

IMPACTS OF EXTRACTIVE INDUSTRY AND INFRASTRUCTURE ON FORESTS

AMAZONIA



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Assessment and Scoping of Extractive Industries and Infrastructure in Relation to Deforestation: Amazonia

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Acronyms and Abbreviations

Acronym	
AIDSESP	Interethnic Association for the Development of the Peruvian Rainforest
ASGM	Artisanal and small-scale gold mining
BNDES	Banco Nacional de Desenvolvimento Econômico e Social (Brazilian National Development Bank)
CAF	Latin America Development Bank
COICA	Coordinator of Indigenous Organizations of the Amazon River Basin
COSIPLAN	Consejo Suramericano de Infraestructura y Planeamiento (South American Council for Infrastructure and Planning)
CU	Conservation unit
EII	Extractive industry and infrastructure
EITI	Extractive Industries Transparency Initiative
FPIC	Free, prior and informed consent
GDP	Gross domestic product
GIS	Geographic information system
ha	Hectare
IACHR	Inter-American Commission on Human Rights
IBAMA	Brazilian Institute of the Environment and Renewable Natural Resources
IDB	Inter-American Development Bank
IFI	International Financial Institution
INPE	National Institute for Space Research (Brazil)
IT	Indigenous Territory
Mha	Million hectares
MME	Ministry of Mines and Energy Ministério de Minas e Energia (Brazil)
MPF	Ministério Público Federal (Brazil)
PA	Protected Area

PPI and PPP	Public-private investment; Public-private partnership
PPCDam	Plan for Protection and Combating Deforestation in the Amazon
RAISG	Amazonian Network for Georeferenced Socio-environmental information
REDD+	Reducing Emissions from Deforestation and Forest Degradation
UNFCC	United Nations Framework Convention on Climate Change

Executive Summary

This report is part of a larger study commissioned by the Climate and Land Use Alliance (CLUA) to explore the impacts of extractive industries and infrastructure (EII) on forest loss and degradation and community rights in the Amazon, Mexico and Central America, and Indonesia.

In the Amazon, the association of infrastructure development with forest loss and degradation is well established, while the impacts of extractive industry have been significant but much more localized. The rapidly increasing number of approved and proposed infrastructure projects, including dams, hydropower plants, waterways, highways, and access roads and worker housing to build the infrastructure, has contributed and will undoubtedly continue to contribute to the further transformation of the Amazon basin. Extractive activities, specifically industrial-scale mining and hydrocarbons development, also require roads, pipelines, railways and port facilities to move commodities to distant markets. Artisanal and small-scale mining is also favored by access infrastructure. Investments in infrastructure and extractive industries interact and reinforce each other to produce large-scale landscape and social impacts that urgently require strategic assessment on a basin-wide scale.

Extractive industry and infrastructure (EII) also drive increased social mobilization and protest and in general have undermined possibilities for more sustainable forms of production that prioritize local livelihoods. Indigenous and traditional forest populations are drawn into conflicts over access to natural resources in a context in which citizen rights are diminished and existing environmental protections are directly challenged by powerful actors. Women, in particular Indigenous women, are likely to be most negatively impacted by EII activities through exclusion from processes of consultation, loss of access to natural resources such as forests and water, environmental degradation, and intimidation and acts of violence

Amazonia¹ is home to the world's largest tropical rainforest. It has been the site of highly visible international campaigns to save both forests and the many Indigenous populations whose ancestral lands are endangered by advancing human settlement and development. After a period of significant decline in the rate of deforestation in the Brazilian Amazon, attributed in part to a series of reforms limiting the expansion of the agricultural frontier, strengthening enforcement of restrictions on forest clearance, and expanding protected areas, recent trends indicate this is now in reversal.

Looking forward, coordinated investments in infrastructure development linked to regional integration initiatives will drive future land use change in the Amazon. The vast and largely land-locked nature of Amazonia requires significant investments in both energy development and multi-modal transport systems in order for high value commodities to be exploited profitably. Highways and waterways, along with dams/hydroelectric power plants, constitute the priority

¹ The area around the River Amazon in South America, principally in Brazil, but also extending into Peru, Colombia, and Bolivia. The region comprises approximately one third of the world's remaining tropical rainforest. <https://en.oxforddictionaries.com/definition/amazonia>

infrastructure projects in the Amazon. Mineral, grain and beef exports to Asia drive infrastructure investment.

Governments across the Amazon promote an array of policies that emphasize the exploration, exploitation and export of such commodities in support of national development goals. Amazonia's known and potential subsoil wealth is significant and is positioning the region as a new extractive frontier. China, the most important market for the region's commodities, is poised to finance both the expansion of extractive industry activity and related investments in hydropower development and bulk transportation systems. These investments have important implications for the protection of forests and the rights of forest-based peoples.

Powerful special interest groups lobby national governments to privilege international investment in EII and revenue generation linked to extraction over other forms of occupation and use of Amazonia. Episodes of downgrading and downsizing of protected areas, including of Indigenous territories and national parks, in order to facilitate extractive activity are growing. In Brazil, we identified some 140 proposals for new legislation dealing with Indigenous rights and Indigenous territories in ways that would favor external investment. In some countries, ministries and agencies responsible for regulating EII activity have lost power and influence.

Governments have also deployed national, strategic and national security arguments as justifications to override environmental licensing requirements, limit consultation processes, reduce compensation, and fast track investments. The weakening or undoing of social and environmental safeguards often come with growing authoritarian discourse – sometimes nationalist – in support of extraction. This roll back of social and environmental protections threatens to undermine decades of work to protect forests and secure the rights and livelihoods of Indigenous and traditional peoples and other forest-based communities. It also creates a more permissive environment, and encourages land grabbers and speculators and other illegal incursions into protected areas.

The opening up of Indigenous territories to extraction has direct consequences for forest cover. Research on forest loss within Indigenous territories reveals far lower rates of deforestation than in non-protected forests. Opening Indigenous territories to extraction and infrastructure development, combined with the failure of governments to conduct adequate consultation processes, is likely to unleash a new wave of social and environmental harm on some of the world's most vulnerable people.

Public and private organizations play important roles in addressing forest loss and threats to forest people's rights. Initiatives to title and register lands, to expand demarcation of Indigenous territories, to limit the expansion of the soy frontier, and to engage with actors along global commodity chains aim to stem forest loss through greater transparency, engagement with the private sector, and the strengthening of rights. Networks of grassroots groups, communities, civil society organizations, scientists, and activists coordinate information and strategies to respond to the wave of EII investments. Efforts have tended to focus on single high profile projects or have taken a sectoral approach. There is significant scope to develop capacities that analyze the potential synergies produced from investments in hydropower, roads and mines

across landscapes, and potential impacts to forests and forest-based peoples. Indeed, much work on EII in Amazonia has focused on the Legal Amazon (an area in Brazil that accounts for about 65 percent of the Amazon rainforest) and less on how coordinated integration initiatives might drive future forest loss and loss of rights elsewhere, especially in more remote border areas.

A. Introduction

Background/context

In the Amazon, the association of infrastructure development with forest loss and degradation is well established, while the impacts of extractive industry have been significant but much more localized. The rapidly increasing number of approved and proposed infrastructure projects, including dams, hydropower plants, waterways, highways, and access roads and worker housing to build the infrastructure, has contributed and will undoubtedly continue to contribute to the further transformation of the Amazon basin. Extractive activities, specifically industrial-scale mining and hydrocarbons development, also require roads, pipelines, railways and port facilities to move commodities to distant markets. Across the Amazon, investments in infrastructure and extractive industries interact and reinforce each other to produce large-scale landscape and social impacts that urgently require strategic assessment on a basin-wide scale (1, 2). The imperative to construct, extract and export also drives increased social mobilization and protest as Indigenous and traditional forest populations are drawn into socio-environmental conflict in a context in which citizen rights are diminished and existing environmental protections are directly challenged by powerful actors.

Amazonia, positioned in the heart of the South American continent, covers an area of 7.8 million km² and includes the world's largest intact tropical rainforest, approximately 5.5 million km². Often referred to as the world's lungs, the Amazon rainforest absorbs some 2.2 billion tons of carbon dioxide annually (3) In Brazil, the region known as the Legal Amazon, accounts for about 65 percent of the Amazon rainforest (see Figure 1). The remaining rainforest is distributed among five Andes-Amazon countries: Bolivia, Colombia, Ecuador, Peru and Venezuela (29 percent) and the three Guianas of northern South America (6 percent) (3). For the purposes of this study, we focus our discussion on the Legal Amazon of Brazil and the Andes-Amazon countries with some reference to dynamics that also impact the three Guianas.

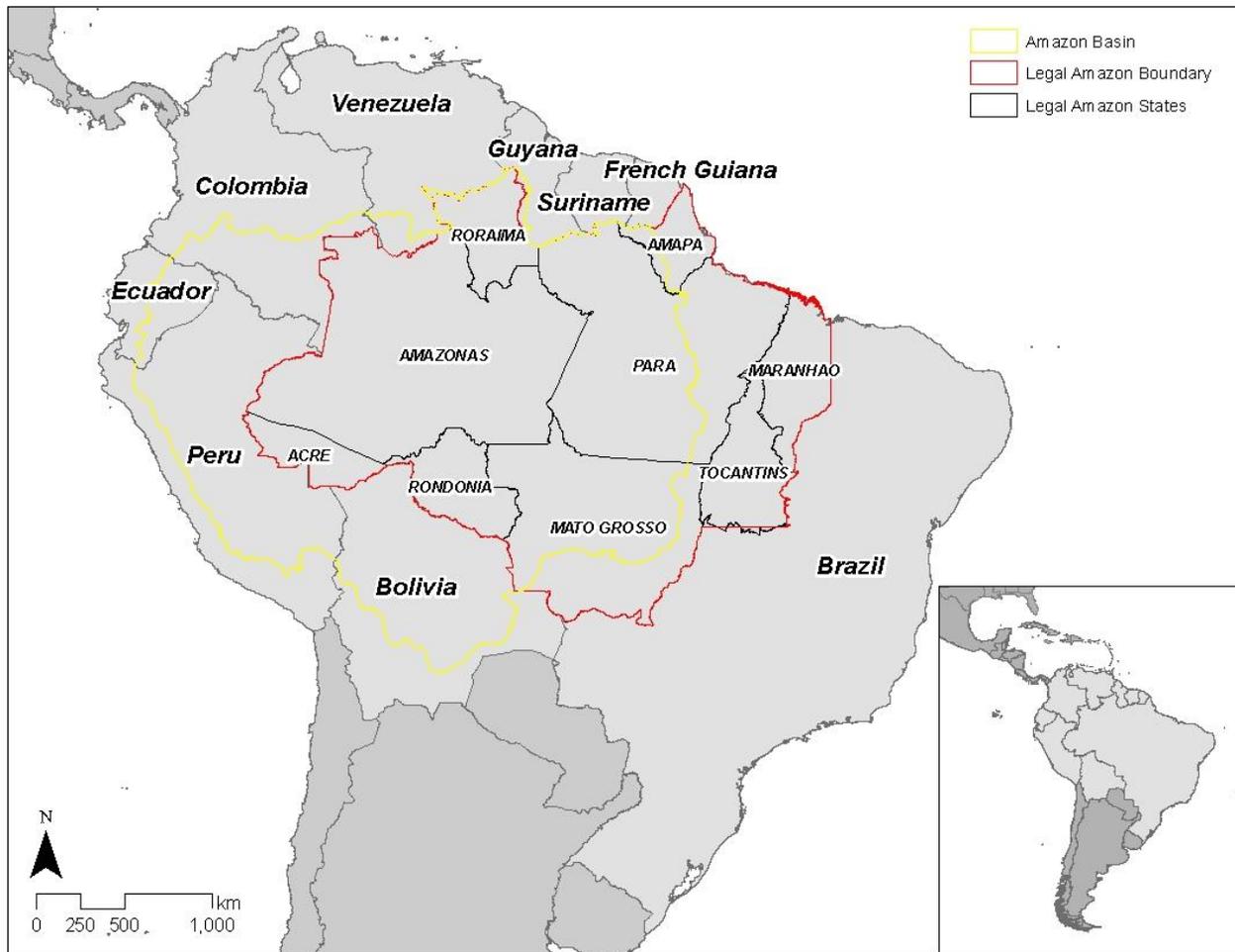


Figure 1. Map of Amazonia, showing national boundaries and state boundaries of Legal Amazon, Brazil. Produced by: J. Rogan, Clark University. The Amazon regions of each country - as a percentage of total surface area - range from a low of 42 percent (Colombia) to 61 percent (Peru).

Some 33 million residents live in the region, with 75 percent of the population living in the Legal Amazon. Today, national protected areas and Indigenous territories cover about 45 percent of the Amazon. However, not all of the 385 Indigenous groups in the Amazon have obtained official recognition of their lands. Of this number, 71 Indigenous groups live in voluntary isolation. These populations, are mostly concentrated in remote regions along Brazil's border with Andean countries, and are under significant pressure from illegal loggers, poachers, miners and encroaching hydrocarbons extraction (4, 5).

Beginning in 2004, Brazil made reducing deforestation a national priority through the introduction of the Plan for Protection and Combating Deforestation in the Amazon (PPCDAm). Reforms included a New Forest Law regulating forest concessions on public lands (2006), a moratorium on soy expansion in the Amazon (2006), and the creation of the Amazon Fund (2008) to channel international donor funding for forest protection. Subsequent phases of

PPCDAm have rolled out the CAR land registry database (Cadastro Ambiental Rural)² and a new Forest Code (2012) providing amnesty for prior acts of illegal deforestation.

From 2001-2014, rates of deforestation fluctuated in the Amazon basin (see Table 1). Brazil’s rate of deforestation was reduced by 80 percent beginning in 2004 – even though rates continued to be the highest in the Amazon (see Figure 2). Analysts point to certain reforms, in particular the soy moratorium and the expansion of protected areas, as helping to curb forest loss.(6, 7) Elsewhere in the Amazon, rates of deforestation continued to rise, especially in Bolivia, Colombia and Peru, and data from SarVision suggest that forest loss in the Guiana Shield is increasing as well (8).

In Brazil, the decline in the rate of forest loss began to slow by 2012. Brazil’s National Institute for Space Research (INPE) reported a 29 percent increase in deforestation in 2016 reflecting a 75 percent increase over 2012 levels (9). Rates increased again in 2017 both in Brazil and across Amazonia as a whole (see Figure 2). Fearnside argues that the steady rise in deforestation since 2012 is directly linked to the loosening of environmental protections, among them the Forest Code of 2012: “That year marked the entrenchment of a major weakening of Brazil’s Forest Code, removing important restrictions on deforestation – particularly in Amazonia” (10).

Table 1. Tree cover loss in the Amazon basin, 2001-2016, based on 2000 tree cover

Country	Percent Lost (2001-16, relative to 2000)	Mean Percent Loss Per Year 2001-2016
Bolivia	6.30	0.39
Brazil	8.90	0.56
Colombia	4.00	0.25
Ecuador	3.60	0.23
Peru	3.00	0.19
Venezuela	2.90	0.18
<i>Average</i>	<i>4.78</i>	<i>0.30</i>

Source: *Global Forest Watch (GFW) 2018.*

² For additional information about Rural Environmental Registry scheme see: <https://www.giz.de/en/worldwide/34060.html>

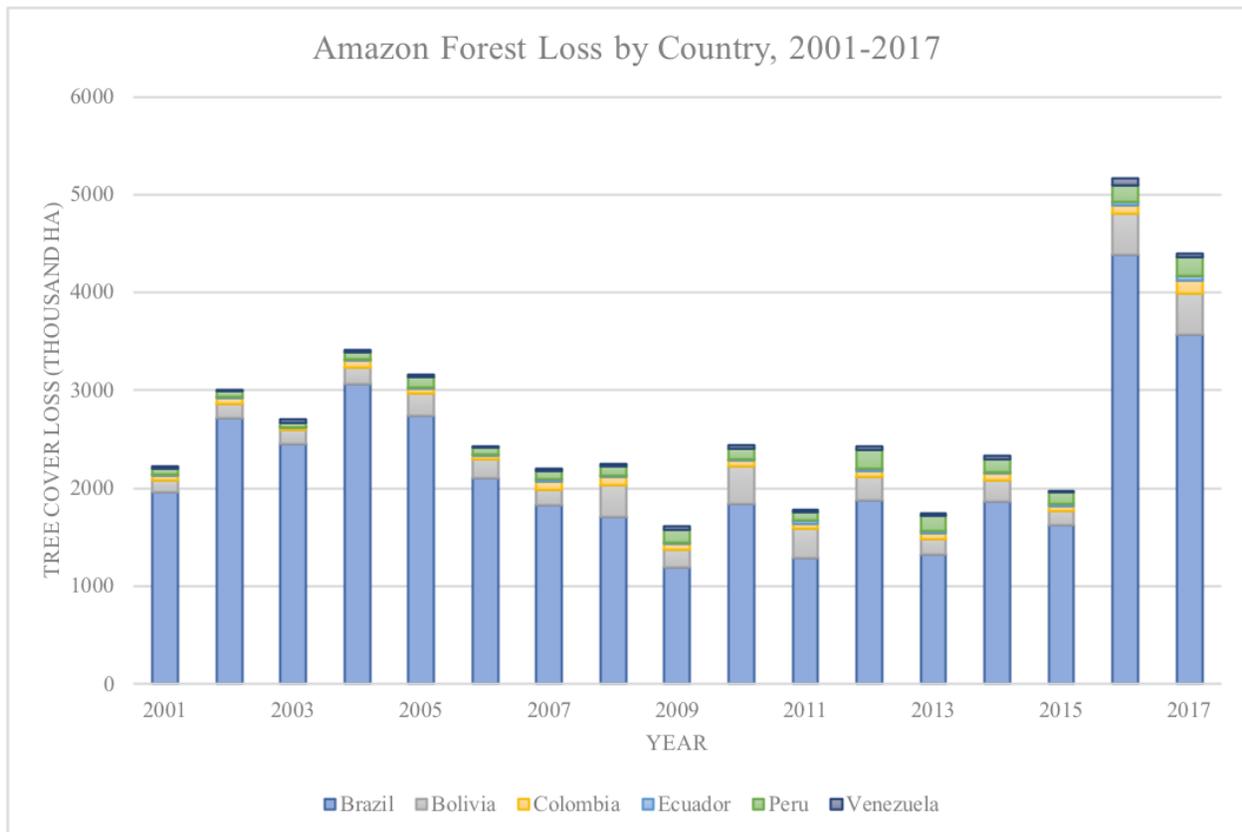


Figure 2. Forest loss by country in Amazonia in thousands of ha, 2001-2017.

