of 2015 only mentions it twice.

At the multilateral level there have also been relevant movements on the subject: on several occasions the Security Council of the United Nations (UNSC) has directly addressed the security implications of the effects of climate change (Planet Security Initiative, 2018).

In most cases, the different positions were clear: the so-called developing countries (with the exception of the small Pacific island group) grouped in the non-aligned movement and the G-77, insisted that the climate problem is essentially one of development, which is why the UNSC is not an adequate scope for its treatment. China and Russia have been critical of the relevance of discussing the issue at the UNSC (Van Schaik et al., 2018). EU countries — and to a lesser extent the US — have argued that it is appropriate to refer to climate change in terms of security and that the UNSC should be considered as another forum for addressing the issue (Scott, 2012).

In the case of the UN General Assembly, it passed a resolution (63/281) in 2009 recognising that the impacts of climate change may have potential security implications, while reaffirming that the UNFCCC is the main instrument for addressing the problem (Scott, 2012).

In relation to individual violence, there are also a number of studies that correlate it with the expected effects of climate change, particularly temperature increases (Schutte & Breetzke, 2018; Heilmann & Kahn, 2019; Ranson, 2014; Hu et al., 2017). First, some experiments in the field of psychology have observed that people tend to behave more violently in high temperature environments (Burke, Hsiang, & Miguel, 2014; Heilmann & Kahn, 2019; Plante, Allen, & Anderson, 2017). Other studies have found that high temperatures tend to increase the incidence of violent crimes — such as rape, murder, and domestic violence — in various places such as India, Mexico, the Philippines, the US, China, and Australia (Burke, Hsiang, & Miguel, 2014; Heilmann & Kahn, 2019; Hu et al., 2017). Heilmann & Kahn (2019) suggest that high temperatures also negatively impact the intensity of policing.

Although the evidence is restricted to the case of Los Angeles, it is relevant to point out that the increase in temperature tends to

increase violence over intimate partners (Heilmann & Kahn 2019), which increases the incidence of gender-based violence. This conclusion is convergent with other studies that affirm that natural disasters are correlated with an increase in sexual and gender violence against women (UN Women, 2014), a fact that is particularly worrisome because of the potential impacts of this type of phenomenon on LAC, the most violent region in the world for women (Essayeg, 2017).

There is also evidence that extreme conditions affecting agricultural production are correlated with greater violence in low-income populations, particularly crimes against property (Hu et al., 2017; Burke, Hsiang, & Miguel, 2014). The literature linking climate disasters with increased crime is more scarce (Burke, Hsiang, & Miguel, 2014). However, there is evidence that in the months following Hurricane Katrina in 2005, cities that received refugees from affected areas experienced increases in crime (Plante, Allen, & Anderson 2017). There is also evidence that crime increased in the aftermath of hurricanes in Honduras and Saint Martin— through criminal groups monopolising humanitarian aid to launder money, in the first case, and through increased property crime in the second (Albaladejo, 2017).

3. Climate Change Threats in Latin America and the Caribbean

According to the latest IPCC report (AR5), the ALC region is already experiencing variations in temperature and precipitation, a trend that will worsen in coming decades, multiplying the risk of floods, droughts and heat waves (Development Bank of Latin America, 2014; Magrin et al., 2014). The Andean region and north-east Brazil are particularly vulnerable, as projected changes are expected to reduce food production productivity. On the other hand, as the Andean cryosphere is in retreat, the flow of water tends to change, increasing, for example, the risk of water shortages in vulnerable semi-arid regions of South America. Changes in land use, particularly deforestation in the Amazon and Cerrado, tend to exacerbate climate risk in the region, as detailed below. Rising sea levels, in turn, pose risks to industries such as tourism and limit disease control. In this sense, the changes already observed are negatively affecting health in the region, increasing mortality, morbidity and the emergence of diseases in previously non-endemic areas (Magrin et al., 2014). In Central America and the Caribbean, the increase in frequency and intensity of hurricanes and tropical storms is among the major threats.

Socio-economic conditions in many areas of LAC, with limited capacities to respond to adaptation needs, increase vulnerability and risk in the face of climate variability and change. As a consequence, one of the main conclusions of the report is that the first step towards adaptation to future climate change and risks is to reduce vulnerability to the current climate (Magrin et al., 2014).

A large part of the LAC population is at high or extreme climate risk, particularly in the Gulf of Mexico, the Caribbean, and some parts of the Andes, where glaciers are under threat. According to Maplecroft (2014), ten of the thirty-three countries in the region surveyed are at extreme risk, another eight are at high risk, seven at medium risk and eight at low risk. However, regarding the general risk situation, LAC is a deeply heterogeneous region: on the one hand, Haiti is the third most vulnerable country on the planet. On the other hand, Uruguay is among the three least vulnerable countries on Earth. In general, the South American subcontinent is less vulnerable than Central America and the Caribbean, which, only after Africa, are among the most vulnerable in the world. (Maplecroft, 2018).

These high levels of vulnerability are related to both physical exposure to climate extremes and reduced adaptation capacities across LAC societies, which means that this is more a developmental problem than an environmental one.

Some of the negative effects of climate change are already being experienced in the region, such as prolonged droughts in the Amazon in 2005 and 2010, catastrophic floods in Colombia in 2010/2011, the intensification of the hurricane and storm cycle in Central America and the Caribbean, the drastic loss of tropical glaciers, prolonged droughts in the Pampas of Argentina and north-east Brazil (Maplecroft, 2014; Magrin et al., 2014). The variations already experienced in temperature and precipitation will only tend to increase in the future.

The 'savannization' of the eastern Amazon rainforest — a major change driven by extreme deforestation and climate change (Nobre et al., 2016) — in the medium and long term, can induce serious

changes in the area's atmospheric circulation, threatening the human development potential of a region that depends on food production as a main economic activity.

4. Climate Risks and Security in LAC: High Crime Rate and Low Interstate Conflict

As we stated earlier, the link between violence and climate change can be considered from three main angles: individual violence, group violence and interstate violence.

In relation to the latter, LAC has historically been a region of low conflict between states, although there is a history of US interventions in Central America and the Caribbean throughout the 20th century. In South America, where larger states are less subject to external interference, there is a positive history of resource management in recent decades, both in the Amazon Basin, where the context was usually cooperative, and in the La Plata Basin, where the geopolitical rivalry between Argentina and Brazil in the 1960s and 1970s was overcome in the following years (Viola & Franchini, 2018). In this context, we do not expect the effects of climate change in the region to operate as drivers of interstate conflict — the struggle for scarce resources or migration — in the short and medium term. The fact that the region has not resorted to aggressions about territorial sovereignty with its neighbours has, as yet, in the face of Venezuela's humanitarian tragedy, inclined us towards this analysis.

This situation, however, may change radically in the long term, depending on the dynamics of climate change in the region and the adaptive capacities developed by LAC countries — in the areas of food production, energy and water security, and the states' capacity to respond to stressors related to climate variations. In this context, the situation of the Amazon ecosystem will be particularly relevant. This plays a key role in regulating the regional and global climate. A continued process of deforestation leading to a savannization of the forest will generate catastrophic changes in the regional climate, affecting patterns of food production, energy supply, and water availability, among others. Furthermore, conflicts similar to those described in

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In relation to group violence, the presence of domestic violence conflicts — in the forms of civil wars of different types and intensities — has been a historical constant in the region until the late 1980s, with the exception of Colombia´s conflict that still lingers. As we have seen, the literature has also found correlations between this type of conflict and climate variations, particularly temperature increases and changes in rainfall patterns. To the extent that these two types of phenomena are expected in the region for the coming de-

cades, there is the potential for an increase in this type of violence in the region. This appears as a future avenue of fundamental research for LAC, however, and as already stated, we have decided in this work to focus on the most urgent aspect of violence in the region.

In this sense, crime, organised and common, has been the main threat to the security of the region's citizens in the last three decades, particularly in the Central American triangle, Jamaica, Trinidad and Tobago, Venezuela, Brazil, and Colombia, The regional homicide rate (22.3) was four times the world average in 2015 (5.3) and only Chile has lower rates than the global average[1]. Also, the only full democracies in the region, Costa Rica and Uruguay, have very high rates, 11.6 and 8.5 respectively, if compared to other democracies of this type.

1 http://info.worldbank.org/governance/wgi/index.aspx#home

Within this framework, we can argue that the main security risks associated with the impacts of climate change in LAC in the short and medium term will be the following:

1 Erosion of public security as a consequence of climate extremes such as hurricanes, extreme rains and floods, making state action more difficult in an area already in deficit in most LAC countries. If there is a systematic lack of response from the police and civil defence to extreme situations, this lack of state presence can be translated into the entrance of organised crime in places where it previously had no presence. As we have seen, there is a history of a criminal advance after natural disasters, as in the cases of Saint Martin and Honduras.
2 Particularly relevant in terms of impacts on public security are the cycles of drought and flooding in large cities with high levels of crime, such as São Paulo or Caracas.
3 Increased violence against women, associated with increases in temperature and the incidence of extreme climate phenomena.
4 The decline in agricultural and fishing production with an impact on the degradation of food security, employment and exports has the potential to increase crime. In particular, the migration of populations deprived of such economic opportunities can feed criminal networks in cities. Indeed, there is some evidence that population growth in a large metropolis tends to increase crime incidence (Gaviria & Pages, (1999) apud Crank & Jacoby, (2014)).
5 The worsening of water shortages in vulnerable semi-arid regions, such as Greater Lima and the Brazilian semi-arid region, have the potential to generate results similar to the previous point. As we have seen, there is a correlation between this type of event and an increase in crime, particularly in relation to property crime.
6 The erosion of energy security by changing the water balance (Crank & Jacoby, 2014), since LAC is the most intensely hydroelectric region in the world, this may also feed criminal activities by reducing economic opportunities or generating opportune situations for crime.
7 Increased climate refugees, predominantly domestic in South America with effects on the growth of urban metropolises, but also cross-border in Central America and the Caribbean, increasing the potential for conflict between them and North American countries, including the militarisation of borders.
8 In the case of the Amazon, there is a double direct link between climate change and public security in all countries of the region: organised crime and corruption are direct actors in deforestation and the resulting carbon emissions that are very important as a proportion of the national total for the cases of Brazil, Colombia, Peru and Bolivia.
9 In particular, a catastrophic climate change in the Amazon, involving the savannization of western Amazonia and the continuing large forest fires would lead to a profound change in atmospheric circulation in the subcontinent, with drastic effects on food, energy and public security. As already suggested, this process does have the potential to fuel interstate conflicts in the region, in the fashion of the interstate climate security literature: massive migrations and disputes over scarce resources.
10 Finally, if the negative effects of climate change exceed the reaction capacities of LAC states, a phenomenon of erosion of confidence in public authorities could jeopardise governance and democracy in the region, i.e. an increase in the potential for authoritarian regimes or failed states. The level of trust of Latin American citizens in their institutions is well known — government, congress, political parties, police forces — it is relatively low and declining, as is the support for democracy as the preferred regime of government (Lagos, 2018).

A relevant corollary of what has been exposed is the need for LAC security and police forces to develop doctrines and practices to address the present and anticipated effects of climate on security. At the same time, as armed forces are being called upon to combat threats to public security — crime in its various forms — in some countries of the region — most notably Brazil, Colombia and, Mexico — it is also necessary for them to incorporate issues of domestic security into their doctrine of climate risk. This movement, necessarily, would become a regional characteristic, making a relevant difference with the doctrines of climate security developed in the US and European armed forces. However, this type of development is also not contemplated in the 'mainstream' climate security literature, which means that there is an unexplored and open field of development for research in this area, that is, combining the characteristics of LAC as peaceful in its interstate relations, but violent within its borders.

A final acknowledgement must be made in this segment, which are the impacts that the Covid-19 pandemic could have on the security situation in the region, which, depending on their level of intensity, could profoundly affect the results of our analysis. At this time, of course, those effects are almost impossible to assess, given the high level of uncertainty about the evolution of the pandemic. However, given the region's specific vulnerabilities, some general statements can be made at this point regarding what to look for. Firstly, the pandemic is claiming a major toll in terms of economic activity, poverty and unemployment in LAC countries, while many of them have weak social safety nets to protect the most disadvantaged. Secondly, and related to the above, the governments of the region had to increase the level of public spending and debt to cope with the economic depression and health-related problems, with unpredictable consequences. Thirdly, it is not clear what the corollary of the pandemics will be in terms of the legitimacy of political elites (and regimes), in a region that was showing strong signs of political dissatisfaction and unrest in the months before the pandemics emerged. Finally, the outcome of pandemics is likely to be heterogeneous across countries in the region, as is often the case with most issues, and those with stronger political and economic institutions are more likely to deal with it in more effective ways.

5. Climate Associated Risks: Index and Country Profiles

Considering that the focus of this work is on the effects of climate on crime, and in order to specify the potential risks of each of the countries in the region, we have developed a regional climate security risk index that combines Maplecroft's (2014) vulnerability index, the effectiveness of the government as measured by the World Bank, and the homicide rate (World Bank, 2020). The index rank is the result of the sum of the relative position of each country in each of the selected indicators. Thus, El Salvador ranks first in the index because it has low scores on the three selected indicators.

As the table above shows, exposure to climate security risks in the region is heterogeneous, the Northern Triangle countries being the most vulnerable — hit by the state's inability to react to the threat of crime; followed by Venezuela — submerged in a governance breakdown with the region's major humanitarian tragedy in the past half-century and; Haiti — a failed state.

On the other hand, the least vulnerable to security risks from climate impacts are Chile, Uruguay, Costa Rica, and Argentina — the most developed democracies in the region, with the exception of Argentina (The Economist Intelligence Unit, 2020). The largest LAC economies, Brazil and Mexico, occupy intermediate positions in terms of risk, with Mexico being most exposed in terms of general climate vulnerability and Brazil being more vulnerable for its high per capita homicide rate. In more detail, the following can be said about the most relevant state players in the region in terms of economy, population and security risks.

Chile is the country least exposed to the security risks derived from climate change, since it has low vulnerability, an efficient government, and the lowest homicide rate in the region — having actually the best score in the three indicators. At the same time, its armed forces are aware of climate change, but not so much as a security problem. Uruguay and Costa Rica share similar characteristics with Chile, although their homicide rates are relatively high. In Uruguay, there is no evidence that its armed forces have the same level of climate awareness as Chile.

Argentina shares this low risk group after scoring worse than Uruguay and Costa Rica in vulnerability and government effectiveness, but better in terms of homicide rate. At the same time, the level of concern about climate change is low in society, including the armed forces. Actually, the armed forces are extremely weak (only 70,000 members as a whole) and the main security forces are the National Guard (Gendarmery) with 100,000 members whose mission is to protect the borders but it has been systematically called for intervention into domestic order issues and the Province of Buenos Aires police (90,000 members), a significant part related with organised crime.

Peru also belongs to the low risk group, although with higher levels of climate vulnerability and government effectiveness than

	Vulnerability (Maplecroft, 2014)	Government Effectiveness (BM, 2017)[1]	Homicide Rate[2] (BM, 2015)	Position Total	Ranking
Argentina	6.66 (18)3	0.16 (17)	6.5 (18)	53	20
Bolivia	2.48 (9)	-0.39 (7)	6.3 (20)	36	11
Brazil	5.77 (17)	-0.29 (11)	28.4 (7)	35	10
Chile	9.54 (22)	0.85 (22)	3 (22)	66	22
Colombia	4.98 (15)	0.07 (16)	26.5 (8)	39	13
Costa Rica	7.7 (20)	0.25 (18)	11.6 (11)	49	19
Cuba	3.9 (12)	-0.20 (12)	5.4 (21)	45	18
Dominican Rep.	1.01 (5)	-0.35 (9)	17.4 (9) 4	23	6
Ecuador	3.76 (11)	-0.32 (10)	6.5 (18)	39	13
El Salvador	0.79 (3)	-0.37 (8)	105.4 (1)	12	1
Guatemala	0.75 (2)	-0.64 (4)	29.4 (6)	12	1
Haiti	0.58 (1)	-2.06 (1)	10 (13) 5	15	5
Honduras	0.92 (4)	-0.51 (6)	57.5 (3)	13	1
Jamaica	1.5 (7)	0.49 (21)	42 (4)	32	9
Mexico	4.47 (14)	-0.03 (14)	16.5 (10)	38	12
Nicaragua	1.19 (6)	-0.64 (4)	8.6 (15)	25	7
Panama	5.57 (16)	0.01 (15)	11.3 (12)	43	15
Paraguay	1.58 (8)	-0.81 (3)	9.3 (14)	25	7
Peru	4.3 (13)	-0.13 (13)	7.2 (17)	43	15
Trinidad and Tobago	7.22 (19)	0.26 (19)	30.1 (5)	43	15
Uruguay	8.33 (21)	0.42 (20)	8.5 (16)	57	21
Venezuela	3.64 (10)	-1.40 (2)	61.9 (2) 6	14	4

Table 1
Index of climate security risk in Latin America and the Caribbean

2 https://data.worldbank.org/indicator/VC.IHR.PSRC.P5?end=2015&locations=HT-DO-TT-UY-VE&start=2014

3 The relative position of the country in the respective indicator is in quotation marks. In this case, Argentina is placed 18 out of 22 in terms of climate vulnerability.

4 2014 Data.

5 Dados de, 2012.

6 Dados de, 2014.

7 https://data,worldbank,org/indicator/VC,IHR,PSRC,P5?end=2015&locations=HT-DO-TT-UY-VE&start=2014

	Ranking	Grade	Category
El Salvador	1	12	High Risk
Guatemala	1	12	
Honduras	3	13	
Venezuela	4	14	
Haiti	5	15	
Dominican Republic	6	23	Medium Risk
Nicaragua	7	25	
Paraguay	7	25	
Jamaica	9	32	
Brazil	10	35	
Bolivia	11	36	
Mexico	12	38	
Colombia	13	39	
Ecuador	13	39	
Panama	15	43	Low Risk
Peru	15	43	
Trinidad and Tobago	15	43	
Cuba	18	45	
Costa Rica	19	49	
Argentina	20	53	
Uruguay	21	57	
Chile	22	66	

Table 2
Country Rankings. Index of climate security risk LAC.

the top scorers. However, it has some level of awareness regarding the climate threat, particularly because of the systematic water scarcity in greater Lima which concentrates a large part of the country's population,

Colombia is a country whose risk is greater than its indicators of government effectiveness and climate vulnerability, because of the extremely serious issue of public security. In this sense, together with Brazil, they are the countries that neglect climate risk the most because they do not consider their impacts on public security. However, Colombia has advanced in terms of climate awareness in the last decade, as a consequence of a sequence of extreme climate phenomena that happened in 2010/11 and is known as 'Ola Invernal' (Franchini, 2016).

Brazil is a country at medium risk not because of its climate vulnerability, but because of its government efficiency and, particularly, the extremely serious problem of public security. In the long term, Brazil is the most relevant country to understand the trajectory of climate risk in LAC, since a catastrophic climate change in the Amazon would put regional stability at risk (Viola & Franchini, 2018). In this sense, Brazil is extremely negligent, because the high rates of deforestation in the Amazon continue to be recorded (Franchini et al., 2020). At this point, the parallel with Colombia also stands out, since the loss of forest mass in the country has reached very high values since 2015 (Global Forest Watch, 2015), which, proportionally to the territory, is much higher than in Brazil.

From the point of view of the armed forces, they had, until the early 2000s, a vision of climate change as a threat to the sovereignty of the Amazon, inspired by a previous tradition that conceived this vast uninhabited region as coveted by the northern countries (Viola & Franchini, 2018). Although this Amazon paranoia has been mitigated, it has not been replaced by a more consistent view of climate risk as a security problem, and has partially returned under the tenure of Jair Bolsonaro (Franchini et al., 2020), as armed forces seem to support the presidential administration response to the criticism by European countries to the dramatic increase in Amazonian deforestation in 2019-20.

Mexico is also among the medium risk countries, particularly because of the high rate of homicides, although it is a medium scorer in terms of government effectiveness and climate vulnerability. Mexico has a major problem governing organised crime, which controls several parts of the country and heavily influences public life and politics, and with armed forces profoundly involved in the matter.

Other countries in this middle risk group are Ecuador due to their high vulnerability, low government efficiency and relatively low homicide rate; Paraguay, for its high vulnerability and low government effectiveness and; Bolivia, that offers a similar situation to that of Paraguay. Finally, Guatemala, Honduras, El Salvador, and Nicaragua are highly vulnerable to climate change and performed very poorly in terms of government effectiveness, and public security — with the exception of Nicaragua in this latter indicator. These four countries have a strong international impact because they are major sources of refugees in Mexico and the US.

Regarding the region's preparedness to face the security risks associated with climate change, we can state that it is low, even in relation to the current risks. Firstly, most countries in the region lack sophisticated and articulated national adaptation plans, that is, sound strategies for responding to climate extremes or long-term issues such as infrastructure or energy, or rapid responses to phenomena such as hurricanes or floods. Secondly, on the specific question of security, most police forces in the region are not prepared to deal with the current impacts of crime, much less to respond to an increase due to climate extremes. The development of doctrines and practices to address the present and anticipated effects of climate is, as mentioned, necessary, but this scenario appears to be of low probability, since many of these forces are overshadowed by current threats. In the case of Brazil, the state military police are in charge of dealing with local environmental issues through the firefighters that form sophisticated organisations, particularly in Sao Paulo and the southern states. However, there is no evidence that they receive specific training about climate security. Thirdly, the armed forces of the region do not assimilate climate change as a potential security risk, yet most ignore it as a reality. In the region's defence doctrines, the only country that has a relevant part dedicated to the climate issue is Chile, but it emphasises cooperation in the area of civil defence while there is a

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directive to create a climate policy for the defence sector — mitigation and contribution with adaptation. Brazil has a green book on defence, in which it considers environmental issues, but it does not highlight climate change as a lesser problem of defence.

In general, there is no inclination in the region's armed forces to securitise the climate threat, that is, to generate hypotheses of interstate conflict, on the contrary, a cooperative vision prevails. At the domestic level, there are signs of a progressive incorporation for the militarisation of disasters into the armed forces of Argentina, Brazil, Chile, and Colombia (Boeno de Souza, 2018).

However, it is worth noting that in the last three years, the Conference of Ministers of Defence of the Americas has made progress in considering climate change on its agenda, creating an ad hoc working group on the role of security forces and armed forces in relation to environmental protection and climate resilience (Gobierno de Mexico, 2018). However, it is still unclear when and if this movement will have an impact on the doctrines of the armed forces.

6. Conclusions

Climate security risks in Latin American and Caribbean countries will be more associated with domestic citizen security issues associated with interpersonal violence than with interstate and civil conflict issues over the next decade. The region's condition as an area of low interstate conflict and high incidence of crime are the factors that allow for this analysis. In this sense, the main findings of the literature on violence and climate anticipate an increase in crime in the region, further demanding the capabilities of the security forces — and in some cases — the armed forces in LAC countries.

The increase in security risks will be linked mainly to the effects of climate extremes and temperature increases in crime, particularly in large cities; the degradation of food security and jobs in agricultural and fishing areas, generating domestic or international migration; and the degradation of energy security through water stress. Of particular concern, in this context, are the most vulnerable populations, particularly women and children, affected by the potential increase in domestic violence. If LAC states are unable to deal with these situations, they may suffer further degradation of their legitimacy, with negative effects on democratic governance in a region already suffering political unrest in many places.

However, in the long term, the potential destabilisation of the regional climate motivated by the savannization of the Amazon rainforest may aggravate the panorama to the point of operating as a catalyst for interstate conflicts. Within this framework, the climate security literature that focuses on violence between groups may offer greater analytical resources to analyse the eventual worsening of conflicts for scarce resources and migrant populations.

As a way to assess climate security risk with the particular characteristics of LAC countries, we propose an index combining data on climate vulnerability, state efficiency, and homicide rate. As a result, we find that the Northern Triangle countries, Venezuela, and Haiti are the most vulnerable countries in the region; Chile, Costa Rica and Uruguay — the most consolidated democracies in LAC — occupy the opposite place in the spectrum, along with Argentina.

The climate-related security risk situation is worsening as most countries in the region have been unable to develop strategies to minimise these risks, including sound adaptation strategies or the incorporation of climate risk into military and police force doctrines.