Source: GFW data, adapted and prepared by L. Sauls.

The roots of forest loss in Amazonia lie with governments' longstanding policies and initiatives to occupy this vast territory and promote economic growth on the basis of the Basin's natural resources.³

In Brazil, state policy promoting human settlement in the Amazon dates back to the 1940s and the creation of the Superintendency for the Economic Valorization of Amazonia (SPVEA). The Brasília-Belém highway, completed in the 1960s, opened up the Amazon to colonists and established a pattern of settlement and deforestation that has come to characterize the region. The Trans-Amazon highway came next and incentives were provided to small farmers to pursue agriculture and cattle raising;⁴ loggers and land speculators followed. In the aftermath, deforestation levels soared.

³ Military governments in power around the Amazon basin in the 20th century also sought to secure borders and control resource rich areas – in some cases military budgets were directly funded with resource flows linked to extraction.

⁴ The 4,000 km highway, BR-230, bisecting the Legal Amazon was completed in 1972. It extends across the states of Paraíba, Ceará, Piauí, Maranhão, Tocantins, Pará and Amazonas. The highway sought to

In the 1970s, state-promoted, large-scale development projects, many of which were funded by International Financial Institutions (IFIs) such as the World Bank and the Inter-American Development Bank (IDB), supported industrial mining, timber extraction, agricultural production, electricity production, and industrialization. Large-scale development initiatives attracted hundreds of thousands of migrant families to the region looking for land and jobs. Over time, investments in EII gave rise to a highly technical, consolidated construction sector. Since 2000, this politically powerful sector directly benefitted from regional integration initiatives and IFI and government financing that expanded business opportunities for Brazilian firms to build infrastructure across South America and beyond.

Brazil's coordinated, large-scale investments in EII have expanded over the past 15 years as a result of: the country's integration into new global markets (especially China, and its role as architect and financier of South American integration) and the favorable market conditions for Brazil's priority commodities (soy and iron ore).

While Andes-Amazon governments also have long histories of promoting and financing the occupation of their respective Amazonian territories, including the exploitation of natural resources, these processes were generally slower and somewhat less successful than in Brazil. For all the Andes-Amazon governments, an important brake on developing their respective Amazon regions was lack of state financing. In the late 1990s, under the leadership of Brazil and with the support of IDB, South American governments came together to overcome financial constraints, creating a comprehensive framework to coordinate and finance region-wide investments in infrastructure.

Looking forward, Killeen (11) notes that how infrastructure defines the future is likely to result from the coordinated investments of South American governments under the Initiative for the Integration of the Regional Infrastructure of South America (IIRSA) – now managed by the South American Council of Infrastructure and Planning (COSIPLAN).⁵ Along with analysts Dourojeanni (12) and Little (13), Killeen maintains that a second “Andean arc of deforestation”⁶ is underway, running along the Western Amazon and involving the expansion of mining, hydrocarbons, and hydroelectric and road infrastructure planned and/or already under construction in Peru, Bolivia, Ecuador and Colombia (1, 14, 15). These investments will threaten what Song et al. characterize as among “the most bio-diverse, most carbon-rich, yet mostly unprotected rainforests in Northern Bolivia and Southern Peru” (16).

connect Brazil with Colombia, Peru and Ecuador. The road was to be paved but costs over-runs and technical problems, exacerbated by economic crisis, meant that only sections were completed.

⁵ For a detailed list of Integration axes, hubs and projects, including investments in the Amazon basin see <http://www.iirsa.org/Page/Detail?menultemId=45> (last accessed 23 August 2018)

⁶ The first arc of deforestation extends along the eastern and southern states of Pará, Mato Grosso and Rondônia.

Purpose and structure of report

This report builds upon an initial scoping exercise, commissioned in 2016-17 by the Climate and Land Use Alliance, to identify and discuss the drivers behind forest loss and the ensuing negative impacts on Indigenous and traditional people's territories in the Brazilian Amazon. A second round of work extended the lens to the larger Amazon region in order to analyze potential impacts of expanded extractive industry and infrastructure development across the basin and to consider the ways in which different organizations have responded to these challenges. This report on Amazonia is one of three separate regional reports and one global/synthesis report.

The report takes as given that historic drivers of deforestation (logging, cattle-raising and agricultural expansion) continue to be proximate drivers of deforestation across much of Amazonia. In this study, we ask to what extent investments in extractive industry and large-scale infrastructure (EII) also drive forest loss and degradation, greenhouse gas emissions and the loss of rights among forest-based peoples.

The report is organized as follows. In Section B we identify current and proposed investments in EII in Amazonia, and in Section C discuss the drivers of these investments, differentiating among regional, national and sub-national policies, the synergies between extractive industry and infrastructure development and trends in financial flows and financing mechanisms. Section D describes the impacts of these investments on forest cover and community rights, and Section E outlines public and private responses to the impacts of EII on forests and communities. The report closes with a summary of key themes emerging from this analysis in Section F.

The report is based on a review of the academic literature; a review of policy documents; key informant interviews with civil society and public sector informants; geographic information systems (GIS) and remote sensing analysis of concessions and forest cover; and workshops in Lima, Peru and Brasilia, Brazil.⁷

B. Extractive industry and infrastructure in Amazonia

Given the vast and largely land-locked nature of Amazonia, the development of high value, sub-soil commodities (minerals, oil and gas) requires investments in infrastructure to facilitate access to and transport of these resources, and to provide energy to support the process of extraction. This section outlines some of the history of these investments in industrial mineral

⁷ The paper also benefitted from comments from staff and program officers in the Climate Land Use Alliance.

development in the Brazilian Legal Amazon and oil and gas development in the Andes-Amazon, and their interactions with large-scale infrastructure.

Extractive Industry

The Amazon basin contains world-class deposits of copper, tin, nickel, iron ore, bauxite, manganese and gold and large reserves of oil and natural gas. The region has been the site of significant industrial mining and hydrocarbon development for much of the twentieth century. The difference today is the extent to which, in a period of sustained high prices, governments have committed to natural resource extraction as a strategy of revenue generation and economic development, as well as the breadth of private and public sector activity in these industries. Currently, all Amazonian countries promote variants of “extractivism” – policies that support exploration, exploitation and export of high value minerals and hydrocarbons – as part of national economic development (see discussion in Section C).

The importance of revenue from extraction varies by country: In 2011, revenues linked to mineral extraction (excluding oil and gas) were 11 percent of GDP in Peru, 6 percent in Bolivia, 3 percent in Brazil, and just one percent in Venezuela (17). In contrast, revenues from oil and gas compose 50 percent of Venezuela’s budget, and in Bolivia, hydrocarbons represent about 45 percent of the country’s total exports. The flow of resources linked to the export of commodities, together with governments’ developmentalist visions (18, 19), also fuel significant investments in large-scale infrastructure across the basin. Decentralization initiatives and revenue-sharing arrangements with sub-national authorities help ensure local support for extractive activities.

Strong and sustained global demand for minerals and hydrocarbons has driven the expansion of mining and oil and natural gas speculation and development into ever more remote landscapes across Amazonia and this has important implications for forests and protected areas. The Amazonian Network for Georeferenced Socio-environmental Information (RAISG) identifies 327 oil or gas blocks available for bidding or under exploration across the basin (covering some 1.08 million km²) (20). In Brazil, mining leases, concessions and exploration permits cover 1.65 million km² – approximately 21 percent of the Legal Amazon (21). Moreover, while a period of lower prices for key minerals (2012-2015) had a dampening effect on new investments in the industrial mining sector, conditions continued to fuel increased artisanal and small-scale gold mining (ASGM) activity, especially in border areas. Mineral prices have trended upwards again since 2015.

These investments and property rights in the subsoil overlap with protected areas, Indigenous Territories (IT) and traditional peoples' lands.^{8,9} RAISG's maps reveal that nearly all protected areas and Indigenous territories across the Amazon Basin are affected by some form of mining, oil and gas, and hydropower investment, as well as investment in access infrastructure such as roads and waterways (see Section D for details). The following sub-sections discuss patterns of mineral extraction and hydrocarbon development.

Mineral extraction

Mineral extraction in Amazonia is dominated by industrial mining in the eastern Amazon (specifically the states of Pará and Maranhão), copper mining on the eastern slopes of the Andes, and ASGM focused on alluvial gold deposits.

Brazil

Brazil is the fifth largest mineral producer of the world. Mining's contribution to Brazil's GDP reached 4 percent in 2016 and the value of mineral exports reached \$25 billion and represented 9.4 percent of total exports (22). There are some 8,400 mines in operation employing 200,000 workers. Government policies seek to increase mining's contribution to GDP to 6 percent, with investment in the sector increasing to \$19.5 billion over the 2018-2022 period (23).

Iron ore is Brazil's leading mineral export, accounting for 73 percent of the sector's export revenues and 7.2 percent of all Brazilian exports (24). Despite the diversity of Brazil's mineral wealth, the sector is highly concentrated in one company (Vale S.A.), on one commodity (iron ore) and dependent on one market (China).

Over the last several years, the mining sector has suffered a number of setbacks that have stalled some of its growth. One was the Mariana dam disaster in 2015 (see Section D), following which Samarco and co-owners Vale, S.A. and BHP Billiton¹⁰ reached an agreement with the Brazilian government that required them to fund \$6.5 billion of social and environmental remediation initiatives (25, 26).¹¹ The disaster immediately prompted calls for greater environmental regulation and government oversight of mining operations. A second set-back

⁸ For the purposes of this report, we will refer to all Indigenous peoples recognized and pending claimed territories across Amazonia as Indigenous Territories (ITs). Traditional peoples refers to a mix of populations including *quilombas*, long time riverside communities and forest-based extractivist communities whose presence dates back to the early 20th century.

⁹ In some cases, the investments also overlap with agrarian settlements established by Brazil's Colonization Agency, INCRA.

¹⁰ The owners of Samarco are Vale, S.A. and BHP Billiton, two of the world's largest mining companies and ostensibly practitioners of the highest levels of industry standards in terms of safety and environmental risk management.

¹¹ The fund includes the recovery of 5,000 streams along the Rio Doce, the reforestation of 10,000 hectares and restoration of another 30,000 hectares. The settlement is being contested in the Brazilian courts. It could potentially establish a protocol for other communities suffering the impacts of environmental contamination linked to mineral extraction.

derives from Vale's dependence on Chinese demand for iron ore. With the (relative) slowing down of growth in the Chinese economy, Vale has scaled down or suspended some of its projects, focusing instead on projects with the highest-grade ores for which per unit production costs are lower. These are among Brazil's most iconic mining projects and are described below.

The Grande Carajás Program

The Grande Carajás Program is a coordinated government investment formally launched in 1982 to develop the region's vast iron ore deposits, expand the national mining sector, build infrastructure and support regional development with financing from the World Bank. The program extends over 900,000 km² and is located in the Carajás mountain range (Serra dos Carajás) in the State of Pará. The program included the construction of the Tucuruí hydroelectric plant to power the mine, along with a railway and a port to transport minerals. As part of the program, some 800,000 hectares of protected areas and Indigenous reserves were created. Vale S.A. (formerly Companhia Vale do Rio Doce – CVRD) operates the mine, which also supports the production of pig iron in the same region. The pig iron is transported and then exported to the United States, among other countries, where it is used for different consumer products.

Mineral Complex S11D

Vale, S.A. refers to S11D¹² as the largest and most complex mineral project in the company's history (27).¹³ The complex lies 30 miles south of the Grande Carajás mine, within the National Forest of Carajás (Floresta Nacional de Carajás, Flonaca) in southeastern Pará. It is estimated that there are more than 4.24 billion tons of high grade iron ore in the subsoil, and the life of the mine is projected to be nearly 30 years. The complex uses an elaborate system of mobile and fixed conveyors to move ore to the 100kms of rail line recently constructed to link S11D to the Carajás Iron Railway (EFC) and then on to the Ponta da Madeira port in São Luis (Maranhão). To ensure sufficient power for S11D, some 10 km of electricity transmission lines were hung. More than half of the equipment and infrastructure for the project came from China, shipped in 64 vessels. The first shipment of iron ore from the Ponta da Madeira was made in January 2017 (27).¹⁴ By 2020, Vale expects to increase production volume by 55 percent over 2016 levels.

Mineração Rio do Norte (MRN)

Most of Brazil's world-class bauxite reserves are located across an extensive area of Pará and Maranhão (bauxite is used in the production of aluminum). Mineração Rio do Norte (MRN) is the largest producer of bauxite in Brazil and the third largest producer in the world. Located on the Trombetas River Basin in Northern Pará, MRN provides bauxite to various refineries including

¹² The name S11D reflects the number of the block within the concession.

¹³ The breakdown of the investment is as follows: \$6.4 billion for the mine and plant; \$7.9 billion for the construction of a 101-km railroad line and to expand the Carajás Railroad (EFC) and the Ponta da Madeira Maritime Terminal.

¹⁴ The mine will use dry processing technology which uses the iron ore's own natural moisture. This is estimated to reduce water usage by 93% and eliminate the need for tailings dams.

Alunorte (Pará) and Alumar (Maranhão) and exports to the United States, Canada, Europe, China and South America (28). Today MRN is jointly owned by eight of the world's largest mining companies. In Oriximiná, MRN operates an industrial park for drying bauxite, manages 23 dams for mineral tailings and fresh water storage, a 28-kilometer railroad, a port for shipping bauxite, and two thermoelectric power plants. MRN also runs a closed company city, Porto Trombetas, where 6,000 employees and their families live. The complex has its own hospital, school and airport (28).

National Copper and Associated Minerals Reserve (RENCA)

In 2017, the Ministry of Mines and Energy proposed to open up the National Copper and Associated Minerals Reserve (RENCA) to private investment for development as part of a plan to reinvigorate Brazil's mining sector. The announcement set off a national debate. The reserve, created in 1984, straddles the states of Amapá and Pará near the border with French Guiana, covers a total area of 46,000 km² and contains huge quantities of gold, tantalum, iron ore, nickel, and manganese. Niobium is also present and of particular interest to aerospace and naval industries. Statements from mining authorities suggested the vast quantities of gold within RENCA could produce another Carajás (29).¹⁵ Ministry maps reveal potential overlaps with Indigenous Territories, conservation areas and agrarian reform settlements, although officials maintained that no mining would be permitted within ITs and Conservation Units (30). The opening of RENCA could also propel further investments in hydroelectric projects (both online and proposed) impacting the Paru and Jarí rivers, reinforcing the synergies between industrial mining and the development of hydropower potential in the region. In response to the public outcry, the government reversed its decision, and RENCA is currently still a reserve. Given the significant gold reserves within RENCA, however, the region may become a new hotspot for ASGM.

Western and Northern Amazonian Countries

The eight countries whose territories cover the northern and western frontiers of Amazonia have each made commitments to, or are experiencing increased investment in, mining activity. While most industrial mining in the countries west of the Amazon takes place in highland environments, new frontiers of copper and gold mining may expand into rainforests and could affect forest cover and communities' rights. Below we note some larger scale investments emerging in some of these countries. (Smaller scale mining is discussed in the following section.)