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Modes of Lithium Extraction in Argentina: Mining Politics in Catamarca, Jujuy, and Salta

LUCAS GONZÁLEZ , RICHARD SNYDER

Lithium is a strategic mineral resource. Because of the high-charge density and long life of lithium carbonate, rechargeable lithium-ion batteries are widely used not only in consumer electronic devices, such as mobile phones and laptops, but also in electric vehicles and for storing electricity from wind and solar energy. Lithium is thus a vital element for making a successful global transition from fossil fuel to renewable energy. Together, Argentina, Chile and Bolivia account for about half the total lithium reserves in the world (US Geological Survey, 2016). Argentina is the only one of these three countries that permits exploitation freely through concessions, and this lack of regulation, coupled with low taxes makes Argentina especially attractive for foreign investors. Argentina's exports of lithium carbonate were $356M in 2018, ranking second only to Chile, with exports of $1B.[1] The gap between the two countries is expected to narrow as production increases in Argentina with a wave of new investment in lithium mining (Fornillo, 2015, p.12).

The production of lithium carbonate in Argentina dates to 1998, with a boom beginning in 2010 and continuing through the rest of the decade. All current production of lithium is located in three north-western provinces, Catamarca, Jujuy, and Salta, which together form the Argentine leg of the so-called 'lithium triangle' that straddles parts of Argentina, Bolivia and Chile. The three provinces produced about 30,000 tons of lithium carbonate in 2016, or approximately 16% of total global production. Jujuy was responsible for about 12,000 tons with the bulk of the remaining output com-

1 https://oec.world/en/profile/hs92/6283691/#:~:text=Lithium%20carbonates%20are%20the%20world's,and%20Germany%20(%2446.2M).

ing mostly from Catamarca and, to a far smaller degree, Salta. The companies in the three provinces estimate they can extract about 145,500 total tons by 2022 (Ministerio de Energía y Minería, 2017). Although there are some projects in other provinces, such as San Luis and Córdoba, these mines are not in operation yet.

Although these three Argentine provinces have shared historical roots, cultural traditions, socio-economic profiles and political institutions as subnational units in a federal system, we observe striking variation both across and within them in the *modes of lithium extraction*, that is, in how mining projects articulate with local stakeholders, especially indigenous communities and organisations.

In some mining projects, lithium extraction was *non-negotiated*, with mining companies imposing their preferred terms and conditions and making minimal concessions, if any, to local stakeholders. In such instances, the economic benefits of mining for nearby communities were minimal, and the environmental impact was usually large and negative. In other cases, by contrast, companies had to negotiate with local communities for mining to proceed. In these instances, for what we call *negotiated extraction*, companies had to make concessions that improved some local socio-economic indicators and mitigated environmental damage. Company concessions included providing local communities a guaranteed number of jobs, investment in public goods, monetary payments, and environmental monitoring. A third outcome, *aborted extraction*, resulted when companies decided to halt a project and withdraw from the production site because of large costs, usually stemming from organised resistance by local stakeholders. In these cases, conflict was often intense, the socio-economic impact of mining on localities very limited, and environmental damage minimal. Why do some lithium mining ventures result in non-negotiated extraction whereas others result in negotiated or, alternatively, aborted extraction?

To address this question, we focus on five mining projects across the three provinces. Together, these five projects encompass a wide range of extraction outcomes: *Fénix*, a long-standing instance of non-negotiated extraction located in the Salar del Hombre Muerto in Catamarca; *Sales de Jujuy* and *Minera Exar*, two cases of negotiated extraction located in the Salar de Olaroz-Cauchari in Jujuy, as well as *AIS*, a case of aborted extraction in Salinas Grandes-Guayatayoc, also in Jujuy; and, lastly, *ADY*, a recent case of non-negotiated extraction located in the Salar de Rincón in Salta.

The next section discusses existing theoretical perspectives on resource extraction. We then describe the selected cases, focusing on cross-province variation in the role of state institutions in regulating lithium mining and also in the linkages between mining projects and local indigenous communities. We propose a typology of modes of extraction and explore the effects of different modes on local social conflict and economic conditions. The conclusion summarises the main findings and considers comparative implications of the study.

1. The Subnational Political Economy Of Mineral Wealth

A prominent body of comparative cross-national research finds that mineral wealth is mostly a curse (Mahdavi, 1970; Beblawi & Luciani, 1987; Ross, 2012). In so-called 'rentier states'[2], mineral resources are expected to promote poor macroeconomic performance, unstable growth, deindustrialisation, and authoritarianism (Gylfason et al., 1997; Larsen, 2006; Torvik, 2001; Van der Ploeg, 2011). In the case of lithium, most studies report vast negative effects of mining on traditional economic activities, including small-scale agriculture, cattle husbandry and artisanal salt production, in addition to the local environment, mainly because of the massive amounts of water required to extract lithium carbonate from lithium brine pumped up from beneath the surface of salt flats (*salares*) (Argento & Zicari, 2015, p.42; see also Slipak, 2015; Puente & Argento, 2015; Fornillo, 2015; inter alia).

However, a growing number of recent studies find that resource wealth can have contrasting effects, acting as a curse or, alternatively, as a blessing depending on mediating institutional factors (Snyder, 2006; Snyder & Bhavnani, 2005; Jones-Luong & Weinthal, 2012). The varied consequences of resource wealth are especially visible subnationally, inside countries, because mineral and other natural resources are rarely, if ever, distributed evenly within countries. Recent research has effectively exploited subnational variation in the distribution of mineral wealth to test, refine and even challenge the national 'resource curse' thesis (Díaz-Rioseco, 2016; Orihuela, 2017; González,

2 In rentier states, defined as those countries that 'receive on a regular basis substantial amounts of external rent',(Mahdavi 1970, p. 428), only a few people generate the rent, the majority is involved only in its distribution or utilisation, and the government is the principal recipient of it (Beblawi and Luciani 1987).

2018; González & Lodola, 2019). While some subnational studies offer new evidence that supports the resource curse, they also show that the causal mechanisms proposed in the national level literature, to explain the association between resource wealth and underdevelopment, either do not travel to subnational levels or require significant modifications when applied there. For example, in a study of the US states, Goldberg et al. (2008) conclude that the 'Dutch disease' mechanism, whereby natural resource booms cause an appreciation of the exchange rate which, in turn, leads to poor economic performance, did not explain why resource-rich states in the US performed worse economically, because all the US states shared the same currency, and real prices varied little among them. Likewise, Monteiro and Ferraz (2012) show that although oil windfalls stifle political competitiveness at the municipal level in Brazil by providing incumbents more resources to spend on patronage, a result congruent with the national-level resource curse literature, the mechanism of resource-driven patronage as a source of incumbency advantage, works differently at the local level. Because of an increase in the enforcement of federal regulations that constrain the use of oil rents to hire public employees on a permanent basis, the large incumbency advantage at the municipal level associated with the oil windfall boom proved fleeting in Brazil, disappearing after just two elections.

Other studies go further, using a subnational perspective to challenge the notion of a resource curse altogether. In his analysis of oil wealth in the Argentine provinces, Díaz-Rioseco (2016) shows that, in some instances, oil actually leads to more, not less, political contestation at the subnational level. To explain the contrasting consequences of oil on levels of political competitiveness at the provincial level, Díaz-Rioseco focuses on 'rent sharing regimes', that is, the fiscal institutions for sharing resource revenues among levels of government. When these institutions distributed rents to municipal governments, rather than concentrating them under the control of governors, the result was an increase in political competitiveness at the provincial level.[3] We build on these and other exemplars of 'place- and institution-sensitive research' (Orihuela, 2017, p.2) by exploring subnational variation in the political, socio-economic and environmental consequences of lithium.[4]

Argentine provinces offer an excellent setting for assessing these effects of lithium mining. Firstly, there is large variation both across and within provinces in modes of lithium extraction, with different modes, in turn, hypothesised to have contrasting political, socio-economic and environmental consequences. Secondly, Argentine provincial governments are constitutionally mandated to administer mineral wealth, allowed to levy their own royalties, and enjoy significant discretion over how these revenues are used. This discretion, which is evident in the strikingly different roles played by provincial government agencies in the mining sectors across the three provinces, provides an opportunity to explore how subnational variation in the degree of state regulation and intervention affects modes of extraction. Lastly, while taking advantage of this subnational variation in provincial politics and modes of lithium extraction, a focus on these three adjacent provinces allows us to hold constant key economic, cultural, and institutional factors, in addition to the unobservable determinants that are invariant across our cases and that might also affect our outcomes of interest (Snyder, 2001; Goldberg et al., 2008, p.488; Weitz-Shapiro, 2012, p.572; Giraudy et al., 2019).

2. Lithium Mining In Argentina: Regulatory And Social Contexts

Extraction by transnational mining companies (TMCs) does not occur in a vacuum. Mining in the contemporary period is nested in a complex set of multilevel rules and regulations designed to protect the environment and, especially, local communities. At the international level, these rules include legal instruments codified in international treaties and regimes that protect indigenous peoples and the environment from 'negative externalities' of mining, for example, Convention 169 of the International Labour Organization (1989), the United Nations (UN) Convention on Biological Diversity (1992), and the UN Declaration on the Rights of Indigenous Peoples (2007).

At the national level, most governments across the world, in addition to signing these international treaties regulating extraction and agreeing to abide by them, issue additional regulations, including setting tax and royalty rates on TMCs. In Argentina, the federal government (*Código Minero*, Law 24,196, adopted in 1993) completely deregulated the mining sector, granting companies extensive benefits

3 Regarding the local economic and environmental impact of mineral and oil production, Caselli and Michaels (2013) and Postali and Slaibe (2009) find limited positive spillovers of oil rents on local economic activity in Brazilian municipalities. Aragón and Rud (2009) find that gold extraction in the Peruvian mine of Yanacocha has only modest positive effects on local income and household welfare. Similarly, Arellano-Yanguas (2016) shows that mineral rents transferred to producing regions in Peru have a small positive effect on economic growth but are also associated with higher poverty levels.

4 Lithium mining is generally smaller in magnitude, both in the scale of investments and the amount of revenue generated, than extraction associated with minerals like oil or kimberlite diamonds, the conventional source of wealth for classic rentier states.

for extracting and processing of minerals, including 'extensive tariff exemptions, tax relief schemes, 30 years of fiscal stability, and low provincial royalties' (Nacif, 2014, n/p, quoted in Puente & Argento, 2015, p.122).[5] This law eliminated all municipal taxes and stamp duties, setting royalties at three per cent of the pithead price (Marchegiani et al., 2019, p.10). The federal government plays a minimal regulatory role in extractive industries, mostly limited to environmental protection and the participation of indigenous communities in managing natural resources located in their territories (Puente & Argento 2015, p.123). As a result, in Argentina there is no specific federal regulatory framework for lithium mining.

5 The Constitutional Reform of 1994, in Article 124 states, 'The provinces have the original domain of all natural resources in their territory', which implies that provinces set their own rules in mining matters (Puente & Argento 2015, p.123).

2.1. The Varied Roles of the Provincial State

Because the federal government of Argentina lacks a centralised strategy for lithium and ownership of minerals is reserved to the provinces, provincial governments and their state agencies play a decisive role. The provincial state plays different roles in the lithium sector across the three provinces on which this study focuses. In both Catamarca and Salta, the provincial state has taken a *laissez-faire* approach in the case of lithium, letting private companies make investments and carry out their mining activities with little oversight. In Jujuy, by contrast, the provincial state has played a more active and interventionist role, becoming a minority shareholder in lithium mining projects launched by private companies (Puente & Argento, 2015, p.123).

The first modern, lithium mining project in Argentina was launched in Catamarca near the border with Salta in 1998 as Project Fénix. Today, the main projects are owned by the US firm, Livent (previously FMC Lithium), and Sal de Vida, owned by Galaxy Resources Limited, an Australian firm. Both are in Salar del Hombre Muerto and are run by private companies. The province of Catamarca created the state-owned company Catamarca Minera y Energética Sociedad Del Estado (CAMYEN S.E.) in 2012, which had a monopoly over extraction of rhodochrosite but played no role in the extraction and processing of lithium.[6] Lithium mining operations in Salta are also run by private companies. Although the province created the state-owned enterprise, Recursos Energéticos y Mineros Salta (REMSA), the main goal of this corporation is to attract private business to take over the extraction of lithium (Slipak, 2015, p.98). Like Catamarca, Salta thus opted for a private business-led approach, very much dependent on private companies for the extraction and processing of lithium. The main production sites in Salta are Salar de Rincón, operated by the Australian firm, Argosy Minerals Ltd. (ADY) mining company ADY, and in Salar de Ratones y Salar Centerario, where the French company, Eramet has invested. In Jujuy, by contrast, the provincial state plays an active role in regulating lithium extraction and processing. In early 2011, the provincial government (through Decree-Agreement No. 7592) declared lithium a 'strategic resource' and created a committee of experts in charge of overseeing mining projects related to lithium (Informe Paralelo CDESC, 2011, p.4, quoted in Puente & Argento, 2015, p.123).[7]

The Salar de Olaroz-Cachaurí in the department of Susques, at 4,500 metres above sea level and 60 km from the Jama pass to Chile, is the main site for lithium extraction in Jujuy. Sales de Jujuy and Minera Exar are the main companies. The Argentine subsidiary of the Australian transnational mining company, Orocobre Limited and the Japanese automaker, Toyota Tsusho are responsible for operations in Sales de Jujuy. The Chinese company Ganfeng and the Canadian company Lithium Americas Corporation run the Minera Exar project in a 50/50 joint venture (Marchegiani et al., 2019, p.21).

After the concessions and the provincial government's declaration of lithium as a strategic resource, the government of Jujuy negotiated with Orocobre and created the state-owned enterprise Jujuy Energy and Mining State Society (Jujuy Energía y Minería Sociedad del Estado, JEMSE) in 2011.[8] JEMSE got 8.5% of the shares, while the remaining 91.5% stayed in the hands of the private companies Orocobre (66.5%) and Toyota (25%).[9] In a parallel arrangement, JEMSE also got 8.5% of the shares of Minera Exar (Marchegiani et al., 2019, p.22). A second important site for lithium mining in Jujuy is Salinas Grandes-Laguna Guayatayoc, where, as discussed below, the Canadian firm, A.I.S. Resources, ceased its operations after facing sustained resistance from local indigenous communities.

These differences in provincial state regulations and involvement, while important, cannot explain the variation across the three provinces in the modes of extraction, socio-economic impact, and levels

6 https://www.elancasti.com.ar/opinion/2018/1/29/litio-estcamyen-360239.html The province of Catamarca created a longstanding state company, Yacimiento Mineros Agua de Dionisio (YMAD) in 1958. It formed a temporary joint venture with Minera Alumbrera Limited (M.I.M. Holdings Ltd. of Australia, North Limited of Australia, and Rio Algom Ltd of Canada) to mine copper, gold and molybdenum. This company does not have any role in lithium.

7 The Committee includes geologists and other experts from the National Scientific and Technical Research Council (CONICET) and the National University of Jujuy, who are nominated by the provincial legislature, the Environmental Management Agency and the provincial mining department (Marchegiani et al., 2019, p.15). The Committee of Experts was recently dissolved by the current governor through executive decree (Decree-Agreement No. 9194, July 17, 2019).

8 Decree No. 7626 of the provincial executive created the state-owned company JEMSE in 2011. The decree grants the company large authority in areas ranging from exploration of deposits to the commercialisation, generation, industrialisation, and transportation of mineral wealth (Puente & Argento 2015, p.123).

9 Because JEMSE lacked the necessary funds to contribute capital to the joint venture, Orocobre loaned the state-owned company the funds it needed to cover its share. JEMSE agreed to pay back the loan by transferring to Orocobre 33.33% of its shareholder dividends once the project begins to turn a profit (Slipak 2015, p.97; Argento & Zicari, 2015, pp.41-42).

of conflict associated with lithium mining. Firstly, within a single province, Jujuy, where the role of the provincial state does not vary, we nevertheless see sharply contrasting outcomes, with high levels of conflict resulting in aborted extraction in one area of the province (Salinas Grandes and Laguna Guayatayoc) whereas in another area (Salar de Olaroz-Cachauri) low levels of conflict led to negotiated extraction and, in turn, modest improvements in employment opportunities and public services for local residents. Secondly, while we might expect more conflict in provinces like Catamarca and Salta, where the state gives private mining companies free rein, lithium extraction proceeded in the former case for more than two decades without resistance and continues to face no resistance in the latter. Lastly, the recent emergence of protests against lithium mining in Catamarca after more than twenty years of quiescence, and without any notable change in the provincial state's role in the sector, further highlights the inability of provincial state regulations to explain the socio-economic consequences of lithium mining.

10 The nature, and visibility, of the 'threat' that different kinds of mining operations pose to communities is a crucial factor to consider. In contrast to open-pit mines, which are highly visible and may rely heavily on toxic chemicals like cyanide, the most widespread and harmful negative externality of lithium mining in Argentina is the slow, silent depletion of water supplies (depending on the processing technique, toxic chemicals may also be involved in lithium mining). In addition to being gradual, these negative effects may be more difficult to 'prove' scientifically, especially when the companies themselves are in charge of geological surveys and environmental impact assessments, as is often the case in the Argentine Puna region.

2.2. Community Stakeholders

In addition to being nested in this multilevel array of international, national and provincial rules and regulations, extraction also occurs in a local context, defined by communities of stakeholders whose interests are directly affected by the externalities, often harmful, of mining activities.[10] Community organisation and mobilisation may help explain the level of local conflict and the degree of redistribution of mineral wealth (Puente & Argento, 2015; Argento & Zicari, 2015).

Depending on their cohesion, organisational strength and access to responsive state and government authorities and other key allies, communities vary in their abilities to defend their interests, including by appealing successfully to the international, and perhaps national, rules and regulations designed to protect them. Moreover, communities can have divided and evolving preferences about the desirability of mining, which, especially in remote areas, may represent both a welcome source of employment and, under the rubric of 'corporate social responsibility', a source of scarce public goods, such as schools and basic infrastructure in areas where the national and provincial

The ability of local leaders and organisations to influence the outcome of negotiations with companies depends on their organisational capacity and power for mobilisation. The ability of companies to influence the outcome depends, in turn, on the value of their sunk costs and fixed investments in relation to projected profits from the mine

'public' state is unable or unwilling to provide such goods. This is especially true in situations of extreme poverty where 'the only thing worse than being exploited is *not* being exploited'. Communities may thus face a difficult trade-off between negative public health and environmental consequences, on one hand, and positive economic and material welfare benefits, on the other. This trade-off can give TMCs a strategic opportunity to offer selective incentives in the form of jobs and private social provision that produces support among some locals which, in turn, may have a divisive, wedge-like effect on community solidarity that weakens the capacity to resist extraction.

Negotiations among community leaders, local organisations, and mining companies occur in both formal and informal arenas. When a local municipal council serves as the venue for negotiations, any resulting agreements may be relatively institutionalised, especially when municipal and provincial authorities participate, as they sometimes, though not always, do. Alternatively, bargaining among communities, local organisations and TMCs can occur informally and depend on ad hoc agreements, usually between companies and local leaders. The ability of local leaders and organisations to influence the outcome of negotiations with companies depends on their organisational capacity

and power for mobilisation. The ability of companies to influence the outcome depends, in turn, on the value of their sunk costs and fixed investments in relation to projected profits from the mine: *Ceteris paribus*, TMCs with low sunk costs and expecting modest future profits will have more leverage in negotiating the terms of mineral extraction than companies with high sunk costs and large projected profits.

3. Modes of Lithium Extraction: How Companies, Communities, and Governments Set the Terms of Mining in Catamarca, Jujuy and Salta

At the most general level, three modes of extraction can result from TMCs looking to extract minerals: non-negotiated extraction, negotiated extraction, and aborted extraction. *Non-negotiated* extraction occurs when TMCs make few, if any, concessions to local stakeholders, although the companies may still abide by existing national regulations and share revenues with host country governments as stipulated in mining regulations. *Negotiated* extraction occurs when local stakeholders are able to influence the terms of extraction, for example by getting the company to agree to provide a guaranteed number of jobs, local investments in public goods, or monetary payments. Negotiated extraction may involve a 'social licence' and the creation of new institutions for governance and monitoring of TMC activities through which both communities and local government participate jointly. Depending on the balance of power between local communities and TMCs, negotiated extraction can be *symmetrical*, with communities enjoying a strong influence over TMC behaviour, or, as is probably more common, *asymmetrical*, with communities having a weak influence. A third possible outcome of TMC investment is *aborted* extraction. This can occur when TMCs choose to 'exit' the locale, calculating that the cost of future investments outweighs the sum of anticipated profits and 'sunk costs', perhaps because of a drop in the international price and market for the minerals in question or an increase in the strength of resistance to the enterprise by local stakeholders. Aborted extraction can also result from a stalemated negotiation where TMCs and local communities fail to reach an acceptable agreement over the terms of extraction.

We look at cases of lithium mining projects in *salares* across the three Argentine provinces with the highest levels of lithium mining investment: Catamarca, Jujuy, and Salta. By focusing on projects with divergent extraction outcomes in the same province, we exploit a 'most similar systems' design that allows us to hold constant federal as well as provincial-level factors, including the type of government and the provincial regulatory framework. In turn, by exploring cases with similar extraction outcomes *across* provinces we draw on a 'most different systems' design that allows us to highlight how similar causal mechanisms — the strengths and strategies of companies, communities and governments — operate across distinct institutional, political and socio-economic contexts.[11]

3.1. Jujuy: Negotiated Extraction in the West Puna and Aborted Extraction in the East

In Jujuy, the lithium 'white goldrush' began in 2010 with a wave of foreign investment aiming to mine the deposits in brine beneath the province's multiple *salares*. We focus on the sharply contrasting outcomes that occurred in the eastern and western sides of the Puna Jujeña.[12]

3.1.1. A Failed Attempt at Symmetrical Extraction in Salinas Grandes and Laguna Guayatayoc

In Salinas Grandes and Laguna Guayatayoc, Orocobre and other TMCs faced strong resistance from local indigenous communities who mobilised successfully to halt their mining projects. Before the arrival of the lithium mining companies, the sparsely populated and geographically dispersed local Kolla and Atacama settlements were weakly interconnected. However, the entry of the mining companies in 2010 triggered a process of organisation that resulted in a confederation encompassing thirty-three indigenous communities across the region (thirty-three Comunidades de la Cuenca de las Salinas Grandes y la Laguna de Guayatayoc). While not unconditionally opposed to mining, the thirty-three Communities demanded that

11 A 'most similar systems design' compares closely matched cases which differ only in the outcome of interest, or the 'dependent variable'. This makes it easier to identify crucial factors that explain the observed variation in the outcome. A 'most different systems design' compares contrasting cases which are matched only in the outcome of interest, or 'dependent variable'. This makes it easier to identify the crucial similar factors that explain the shared outcome across otherwise quite different contexts. See Przeworski and Teune (1970).

12 See Pragier (2019) and Marchegiani, Morgera and Parks (2019) for insightful studies of these divergent outcomes on either side of the Puna in Jujuy.

any extraction be carried out, not only with their consent, but also on their terms. With support from local environmental lawyers and a national environmental NGO, *Fundación Ambiente y Recursos Naturales* (FARN), which helped publicise their struggle, these indigenous communities drew effectively on international treaties and allies, forming a powerful Transnational Action Network (TAN) (Keck & Sikkink, 1999). In 2010, the communities filed an injunction against the governments of Jujuy and Salta demanding that mining companies respect their right to prior, free and informed consultation on lithium mining in accordance with International Labour Organization (ILO) Convention 169, which Argentina ratified in 1992. Not only did the communities succeed in bringing their case to the Argentine Supreme Court, they also managed to get the Inter-American Court of Human Rights (CIDH), based in San José, Costa Rica, to review the case (Roth, 2019). The communities also solicited successfully an endorsement and visit in 2011 from the UN Special Rapporteur for Indigenous Rights, James Anaya.

The thirty-three communities embarked on an intensive, multiyear deliberative process that resulted in a remarkable document, *Kachi Yupi* ('Footsteps in the Salt') (2015), which outlined a community-approved protocol by which mining companies could gain their consent. The protocol, which would have enabled symmetrical negotiated extraction, was submitted to the provincial government for ratification into law by an executive decree. While the provincial government of the Partido Justicialista (PJ), governor Eduardo Fellner (2011-15), might have been amenable to their proposal, the newly elected pro-business government of Gerardo Morales (2015-present) delayed review of the community-generated protocol for three years, finally rejecting it in 2018. The government's refusal to endorse the *Kachi Yupi* initiative and codify it as law through an Executive Decree signalled the failure of the initiative to achieve symmetrical negotiated extraction.