Ecuador: The government continues to encourage private investment in mining, especially copper. Since 2016, it has accelerated the awarding of mining concessions resulting in some 14 percent of national territory either under or potentially under concession. In the Amazon region, 30 percent of the country's protected forests are potentially affected; 27 protected forests have overlaps with mining concessions that exceed 50 percent, and 15 of those have overlaps

¹⁵ The reclassification of RENCA was accompanied by a series of other measures to promote investment in the sector including lifting the prohibition on mining activity in border areas and the creation a national mining agency.

exceeding 90 percent. Large-scale projects have been developed in the south-east provinces of Morona Santiago and Zamora Chinchipe where there has been significant social mobilization and conflict between the Shuar, an Indigenous group living in the rainforest, and transnational mining companies. Many concessions and projects overlap with Indigenous Territories, protected areas, and other forested areas that hold significant biodiversity (31).

Venezuela: In 2016, the government of Venezuela created a special economic zone known as the Arco Minero del Orinoco (Orinoco Mining Arc) intended to attract private investment in gold, iron, bauxite, coltan and diamond mining (32). Comprising about 12 percent of the nation's territory and covering forested areas of the upper reaches of Amazonia, the Arc is under military control and constitutional rights are suspended. A Supreme Court ruling in 2016 reaffirmed the government's suspension of rights, citing the strategic importance of mining, and investment in general, for the country. No environmental impact assessment was conducted before creating the Arc, but the government claims to have Indigenous leaders' support for the project. While the Arc has already seen increased mining activity, it is possible that any process of political transition in Venezuela would see a further increase in extractive industry activity as a means of generating revenue for economic recovery. As in Northern Brazil, Venezuela holds important bauxite reserves and aluminum smelting operations with potential for growth. The construction of the Gurí hydroelectric complex on the Caroni River in 2008 supported the expansion of bauxite mining in the region.

Peru: Mining accounts for 17 percent of Peru's GDP and half of total exports (33). Over the last two decades, Peru has become a world-class producer of copper, silver, zinc and gold and many of the world's largest mining companies have operations there. The government is seen to be creating a favorable environment for private investment; although new investment has dropped significantly since its peak in 2013, projected investments are still very large.

In 2014, there were over 50,000 mining concessions, covering about 18 percent of national territory. This does not include illegal mining activity, which is a growing threat especially in Peru's rainforests. While most industrial mining activity is concentrated in the Sierra, there are some important projects in forested areas - such as the Afrodita mine in the Cordillera del Condor straddling the Peruvian/Ecuadorian border.¹⁶ The region is known for its biodiversity and the presence of multiple Indigenous groups and natural protected areas: the Cordillera del Condor National Park and the Communal Reserve Tunta Nain, as well as the Awajun Wampis Indigenous Territory.

Colombia: Like other Andes-Amazon countries, Colombia is committed to developing its mining sector as an engine of growth. While industrial mining activity is mostly concentrated in higher elevations, there are more than 1,500 concessions in the Colombian Amazonia. One of those concessions, extended by the Uribe government to Anglo American in 2007, involves a 25,000 hectare concession (Mocoa Ventures) to exploit zinc, silver, copper and gold in the rainforest of the Putumayo.

¹⁶ In September 2016, the regional government revoked the mine's permit to operate citing the company's failure to consult with Indigenous groups.

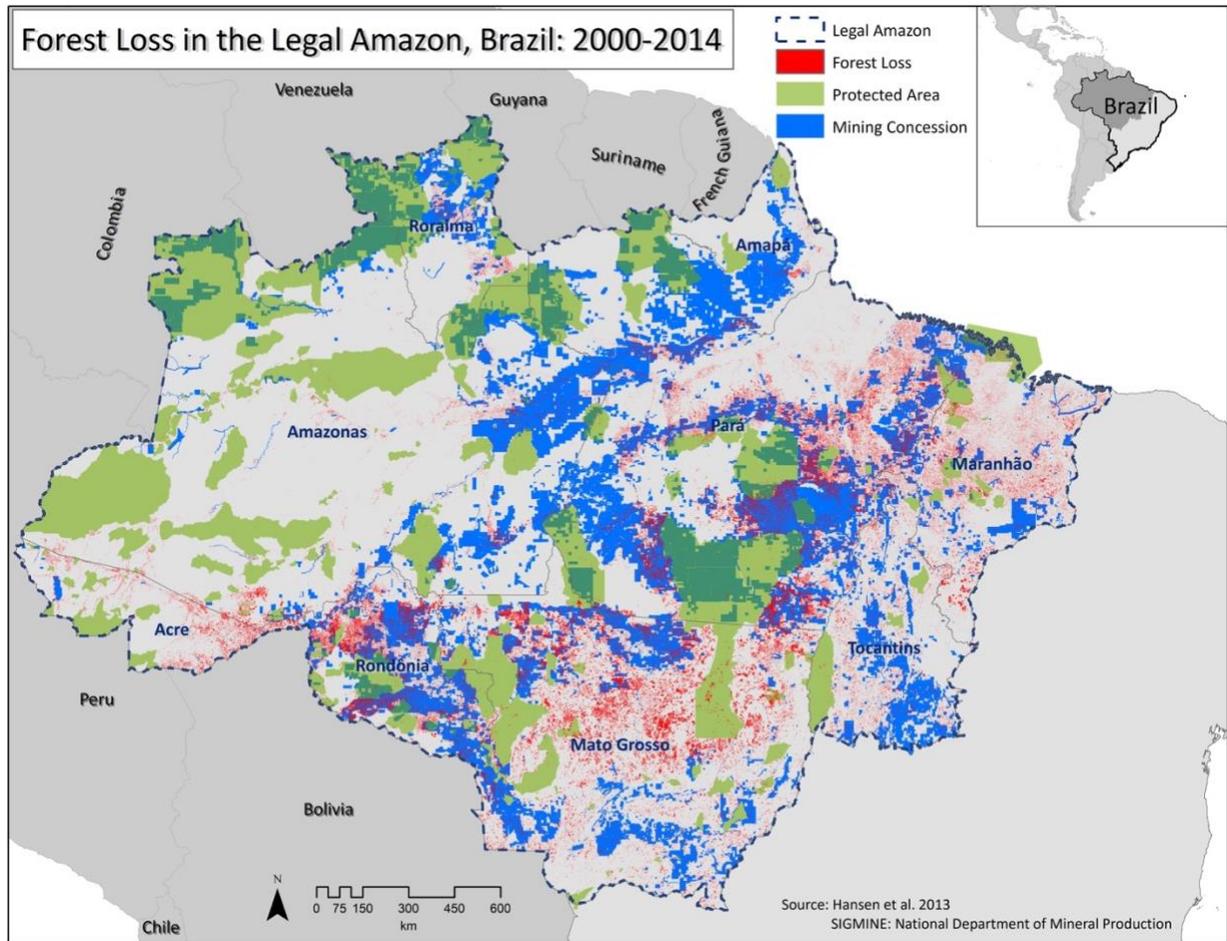


Figure 3. Mineral Concessions (including for Exploration and Exploitation), Protected Areas, and Forest Loss in Legal Amazon, Brazil.

Map produced by A. Khan and J. Rogan, Clark University

Artisanal and Small-scale Gold Mining (ASGM)

Much of the mining in the countries on the northern and western fringes of Amazonia, as well as in Brazil, is characterized by small-scale gold extraction,(34) both legal and illegal. The price of gold and limited livelihood opportunities elsewhere in the economy drive the expansion of small-scale gold mining and forest clearance across the Amazon basin. Beginning in 2000, the price of gold rose steadily to reach a peak of around \$1,800/oz. in 2012. Though prices have declined and stabilized around \$1,200/oz., they remain far above prices prior to 2010. Economic declines encourage more individuals to enter ASGM, reflecting the combination of weak labor markets and price incentives.

ASGM has been part of the livelihood strategies of rural households in the Amazon basin for hundreds of years. It is a labor-intensive and largely informal sector that frequently operates outside of legal frameworks and beyond government control. Conflicts between local populations and miners are frequent. Uncontrolled gold mining offers livelihoods but also

contributes to forest clearance and degradation, contaminates waterways, and degrades riverbeds and soils (35).

ASGM miners are highly mobile and move on to new boom areas, especially in border regions. Investments in roads that promote regional integration also facilitate the movement of miners across the Amazon. Researchers have concluded that the construction of the Southern Inter-Oceanic Highway, which connects Peru and Brazil, facilitated the mass movement of migrant miners into Madre de Dios (36, 37).

The GOMIAM project, a multi-disciplinary network of researchers based in South America and Europe, estimates there are more than 500,000 small-scale gold miners active in the Amazon basin (Table 2). Hundreds of thousands more people provide services to the sector or are dependent family members. Given the number of individuals directly and indirectly employed, small-scale gold mining should be understood as a driver of economic activity in the Amazon and a powerful political force (38).

Most gold mining in the Amazon basin is alluvial mining in river beds with some degree of mechanization and collective organization. In Bolivia, miners often form cooperatives to exploit mineral resources along river beds. In Brazil, federal and state laws regulate how such mining takes place, although in remote locations the absence of state authorities means that miners generally rely on customary or “miners’ law” to resolve disputes (38). Conflicts between local populations and miners are frequent. In Brazil, the culture of *garimpagem* (ASGM) is present in nearly every state of the Amazon, with Pará and Mato Grosso being the states with the largest presence of miners, and Roraima also having significant activity, specifically in the TI Yanomami. One developing hotspot of gold mining activity is the Guiana Shield – a region characterized by the largest block of intact rainforest, vast freshwater reserves and low population density. The Guiana Shield covers some 270 million hectares and stretches from southeastern Colombia, across Venezuela, northern Brazil and Guyana, Suriname and French Guiana.

Table 2. Estimated number of small-scale gold miners by country and areas impacted

Country	# of small-scale gold miners (1)	Amazon areas impacted (4)
Brazil	200,000	States of Acre, Pará (Tapajós River) Rondônia (Madeira River) & Roraima
Bolivia	100,000 (2)	Departments of Beni, Pando, (Norte) La Paz, (Norte) Santa Cruz
Colombia	182,000 (3)	Border area with Venezuela & Brazil
Ecuador	90,000	Province of Zamora-Chinchiipe
Peru	60,000	Departments of Madre de Dios, Amazonas, Huánuco
Venezuela	n.a.	States of Amazonas and Bolívar

Sources: GOMIAM Project, CEDLA-Bolivia, UNEP-Ecuador, SPDA

- (1) Figures include gold mining outside of Amazon basin
- (2) Estimated number of all cooperative miners which includes small-scale gold miners
- (3) Includes small-scale and large-scale miners
- (4) Data from Sociedad Peruana de Derecho Ambiental (39)

In Brazil, the Tapajós River has long been an epicenter of gold mining. There are estimated to be some 50,000 gold miners working over 300 mining areas (40). In 2005, the federal government imposed strict controls on land use adjacent to Highway BR163 assigning protected status to some adjacent areas. Notwithstanding this approach, environmental damage from illegal mining persists with significant impacts on forests and the aquatic system.

Hydrocarbons Extraction

Exploration and exploitation of oil and natural gas is largely concentrated in Western Amazonia with some development of reserves in Brazilian Amazonia. Large areas of Amazon territory in Bolivia, Ecuador and Peru are classified as areas of interest and/or subject to concession. Recently, major discoveries of offshore oil and gas reserves in Guyana made international headlines (41).

Western Amazonia

Exploration and development of hydrocarbon fields in the Western Amazon boomed in the past two decades as investors responded to strong demand, high prices, and the liberalization of the hydrocarbon sectors in Bolivia, Peru, and Colombia. Between 2004 and 2009, Peru experienced a surge of investment when the total area of the Amazon region under concession for hydrocarbon exploration jumped from less than 13 percent to over 72 percent. Technological innovations in identifying, extracting and transporting oil and gas enabled previously unviable projects to go forward. Two emblematic projects are in Camisea (southern Peru) and Yasuní (Ecuador), both considered projects of strategic national interest. In both cases, significant oil and gas reserves were found in remote forests overlapping with Indigenous Territories and highly biodiverse areas. In Camisea, companies agreed to use offshore (platform) operations to avoid building roads and to reduce social and environmental impacts, and the Inter-American Development Bank, an important funder, set relatively demanding standards for operations (42). In Yasuní, however, despite early commitments to do otherwise, access roads were built to conduct exploratory activity and the companies providing financing have not demanded similar standards as in Camisea. Laurance notes that access infrastructure “can open up a Pandora’s box of unplanned environmental maladies” in which loggers, gold miners, poachers and traffickers follow new roads into the forest (43).

According to Finer (44) as of 2015, the total area of potential hydrocarbon activities in the Western Amazon was 733,414 km². However, there are significant physical and economic barriers to overcome in converting remote hydrocarbon reserves into a commercially viable commodity. Of the areas analyzed, as of 2015, only 7.1 percent was under extraction; 52.1 percent was in the exploration phase and 40.8 percent was in the promotion phase. Exploratory

and extraction activities can involve forest clearance, depending upon the technologies used to conduct seismic testing and exploratory drilling and later extraction. Likewise, forest clearance can be avoided if companies use best practice technologies. The promotion phase refers to those blocks not yet leased or contracted, meaning that no drilling has occurred.

Figure 4 shows active areas of hydrocarbon production in the Western Amazon. Another area of hydrocarbon production, which is not included in the map, stretches from the border with Peru across to the Department of Santa Cruz in Bolivia.

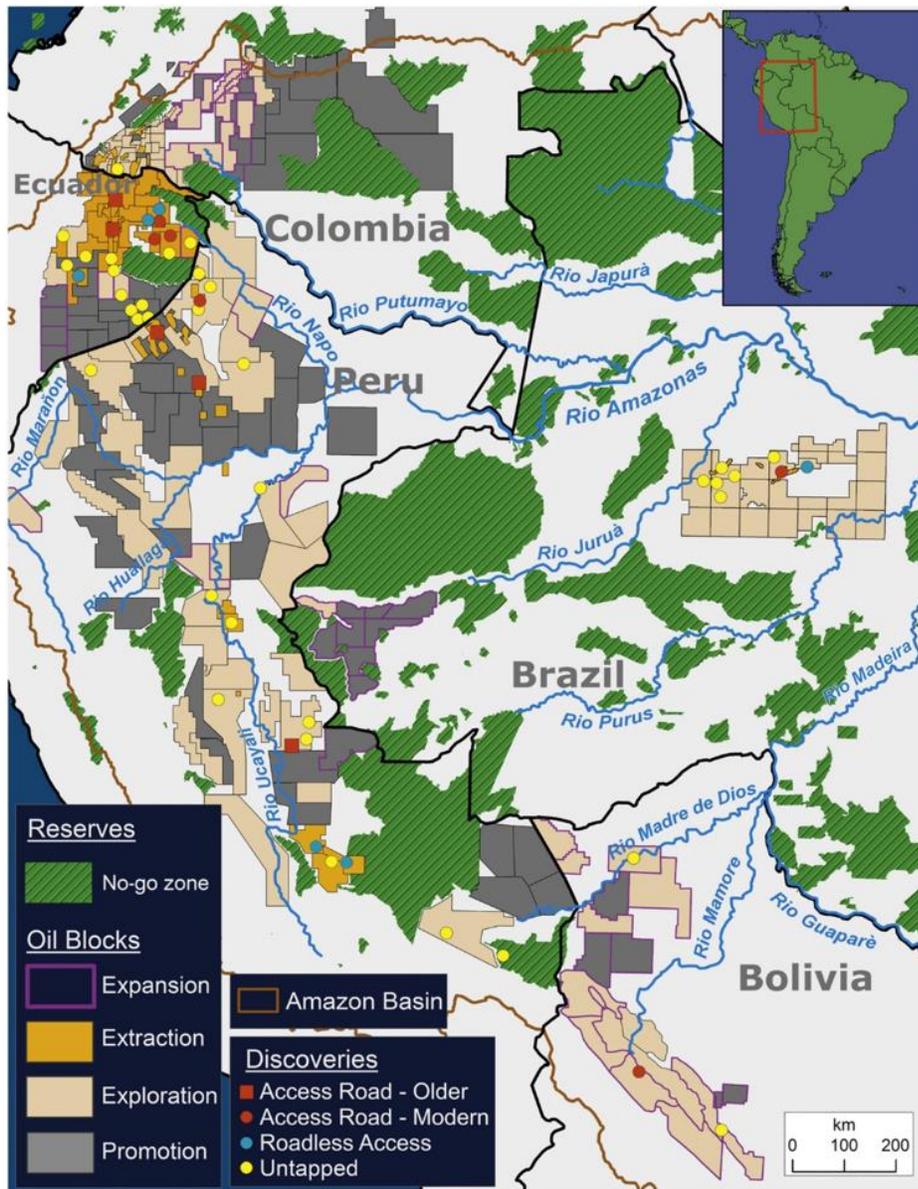


Figure 4. Hydrocarbon exploration and extraction in the Western Amazon Basin

Source: *Finer et al. (44)*

Although in the past national parks and the territories of Indigenous peoples in voluntary isolation have been considered no-go zones and off limits to drilling, both Ecuador and Bolivia have changed their laws to allow drilling in national parks. Ecuador began drilling for oil in Yasuní national park after a proposal to pay the government compensation in exchange for keeping the oil in the subsoil failed. In January 2018, Petroamazonas, Ecuador's state oil company, announced it would begin a second phase of exploratory drilling in the park, which is also the territory of the Waorani, an Indigenous group.⁽⁴⁵⁾ In Bolivia, which is highly dependent on gas revenues to fund a range of social programs, the government has encouraged exploratory drilling in the northern Amazon to open new regions for hydrocarbon production. In both instances, there is potential to develop roadless access and to use extended drilling technologies to reduce negative impacts. Peruvian law allows for extractive projects in the territories of Indigenous peoples living in voluntary isolation, except in the Lower Urubamba Valley.¹⁷

Despite government assurances of environmentally and socially sound extraction, local populations and transnational networks insist that these are not areas that can support extractive activities. In Peru, Canadian Pacific Exploration and Production abandoned plans to develop a concession (Lot 135) in an extremely remote region that overlaps with Matsés Territory, a proposed reserve for an Indigenous population living in voluntary isolation, and the recently created Sierra del Divisor National Park (46). The company has reorganized and changed its name to Frontera Energy, concentrating operations in Colombia and Peru. This reflects a common trend in the industry – of frequent acquisitions, mergers, reorganizations and name changes – which makes following the development of oil and gas fields a complex endeavor.