In the wake of the provincial government's rebuff of *Kachi Yupi*, a new company, the Canadian firm A.I.S., together with local investors from the neighbouring province of Salta (Ekeko, and the current Secretary of Mines of Salta), moved with the government of Jujuy's approval to end the eight year moratorium on lithium mining in the Guayatayoc area by starting exploratory drilling in its properties without community consent. This step toward non-negotiated extraction provoked protests and highway closings by the thirty-three communities in February 2019. Having failed to achieve their goal of symmetrical negotiated extraction because of the lack of provincial government support for the initiative, and in the face of efforts by companies like A.I.S. to proceed without community consent, the preferences of community members seem to have shifted toward a maximalist position favouring 'no extraction' over 'non-negotiated extraction'. For their part, the mining companies had tried to implement a 'divide and conquer' strategy by negotiating individually with communities that might be persuaded to defect from the no extraction position, although it remains to be seen if these efforts will succeed. Meanwhile, in a move signalling a continued disregard for the demands of the indigenous communities of the region, the government of Jujuy proceeded to issue a tender for new lithium mining projects in the Salinas Grandes and Laguna de Guayatayoc regions in early 2019.

In summary, the bitter experience of failing in their efforts at symmetrical negotiated extraction, combined with the unresponsiveness to their demands for prior consultation by the provincial government, seems to have driven the indigenous communities of the region to shift toward a maximalist position of unconditional opposition to mining: 'no al litio, si al agua y la vida'. As a result, the Salinas Grandes region has yet to produce any lithium.

3.1.2. Asymmetrical Extraction in Olaroz

On the other side of the Puna Jujeña, a mere 50 miles to the west, events took a different course. In Olaroz, *Sales de Jujuy*, a consortium led by Orocobre, faced some resistance from an organisation of indigenous residents, *La Apacheta*, which opposes mining altogether. The standstill it faced in the east of Jujuy because of community resistance to its plans may have led Orocobre to see that non-negotiated extraction was not a feasible option and that negotiation, ideally asymmetrical, was its best strategy. Whether or not the company had learned this lesson from the east Puna, *La Apacheta*'s resistance surely underscored the urgency of investing in building community support in Olaroz in order both to weaken pressures for symmet-

rical negotiated extraction or, worse, a no extraction standstill as in Salinas Grande-Guayatayoc. Orocobre enlisted a local geologist and also benefited from the support of the provincial government. The company soon reached a set of agreements, negotiated on a case-by-case, 'divide and conquer' basis with local indigenous communities guaranteeing jobs, annual monetary payments, and modest public works, such as building a new school and an internet access centre. This *negotiated extraction* allowed the company to start profitably mining in 2015, making it only the second company to actually begin mining lithium in Argentina.

Following on the heels of the success of *Sales de Jujuy*, other international mining companies followed suit and launched a cluster of new lithium projects that have transformed western Jujuy into a profitable lithium mining district.[13] One of the new entrants advertises its locational advantage in what the company's online promotional material tellingly describes as 'a well-established, pro-mining business jurisdiction [that] minimises the project's risk profile'. Moreover, the placement of this company's project in the 'prolific lithium mining district' with a strong foundation of services and infrastructure is presented as an asset that strengthens the 'prospect of a fast-track to production'. Negotiated extraction thus opened the way for the Olaroz-Cauchari region to emerge as a dynamic hub for lithium mining.

In assessing the conditions that made negotiated extraction possible in the western Puna Jujeña, it bears emphasis that *La Apacheta* was a far weaker organisation than its counterpart to the east (i.e. the thirty-three communities). Not only did *La Apacheta* have a far more circumscribed territorial reach than the thirty-three communities, it also lacked the international ties and support from an internationally funded national NGO enjoyed by its peers. Had *La Apacheta* posed a stronger threat it might have been able to achieve a more symmetrical negotiated outcome.

Finally, the asymmetrical nature of negotiated extraction can be seen in mounting frustration and 'buyer's remorse' expressed by community members in the face of increasingly evident negative environmental and health consequences of Sales de Jujuy's mining operations. According to Marcelo Sticco, a hydrogeologist from the University of Buenos Aires who toured the Olaroz plant in February 2019 with community members, the company's production methods involve an 'environmental sacrifice' (Roth, 2019). Local inhabitants are increasingly forced to move far away because of shortages of water suitable for human and animal consumption. It is thus not surprising that Sticco reports that community members now regret having approved the Olaroz project.

13 In the Cauchari *salar*, adjacent to Olaroz, the Chinese company Ganfeng and the Canadian company Lithium Americas Corporation launched the Exar joint venture, which seems to have emulated successfully Sales de Jujuy's strategy of asymmetrically negotiated extraction. Having cut a series of community-by-community deals, Exar is now poised to become Argentina's third lithium-producing company. Orocobre itself expanded its footprint in lithium mining in the region through a new 25/75 joint venture agreement with the Canadian firm, Advantage Lithium Corp, to develop the Cauchari JV project situated immediately to the south of the Sales de Jujuy facility. A fourth venture, Cauchari East, led by the Canadian mining company Millenial Lithium, is also in development.

3.2. Salta: Non-negotiated Extraction

In stark contrast to Jujuy, there has been no detectable community resistance to mining in Salta. This may reflect the remote location of some of the mines in very sparsely populated areas, for example, Salar de Rincón. However, it also surely reflects the weakness of indigenous social movements in Salta. The provincial government in Salta has neither recognised local indigenous communities near the *salares* nor granted them land titles. The government's lack of recognition of indigenous rights, or even the 'right to have rights', is evident in its refusal to even send a delegate to the Supreme Court during the 2010 case filed by the thirty-three communities of Salinas Grandes and Laguna Guayatayoc, despite the fact that some of these communities were located in Salta.[14] This, together with a series of consistently pro-business provincial governments, has made non-negotiated extraction the predictable outcome in Salta.

The perceptions of international mining executives validate the appeal of Salta as a 'mining friendly' place. According to one foreign executive of a large international mining company with investments in Salta's Taca Taca copper mine, 'on a relative basis to other parts of the world the permitting process [in Salta] is transparent'. Noting that a precedent had been set in Salta by the company, Mansfield Minerals, which won an environmental permit from the provincial government for a leachable gold porphyry deposit, the same executive observed, 'you hear about horror stories in various provinces of Argentina, yet here we have a mine [Mansfield's] that is going to be built as an open pit and it's going to use heap-leach and cyanide. Its EIA [Environmental Impact Analysis] was approved in a reasonable period of time'. Whereas some Argentine provinces, for example Chubut and Río Negro, have banned the use of cyanide, in other provinces, such as San Juan and Santa Cruz, mining proceeds

14 To the degree that indigenous organised resistance and mobilisation occurs at all in Salta today, it seems concentrated in the northern part of the state among the Wichí people, and near the eastern border with Chaco and Formosa provinces, where there are no lithium mining activities.

unhindered. 'Salta is in that happy camp', the executive noted, 'It's a pro-mining space...this is a great province to be in'.[15]

This view of Salta as a mining friendly jurisdiction is widely shared among international mining companies, as confirmed in the results of the Annual Survey of Mining Companies by Canada's Fraser Institute. The survey, which is distributed worldwide to executives and senior managers of mining companies, serves as the basis for an index that ranks countries, states and provinces according to the extent that public policies encourage or discourage mining investment.[16] As seen in Table 1, between 2015-2019, Salta earned the highest average score of the ten mineral-rich Argentine provinces included in the Fraser Institute's Policy Perception Index (PPI). The PPI is composed of survey responses concerning policy factors that affect investment decisions, including uncertainty over the administration of regulations, environmental regulations, regulatory duplication, the legal and taxation systems, uncertainty involving protected areas and disputed land claims, socio-economic and community development conditions, labour regulations and skills availability, infrastructure, trade barriers, political stability and security. The PPI thus aims to offer 'a "report card" to governments on the attractiveness of their mining policies' (Stedman, Yunis & Aliakbari, 2019, p. 2).

Still, Salta poses some puzzles. If mining conditions in Salta are so propitious because of the favourable investment climate and lack of community opposition, why have none of the lithium projects actually begun producing lithium, whereas Orocobre, despite operating in the social minefields of Jujuy, has been producing steadily

15 ttps://www.northernminer.com/news/taca-taca-gets-bigger-and-better/1000750981/

16 The 2019 Fraser Institute Annual Survey of Mining Companies was sent to approximately 2,400 exploration, development, and other mining-related companies around the world.

Table 1
Policy Perception Index (PPI), Argentine Provinces, 2015-19
Source: (Fraser Institute Annual Survey of Mining Companies, 2019)

Province	2015	2016	2017	2018	2019	Average Score (2015-19)
Salta	62.30	83.13	71.89	67.72	77.97	72.602
San Juan	53.61	73.50	66.96	64.76	80.21	67.808
Catamarca	44.35	59.28	70.50	79.31	68.17	64.322
Santa Cruz	40.86	62.00	61.38	65.09	63.73	58.612
Río Negro	32.58	**	**	**	70.23	51.405
Neuquén	25.43	50.33	74.99	34.42	64.98	50.03
Jujuy	42.68	37.07	54.75	56.53	57.44	49.694
La Rioja	22.15	37.96	52.66	46.76	42.44	40.394
Mendoza	35.56	34.23	43.22	50.37	36.14	39.904
Chubut	25.13	31.79	26.34	37.07	30.89	30.244

since 2015? And while the Salar de Rincón project seems far along, with considerable investments by the company in building facilities and doing pumping tests and pilot production runs, it is still not in regular production. The reason for this delay has likely far less to do with local factors than with global market conditions for lithium, in addition to the imperative to create an appearance of steady progress for the purpose of satisfying company shareholders and raising investment capital. In the absence of community resistance, or even communities, companies may thus prefer to 'stand pat' on their reserves, which allows them to raise capital from investors based on estimated future profits, without actually mining anything. This could help explain the flurry of new and in-development lithium mining projects, more than fifty across the Argentine Puna, many with sophisticated prospecting studies exploring the quality and size of deposits, yet with only a small handful of three or four actually producing anything. Much of the current investment seems geared speculatively toward futures and options.[17]

3.3. Catamarca: Contestation after Twenty Years of Non-negotiated Extraction

In contrast to mining-friendly Salta, where weak indigenous movements and a pro-mining provincial government allow mining not only in lithium but in other minerals to proceed non-negotiated, in neighbouring Catamarca, mining has over the last decades, met with strong resistance from powerful grass-roots movements, especially in Andalgalá and Tinogasta (Christel, 2015). Despite this contentious context for mining gold, silver, and iron-ore in Catamarca, lithium extraction has, until recently, faced no organised resistance. This has allowed non-negotiated extraction to proceed for more than twenty years, since the Fenix project, owned by the US company FMC, first began producing in 1998. Why, until late 2019, has lithium proved an exception to the contentious pattern seen in mining of other minerals in Catamarca?

One possible answer concerns the remote location of the salares in Catamarca, with most near the border of quiescent Salta. In both Salta and Catamarca, local communities are further away from

17 The case of the French company, Eramet, with some $150 million invested in the Centenario and Ratones Salares of Salta offers another interesting example of 'no extraction', not because of resistance from affected communities, but because of the Covid-19 pandemic and its effects on global demand for lithium. Eramet announced recently that it was abandoning its Salta facilities and project.

lithium extraction sites than they are in Jujuy. Moreover, lithium mining does not require a large open pit as in the cases of gold, silver, and iron ore, nor does it use highly toxic pollutants, such as cyanide, which have a visible human and environmental impact in the short term. Rather, lithium extraction in the Argentine Puna produces a slow, hidden, and insidious depletion of water in a region where it is quite scarce. Because the Fenix project in Catamarca was the first lithium mine in the country, preceding the others by more than a decade, knowledge among local communities about the creeping and pernicious hydraulic consequences of the mine may simply not have existed. The gradual drying up over recent years of the Trapiche River, the Fenix project's main source of water for processing lithium brine, may very well have been the first visible sign to local residents of the mine's harmful impact. It changed the course of events.