Brazilian Amazonia

Brazil is now the largest producer of oil in South America (2016) and holds the second highest proven natural gas reserves after Venezuela. It produces approximately 3.24 million barrels per day of oil and other liquids and 101 million m³/day of natural gas. More than 91 percent of Brazil's oil production and 85 percent of its natural gas reserves are located offshore (47, 48). Fossil fuels (oil, natural gas and other liquids) represented 58 percent of Brazil's domestic energy consumption in 2016. Renewable energy sources, including hydropower and biomass, accounted for slightly less than 37 percent of Brazil's energy consumption (47).

Brazil's oil and gas sector will dominate the country's energy policy as the country seeks greater energy security and the Pre-salt operations come online (Figure 5 summarizes the current geography of hydrocarbon concessions and infrastructure in Brazil).

¹⁷ In Peru, Law (Ley) 28736 created protective status for Indigenous peoples living in voluntary isolation but also permits economic activities such as mining, oil and gas drilling to be carried out in Indigenous reserves (reservas indígenas) where these groups live (art. 5, lit. c).

Araracanga (2006) gas fields. These fields were included in a list of priority projects in Petrobras' strategic plan for 2012. There are indications of important reserves in this area, including an estimated 245 trillion cubic feet and 5.4 billion barrels of technically recoverable shale oil and gas resources. There is no recent discussion of developing these fields, but any initiatives to expand pipeline capacity linked to these fields could be an indicator of a change in policy.

Areas of recent interest include the Foz de Amazonas Basin located off the coast of Amapá, containing both oil and gas reserves of up to 14 billion barrels, and a recently discovered and extensive belt of coral reefs (52). In 2017 Greenpeace Brazil launched an advocacy campaign calling for protection of the reef and also of the world's largest belt of mangroves and thousands of square miles of virgin rainforest.(53) Total, SA (France), operator of one of the concessions, is seeking to move forward with exploratory drilling.¹⁹ In April 2018, the Public Prosecutor's Office in the State of Amapá recommended that the Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA) deny the environmental license to support drilling activities.

The speed of new investment in hydrocarbons in Brazil has been slowed down by the *Lava Jato* corruption scandal (see Impacts on Corruption in Section D), which involved top Petrobras officials and implicated government authorities at the highest levels. Following the break of the scandal, Brazil's investment in oil and gas production dropped from \$335 billion (2014) to \$155 billion (2017). In this uncertain context, Petrobras' 2015 five-year Business and Management Plan reflects the downward revision of its total production target of oil and natural gas (including international production) to 3.7 million barrels of oil equivalent per day by 2020. With debt pressures growing and an order to pay out \$2.95 billion in legal settlements in the U.S., Petrobras plans to divest \$21 billion in assets in 2017-2018 (47, 54).

Despite Petrobras' prolonged crisis, Brazil expects to attract more than \$80 billion in direct investment and will need 300 offshore wells to access 10 billion recoverable volumes of oil and natural gas. Ten upcoming proposed auctions (2017-2019) seek to build a diversified portfolio of private investors in the wake of a considerable sell-off of Petrobras' assets (48). Much of this increased production will come from the offshore Pre-salt fields.

Large Scale Infrastructure Development

Hydropower

Brazil's installed capacity to generate electricity continues to be dominated by hydropower, followed by fossil fuels (oil and natural gas), non-hydro renewables (i.e. biomass, wind and solar) and nuclear. Brazil has a long history of investing in and subsidizing large-scale hydropower projects and is the world's largest hydropower producer after China. Most

¹⁹ In the basin there are a total of 14 blocks covering 9,392km² with seven companies (Petrobras, Total, Brasoil, BHP Billiton, Ecopetrol, BP Energy, Queiroz Galvao) and a total of nine concessions.

hydroelectric potential is within the Amazon basin, while Brazil's urban and industrial centers are largely along the eastern coast, and highly clustered in the southeast. This requires significant investments in transmission lines and distribution systems. Dependence on hydropower, the impacts of climate change, and the challenges of connecting the source of energy generation to distant markets are key issues in the sector's future.

Brazil has pursued an aggressive program of energy expansion based on the construction of dams and hydroelectric plants. Reviewing the government's Energy Expansion Plan 2023 (PDE, 2023), we verified a list of 23 hydroelectric plants (UHCs) to be built or expanded along several rivers and tributaries in the Legal Amazon. In at least 17 cases, Indigenous populations and their territories would be affected, directly or indirectly (see Section D).

In early January 2018, the federal government signaled it was rethinking longstanding policies in support of construction of hydroelectric plants in the Amazon, including the highly contentious São Luiz do Tapajós project in the State of Pará (55). The ~8 thousand megawatts (MW) project was put on hold after the environmental licensing process was suspended in April 2016 by IBAMA. However recent media reports suggest that the government may only be delaying projects – as the Consórcio Tapajós, involved in developing the energy distribution services linked to the hydroelectric project, received an extension to 2019 to present the required technical and economic feasibility studies (56).

Expansion of dam-building and hydropower construction projects in the Andes-Amazon countries are shown in Figure 6. The bulk of the dam/energy complexes proposed for Ecuador, Peru and Bolivia are designed to generate power for Brazil.²⁰

²⁰ Andean governments can generate important revenue flows from such investments. In 2007, one author participated in a meeting between civil society representatives and Bolivia's (then) Minister of Economy to discuss the proposed Madeira dam-building investments. The Minister agreed with the group's concern about the potential negative impacts of Brazilian dam-building on Bolivian ecosystems. He then reported that Bolivia had just successfully re-negotiated with Brazilian officials the relocation of two hydropower projects inside Bolivian territory so that Bolivia could reap greater benefits by selling energy to Brazil.

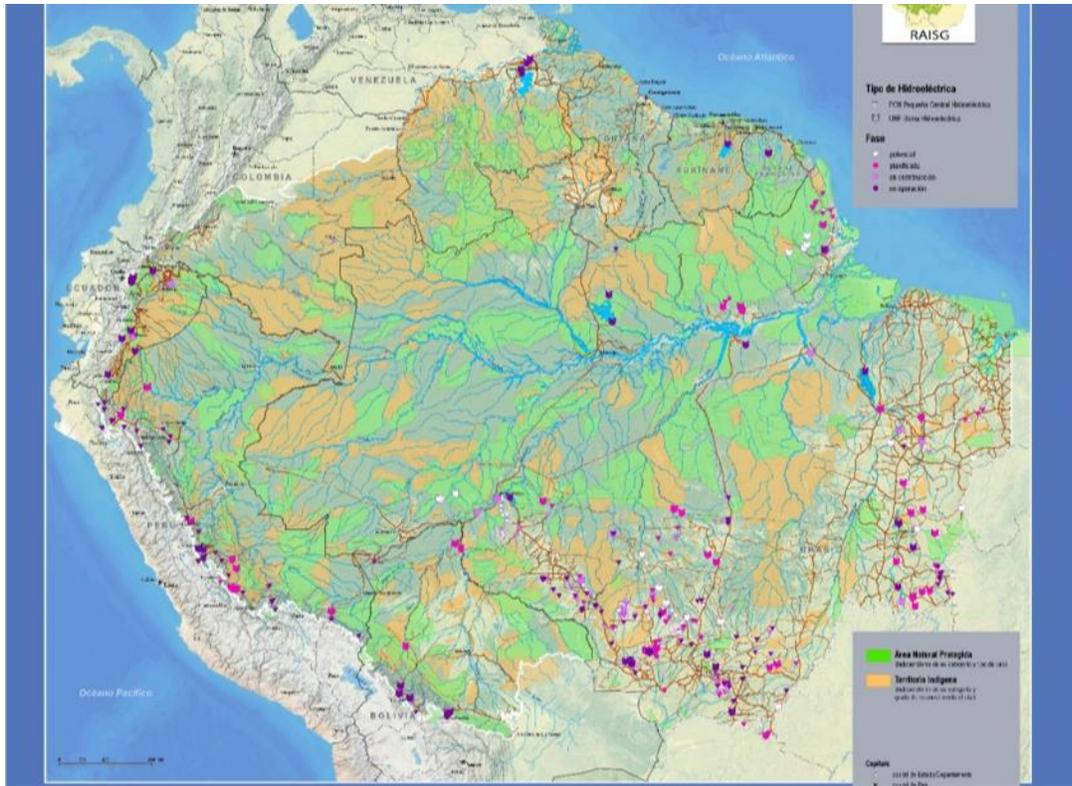


Figure 6. Proposed, Planned and Existing Hydropower Projects

Source: RAISG 2015 (20).

To summarize, the key areas (sub-basins) of concern for dam construction and hydropower energy development include:

- The Ucayali (Peru) – 47 dams²¹
- The Marañon River Basin (Peru) – 104 dams, the Marañon is considered to be critically threatened
- The Napo River (Ecuador & Peru) – 21 dams
- The Tapajós River Basin (Brazil)
- The Xingu River Basin (Brazil)
- The Madeira River Basin (Brazil & Bolivia) – considered to be the most threatened river in the Amazon basin(1)

²¹ While these are considered priority projects for dam, hydropower and in some cases waterway development, it is important to note that in the wake of the Lavo Jato scandal (see Section D), a number of these investments are stalled and it is unclear if they will go forward. In the Western Amazon, the Marañon river basin is most likely to experience hydroelectric development over the next five years.

Access Infrastructure

Along with dams/hydroelectric power plants, highways and waterways constitute the priority infrastructure projects in the Amazon. They form part of multi-modal transport systems that also include railways and entrepôt facilities designed to move large quantities of commodities over great distances to ports for export. Mineral, grain and beef exports to Asia drive infrastructure investment.

Waterways

In Brazil, a series of existing and proposed waterways are linked to the country's Grain Producing Region (Área de Produção de Grãos). Five of these are of critical importance to multi-modal systems for bulk transport of the Amazon's principle agricultural and mineral commodities and are proposed for expansion and/or upgrading (see Table 3).

Under the Rousseff Administration, the Ministry of Transport developed the Strategic Waterway Plan (Plano Hidroviário Estratégico, PHE) of 2012. This was followed in February 2013 with the National Plan for Waterway Integration (Plano Nacional de Integração Hidroviária, PNIH), prepared by the National Agency for Waterway Transportation (Agência Nacional de Transportes Aquaviários, ANTAQ). The 2013 integration plan called for a detailed study of Brazilian waterways and the strategic siting of port facilities (57).

The improvement of bulk transport systems is a major concern of agribusiness, in particular soy producers who are most interested in developing infrastructure within the Northern Arc (Arco Norte) and using Brazilian ports to export production (58). According to Carlos Alberto Nunes Batista, General Coordinator of the Department of Infrastructure, Logistics and Geographic Information Systems for Agriculture, in the Ministry of Agriculture, Livestock and Supply (MAPA), of the five waterways mentioned in Table 3, the last route (Paraná-Paraguay) is of least interest to Amazon-based agribusinesses as a transport corridor for corn and soy. He also stated that the agribusiness sector would seek private funding to complete the needed infrastructure through the expansion of private-public partnerships (Progama de Parcerias no Investimento, PPI).²²

²² Interview with Carlos Alberto Nunes, Secretary of the Agribusiness Infrastructure and Logistics Chamber (Câmara Temática de Infraestrutura e Logística do Agronegócio) conducted on 12/05/2016, in the Ministry of Agriculture (MAPA).

Table 3. Waterways and the Transport of Mineral and Agricultural Commodities in the Legal Amazon

Waterway	Main Products Transported	Comments
Tocantins-Araguaia	Bauxite, Aluminum and trunk semi-trailer	The waterway has a navigable stretch of 2,250 km, spanning the states of Goiás, Mato Grosso, Tocantins, Maranhão and Pará. Along the route, there are two reservoirs and three dams. Waterway use is restricted to six months of the year due to impediments like sandbars. The waterway connects to the Solimões-Amazonas waterway and thus handles a large volume of cargo. In the PPA 2016-2019, R\$800 million is budgeted to improve and expand navigation on the Tocantins-Araguaia Waterway.
Complexo Solimões-Amazonas	Soy, Bauxite and Iron Ore	Considered the largest hydrographic network in the world, the Complex is the main transportation route across the Amazon Basin - 16,797 km long. Bauxite is transported along the Solimões-Amazonas corridor from Oriximiná/PA and Juruti/PA for export. In 2013, the waterway carried 47.8 billion TKM ²³ (tonne kilometer util), representing more than 74% of Brazilian Waterway TKM.
Madeira	Soy and Corn	The Madeira waterway is the second most important Brazilian waterway in terms of TKM. There are no hydraulic works and there are few restrictions in the dry season. Despite favorable natural conditions for navigation, the waterway requires investment in signaling and dredging to support bulk transport of grains, fuels and other products. Much of the soy produced in the center-west region is loaded in Porto Velho/RO then heads down the Madeira River to Itacoatiara/AM or Santarém/PA and out for export.
Tapajós – Teles Pires	Soy and Corn	A bulk cargo transport route for grains from the central region, the navigation potential could reach 1,043 km. Waterway transport between Santarém/PA and Cachoeira Rasteira/MT depends on the construction of hydroelectric plants with locks systems which would allow navigation along extensive segments of both rivers. Between Itaituba/PA and Cachoeira Rasteira/MT, further measures are needed such as: dredging and straightening of the waterway in addition to signaling. Environmental issues along with the significant presence of traditional and Indigenous groups in riverside settlements raise concerns as to the future viability of the waterway.
Paraguai/Paraná	Iron Ore and Manganese	This waterway is not within the Legal Amazon. Minerals are loaded in Corumbá/MS and Ladário/MS and transported to Argentine ports for export. This waterway is the less preferred option.

Sources: ANTAQ, 2013 & 2014, R. Verdum.

²³ TKM (tonne-kilometre) indicates the number of tonnes (1,000kg) transported over one kilometre.

The latest annual report of the Third Program for Accelerated Growth (PAC 3, 2015-2018: See Section C for more on PAC) indicates that 30 waterway terminals in the Northern Region are planned for the next three years, of which 17 are under construction and 3 have been completed. In addition, in 2017 a contract was signed to open a navigable canal in Pedral do Lourenço located on the Tocantins Waterway near the massive Tucuruí Dam and Marabá (PA) (59). The project, prioritized by the Rousseff government, will improve the transport of grains, beef and minerals from Pará, Maranhão, Tocantins, Goiás and Mato Grosso (60).

Roadbuilding

Proponents of new highway construction and road upgrades in the Amazon argue that increased connectivity (via multi-modal transport corridors) will allow producers to reduce transport time and costs, improve competitiveness and increase exports to China. There is a high degree of complementarity between Brazil's three principal exports and what China buys from Brazil (see Table 4). Chinese demand for soy, iron ore and beef, which is expected to stay strong over the next 2-3 decades, has driven and will continue to drive Brazil's agribusiness and mining sectors' demands for comprehensive investment in transport corridors.

Table 4. Brazil: Principal Exports, 2014

Commodities	Total value – \$ billions
Soy complex	30.8
Iron Ore	23.8
Meat	15.9
Sucro-alcohol complex	9.4
Forest products	9.0

Sources: *Agrostat/MAPA and AliceWeb/MDIC*

The network of roads in the Legal Amazon grew by 10,000 miles per year between 2004 and 2007 (61), and current plans include a range of highway and rail projects both within the Legal Amazon and as part of larger, multi-modal and integrated transport corridors linking countries (see Appendix 1 for several such projects). Some of these projects are linked to COSIPLAN. All of these projects would expand bulk transport systems creating the infrastructure to support the expansion of the soy frontier and mineral extraction in the Amazon.

Plans to upgrade and pave a group of highways (see Figure 7 below and Appendix 1 for more detailed information) could open up areas of less deforestation to human settlement and land clearing. This includes BR-163, which connects the farms of Mato Grosso with grain storage facilities and terminals on the Amazon River. The paving of BR-364 between Rio Branco and Cruzeiro do Sul, in the State of Acre, BR-319 from Manaus to Humaitá, in the State of Amazonas, and BR-174 from Manaus to Boa Vista could lead to new hotspots of deforestation (11). Improvements to these roads would most certainly spur an expansion of secondary road networks that contribute to the fragmentation of remaining forests.

The construction and consolidation of multi-modal systems of transport (road, rail, waterway) to ports on the Pacific Coast will largely depend on the successful joining up of Brazilian investments with existing and proposed transportation works in Bolivia, Peru, Ecuador and Colombia (62). In previous years, these investments were promoted by Brazil, with potential funding from Brazil. In the wake of the Lava Jato scandal, Brazil has emphasized its own domestic infrastructure development in the Northern Arc (Arco Norte) focusing on moving grains to northern ports for export (see Figure 7) (63).

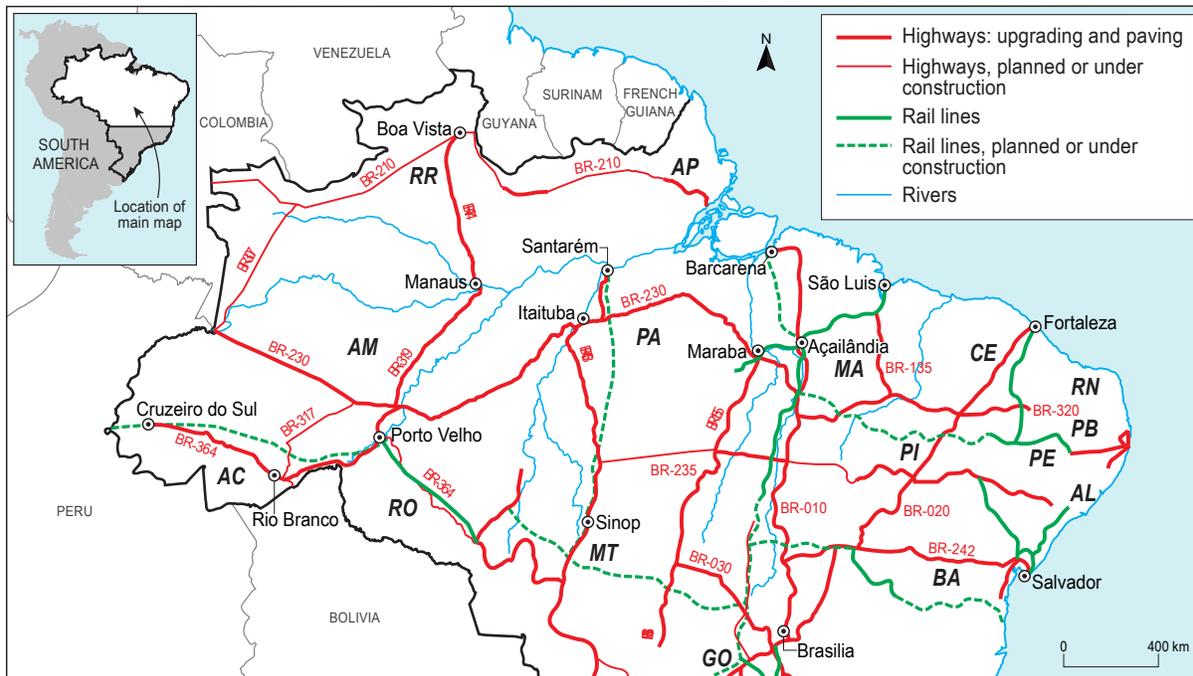


Figure 7. Existing and Planned Infrastructure Expansion in the Brazilian Amazon.

Map produced by: Chandra Jayasuriya.

In early 2018, financial news reports have begun to suggest that after three years of turmoil, Brazil's capital markets are rebounding and the country is on the verge of another growth spurt (64). President Temer is seen as addressing perceived bottlenecks to investment (i.e. labor regulations, foreign ownership of assets, and restrictive regulation). His government is also seen to be creating mechanisms (such as state-private partnerships, PPP, and concessions to private operators) to encourage and support private sector infrastructure development. In both Brazil and the countries of the Western and Northern Amazon, alternative financing arrangements and joint ventures are being pursued, including increasing Chinese participation in key infrastructure projects. Chinese investors have expressed interest in investing directly in ailing Brazilian construction firms (65).

Table 5. Upcoming infrastructure projects with potential significant social and environmental impacts across Amazonia

Country	Project	Status	Amount of Investment
Bolivia	Central Interoceanic Train	(COSIPLAN) The project will link the port of Santos in Brazil with Ilo in Peru via a rail line across the center of the continent. This will improve bulk transport capacities to support the export of commodities (soy and minerals) across the Pacific to Asian markets. Feasibility studies in Bolivia are underway. Bolivia has signed MOUs with Peru, Paraguay and Uruguay, and is conducting negotiations to sign an MOU with Brazil. China and European firms (France, Germany) have expressed interest in financing and/or executing the project.	\$10 billion
Bolivia	Hydroelectric Project “El Bala”	(Public financing) The investment involves the construction of two hydroelectric plants, Chepete and Bala on the Beni River (3676 MW). The dams will flood a large area generating significant social and environmental impacts to the Madidi National Park and lead to the displacement of dozens of communities.	\$6 billion
Colombia	Rio Magdalena Waterway	(Public-Private Partnership) The project seeks to recover navigability along the Magdalena River. This is the first PPP in Colombia and was originally awarded to Odebrecht. The concession was later revoked after the company was accused of corruption. The project has lost its financial backer and is currently suspended.	\$850 million
Colombia	Hidroituango Project	(Public financing) Hidroituango is considered the largest hydroelectric project in the country (2400 MW). Construction began in 2010 and is expected to go online in 2018. The project is financed with an IDB loan and is controversial because it will inundate some 4,500 hectares of Dry Tropical Forest in addition to displacing rural families in the region which contravenes IDB safeguards. Furthermore, the Brazilian construction firm, Camargo Correa, is under investigation by authorities for possible acts of corruption linked to the Lava Jato scandal.	\$550 million (IDB loan)
Ecuador	Andes Petroleum	(Concession) The Ecuadorian government has signed contracts for Blocks 79 and 83, with the Chinese consortium Andes Petroleum. The project has stirred controversy because one of the blocks is located within “intangible zone” of the Yasuní National Park. Indigenous communities impacted by the project have alleged that the FPIC process was deficient and did not include all the communities to be impacted by the project.	\$72 million (initial investment)

Country	Project	Status	Amount of Investment
Peru	Sur Peruano Gas Line	(Public Private Partnership) The project will connect the Camisea gas fields with Southern Peru (an important mining area). Currently about 60% of the project is completed but work has stopped. The Peruvian government cancelled the concession, awarded to Odebrecht, in light of admitted corruption. A new public bidding round is pending. The project will be organized as a PPP with the Peruvian government co-financing the project.	\$1.5 billion to date
Peru	Transmission Line Moyobamba - Iquitos	(Concession) The project will link the city of Iquitos with the National Interconnected Electrical System. The line will be approximately 600km long with a capacity of 145 MVA. The transmission line will cross ecologically sensitive areas, including floodable forests, and the remains of an immense lake dating back 10 million years. To lay the line, a trench of approximately 50 meters in width will be required. The risk is that thousands of families, looking for land, gold, valuable wood, will enter the forest following the transmission line.	\$499 million
Peru	Hidrovia Amazonica	(Concession) The Amazon Corridor includes the “Hidrovia Amazonica” project which includes dredging, removing sediments and managing the aquatic channel of three rivers (Marañon, Ucayali and Huallaga rivers) by SynoHydro, a Chinese company.	\$96 billion
Venezuela	Arco Minero del Orinoco	(New Policy) In 2016, the government of Venezuela decreed the creation of the Arco Minero del Orinoco and awarded up to 150 mineral concessions (Bolívar State) to different companies. Located in the southern part of the country, it is an area of significant biodiversity. There is already a population of some 50,000 artisanal and/or illegal miners in the area. An estimated 200 million tons of bauxite reserves along with 44,000 tons of gold and diamonds are in the region. To date, the Venezuelan government has signed contracts with firms totaling \$4.5 billion.	\$4.5 billion

Source: C. Gamboa DAR (2017)

Grain Trains and other rail lines

Though subsidiary to waterways and roads, railways are a further component of the multimodal transport networks being rolled out across and beyond the Amazon. Improved railways allow for Brazil to increase its bulk transport capacity and reduce transport costs for producers. Some of these projects are enormous and ambitious. Again, the connection with the expansion of the agricultural and mineral extraction frontiers is clear. Companies in both sectors are important investors in the development of the rail network. (66)

Priority rail projects include the Ferrogrão which would link SINOP, a key soy growing region in Mato Grosso with the port of Miritituba on the Tapajós waterway (67); and two stretches of the Ferrovia Norte Sur (FNS) which would stretch across ten states, intersect with east-west rail lines, and expand transport options while lowering costs for grain producers (67). Another potential new rail line is the Bi-Oceanico Central railway (Tren Bioceanico), connecting the Atlantic port of Santos in Brazil with a Peruvian port on the Pacific Coast, to facilitate the transport of bulk cargo. Two routes have been proposed with one corridor taking a more northerly route across Brazil and Peru and the second taking a more direct route via Bolivia. The project has been prioritized by COSIPLAN. Both routes could contribute to deforestation as they would directly impact protected areas and indigenous territories.

C. Key drivers of EII

Diverse forces foster and induce increased investment in resource extraction and infrastructure across Amazonia. These forces are transnational, national and sub-national in character, and in many instances particular policies or reforms are driven by factors at each of these levels. Given this, rather than identify drivers by scale, we organize this discussion in terms of commodity market drivers, policy drivers, financial drivers and sub-national drivers.

Commodity market drivers

Global demand for and prices of commodities clearly influence levels of investment in resource extraction and in infrastructure that supports agroindustry and mining. The increasing integration of the Brazilian Amazon, in particular, into global markets has been key in driving increased large-scale investment in soybean and other agro-livestock products and supporting transport infrastructure. Investment in iron ore mining is similarly oriented towards export markets, and moves in relation to global prices. Increased gold prices (coupled with poverty) help explain increased artisanal and small-scale gold mining activity as well as investors' speculative interest in securing mineral licenses. While commodity prices slumped following the global recession, there are indications that prices are rising, and prices are still at historically high levels for most minerals in comparison, for instance, with prices in the early 2000s. Just as one example of relevance to Brazil, iron prices moved from \$48.57 per ton in 2016 to \$85.63 per ton in 2017.

In these commodity markets, Chinese economic growth, industrialization, urbanization and increases in consumer demand are a key factor. China accounts for 72 percent of global demand for iron, 52 percent for nickel and 48 percent for copper (68). The Amazon basin, in particular in Brazil, has become increasingly integrated into Chinese markets since the early 2000s. Fearnside and Figueiredo (2016) associate increased trade with forest loss in the state of Mato Grosso, concluding that “increases in Brazil’s exports to China are significantly, positively associated with increasing deforestation rates” (69). This is primarily because of Chinese consumption of Brazilian soy, beef, iron ore and timber, as well as Chinese investment in the railway linking the State of Mato Grosso to northern ports for the export of soy to China (70). Mato Grosso is one of the primary targets of Chinese investment in Brazil.

Although investment is clearly driven by rising prices, evidence suggests that falling prices can also lead to the creation of improved conditions for investors. Research by NRG Latin America has drawn attention to how, in economies that are particularly dependent on revenue from extractive industry, falling prices have driven aggressive policy reforms designed to promote investment (see discussion of policy drivers below) (71). In these instances, governments seek to increase production volume as a means of offsetting the effects of price decline.

While the commodity markets that drive investment are mostly international in character, this is not always so. For instance, investment in oil palm cultivation in the Peruvian Amazon has, to date, been driven primarily by growing domestic demand.

Although markets create demand for commodity production and resource extraction, of much more importance in determining patterns of investment are national policies. These policies facilitate or obstruct decisions to invest. Some time ago, Bridge (72) showed that global patterns of mining investment depended much more on policy environments than on the quality of mineral deposits (a position also reflected in the Fraser Institute’s ranking of mineral policy contexts) (73).

Policy drivers

Governments throughout the Amazon basin have pursued growth policies that emphasize resource extraction and infrastructure. More recently, many are pursuing active legal and procedural reform in support of greater deregulation in order to continue to attract private investment in extractive industries and infrastructure development. Arguing that their economies must maintain competitiveness and sustain revenue flows, in some instances in the face of recession (e.g. Brazil), environmental and social commitments assumed during the boom period are now seen as overly bureaucratic, burdensome and obstructive to national development goals and plans. These regulatory reforms rarely involve sub-national authorities and local populations and thus contribute to a further centralization of decision-making around large-scale resource extraction and infrastructure.

Across the Amazon, the roll back of social and environmental protections directly affects the rights and livelihoods of Indigenous and traditional peoples and of forest-based communities. In the current context, international investment and growth indicators are privileged over more

sustainable, local, small-scale forms of production. Increasingly governments invoke national, strategic and public interest as reasons to weaken environmental licensing requirements, to limit consultation processes, reduce compensation to affected populations, and fast track investments. In Brazil, the government has used national security arguments to work around social and environmental protections. Elsewhere governments invoke strategic national interest, raising questions of whose interests are being served. The assault on social and environmental safeguards comes with a growing authoritarian discourse - sometimes nationalist - in support of extraction. The failure of governments to articulate a post-extractive future further drives the perception of a threatened future for the Amazon basin and what analysts describe as a “race to the bottom” (74).

Policy reforms are outcomes of political bargaining among groups able to exert sufficient power that elites have to take their concerns into consideration. In some instances (as revealed most starkly by the Lava Jato scandal), these bargains can involve corruption either through direct payments or payments in support of political campaigns. In other cases, they reflect the ability of economic and political elite interests to place key allies in high-level positions within government (as revealed by tracing the professional histories of many senior appointees in Ministries of Mining, for instance). More generally, they reflect trades among different interest groups within Congress that in turn reflect the overall balance of power.

Plans, policies and efforts to foster investment and reform legal frameworks in Brazil and the Andes-Amazon countries are discussed below. While political dynamics and policy debates are distinct in each country, there are certain common trends that suggest governments and political and economic elites are doubling down to expand extractive industry and infrastructure in which the Amazon basin is seen as the new extractive frontier.

Growth Policies and National Development Plans

Countries in the basin have prioritized resource extraction in their national development plans. Colombia’s 2010-2014 development plan identified mining investment as the principal “locomotive” for development. Peru and Bolivia often refer to themselves as mining countries, while oil is key for Venezuela and Ecuador. Over the last decade each country has also emphasized mining, in particular in western and northern Amazonia, as a complementary part of their national development strategies.

These growth policies are closely tied to fiscal policy designed to generate revenue for social investment. Governments in Bolivia, Brazil and Ecuador, for instance, have been explicit about this link, including in public information campaigns. This social spending of resource-based revenue creates broad constituencies that defend the continuation of these programs, to some degree pitting an environmental and Indigenous rights agenda against an urban social agenda. This further complicates efforts to curtail investment in resource extraction.

Reforms Promoting Mining Investment

Special interest groups and governments across the region have sought to introduce reforms to support the expansion of mining, usually via reforms to national mining codes.²⁸ These reforms are usually centered on ensuring the legal security of investors, expediting the permit process, reducing royalty and tax rates, reducing state oversight and promoting more self-regulation by companies themselves. Peru's regulatory framework is seen as most favorable while Bolivia's code is seen as least attractive to international investors. Ecuador and Venezuela have moved to open up their mining sectors to foreign investment by attracting companies willing to assume greater risk. In Colombia, after rapidly opening the sector to foreign investment in the previous decade, new mining investment has been slowed down by issues of social conflict, environmental licensing, prior consultation, and decisions of the Constitutional Court.

In Brazil, sustained efforts to reform the Mining Code are gaining traction. In 2011, the government produced a National Mining Plan 2030 (Plan Nacional de Mineração 2030, PNM-2030). Two years later a proposed bill (Projeto de Lei nº 5.807/2013) attempted to position the mining sector for increased foreign investment by revising royalty rates, expanding the distribution of royalties to include communities impacted by mining, and by creating an independent mining agency and a new regulatory body (75). In June 2018, the Ministry of Mining and Energy (MME) expanded the definition of municipalities affected by mining to include areas affected by roads, railways, port areas that transport and handle minerals, in addition to areas of mineral waste storage and processing. This change allows more communities to benefit from mining royalty revenues – and it is seen as a way to reduce local opposition to mining projects.

Congress recently approved the creation of a new mining authority, the National Mining Agency (Agência Nacional de Mineração - ANM) though other issues remain unresolved (76). One such issue is the ability of ANM to designate projects as being of strategic mining interest (*relevante interesse da mineração*), which would give them precedence over other rights. This would authorize mining in Conservation Units (UCs) and Sustainable Use as well as Sustainable Development Reserves.