3.3.1. Contesting Non-negotiated Extraction: New Community Demands for a 'Social Licence'

The remarkable pattern of more than two decades of quiescence in Catamarca's lithium industry has recently come to an end. In October 2019, several members of an indigenous family, the Morales, were beaten and arrested for opposing the removal of a livestock fence on what they claimed was their ancestral property. The fence had been taken down so that a road bypass could be opened for mining company vehicles to build a new, 30 km-long aqueduct to transport fresh water pumped from the Río los Patos for use in lithium processing by the US company Livent, additionally by two start-up companies, Galaxy Lithium SA and Minera Santa Rita SRL. The provincial and municipal governments allied with the mining companies by declaring that the disputed land did not, in fact, belong to the Morales family. During the same period, local indigenous people comprising the Atacameños del Altiplano communities, together with anti-mining ecological activists affiliated with the NGO Pucará based in Antofagasta de La Sierra, began mobilising to protest against the new aqueduct, which, in apparent violation of ILO Convention 169, had not been subjected to prior consultation and community approval for a 'social licence'. The communities, who depend on the rivers to sustain their livestock husbandry in the harsh and arid climate of the Puna, blame the mining operations for causing the Trapiche River to dry up and mobilised to prevent the same thing from happening again with the Patos river.

Thus far, Livent and the other companies have shown no signs of wavering from the position of non-negotiated lithium extraction enjoyed in Catamarca since 1998. Indeed, protests have been met with a level of repression not seen in Jujuy, with protestors beaten and arrested by provincial police forces. The provincial government had relied on police brutality to counter anti-mining protests before, both in Tinogasta and Andalgalá, with an especially high level of repression in the latter case in 2010. Moreover, vehicles were reportedly provided by the mining companies to transport provincial police to protect the construction of the aqueduct.[18] Provincial government officials, notably the provincial Judge for Mining (*Juez Electoral y de Mina*) and the Minister of Mines have been unresponsive to petitions from the indigenous communities to halt construction of the aqueduct, with the Judge reportedly stating that his court is 'pro-mining'.

Despite the affiliations of both the current (Raúl Jalil, 2019-) and prior governors (Lucía Corpacci, 2011-19) with the more populist faction of the PJ, the Frente para la Victoria (FPV), the provincial government and its police forces, together with the provincial judiciary, have been responsive not to the communities but to the mining companies. The community opposition to the mining interests in Catamarca will thus likely turn to the federal judiciary to seek relief, as did their peers in Jujuy without success in 2010-11. While the communities have the support of several new organisations, most notably, Pucará: Pueblos Catamarqueños en Resistencia y Autodeterminación and Antofagasta Resiste, they have yet to achieve the international, or even national, attention and visibility of their counterparts in Jujuy.

This low profile may partly reflect the more remote location of the mines in Catamarca, more than 10 hours by car from the capital. Of equal significance, the communities of Catamarca opposed to lithium mining faced a far more tenacious and formidable adversary. In contrast to the eastern Puna in Jujuy, where the communities aimed to prevent mining companies from entering in the first place, the communities in Catamarca confronted a longstanding and rooted mining venture which had been in operation for more than twenty years. Not only did this company have a large amount of fixed capital investments

18 Darío Aranda, 'Litio: Denuncia contra un minera en Antofagasta de la Sierra', *Página 12*, March 23, 2020.

in the area, it also had established strong ties with provincial and local officials, including the ability to deploy units of the provincial police as a private force to protect the company and its investments.

Moreover, in further contrast with the lithium projects in the eastern Puna of Jujuy and most of the other forty-plus recent ventures, the profitability of Livent's operations depended not on the speculative promise of *future* production signalled by a mere concession over proven lithium, but on its ability to produce lithium currently. To sustain the profitable extraction of lithium, Livent aimed to expand the territorial scope of its operations, which in turn required a new source for the large quantities of fresh water needed to process lithium brine into lithium concentrate through the solar evaporation technique employed by the company. The previous source of fresh water, the Trapiche River, had dried up, a result, according to the local communities, of two decades of overuse by the company. To continue its operations, the company needed a new source of fresh water. In the arid Puna, the Patos offered one of the only sources, and, with the provincial government's approval, the company began building the new aqueduct that became a mobilising focal point that helps explain the recent emergence of organised resistance by indigenous communities after more than two decades of collective quiescence.

The communities in Catamarca have adopted a maximalist, 'no extraction', position demanding cessation of lithium mining. Yet they are in a weak position. Firstly, the anti-mining forces in Catamarca lack the national and international visibility and support enjoyed by their counterparts in the eastern Puna of Jujuy. Secondly, this is compounded by a geographically unfavourable location in a remote region lacking major transportation arteries vulnerable to a blockade by a small number of activists. In Jujuy, the proximity of the thirty-three communities to a vital international highway linking northern Argentina and Chile served as an effective basis for making credible threats to inflict collateral damage on economic interests far beyond the lithium industry. The indigenous communities in Catamarca, by contrast, lack a comparable source of leverage.

In Salta, where lithium mining projects have yet to face organised resistance, non-negotiated extraction is feasible without resorting to repression. And in Jujuy, neither the companies nor the government have proved willing, or able, to deploy the force that would likely be required to impose non-negotiated extraction. In Catamarca, by contrast, perhaps because an actively producing, profitable, and entrenched mining project is involved, both the company and the local state apparatus were willing to turn to repression to sustain non-negotiated extraction. Whether this will continue remains to be seen.

Conclusion

The modes of lithium extraction vary widely across provinces in Argentina. In Salta and, until recently, in Catamarca, extraction has been non-negotiated, with mining companies imposing conditions and making few concessions to local stakeholders. In the western Puna of Jujuy, by contrast, companies negotiated with local communities and offered some benefits that may have had a modestly positive impact. In a third scenario, observed in the eastern Puna of Jujuy, extraction was aborted and companies exited. This chapter describes this variation and explores some of the factors that may help explain it.

Although federal and provincial institutional factors may be relevant, they are far from decisive. In the case of Jujuy, where we observe sharply contrasting outcomes across subregions, it is hard to explain with a focus on federal and provincial institutions because these institutions do not vary inside the province. Likewise, provincial-level institutions that have not changed over time cannot explain the recent shift from quiescence to contention in Catamarca. Other, more dynamic province-level political factors seem to play a stronger role, including alternation between incumbents of different parties and with distinct coalitions of support and leadership styles. For example, the shift in Jujuy from a populist PJ governor (Fellner), more responsive to grass-roots pressures, to a pro-business governor (Morales) may have foreclosed the possibility of a negotiated outcome in the eastern Puna. Still, Catamarca has been governed over much of the last decade by leaders affiliated with a populist PJ faction similar to the one with which the governor of Jujuy was linked, yet this resulted not in a negotiated outcome but in state-company collusion with local police forces and the provincial judiciary acting in the company's service. Provincial politics provides a fertile ground for future comparative research on mining in Argentina.

Local factors appear crucial. These include the location of mines, the capacity of communities to organise and mobilise, and links among local, national and international networks of activists seem to play an important role in determining modes of extraction. Local conflicts are more likely to emerge and escalate when mining threatens well-organised communities located near vital transportation routes that can provide leverage by being easily occupied and shut down. The potential for escalation is amplified when the communities are also connected to national and international networks of activists. Under such conditions, firms may be more likely to negotiate and offer concessions. This, in turn, may improve the local socio-economic impact of mining and mitigate its ecological damage. On the other hand, where local communities are weakly organised, less integrated into external, especially transnational, civil society networks, companies will have few incentives to negotiate. In these situations, as seen in Catamarca, mining companies may be more prone not only to seek to collude with local government but also to respond to local resistance with repression.

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Hydropower and Environmental Conflicts in Latin America

SALEEM ALI, RICARDO LLAMAS

1. Introduction

Large infrastructure projects are often promoted in Global South nations to both stimulate the economy of the nation and advance the nation's technological capabilities. Among these projects, electricity-generation infrastructure has functioned as one of the main axes to provide energy as a means of production to improve the quality of life of city and countryside communities (IHA, 2019). Historically, hydropower projects have been a key energy production alternative in many countries around the world, as opposed to fossil fuels or other combustion-linked sources of energy (Varas et al., 2013). Furthermore, hydroelectric dams can provide an additional advantage for flood control and irrigation management alternatives in agrarian economies.

Hydropower is a renewable resource, thanks to the endless source of energy provided through the water cycle (CNA, 2017; IFC, 2015; Sherman, 2004). The contribution of electricity powered by hydropower has increased significantly in recent years. In 2015, energy from hydropower projects represented only 16% of global electricity production (IFC, 2015), and by 2019, it generated almost two-thirds of the world's renewable electricity (IHA, 2019). This source of energy may reduce reliance on imported fuels, especially in developing countries, which are more vulnerable to price volatility, foreign currency requirements, and supply uncertainty (IFC, 2015). Additionally, these projects also support multiple purposes, such

as flood protection downstream, irrigation, domestic water supply, and fishing (IHA, 2019; Sherman, 2004).

However, all over the world, hydropower projects also affect local social structures in both positive and negative ways (Ledec & Quintero, 2003; Varas et al., 2013). Positive aspects of a hydropower plant for a local community can include its ability to improve water supply and new road infrastructure among other benefits. Despite the apparent advantages, hydropower projects also carry negative consequences such as reducing fish resources, loss of fertile cultivated areas due to bank erosion, greenhouse gas emissions from flooded vegetation, loss of biodiversity, among other issues (Ledec & Quintero, 2003; Schmidt & Hatch Kuri, 2012; Sherman, 2004). Hydropower projects also affect individuals in both direct and indirect ways, including damages due to flooding events, and community or home resettlement due to reservoir development behind the dam that can inundate erstwhile settlements. When people living on the sites of the proposed projects are relocated, they not only lose their houses but also their cultural property and historical conception of a home space (Díaz et al., 2015; Ledec & Quintero, 2003; Olvera Molina, 2012; Schmidt & Hatch Kuri, 2012). Hydropower plants often require the construction of a dam structure within the narrow valley of a river to generate energy from a retained water reservoir. The water reservoir floods the land previously occupied by natural organisms, such as vegetation, wildlife, in addition to human settlements. Furthermore, hydropower projects require significant funds, which can have a large impact on public finances in countries where governments must apply for credits from international institutions such as the World Bank, International Monetary Fund (IMF), and Inter-American Development Bank (IDB) among others (Martínez & Castillo, 2016).

In Latin America, many countries have topographic and hydrological characteristics that are suitable for hydropower projects. Although there are many similarities in hydropower projects across Latin America, differences in political structures and access to funds make each country a unique case study, especially concerning environmental protection, water governance, and social justice.

In this chapter, we analyse the development and conflict characteristics of two hydropower projects; 'El Cajón' in Mexico, which began operations in 2007, and 'Hidroituango' in Colombia, which

Although there are many similarities in hydropower projects across Latin America, differences in political structures and access to funds make each country a unique case study, especially concerning environmental protection, water governance, and social justice.

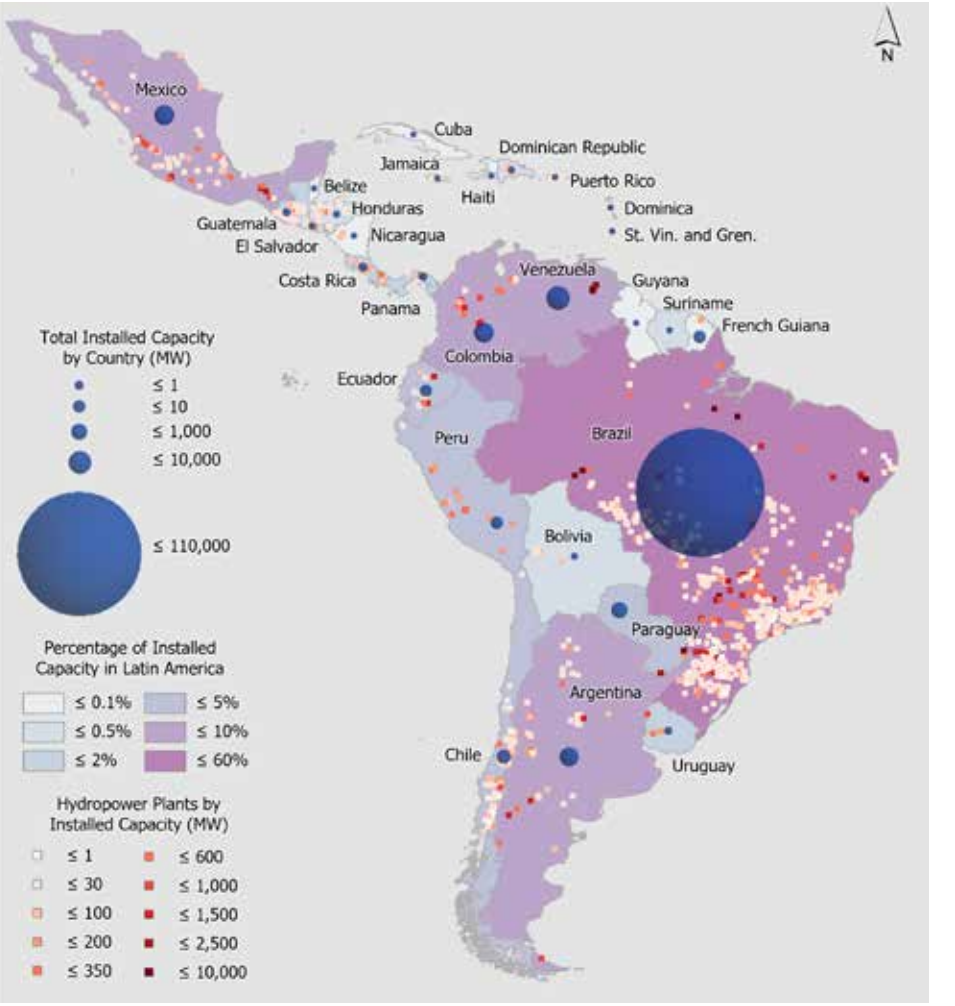
is expected to begin operating in 2021. Both cases offer unique scenarios related to the project implementation dynamics for the public and private sectors, including the arising of conflicts associated with construction activities in addition to stakeholders' involvement. Lessons learned from the Mexican case in 'El Cajón', are likely to serve as a basis to advise current and future conflict scenarios for 'Hidroituango' in Colombia, linking unique scenarios of project development in countries with similar political and economic structures, and a common cultural inheritance.