Reforms Promoting Hydrocarbon Investment

As in the mining sector, recent hydrocarbon reforms seek to expand private investment in identifying and extracting oil and gas reserves for export. Declining oil prices and subsequent declines in revenues have pushed Amazonian governments, notwithstanding political affiliation, to make changes to fiscal policy and social and environmental safeguards with the goal of making their countries more competitive and attractive to investors. Government commitments to transition to post fossil fuel economies are less clear.

The scale of hydrocarbon projects, specifically the large amount of capital and lengthy periods required for bringing fields into production, supports efforts to ensure legal security for investors

²⁸ Such as the Instituto Brasileiro de Mineração (IBRAM)

and the primacy of oil and gas extraction over other projects and uses. Large-scale projects require significant investments in roads, pipelines and airstrips that often require modifications to existing legislation. Large-scale investments in oil and gas often invoke national interest arguments to support extraction within national protected areas, to lift restrictions and fast track environmental licensing processes.

In Bolivia and Ecuador, recent legislation allows for exploratory and extraction activities in national parks, which has resulted in a significant increase in the number of concessions and total area open to exploration. In the hydrocarbons sector, the amount of probable and proven reserves is an important indicator of the robustness of the sector. In Bolivia, which has grown more dependent upon natural gas revenues, developing new reserves is of utmost importance. The government of Ecuador was equally pressed to replace lost oil revenues. In 2012, it held an important international auction offering 21 hydrocarbon blocks involving three provinces and more than 3 million hectares (Mha) in central-southern Amazon. The blocks were superimposed on the territories of seven Indigenous groups, including populations in voluntary isolation and initial stages of contact. While Indigenous groups in both countries have asserted rights to govern territory and participate in decisions about investments in their territories, governments have responded by curtailing consultation processes and limiting compensation agreements. Public access to information about extractive activities is also limited.

Following declines in the price of oil in 2015, Peru introduced reforms to loosen tax rates and environmental protections and promote international investment. This included limiting the capacity of the newly created Environmental Oversight Authority (Organismo de Fiscalización Ambiental (OEFA) to impose fines and reduce the period for approving Environmental Impact Assessments (EIA) (73). Peru's powerful hydrocarbons lobby has also pushed the government to open up no-go-zones (such as the territories of Indigenous people living in voluntary isolation in the Lower Urubamba Valley as well as national parks) to hydrocarbon exploration, citing the examples of Bolivia and Ecuador (77).

In Brazil, the principal government agency charged with regulating and monitoring the oil sector is the National Petroleum Agency (Agência Nacional do Petróleo, Gás Natural e Biocombustíveis, ANP). It is responsible for issuing exploration and production licenses and ensuring compliance with relevant regulations. The ANP has been conducting a series of open auctions to promote investment in developing hydrocarbon reserves. Until recently, Brazil's hydrocarbons sector was dominated by Petrobras, a former state-owned enterprise turned multi-national oil and gas firm.

Reforms to Ease Environmental Licensing

The previous section highlighted the recent efforts of governments to introduce reforms that support the expansion of extractive industry and infrastructure development. In recent years, community leaders, NGO staff, environmental advocates and conservation funders also note a concerted effort by state and private sector actors to dilute or eliminate social and environmental safeguards related to extractive and large-scale development projects. More generally, Bridge

argues that as resource extraction intensifies, it is often accompanied by more flexible environmental regulations and reduced oversight by environmental authorities (35).

Governments of different political orientations pursue these efforts arguing that environmental and social protections have become too restrictive and constitute an obstacle to national development. Socio-environmental protections secured in earlier years when commodities prices were high and demand was strong, are now being undone. In Peru, for instance, new legislation restricts the Ministry of Environment's ability to create protected areas (*zonas reservadas*) and suspends the Ministry's oversight of extractive industry operations. In Ecuador and Bolivia, environment ministries have lost power and influence after reorganizations. Given that much current investment in resource extraction and infrastructure affects protected areas and Indigenous territories, the rolling back of these protections has serious implications for vulnerable populations and forest landscapes.

Brazil has a long, fraught history of dispute and conflict about environmental licensing. Early efforts to establish regulations for the exploitation of natural resources date to a 1981 law (Lei nº 6.938) and the creation of the National Environmental Policy (PNMA). The policy established the current three-step licensing process: prior license (LP), installation license (LI) and operating license (LO). The national environmental agency IBAMA was created in 1989 to conduct inspections and oversee environmental licensing regarding the use of natural resources. Over the 1980s and 1990s, the government sought to expand the scope and application of EIAs and to further define the procedures and criteria for conducting assessments. The government also designated responsibilities and authority for environmental licensing and oversight.

At the same time, other interest groups and politicians have sought to limit these and other regulations. As already noted, reforms in 2012 to the Forest code reduce the area landowners have to keep under forest, and gave amnesty to those who had cleared forest prior to 2008 without approval. In 2016 there were some 140 proposals for legislative change that would affect environmental protections, Indigenous and community land rights. In 2017, one federal deputy presented legislation to weaken the authority of public agencies responsible for managing Conservation Units and to broaden the types of resource extraction activities allowed in protected areas (78).

Legislation has also been sponsored that would guarantee that there could be no stoppages to an investment project once the initial EIA has been presented. So-called "suspensão de segurança" laws allow the President to unilaterally suspend decisions (even when made within the scope of the law) made by lower-level public institutions by arguing that such decisions might incur significant risk to public order, public health, public security and the national economy. National security arguments have been used to facilitate investments in Belo Monte (Para) and the railway for moving iron ore from Carajás (Pará and Maranhão).

In February 2017, the federal government introduced an urgent decree (known as a *Medida Provisória*) related to the sale of lands to foreign entities. The intent was the immediate lifting of restrictions on the amount of rural land that Brazilian firms with majority foreign ownership could acquire either directly or indirectly. The ensuing polemic forced the government to back down

and withdraw the decree, though Congress is still considering legislation (PL 4059/2012), which would modify laws regarding land ownership by individual and legal foreign entities in Brazil.²⁹ The proposed reform is pending and is seen as necessary to facilitate foreign direct investment in agricultural and resource extraction activities.

Policies for the Promotion of Infrastructure Investment

Brazil has led the region in developing policies and instruments to facilitate large-scale investment in infrastructure. Of particular importance has been the Growth Acceleration Program (PAC), launched in 2007, which is the principal federal government-led initiative supporting social, urban, logistics and energy infrastructure development across the country. The majority of PAC Transport Axis projects are in the Legal Amazon (of the 82 land and river works, 37 are in the State of Amazonas, 14 in Rondônia, and 10 in Pará). The latest review of PAC 3 (2015-2018) indicates that 30 waterway terminals in the Northern Region are planned, of which 17 are under construction and 3 have been completed. As discussed later, many of these projects affect Indigenous territories.

National efforts to promote infrastructure have also been pursued in conjunction with the supranational plans and visions of the Initiative for Regional Infrastructure Integration in South America (IIRSA), now managed by COSIPLAN (the South American Council of Infrastructure and Planning).³⁰ This framework prioritizes investments through a series of corridors and hubs. One priority corridor is the Amazonas corridor for which, without including completed projects, there are 19 projects in the pipeline worth over \$2.45 billion. Corridors offer governments and potential funders concrete platforms for launching big vision projects with narratives that emphasize connectivity, employment and regional development. Examples of the focus on connectivity include proposed investments that seek to improve the navigability of rivers in the Peruvian Amazon, such as the Hidrovia Amazonica project in the Marañón Basin, and improve logistical infrastructure in nearby towns and cities. There are also investments related to developing the Central Inter-Oceanic Highway known as IIRSA Centro as the vertical highway from Tingo Maria (San Martín) to Pucallpa (Ucayali). IIRSA Centro would eventually open the possibility for further highway construction to Cruzeiro do Sul in the State of Acre (Brazil). In 2012, Peru and Brazil began discussions about the Atlantic-Pacific Transcontinental Railroad, a project of significant interest to Chinese investors.³¹ These investments are attractive because they are high value projects and open up new frontiers for other forms of investment. However, both projects directly impact the Isconahua, an Indigenous group living in voluntary isolation. The projects also affect biologically valuable areas, known as the Sierra del Divisor in Peru and the Serra do Divisor in Brazil, and most certainly increase deforestation.

²⁹ <http://www.camara.gov.br/proposicoesWeb/fichadetramitacao?idProposicao=548018>

³⁰ The future of COSIPLAN is uncertain in light of growing disagreement among UNASUR members (79).

³¹ In 2014 the governments of Peru, China and Brazil signed an agreement to finance economic and technical feasibility reports. In 2016 the Peruvian government rejected the proposed route.

Downsizing, Downgrading and Degazetting Protected Areas (PADDD)

Conservation researchers and practitioners describe the process of weakening protected areas as downgrading, downsizing and degazetting, or PADDD (for the global scale of this problem, see also the World Wildlife Fund's global online PADDD tracker: www.paddtracker.org) (80).³² Specifically, PADDD involves a series of legal changes to allow more human activity within protected areas, reduce the total area of protected areas, or eliminate protected status entirely. Forrest et al. note, "the proximate causes of most enacted PADDD events are generally associated with industrial-scale resource extraction and development or local land pressures and land claims" (81).

PADDD events have increased as governments seek to make the subsoil available for mineral and hydrocarbon extraction, but also to build dams and expand hydropower energy development. In Brazil, Pack et al. find that hydropower projects are implicated in 39 percent of PADDD events while rural settlements are linked to 20 percent of PADDD events. In some hydropower projects, the government has used urgent decrees (*medidas provisórias*) to support the PADDD event. Such decrees have immediate effect and are generally restricted to urgent situations.

In May 2017, the Brazilian Senate passed a bill to redraw (downsize) the Jamanxim National Forest and Park (Pará). The proposed changes to the protected area, created in 2006, could open up an additional 280,000 hectares to deforestation. Members of the congressional rural caucus (*Bancada Ruralista*) have been consistently calling for a review of environmental restrictions in order to open up public lands for agricultural development. Given President Temer's tenuous hold on the presidency, the Financial Times reports that the *Bancada Ruralista* can take advantage of the situation "to pass projects they have never managed to pass" (82).

There are too many PADDD events to review here, but the larger point is that they are increasing across the Amazon and eroding important gains from prior decades of government and civil society effort. This is not limited to a single country, though the situation may be more urgent in Brazil given recent aggressive efforts to open up restricted areas for investment and resource extraction. As a basin-wide problem, PADDD requires a coordinated, strategic response.

Financial Drivers

The primary financial flows to the infrastructure and extractive sectors in the Legal Amazon of Brazil and the Western Amazon come from three main sources: international financial institutions (IFIs), primarily the Inter-American Development Bank (IDB) and the Latin American

³² These changes are defined as: reducing the spatial extent of protected areas (downsizing), eliminating their protected status entirely (degazetting), and allowing more human activity within protected areas (downgrading)

Development Bank (CAF); Brazilian national institutions, in particular the Brazilian National Development Bank (BNDES) (83); and Chinese financial institutions (84).

The IDB has been and continues to be an important funder of infrastructure projects in Brazil and the Western Amazon, as well as assisting in negotiating for infrastructure development in South America. Brazil has been a primary recipient of IDB support for many years and until recently represented a large percentage of the Bank's loans to Latin America. The emergence of IIRSA (now managed under COSIPLAN) in 2000 led to the renaming of the Corporación Andina de Fomento-CAF as the Development Bank of Latin America (though it retained the CAF acronym). CAF now funds about 30 percent of all lending in Latin America and is a leading lender for infrastructure projects.³³ CAF is a public-private mechanism – a Multilateral Development Bank originally created by five Andean countries and currently owned by 19 countries in Latin America, the Caribbean and Europe as well as 14 private banks from the Andean region. Within the IIRSA/COSIPLAN portfolio, IDB has invested \$9.8 billion in 37 projects (completed and in progress) while CAF has invested \$8.8 billion in 32 projects. The World Bank is a distant third with \$792 million invested in four projects.³⁴

Multilateral lenders have also promoted Public Private Partnerships or Associations (PPPs) to support investments in infrastructure and energy. Between 2006-2015, Latin America and the Caribbean region had investments of \$360 billion in 1000 projects organized as PPPs, most of which were in the transport sector. Countries with developed PPP frameworks include Colombia, Peru and Brazil. These partnerships, which come in different complex modalities, allow the public sector to attract private capital for projects and create concession mechanisms for maintenance, such as toll roads. However, many of the region's largest construction firms have been caught up in the Odebrecht (i.e. Lava Jato) scandal and this has led to the cancellation of a number of PPPs (as is the case with the proposed waterway on the Magdalena River in Colombia). PPPs were also cancelled linked to the development of IIRSA Centro and Norte highways, and the construction of a gas line in Peru.

Changes to the performance standards of the International Finance Corporation (IFC) reflect a shift toward more self-regulation in which the client (a private company) assumes responsibility for implementing environmental and social protections. In 2016, the World Bank introduced a new framework for social and environmental management, similar to that of the IFC, in which the responsibility for meeting standards also lies with the client and that weakens the capacity of the World Bank to monitor compliance. The newly created Inter-American Investments Corporation is following a similar path of promoting self-regulation for loans to the private sector.

A range of Brazilian government agencies and banks have also been important actors in financing infrastructure and extractive projects. Primary among these are BNDES (Brazil's

³³ In the early 2000s, CAF became involved in infrastructure lending, specifically the Southern Inter-Oceanic Highway in Peru. The institution's lack of social and environmental safeguards made approving mega projects easier.

³⁴ Figures provided by C. Gamboa, Derecho, Ambiente y Recursos (DAR). Figures are for 2016 and only refer to investments in IIRSA related projects.

National Development Bank) and the Banco do Brasil (which also provides approximately 60 percent of rural credit in the country, making it a key player in the Legal Amazon and Cerrado). Brazilian pension funds can also invest up to 20 percent of their portfolio in infrastructure, and they were also vehicles for investing in the Accelerated Growth Program (PAC) (85). While these sources will continue to be available in the future, the scale of government financing for infrastructure has declined in the wake of the Lava Jato scandal. Furthermore, financial mechanisms to support investment in infrastructure and extraction are dynamic and evolving. Speculative investment by international and national investors (including mergers and acquisitions) makes it a challenge to follow developments. Partnerships with academics and journalists who specialize in monitoring such financial flows and maneuvers can produce timely information.

Chinese financing supports a growing number of extractive and infrastructure projects. In 2017, Brazil and China created a \$20 billion Cooperation Fund to promote Chinese investment in Brazil (86). Most of this lending is focused on securing the food and natural resource commodities needed by the Chinese economy. Chinese loans to Venezuela and Ecuador for example have focused on securing a flow of hydrocarbons through new financing mechanisms (loans for oil) (87). Increasingly, China is using its new relationships to be more actively involved in extractive activity or in building infrastructure. In Ecuador, Andes Petroleum, a consortium of two Chinese state-owned firms, has acquired a vast concession in southern Ecuador and Chinese contractor Sinohydro is building the Coca-Codo Sinclair hydroelectric Complex. China is well positioned to finance both the expansion of extractive industry activity and related investments in hydropower development and bulk transportation systems over the next decade. These investments have important implications for the protection of forests and the rights of forest-based peoples (88).

Alongside these formal financial flows, other, much less understood flows of finance are also helping drive investment. This is especially the case for small and medium and 'boutique mineral mining' linked to international smuggling networks (89).

Sub-national drivers

Another set of drivers facilitating EII investment operate at sub-national levels, though often in ways enabled by national policy. In particular, as central governments have decentralized budgets and resource flows to sub-national authorities, there is the potential for greater local support for extractive activity. In Ecuador, former President Correa introduced the practice of *regalías anticipadas* (upfront royalty payments) in which a company pays royalties before operations begin and the government channels funding to local infrastructure projects (such as roads, hospitals and schools) before mining gets underway. Correa also introduced a reform to direct 60 percent of royalties to the producing province. While instruments such as these are designed to discourage local opposition to investment, evidence is decidedly mixed regarding the impact of such fiscal transfers on local development, poverty reduction, and conflict (90).

Other sub-national drivers reflect the intersection of livelihoods and local politics in situations where those who derive employment from resource extraction also have dominant representation among local political authorities. Regions with significant ASGM are one example of this intersection. While ASGM is also favored by other drivers already mentioned (investment in access infrastructure, commodity prices), its emergence also reflects the absence of employment options in the local economy. Where miner numbers are particularly large, this can facilitate the election of allies or leaders to positions of local political authority, leading to a dynamic in which the economy and politics align to favor further expansion of mining activity. Madre de Dios in Peru is a good example of this phenomenon.

D. Impacts of EII

As debates within the literature on the natural resource curse³⁵ show, expanded investment in resource extraction and large-scale infrastructure has diverse social, economic, political and environmental impacts. In this section, we focus on impacts in three domains: land and forest cover and forest degradation; community rights and livelihoods; and forest governance and practices of corruption and illegality.