2. Hydropower In Latin America

Hydropower projects boomed in Latin America beginning in the 1970s, with large projects in Brazil, Argentina, Paraguay, and Colombia (Hartmann et al., 2013; Martínez & Castillo, 2016; Varas et al., 2013). The increase in hydropower projects represented the beginning of an era in shifting towards more clean energy sources, as opposed to traditional fossil fuel-based thermal power plants. During the 1980s and 1990s, some of the largest hydropower projects in Latin America were built, including Itaipu on the border of Brazil and Paraguay, and

Yacyretá, which is on the border of Argentina and Paraguay. These two projects represented binational efforts to not only provide clean energy but also caused significant environmental impacts and triggered social conflicts (Varas et al., 2013). Latin America has become one of the most important regions in generating electricity from hydropower sources, largely because of the substantial increase in hydropower plants in Brazil, both in number and magnitude, which lends Brazil as the world's second-largest producer of hydroelectricity as of 2020 (IHA, 2020). In 2019, Brazil became the largest single contributor of added installed capacity in the world, after the completion of Belo Monte, the world's fourth-largest hydropower plant (IHA, 2020). Currently, Latin America has an overall installed capacity of more than 196,000 Megawatts (MW), representing 15% of the world's total, with 20,213 MW in Mexico, Central America, and the Caribbean countries, and 176,280 MW in South America (IHA, 2020). The Central American region counts on a regional electrical interconnection system (SIEPAC) which facilitates electricity surplus trading. As of 2019, Guatemala was the largest seller and El Salvador the main purchaser with 58% and 68% of the regional market respectively (IHA, 2020). Notably, Brazil contributes 109,058 MW of hydro-powered energy, which represents 55.5% of the total installed capacity in all Latin America (IHA, 2020). Further, Colombia has added 80.61 MW of installed capacity in 2019, the second-largest addition after Brazil, aiming to become one of the main hydroelectric power producers in the region. While hydropower projects can serve as multipurpose projects, where water stored in reservoirs can be used for both public water demands in addition to irrigation, the Latin American region has the lowest percentage of multipurpose projects (IHA, 2019).

The main concerns when developing hydropower projects in Latin America are linked to the impact of high biodiversity regions (Varas et al., 2013). According to the IDB, a significant amount of the hydrological potential of Latin America is located in areas with a high value of ecosystem services (Hartmann et al., 2013). Moreover, the Organization for Economic Cooperation and Development (OECD) stresses that non-fossil fuel energy sources, such as hydropower and biofuels, have placed serious pressure on water resources in the region (Akhmouch, 2012). In addition, areas with the highest potential for hydropower projects development in Latin America



overlap with areas of important cultural diversity. Thus, hydropower projects in Latin America cause a multitude of challenges, not only the impact on the environment but also on indigenous communities who rely on resources affected by the construction of dams (Hartmann et al., 2013; Varas et al., 2013).

In Latin America, many hydropower projects are typically developed based on a project-based approach, where the infrastructure needs and the physical characteristics of the project site are prioritised

Figure 1
Hydropower plants and installed capacity by country in Latin America
Source: (IHA, 2020; Byers et al., 2019)

over the sum of elements that are involved in dams' construction and their effects. According to Hartmann (2013), hydropower projects also require system-scale planning, development, and management approaches, where the system concept encompasses any territorial level beyond individual projects; from river basin, country, to regions of interconnected grids. A system-scale approach is likely to prevent or manage conflicts among stakeholders as it serves as a negotiation basis when financial risk, environmental damage or social dissatisfaction arise. Additionally, a project-based approach on hydropower projects is also likely to miss potential synergies and opportunities that can be facilitated at the system-scale level (Hartmann et al., 2013).

Although Latin American countries have similar cultural and political conditions, the natural features of each country and specific political contexts represent a different level of relevance for hydroelectric energy (Varas et al., 2013). The overall regional trend shows that state institutions tend to conduct the development and management of hydropower projects, or in some cases, state institutions work in conjunction with private companies. Chile represents the exception to this rule, as energy generation is operated by private entities (Varas et al., 2013).

Central American countries produce most of their electrical energy through renewable sources, mainly hydroelectric power (IHA, 2019). The topographic conditions of Central America yield important hydroelectric potential, where mountainous regions with narrow valleys predominate, which offer natural conditions for dam construction, regardless of the existence of high-capacity rivers. On the other hand, South America exhibits a more diverse scenario, as the region has a more varied and complex natural landscape. The range of landscapes supports the construction of hydropower plants in both mountainous regions with smaller rivers, additionally in plain regions with large rivers, such as the Amazon and Parana.

Mexico has suitable natural conditions for developing hydropower projects, which has led to the construction of large dam projects beginning in the 1960s and expanding over the following decades (Alonso et al., 2018). As in other Latin American countries, the Mexican state operates hydropower projects through the Federal Electricity Commission (CFE). After 70 years of a one-party government system, the new federal government leadership appealed to hydropower energy between 2000 and 2012, with the flagship projects of 'El Cajón' (2007) and 'La Yesca' (2012). However, the period from 2012 to 2018 resulted in no major hydroelectric projects, when the traditional right-wing party had returned to power. In 2019, the new federal government represented by a left-wing party made plans to increase the country's hydroelectric generation capacity, building new plants and rehabilitating those that already exist (IHA, 2019). Nonetheless, Mexico is still the country with the lowest installed hydropower capacity in Megawatts per hour (MWh) in the North American region, following Canada and the US.

As a country with high hydropower capacity, Colombia has also shifted to prioritise hydropower as one of its main sources of electricity generation. The prioritisation of hydropower began as a result of the oil crisis in 1973 when the country questioned traditional energy sources (Martínez & Castillo, 2016). Colombia (11,918 MW) is the third-largest hydropower producer in South America, after Brazil (109,058 MW) and Venezuela (15,393 MW). The era of hydropower projects in Colombia was marked in 1972 with the construction of 'Guatapé 1', followed by other important projects in each decade until the recent and cornerstone project of Hidroituango, which started in 2010 and has an expected energy generation capacity of 2,400 MW (IHA, 2019; Vinasco et al., 2014). Like other countries, electricity generation and distribution are operated by the state. Legislation changes in 1982 set the energy sector as a national priority, not only for supplying national demand but also to participate in regional markets as an exporter of surplus electricity (Martínez & Castillo, 2016). Martínez & Castillo (2016) identify the beginning of Colombia's electricity expansion between 1970 and 1989, which corresponds to international trends during the same period, and later the global contraction of hydroelectric power plant construction in the 1990s (IHA, 2019).

3. Two Hydropower Projects in Latin America, Impacts and Conflict Characterisation

While there are many similarities in the type of hydropower projects among Latin American countries, there are still environmental and social conflicts that differ from country to country. This chap-

ter addresses two cases, 'El Cajón' in Mexico and 'Hidroituango' in Colombia, analysing the impacts, conflicts, and implications of each of these projects. The comparison of these two projects offers an opportunity to analyse how projects similar in structure and scope generate different impacts and conflicts concerning the political, social, and economic context of each country.

Since the 1970's, conflicts related to large dams around the world have proliferated and intensified (Khagram, 2004), and Latin America has been no exception. While benign projects in the upper tributaries tend to be relatively manageable, the most problematic projects are typically in the main streams of large rivers (Ledec & Quintero, 2003), such as in El Cajón in the main stream of the Santiago River in Mexico and the Hidroituango dam over the Cauca River in Colombia.

3.1. Case Analysis: El Cajón (Mexico)

El Cajón is an existing hydropower project located in the state of Nayarit, in the western portion of Mexico, and can produce 750 MW of electricity. The site of the dam is located 45 km east of the state's capital, Tepic, and 60 km upstream of the hydro-electrical plant of 'Aguamilpa', which is another prominent hydropower project in Mexico (CFE, 2002). Both dams are part of a series of artificial reservoirs on the Santiago River, part of the 'Lerma-Chapala-Santiago', the largest watershed in Mexico. The 'Federal Electricity Commission' of Mexico (CFE) planned the project during its initial stage and outsourced the construction phase to 'Ingenieros Civiles Asociados' (ICA), the largest construction company in Mexico.

The planning phase for the El Cajón project began in 2002 and was the leading project promoted by the federal government. The construction of the project was projected to begin in 2003, with the complete operational activity expected by 2007 and a total estimated construction cost of US$ 812 million (CFE, 2002). At the time, CFE stated that the natural ecosystem would be preserved to the maximum extent possible to minimise the disturbance of the diverse species living in the proposed flood area (CFE, 2002). The new artificial lake was planned to flood sixty-four houses, fifty-five of which were inhabited at the time. As reported by CFE in the environmental impact assessment of the project, 210 people would require relocation before the dam construction. Another sixty-four people would be affected in the nearby areas, beyond the proposed flood area. In total, 273 people were estimated to be affected by the dam construction and the reservoir formation. In addition, there were significant impacts on the minority populations, where 16% of the population planned to be relocated belonged to the Huichol ethnic group (CFE, 2002).

Promoters of the El Cajón project included the federal government and CFE, which highlighted the regional benefits of the project; including the creation of 10,000 direct and indirect jobs, the increase of economic capital, the construction of ancillary infrastructure, and an increase in clean energy generation, which would result in a saving of up to 2 million barrels of oil and gas (CFE, 2002). Moreover, the project gained prestige from international credit rating agencies and banks, such as the World Bank and the IMF, where favourable support from these lending agencies was believed to improve the development potential of the regional economy and would result in future support for the region.

Even though there were perceived benefits of the El Cajón project, the federal government and CFE also experienced varying degrees of opposition to the project. For instance, the beliefs of the Huichol indigenous group are intricately linked to the motherland, where the Huichol people often use the land surrounding El Cajón for traditional ceremonies. Therefore, the Huichol were strongly opposed to the dam construction project, in fear that it would affect their historical land rights. Additionally, project opponents also revealed several issues in the project plan published by CFE. Firstly, the original design of El Cajón did not guarantee enough water storage to support the regional demand during the dry season. Secondly, there was concern that the water supply would be affected by sewage and industrial discharges from large upstream cities, such as León and Guadalajara. Furthermore, high deforestation rates in upstream areas were projected to accelerate sediment deposition, limiting the future operational capacity of the hydropower plant (Castro Soto, 2006). In addition to environmental concerns, the association of groups affected by large reservoirs, COAGRET, reported that the National Institute of Anthropology and History (INAH) had found

archaeological vestiges in 2004 when the construction was ongoing, suggesting the dam construction could cause an increase in unveiled vestiges (COAGRET, 2005).