Impacts on forest cover and degradation

As Amazonian countries pursue policies to support the expansion of mining, oil and natural gas development, they continue to see their respective humid tropical forest territories as a resource frontier. Some expansion is in new frontiers, while some is in areas long known for extractive activity such as the oilfields of Southern Colombia, Eastern Ecuador and Northern Peru, and the industrial mining belt of Eastern Brazil. These are regions in which major investments to develop mineral and hydrocarbon deposits required complementary infrastructure in the form of roads, pipelines, rail lines, processing plants and port facilities. The presence of such infrastructure facilitated the expansion of extraction into adjacent areas. Much of this extractive activity and related infrastructure took place under military/autocratic rule of the 1960s-80s, in a weak regulatory environment and without social protections in place. Agreements to close mines and manage waste products from extractive activity were minimal or nonexistent and sub-national and national authorities lacked capacity to provide adequate oversight of company operations.

Oil and natural gas

The direct impacts of oil and gas extraction on forest cover have, in aggregate, been limited, reflecting the small footprint of operations. However, other environmental impacts have been significant, and indeed the legacy of nearly six decades of oil extraction within the Putumayo-

³⁵ Authors have noted it is often the case that economies with high dependence on mineral and hydrocarbon extraction are characterized by poor growth, performance and distributional performance, and are often associated with high levels of political corruption: a “natural resource curse.”

Oriente-Marañon corridor is significant. In Ecuador, the development of oil fields was accompanied by state-promoted colonization schemes. A similar dynamic occurred in the Putumayo region of southern Colombia while in northern Peru there was no promotion of human settlements. Prior to adopting more rigorous environmental standards, industry practice was to dump produced waters and other chemical waste into nearby waterways. Over time, the storage and management of waste has proven clearly insufficient, leading to episodes of widespread contamination including degraded forest landscapes. Today ageing pipelines are responsible for frequent spills and fuel social conflict between companies and local populations.

Industrial mining

In Brazil, the historical association of industrial mining and forest loss is limited, and concentrated in particular locations linked to particular mine sites. Looking forward, however, the geographical extent of exploration concessions and concessions being requested suggests the potential for future impacts that may be more widespread. The localized impacts of mines on forests to date are thus important indicators of what could happen in the future absent more effective forms of regulation. For instance, the large-scale production of pig iron within the Grande Carajas project has relied on vegetable charcoal. Here, the interests of ranchers and charcoal producers converged as both benefitted from the clearing and burning of forests for charcoal making (91). Illegal loggers in search of wood also enter reserves and Indigenous lands and threaten local residents with violence if they resist.³⁶ An estimated 1.5 million hectares of forest has been lost in the states of Pará and Maranhão over a 30-year period (93). In addition to this significant deforestation in the immediate area of the mine, the company's storage, transport and processing operations have affected the rights and livelihoods of a larger population in the region (94). In 2007, the Brazilian government recognized pig iron production in Carajás as a driver of greenhouse gas emissions from deforestation (95). A 2013 Greenpeace report concludes that few parts of the Legal Amazon have experienced the level of deforestation and destruction experienced in the Carajás region.

In 2012, three pig iron companies arrived at a legal settlement with the Public Ministry's Office in Pará. The settlement introduced important reforms for charcoal sourcing, allowing the companies' time to identify new inputs for charcoal so that its extraction would be less damaging. However, identifying the origin of the wood used to make charcoal is difficult as informal charcoal camps operate largely undetected in remote areas.

The northern Legal Amazon is seen as holding strong potential for future development of natural resource based economic activity. Although the region has not been completely surveyed, it is already subject to quite extensive mining license requests (Figure 3). If projects were to go ahead in some of these areas, they would likely overlap with current primary forest, and also interact with potential resource extraction investments in neighboring countries to the north and west (such as Venezuela, Peru and the Guianas). Plans to extend access infrastructure into the

³⁶ The murders of Zé Cláudio Ribeiro da Silva and his wife Maria do Espírito Santo are just two examples of the violence associated with the production of pig iron in Pará (92).

state of Amazonas would likely make such mineral development more technically and economically viable.

Beyond direct impacts on forest loss, environmental damage linked to both old and new industrial mineral extraction is of growing concern. This damage can also have long-term implications for forest health, aquatic ecosystems, and livelihoods. In November 2015, Brazil experienced its worst mining disaster when a tailings dam, linked to BHP Vale-owned Samarco-operated iron ore mining operations in Minas Gerais, burst and sent tons of toxic mud and water along some 600 km of the Rio Doce. Twenty people were killed, a town was destroyed, and the flow of toxic mud and water polluted freshwater and forest ecosystems for hundreds of kilometers downstream. Scientists tracking the movement of contaminated waters and mud note that there are significant, if not fully understood, long-term implications for terrestrial and coastal ecosystems, including the possibility of recurring incidents of contamination that could extend into the Atlantic Ocean (96).

One of the more serious examples of waste management failure involves the former INCOMI manganese mine of the Serra do Navio in Amapá. INCOMI was the first industrial mine in the Legal Amazon operating for some five decades (1947-1997). After its closure, local residents struggled with the aftermath of widespread soil and water contamination from arsenic. State authorities in Amapá fined the company in 2000 after it was discovered company workers tried to hide the contaminated materials. In 2013, the government of Brazil and company officials came to an agreement for company remediation of environmental damage - that included the right of the company to explore for manganese at a new site (97).

The Mariana disaster ignited important public discussion about the consequences of large-scale extraction, the responsibilities of companies and the state to restore communities and environments, and the need to reform a 'business as usual' approach. The disaster showed that mine dam and tailings failures have the potential to affect very large areas leading to contamination and potential forest loss. Hazardous waste-management plans are often insufficient and oversight of such plans is inconsistent and not the priority of governments. Following this disaster, there were increased calls for governments to strictly enforce the lodging of environmental bonds and insurance by mining companies. These bonds are held in escrow in anticipation of future clean-ups and mine closures, though not all governments require such bonds, and those that have requirements do not always enforce the law. Powerful mining lobbies and links between extractive industry companies and political actors, as in the case of Brazil, have resisted the implementation of stricter controls and supervision of their operations and instead insisted on self-regulation (98).

The potential for future episodes of contamination across Amazonia is significant given the presence of active mine-tailing dams both within the Legal Amazon and on the steep eastern slopes of Andes-Amazon which feed Amazon tributaries. Geomorphological research on Andean mines suggest that mining waste management practices in mountainous areas are likely insufficient in holding back sediment flows in the event of high rainfall events (99). Still governments continue to rely on company expertise and capacity to implement adequate waste-management practices. External pressures on companies to increase production and

profitability may undermine risk management practices at mine sites. Brazilian authorities suggest that the Rio Doce disaster was linked in part to company pressure to increase production to offset poor iron ore prices (100).

ASGM

While ASGM involves small-scale operations with low levels of technology in comparison to industrial mining, the cumulative impacts of thousands of miners on forests and waterways over decades are significant. As entrepreneurs involved in the ASGM sector begin to accumulate profits, they invest in larger scale earth moving technology, further expanding impacts. The Serra Pelada mine (Pará) – once the largest open pit gold mine in the world – reflects the scale of impacts that informal mining can produce. In 1980, tens of thousands of *garimpeiros* (miners) came to the area in search of gold. Federal police were dispatched to the region to restore order. The mine was closed in 1992 after a series of landslides killed miners. In 2007, with gold prices on the rise, Canadian energy firm Colossus Minerals invested heavily to reopen the mine through a joint venture with a legally formalized cooperative of *garimpeiros*. The joint venture collapsed amid accusations of corruption, murder and mismanagement and by 2015 the company filed for bankruptcy in Canada (101).

In 2016, the Protected Areas Monitoring Program of the Instituto Socioambiental (ISA) in Brazil published an analysis of 44,911 requests for mining prospecting permits filed with the National Department of Mineral Production (Departamento Nacional de Produção Mineral, DNPM). Over half of the requested permits were to exploit gold, followed by tin (6 percent) and copper (5 percent). The majority of applications referred to artisanal or small-scale mining concessions, including cooperative mining. Some 17,509 of the requests (40 percent) either totally or partially overlapped with Indigenous Territories (ITs) and Conservation Units (CUs) in the Legal Amazon: 24 percent of requests overlapped federal CUs, 7.5 percent overlapped state CUs and just over 9 percent overlapped ITs.³⁷ Five federal Conservation Units are also significantly impacted by mining concessions.³⁸

The impact of expanding ASGM activity on forest cover goes beyond Brazilian Amazonia. The Monitoring Andean Amazon Project (MAAP) closely tracks significant ASGM activity in Madre de Dios, Peru and has also identified incipient illegal gold mining activity in two areas of

³⁷ In a number of cases prospecting permits overlapped with more than a single CU or TI hence the total number here exceeds 17,509. This analysis was conducted using data available in the Mineral Geographic Information System (SIGMINE) from the National Department of Mineral Production (DNPM) (102). Further information about overlaps with ITs is available via the Instituto Socioambiental's website, Terras Indígenas no Brasil, <https://terrasindigenas.org.br/> (Last accessed 23 August 2018).

³⁸ These are: Tapajós (7,905 separate mining permits) again reflecting the high level of small-scale gold mining in the region; Flonda do Crepori (472 permits); Flona do Jamnzim (425); Flona do Amanã (212); and Flona de Itaituba II (172). The five State Conservation Units with the most mining concessions are: Paraná State Forest (977); State Forest of Amapá (408); APA Upaon-Açu / Miritiba / Alto Preguiças (234); APA Triunfo do Xingu (152); and APA Maroaga Cave (108). These are all areas of traditional *garimpeiro* mining.

northern Peru (in the remote Condor Mountain Range and along the Santiago River – Amazonas) and one in Central Peru (El Sira Communal Reserve – Huánuco) (36). MAAP images reflect advancing deforestation (a total area of about 12 hectares) caused by ASGM in the Afrodita concession area over an eight-month period.³⁹ The access road to the Afrodita mining camp is on the Ecuadorian side of the border and advancing deforestation can be seen along the entrance road as well. The Afrodita mining concession has long been controversial for its social and environmental impacts.⁴⁰ Monitoring efforts such as this are critically important to the early detection of ASGM in protected areas (104, 105).

The arrival and expansion ASGM can also undermine the viability of alternative production models that seek to combine forest protection and livelihoods – in large measure because ASGM introduces new economic incentives that can out-compete existing incentives and also cause conflict within communities as some members align with incentives to protect forest, and others align with incentives to expand ASGM. As one example, a model REDD+ project, the Sururí Forest Carbon Project, involving the Paiter-Sururí in the Indigenous Territory of Seventh of September – TISS, (Rondônia and Mato Grosso) unraveled after gold was discovered in 2015. The project was the first Indigenous territory to participate in the United Nations REDD+ carbon program. Located within Brazil's 'arc of deforestation' the project was seen as a pioneering initiative to create a viable financial mechanism to support forest conservation, improve living standards and preserve Indigenous culture. The gold rush was quickly followed by the discovery of very significant diamond deposits a year later. The Brazilian NGO Imazon reported that between August 2016 and July 2017, TISS had the seventh-worst deforestation rate among 419 Indigenous lands in the Brazilian Amazon (106). At least twenty hectares of forest have been destroyed and intra-community conflict and tension has increased – this in a context in which mining of any kind is not legally permitted in Indigenous Territories in Brazil.

Infrastructure

The synergistic impacts of hydroelectric power, waterway, road-building and extractive industry investments are significant contributors to forest loss and forest degradation and are especially threatening to Indigenous Territories. In the Brazilian Amazon, many planned UHCs directly overlap Indigenous Territories.⁴¹

A recent study on the environmental impacts of dam-building in the Amazon basin highlights the urgent need to adopt a basin-scale lens in order to assess impacts at regional and continental scales (1). To date, most analyses of dams and energy projects focus on a single dam and the area around the dam to be affected, but have not focused on the accumulated impacts of a series of dams, and associated infrastructure, on rivers that cross national boundaries. In the Andean foothills, where 136 proposed dams could impact downstream flows of nutrients, there

³⁹ The proposed Afrodita mine has been controversial because of the remote location that overlaps with Awajun and Wampis territories.

⁴⁰ The mining camp was recently invaded by one Indigenous group that opposes the mine (103).

⁴¹ See <https://amazonia.inesc.org.br>

has been no thorough assessment of the potential trade-offs between energy production and other economic, social, environmental and cultural values.

According to the Instituto Socioambiental, among the most impacted river basins are:⁴²

- Xingu River Basin – The Cachoeira Seca TI, directly adjacent to the Belo Monte dam was the most deforested Indigenous Territory between 2012-2015. The area around Belo Monte also experienced forest loss of 1,793km². The Belo Monte facility is sited outside of Altamira. Belo Sun, a proposed gold mining project located in nearby Volta Grande would threaten further substantial forest loss.
- Madeira Complex – More than 36,000 hectares were flooded due to the construction of dams along the Madeira River (107). At the same time, Porto Velho recorded a 237 percent spike in logging (an area of 323km²) linked to the new Jirau and San Antônio dams.
- Tapajós River Basin – The Complex is a package of seven dams to be constructed in the mid-Tapajós River Basin. Currently there are only smaller dams on the Juruena and Tele Pires tributaries. Researchers warn that considering that there are 43 dams planned for the entire Tapajós River Basin, a total area of 940,000km² could be impacted. The dams would produce multiple impacts including the flooding of ancestral Indigenous lands as well as conservation units (CUs) and expulsion of traditional riverine populations. Waterways are also planned on the Tapajós as part of multi-modal bulk transport systems to move grains to northern ports.

Together these investments could transform Amazonian waterways and surrounding forests into what one researcher calls “a multi-modal transportation hub and an industrial agglomeration” (108).

In addition to the greenhouse gas (GHG) emissions from this forest loss, methane generation from large reservoirs in the tropics can also be an important source of GHG emissions (109). The construction of these large dams also contributes to deforestation through the influx of migrants looking for work and land.

Road building constitutes the greatest threat to forest preservation. Barros notes that, “Historically 80 percent of deforestation in the Brazilian Amazon has taken place within 20 km of a road,” (110) while Laurance argues that “In the Amazon, 95 percent of all forest destruction occurs within five kilometers of a road” (111, 112). Paved highways are especially problematic as they lead to a series of larger-scale impacts by attracting migrants and land speculators and fostering chaotic urbanization. Such highways also facilitate the entrance of large-scale mining and hydrocarbons extraction. Again, it is not just that roads are being constructed, but the scale and pace of road expansion and the enormous pressures on the environment that such rapid development ignites (43).

⁴² <https://socioambiental.org/>

Synergies between hydropower and mining investments are frequent but rarely acknowledged upfront and are not considered in environmental impact assessments. The clearest current example of this synergy is the massive Belo Horizonte dam on the Xingu River in Pará State. The proposed Belo Sun Mine, a large-scale gold mine investment by Canadian firm, Forbes & Manhattan, is economically viable because of available hydropower. The mine would be located near Volta Grande and extend across a 675 square mile area. Irregularities with licensing procedures have suspended further work for the time being (113). The availability of energy makes possible the further expansion of industrial mining and further forest loss a real possibility. Activists have, in the past, pointed to what they see as similar interactions between hydropower and mining development in SE Ecuador,⁴³ while in Peru the development of a new mining corridor in the central-southern highlands has the potential to generate demand for new hydroelectricity generation in the high jungle east of the Andes.⁴⁴

Geist and Lambin (2002) maintain that explaining tropical deforestation requires analysts to understand how multiple factors and drivers act synergistically. We believe that is the case here. New investments in mines, oil and gas together with ongoing and proposed investments in infrastructure will open up forested landscapes to human settlement. This suggests that addressing these coming drivers of additional forest loss is that much more urgent (9).

Impacts on livelihoods and rights

In the Amazon, extractive industry expansion is above all a driver of rights violations and of adverse impacts on forest governance (discussed in the following section on governance). Impacts on communities' rights include violations of:

- Property rights – as reflected in cases where concessions overlap with pre-existing community, territorial and other land rights, and also in displacement driven by asymmetric land sales, land grabbing or forced eviction
- Rights to consultation – when free, prior and informed consent (FPIC) processes are avoided or short-circuited
- Rights to existence – where Indigenous populations living in voluntary isolation are affected. In Brazil, this is the case for at least five ITs affected by the Energy Axis project which forms part of the federal government's Growth Acceleration Plan (PAC). Peoples living in voluntary isolation have also been affected by Camisea (Peru) and Yasuní (Ecuador) (114).

Threats to each of these rights will be aggravated by proposed legal and regulatory reforms that seek to reduce protections to Indigenous Territories and protected areas.

⁴³ This observation draws on some of our field research in 2008-9.

⁴⁴ In 2011, a coalition of indigenous communities and NGOs rejected five proposed dam building projects (Inambari, Pakitzapango, Mainique I, Tambo 40 and Tambo 60). The projects would have been built by Brazilian construction companies Odebrecht, OAS, Andrade Gutierrez, Camargo Correa, all of which were involved in the Lavo Jato scandal.