Despite project opposition from the local population and other organisations, CFE approved the project, and house occupants on the project site were required to resettle. However, soon after the project approval, and throughout the construction process, tensions among the affected parties became heated. Householders who were unwilling to sell their land, declared to have not received any notification of land expropriation, nor received the consequent resettlement payment. Since CFE did not adequately fulfil their responsibilities in resettlement notifications and payment, legal action was pursued through a court case. As a result, a federal judge made a ruling in favour of the resettled community, ordering the construction to be suspended. However, CFE did not stop the project (Castro Soto, 2006). As reported by Castro Soto (2006), many of the inhabitants who protested the relocation process mysteriously receded over time. Project tensions were also heightened when Jaime Bracamontes, the lawyer who advised the opposition movement, was murdered suspiciously. Later in March 2005, during a meeting for the group of parties affected by dam projects, and in favour of river preservation (MAPDER), participants demanded answers regarding the thirty workers who died on the construction site (Castro Soto, 2006). Relocated householders also reported that representatives of the environmental organisations who were tasked to mediate the post-conflict process between the government and affected parties had demanded compensation payments, arguing a biased negotiation process (Covarrubias, 2008).

Issues continued upon the completion of the construction of the El Cajón project and then through its operations. According to Olvera Molina (2012), the hydropower plant did not generate the projected energy due to intense and recurrent drought events related to climate change. Relocated householders continued to receive inadequate compensation, where many others who were relocated were still waiting for a series of benefits offered during the planning and construction stages. Additionally, the new houses for the relocated families had already shown cracks and other damages just a few years after moving in (Narváez Robles, 2007). One relocated householder later reported that CFE and the state government encouraged them to leave their lands based on a promise of a better life upon completion of the dam project, suggesting that the relocated families would be able to catch fish in the new reservoir. However, the promise was broken when the new state government was unwilling to issue fishing permits and banned all related activities.

3.2. Case Analysis: Hidroituango (Colombia)

The Ituango hydroelectric project 'Hidroituango' is located in the Cauca River basin in the north of the department of Antioquia, about 170 km from the city of Medellín. In 2008, the Ministry of Mines granted the environmental licence, and project construction began in 2010. Currently, the project is in its final construction phase, and expected to start operating in 2021. The final project will consist of a 220 metre high and 560 metre long dam and will create a reservoir of 2,720 million m^3. The expected installed capacity of the project is 2,400 MW, which will make Hidroituango the hydropower plant with the highest capacity in Colombia (IHA, 2019; Vinasco et al., 2014).

Like other countries in Latin America, the project will be developed and operated by the state through 'Empresas Públicas de Medellín' (EPM), one of the largest public construction companies in the country. The final project investment is expected to be US$ 2.8 billion (HydroWorld, 2011). The direct area of influence of the Ituango project comprises fifty-six localities that are affected by project construction in the dam site, reservoir area, access roads, and transmission lines (Ochoa Cardona et al., 2017).

Although previous research identifies EPM and the Ituango community as the two main stakeholders in the Ituango project (Úsuga Montoya, 2014), some other actors such as the government of Antioquia and the non-governmental organisation, 'Ríos Vivos', have played an important role as promoters and opponents on both sides of the project (OCA, 2019). The federal and state government, on one side, act as the main entities that advocate for dam construction, while, on the other side, social organisations such as Ríos Vivos, have fought to preserve resources in the region and empower local communities in the defence of social justice.

Project opponents have stated that Hidroituango will deviate the main stream of the Cauca River, which will alter important hydrological characteristics linked to flow and sedimentation patterns, and might trigger landslides in a fragile ecosystem such as the tropical dry forest (OCA, 2019). Additionally, changes in the Cauca River will affect local traditional activities such as 'Barequeo' (panning placer gold mining) that historically has been an important part of the local way of life (OCA, 2019).

In August 2008, the Colombian Ministry of Mines and Energy claimed the project's land as a national interest asset. However, local communities have filed complaints in relation to rights violations as a right of information, job access, equity, healthy environment, right to social protest, and decent treatment by the civil and military authorities. In August 2012, more than 700 displaced people participated in a protest demanding the cancellation of the project. In March 2013, people from affected communities marched from northern Antioquia to the capital city of Medellín to defend their constitutional right to social protest. In December 2013, a human rights evaluation mission found serious irregularities and alleged violations of fundamental guarantees by the authorities that indiscriminately conducted forced evictions (Environmental Justice Atlas, 2019).

One of the main events that triggered the intensification of conflicts and the questioning of the security of the dam was a series of events in 2018, in which heavy rains caused an early filling of the dam to contain the extra flow of water in the Cauca River, which generated the displacement of the population that remained in the area and had not been relocated. The heavy rains of 2018 caused the water level to rise alarmingly, creating a risk of overpassing the dam and breaking the structure, which would flood several villages downstream and put at risk various other towns in the region that were not directly related to the affected areas planned in the project. According to reports, the number of people at risk during the 2018 events totalled 120,000 (Daniels, 2018). Later in the same year, EPM re-established and accelerated the construction process regardless of the risky high-flow levels in the Cauca River, which forced the engine room to be flooded. This situation exposed design and construction failures that have motivated several studies assessing the geological vulnerability and have evaluated associated risks for downstream communities. As a consequence, in October 2018, the Latin-American Water Tribunal issued a recommendation to dismantle the Hidroituango project as it represented a permanent risk for the local population (Environmental Justice Atlas, 2019).

Furthermore, the situation of violence in the area has been an important factor in the planning and development of the project; paramilitary armed groups have been present in the area of influence of the dam since the 1970s and armed confrontations have intensified since the construction of the dam (Areiza Madrid, 2013; Herrera Lopera, 2018; OCA, 2019).

4. Conflicts Analysis

Although dams' construction represents evident advantages such as infrastructure development improving the quality of life (IHA, 2019), it is also important to consider that these projects should be planned seeking what the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) set as a main goal: 'conservation and sustainable use of biodiversity, long-term human well-being and sustainable development' taking into consideration nature, the benefits that people obtain from the environment and good quality of life (Díaz et al., 2015).

The IDB in its nature conservancy report stresses that analyses should be carried out for the overlapping areas of planned dams, and areas of environmental conservation, thus identifying conflicts to adjust energy and conservation plans that anticipate conflicts and create a better balance between stakeholders (Hartmann et al., 2013). Additionally, hydropower project plans must consider that there is always a territorial configuration formed by the constellation of natural resources, in addition to the resources created by all kinds of infrastructure, and the impacts created by large projects will inevitably change the territory configuration (Santos, 2000).

As mentioned by Vásques, (2011), large energy-related projects in Latin America cause local conflicts that are triggered by a combination of factors such as: 1) The environmental and social standards of the company involved in the energy projects; 2) The local community's level of radicalisation and opposition to the energy

project; 3) The availability of institutional mechanisms to mediate conflicts; 4) The extent of law enforcement; 5) The existence of old grievances or a history of negative externalities related to energy projects; 6) The level and nature of involvement of international non-governmental organisations in the conflict; and 7) The degree to which companies and governments comply with previous agreements with local communities.

Furthermore, some other elements of analysis, other than traditional project-based approaches (Hartmann et al., 2013) must be taken into account in the dams' construction. Impacts derived from people displacement also represent damages to the environment and human security, which in some cases can trigger militarised conflicts (Khagram and Ali, 2006), as occurred with the Ituango project, where paramilitary groups also had interests (Areiza Madrid, 2013). Besides violent conflicts, people displacement also affects the spiritual and religious value of land, as many cultural groups have practices related to water bodies, forest, and other elements they see as sacred (Díaz et al., 2015). Unlike the violent conflict in Ituango, the impact of spiritual land was one of the key impacts in the El Cajón project, where Huicholes indigenous groups have historically used the mountainous region of western Mexico as sacred land for their traditional ceremonies.

'System-scale' approaches compared to 'project-based' approaches help to anticipate conflicts, by analysing all elements related directly or indirectly to hydropower projects, considering the environmental and social impacts of dams' construction. In addition, the system-scale analysis facilitates the inclusion of stakeholders in the project, which anticipates conflicts, since NGOs and local communities have greater possibilities of knowing and internalising the positive and negative impacts of hydroelectric projects and advocating for more meaningful protection of desired resources rather than dam-by-dam confrontations (Hartmann et al., 2013). However, social participation usually is considered in the final phase of projects, including affected communities in some debates that are highly technical for most of the public participants (Varas et al., 2013).

Additionally, as seen in other cases around the world, hydropower projects increase opposing social mobilisation, favouring the creation of non-governmental advocacy organisations

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(Khagram, 2004; Varas et al., 2013), such as the 'Movimiento de Mexicano de Afectados por las Presas y en Defensa de los Rios en Mexico', and 'Rios Vivos Colombia' (Fuentes, 2015; Movimiento Colombiano Ríos Vivos, 2014). Although project promoters highlight some of the benefits of dams as protection against extreme natural events such as floods related to heavy rainfall (IHA, 2019), social movements claim that dams still represent risks for nearby communities when the water contention capacity is surpassed as occurred in Ituango in 2018 (Daniels, 2018). Organisations defending water rights such as the aforementioned have been unsuccessful, as they generally have relatively low-influence power compared to the power of state institutions and dam construction companies, coinciding with the trend observed by Khagram (2018) in other hydropower projects.

In Colombia in 2018, eighteen new hydroelectric projects were developed, while in Mexico there were no new projects for the same year, despite IHA projections that take into account new changes in the new federal government (IHA, 2019). A new trend in political ideology in the federal government in Mexico, may suggest more regulations that may limit the development of new hydropower projects as policy priorities in countries with 'left ideology' tend to prioritise efforts in reducing social inequality rather than promoting

the free market (Pilbeam, 2003). This may set hydropower projects as a non-relevant priority until more social justice is met.

Although promoters of hydropower projects emphasise their benefits as a reliable and affordable source of energy that helps to reduce pollutants from other sources and offers water management advantages (Varas et al., 2013), it is also true that dams and reservoirs generate many other environmental and social problems related to the displacement of people, restructuration of communities' water rights, and in some cases, the unitary control of modified water resources by state institutions or private water distribution and power generation companies. Arguments in favour of the privatisation of water-related services, such as electricity generation, are that privatisation is the only solution to increase efficiency and effectiveness (Pahl-Wostl et al., 2012). However, where water-related services are regulated by the state, the scenario is different; this might be seen as a way to strengthen water governance, but considering financial commitments with international credit institutions, external agents play also an important role in project planning and decision making.

Water governance conflicts arise since hydropower project development aims at ensuring energy sovereignty and inclusion in regional markets, but also yields commitments with international credit institutions that indirectly influence the design and development plans in those countries for which funding has been granted. In such cases, governance becomes a double-edged sword, since some countries have implemented legislation changes to assure water rights and social justice (Harris & Roa-garcía, 2013) through the sovereign use of natural resources, while credit commitments compel state institutions to resolve conflicts that put project developments at risk without settling water rights. Therefore, conflicts derived from hydropower projects pose conditions of inequality between all stakeholders, limiting the negotiation power of projects' opponents, who pledge for universal access to natural resources, environmental preservation, and respect for cultural spaces linked to indigenous communities. In this sense, sociocultural valorisation aims to capture values that are outside of the market and account for the social and cultural relationships around ecosystem services (Ochoa Cardona et al., 2017).

5. Conclusions

Hydropower facilities present a particular dilemma for environmental planners in terms of their cleaner energy production benefits on the one hand and social disruption on the other. The International Commission on Large Dams and a variety of multilateral donors undertook a detailed evaluation of dams twenty years ago through the World Commission on Dams which resulted in consensus around mitigating the scale of hydropower developments (Khagram, 2004). However, recent concerns about climate change and the need for a more rapid transition to cleaner energy sources have led to greater investment worldwide in hydropower, including in Latin America. Learning from some of the past environmental conflicts, particularly around resettlement is important to ensure this new wave of dams proceeds with greater community consent and is more sustainable in the long run. Through our analysis of an older hydropower project in Mexico, we have provided some comparative lessons for an on-going new project in Colombia. Given some of the specific sociocultural similarities around environmental and social resistance to large infrastructure investments across Latin America, we propose that a regional approach to lesson-drawing around hydropower development should be considered. Existing organisations such as the United Nations Economic Commission for Latin America and Caribbean (ECLAC) or through regional blocs such as the Community of Latin American and Caribbean States (CELAC) should consider opportunities for convening hydropower professionals and impacted stakeholders across the region in this regard. The contributions of hydropower in Latin America's energy transition towards meeting climate change mitigation targets are significant but will require such coordination to achieve expeditious and efficient outcomes.

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