Mining and Overlaps with Indigenous Territories in the Legal Amazon, Brazil

Indigenous Territories are under enormous pressure from special interest groups that promote new laws permitting mining in ITs. According to the Instituto Socioambiental, 17 ITs, totaling 28 million hectares, could be potentially impacted by mining. This is equivalent to 25 percent of all Indigenous land in the Legal Amazon. The five ITs with the most prospecting requests include the IT Yanomani (Roraima); IT Rio Negro (Amazonas, near the border with Colombia); and three ITs in southern Pará – the Menkragnoti, Kayapó; and Baú IT Raposa/Serra do Sol (Roraima).

In a controversial case involving the IT Raposa/ Serra do Sol, the Federal Supreme Court (STF) of Brazil imposed 19 conditions before agreeing to formally recognize the National Indian Foundation's (FUNAI) demarcation of the Indigenous Territory. These included declaring it “an area of national interest” (*relevante interesse da União*) and maintaining the federal government's right to exploit natural resources and build infrastructure such as highways and transmission lines at a future date. Maps prepared by the Instituto Socioambiental highlight potential overlaps between mining concessions, Indigenous Territories and Conservation Units for the states of Acre, Amapá, Amazonas, Mato Grosso, Pará, Rondonia and Roraima.⁴⁵

Some of the mega-mining projects or project expansions in Brazil noted in Section B will have significant impacts on rights and livelihoods. The iron ore transport railway for Vale's S11D project will pass through 27 municipalities, 28 Conservation Units, and 100 *quilombola*⁴⁶ and Indigenous communities in the states of Pará and Maranhão. A further 86 *quilombola* communities will be directly and indirectly impacted by Complex S11D (94). The project has generated significant resistance over projected environmental and social impacts. In 2013, the Plataforma Dhesca⁴⁷ investigated accusations of human rights violations linked to the extraction and transport of the mine's products and the potential environmental and livelihood impacts and risks for the local populations (94). In 2016, Indigenous groups requested the suspension of S11D's environmental license, and asked for a consultation process with local communities and a compensatory payment of R2 million for failing to undertake the necessary studies and conduct FPIC in respect of the ILO Convention 169.

According to Lúcia Andrade, Executive Coordinator of the NGO, Comissão Pró-Índio de São Paulo (CPI-SP), the Mineração Rio do Norte (MRN) project (see Section B) has sought to expand operations into titled and legally recognized *quilombola* lands in the Trombetas River Basin, fueling socio-environmental conflict. MRN's operations also indirectly impact three TIs, Nhamundá-Mapuera, Trombetas-Mapuera and Zo'é and Kaxuyana Tunayana in Oriximiná (115). Extraction also occurs within the Flona Saracá-Taquera Conservation Unit (CU) and

⁴⁵ See <https://www.amazoniasocioambiental.org/es/mapas/#!/areas> (Last accessed 23 August 2018).

⁴⁶ Quilombola people are descendants of African slaves who have since sustained culturally distinct sets of practices, livelihoods, religious beliefs and social organization.

⁴⁷ A network of 36 national social movements and civil society organizations

waste from the extraction process is deposited in some 25 retaining ponds within the same CU.⁴⁸

CPI São Paulo maintains that MRN obtained an Operational License (LO) from IBAMA in 2013 to exploit the Monte Branco area near the Quilombola Alto Trombetas. Despite the fact that the Environmental Plan (PBA) recognized that the area in question was used by seven *quilombola* communities to extract oil from *copaíba* (a stimulant oleoresin) and that any impacts on forests would directly impact their livelihoods, no formal consultation (FPIC) process was conducted, nor was there any attempt to compensate the *quilombolas* for damages, including loss of use. (Meanwhile ICMBio,⁴⁹ the government agency responsible for overseeing conservation units, received R\$73.2 million in compensation for impacts to the Monte Branco protected area). In September 2016, the Federal Public Ministry (MPF) recommended suspending MRN's authorizations and licenses pending consultation with the *quilombolas*. At the same time, IBAMA authorized MRN to proceed with the technical studies to support the environmental licensing process in four additional areas (Cruz Alta, Cruz Alta Leste, Peixiho e Relolado) also affecting *quilombola* lands beginning in 2021.⁵⁰

Impacts on civil and human rights

The erosion of social protections and the recognition of the rights of impacted communities is of concern across the Amazon Basin, especially for Indigenous and traditional peoples. Indigenous and traditional peoples' claims to rights and due process are systematically delegitimized or denied. Communities, environmentalists and human rights organizations that criticize and protest EII projects are regularly denounced as agents of foreign governments, anti-development, opportunistic agitators and anti-patriotic, as Bebbington and Humphreys Bebbington have documented in the Andes and Amazon (116, 117). Protests are deemed to be criminal activity. In recent years, governments have increasingly threatened civil society organizations with loss of their legal status and funding. They are audited and subjected to other forms of harassment.⁵¹ Individuals, in particular community and Indigenous leaders are intimidated, roughed up, arrested and murdered.

EII activities often negatively affect women and can both highlight and deepen certain aspects of gender inequality in the region. Education levels, language abilities, access to information and relationships with outside actors and institutions influence how individuals and communities

⁴⁸ See <http://www.quilombo.org/br/mpas> for additional maps and information about proposed hydroelectric investments programmed for the Rio Trombetas basin, deforestation linked to mining, and waste management practices of MRN.

⁴⁹ The Instituto Chico Mendes de Conservação da Biodiversidade, an agency within the Ministério de Meio Ambiente, is responsible for overseeing the federal Unidades de Conservação (UCs).

⁵⁰ See the video "A resistencia *quilombola* em Oriximiná" which summarizes the struggle of *quilombola* communities for their rights in Oriximiná. <https://vimeo.com/179495868> (Last accessed 23 August 2018).

⁵¹ In 2016, Acción Ecológica, and environmental NGO in Ecuador was threatened with closure by the Rafael Correa government. Fundación Tierra, CEDLA and CEDIB in Bolivia have all been threatened with closure and subjected to audits in response to their criticism of Evo Morales' resource extraction policies.

negotiate their rights around EII activities. Women and men in the Amazon do not usually have equal access to information, decision-making spaces and revenue flows. Women, and Indigenous women in particular, are not adequately consulted (if at all) during negotiations over project design and compensation, and can often be negatively impacted by EII activities that result in their exclusion, loss of access to natural resources such as forests and water, and intimidation and acts of violence. Not infrequently, women environmental defenders have been the targets of extreme violence.

Numerous organizations are tracking and disseminating information on the concerted efforts of governments and companies to undermine rights and protections⁵² and to criminalize protest. Brazil deserves special mention here. Global Witness calls Brazil a dangerous place for environmental activists (118). As noted in Section C, members of the Bancada Ruralista in the Brazilian Congress have launched a series of initiatives to weaken legislation related to protected areas and Indigenous Territories. In June 2017, UN Special Rapporteurs and an IACHR Rapporteur issued a joint statement warning that “the rights of Indigenous peoples and environmental rights more generally are under direct attack” (119).

Over the last 15 years, Brazil has seen the highest number of killings of environmental and land defenders of any country, the experts noted, up to an average of about one every week. Indigenous peoples are especially at risk.

Against this backdrop, Brazil should be strengthening institutional and legal protection for Indigenous peoples, as well as people of African heritage and other communities who depend on their ancestral territory for their material and cultural existence.

It is highly troubling that instead, Brazil is considering weakening those protections.

According to Felipe Milanez, a researcher with the Federal University of Recôncavo in Bahia:

In 2015, 49 activists - 45 in the Amazon - were killed, making it the most violent year since 2004, according to Brazil's Pastoral Land Commission (PLC), and representing a huge regression from policies put in place under the Lula administration to control violence and deforestation. Violence has been legitimized as a normal part of politics. It has become informally 'acceptable.' I've never seen, working for the past 10 years in the Amazon, a situation so bad. All of my friends in Marabá receive death threats. They are part of various social movements, either in the PLC or Landless Workers Movement (MST), or working for the state, such as IBAMA (the government's Brazilian Institute for the Environment and Renewable Natural Resources), and are afraid of being killed like they never were before. (120)

⁵² SERVINDI provides information on Indigenous territories. OCMAL tracks the criminalization of mining protests and EJOLT.

Governance and corruption impacts

Expanded investment in resource extraction and infrastructure influences a range of policies and institutions: macroeconomic policies, fiscal policies, social investment policy and so on. Here we focus on three particular types of impact that derive from the way in which growth in these two sectors of the economy can create new political actors, create resources and incentives for extra-legal and illegal practices, and interact synergistically with efforts to weaken protected area governance. While these are generic effects, they can have subsequent effects on forest cover and community rights because they deepen incentives to further weaken forest protections.

The formation of new political actors and forest governance policies

As economic opportunities from resource extraction and infrastructure investment increase, and investors are able to profit from the combination of concessions and resource control, new economic and political elites emerge or existing elites become stronger. These elites are then likely to consider lobbying for the policies that benefit them. This is a version of a larger argument found in the literature which proposes that policies create constituencies that are likely to advocate for the continuation of a policy even when the policy ceases to be socially beneficial (121–123). The resilience of such policies is likely to be greater to the extent that these elites are powerful enough to become part of the national political settlement. This dynamic helps explain current policy changes in Brazil that weaken forest protection.

The Brazilian military government of the 1970s sought to foster agricultural and regional development in the Cerrado region using, among other instruments, significant investment in infrastructure to support agribusiness (roads, electrification, etc.). The government also displaced small farmers, making their land available to companies committed to producing export commodities. One company that grew out of this process was the Amaggi Group, now one of the world's largest soy bean producers. The owners of this group, the Maggi family, entered municipal politics and in 2002, Blairo Maggi was elected governor of Mato Grosso State at a time when soy was booming in response to Chinese demand. As governor, he emphasized investment in large-scale infrastructure, especially roads, and deforestation accelerated. As the soybean sector grew, so did the wealth and power of soybean farmers (124). The reelection of Maggi as governor saw continued state investment in large-scale infrastructure in Mato Grosso and the Amazon, and the Amaggi Group also diversified, investing in infrastructure as well as grains trading.

A political bloc representing (and composed of) such farmers, the Bancada Ruralista, steadily consolidated power in Brazil's senate, and Maggi became a senator and now serves as Minister of Agriculture. The Bancada Ruralista and the Ministry consistently push within parliament for further investment in infrastructure in forest areas (roads, waterways, and rail lines), curtailment of legislation for the demarcation of Indigenous Peoples' territories, and for legislation favoring large-scale agribusiness investment. Similar political dynamics were at play in the comprehensive reform of Brazil's Forest Code (2012) that effectively reduced the amount of

forest cover landowners were required to maintain, provided amnesty to farmers and ranchers who illegally cleared forests prior to 2008, reduced replanting requirements and increased time periods for compliance (125). These examples demonstrate how infrastructure and large-scale agribusiness interests can merge and become sufficiently powerful to create policy environments that facilitate their further expansion, which puts additional pressures on forest cover and forest communities.

Impacts on corruption

The Operation Carwash (Lava Jato) scandal has had profound impacts on the Brazilian economy and political life and revealed extensive corruption linked to EII investment throughout the wider Amazon and across Latin America, and reaching up to presidential levels.

Operation Carwash (Lava Jato)

The scandal dates to 2004 when Brazil's large construction firms organized a cartel to rig contracts on major projects. Cartel members bribed Petrobras employees and members of the Board of Directors to ensure the durability of the scheme. This corruption is directly linked to the expansion of the infrastructure-extractive economy. All of Brazil's big construction firms are involved: Odebrecht, Andrade Gutierrez, OAS Group, Camargo Correa, among other companies. Construction companies outside Brazil collaborating in Odebrecht projects have also been implicated (for instance, Graña and Montero in Peru). The conviction of Marcelo Odebrecht, CEO of Brazil's largest construction firm, set off a chain of investigations into corruption and influence peddling across Latin America. The privileged status of some Brazilian politicians has, however, made it difficult for the investigations to proceed. President Temer is also the subject of investigation (126).

Brazilian construction firms played an outsized role in financing infrastructure projects throughout the Amazon Basin. As contractors, they have been key beneficiaries of IIRSA/COSIPLAN projects and BNDES financing arrangements (127). In some countries, such as Peru, subsequent investigations have identified 24 contracts with Odebrecht that were negotiated by Peruvian Presidents Toledo, Humala and García as being part of this network of corruption (128). President Pablo Pedro Kuczynski resigned in March 2018 after videos emerged of his political allies engaged in vote buying linked to the Odebrecht scandal.

Along with infrastructure and civil engineering companies, Petrobras was investigated in Brazil and in the United States for bribery and money laundering. (The investigation centers on alleged collusion between Petrobras officials and 16 companies that were awarded contracts and then overcharged Petrobras for construction and service work in exchange for bribes and kickbacks) The total amount of money involved is estimated to be \$6-8 billion. The Lava Jato scandal started with the arrest in March 2014 of Paulo Roberto Costa, head of refining operations for Petrobras (2004–2012), who was accused of money laundering. The scandal escalated with allegations of direct government involvement. It has led to multiple arrests, and the resignation of the CEO, Maria das Graças Foster, a close associate of former President Dilma Rousseff.

With litigation pending, the company's auditor would not certify Petrobras' financial statements, which has kept the company from accessing international capital markets, compounding the company's problems that have partly resulted from falling oil prices. The corruption scandal has altered Petrobras' investment plans in Brazil's oil industry, and instead of increased investments, the company was forced to undertake a sizeable divestment plan in order to raise funds. Presumably, among the implications of this fall-out from Lava Jato will be that Petrobras investments will slow down, but non-Petrobras investment in the sector will increase as Petrobras assets are sold or the company enters joint investment arrangements. In a similar vein, transnational enterprise (especially from China) has begun to acquire troubled civil engineering and energy companies caught up in these scandals.

While evidence of corruption in hydrocarbon and infrastructure companies has become public, it is also the case that half of the 34 federal representatives on the committee responsible for drafting the new Mining Code receive campaign contributions from mining companies (129).

There is also evidence of corruption related to ASGM. The Global Initiative Against Transnational Organized Crime notes that illegal gold mining is a major challenge across the Amazon basin (89). They report the percentage of extracted gold that is mined illegally: 28 percent in Peru, 30 percent in Bolivia, 77 percent in Ecuador, 80 percent in Colombia, and between 80-90 percent in Venezuela. They estimate that the value of gold exports now exceeds the value of cocaine exports in the region. Sustained high prices for gold, poverty and the presence of organized smuggling networks mean that illegal gold mining will continue to flourish.

Illegal gold mining presents unique challenges to forest preservation. Historically, some countries promoted artisanal mining. Migrant families argue that if transnational firms can extract the nation's mineral riches, then they too should be allowed to extract some to sustain their families. In Bolivia, the expansion of small-scale gold mining in the form of cooperatives has enjoyed the support of the Morales government. While many such miners simply seek livelihood opportunities, in some locations, ASGM is also caught up with money laundering and other illicit activity, and some of these areas are only marginally governed by state authorities (89, 130, 131). In other cases, ASGM leaders become part of the state through the electoral process, and there are allegations of ASGM money affecting presidential campaigns. In Peru, the government has stepped up enforcement and removed ASGM families from protected areas, but the challenge of enforcement is severe. Authorities confronting illegal mining can face intimidation and violence. The Director of Brazil's Environmental Agency, IBAMA, says that his agency's vehicles are regularly torched. Following a crackdown on illegal mining along the Madeira River (State of Amazonas) a local IBAMA office was burned down (132).

Impacts on protected area and forest governance

Earlier sections have noted the many efforts to allow new subsoil extraction within protected areas, whether through PADDD events or changes in national legislation or policy. We

discussed these reforms as drivers of increased investment, but they are also a consequence of the power exercised by those who control or benefit from this investment. In this sense, these changes also constitute an impact on the governance of forests in areas that were previously protected. As such they are a direct threat to the protections that had previously been secured through decades of work by governments and social organizations to forge and sustain a basin-wide network of conservation areas and Indigenous territories whose existence reduces deforestation.

Likewise, the extension of concessions for mining, oil and gas exploration into forest and conservation areas creates a change in their governance because these concessions introduce new rights and interest into these areas. While maps of these concessions overstate the current footprint and direct environmental impact of extractive industry, they are indicators of the level of speculative activity, the spatial distribution of resource extraction that governments intend to pursue, and the areas where planned or anticipated expansion of EII could lead to social disruption and conflict. And while figures related to the extent of concessions should be handled with caution, when combined with recent policy reforms, political transitions (Brazil, Peru), the likely increase in extractive industry investment in Venezuela, and the resource extraction possibilities opened up (and perhaps required by) the Colombian peace process, such data and other projections suggest that threats to forest cover are real.

E. Responses to EII impacts on forests and communities

The actual and potential impacts of resource extraction and infrastructure on forest cover and community rights have elicited responses from both governmental and non-governmental actors. While parts of government have actively attempted to promote EII investments, other offices within the public sector have sought to deal with the adverse consequences of these investments. The following discussion is not exhaustive but is intended to give a sense of the existing initiatives on which efforts to increase forest and rights protection might be built.

National and Sub-national Government Responses

Recognizing that extractive activities can impose burdens on and affect the rights of forest-based peoples and that extraction must be sustainable, governments have adopted a range of environmental and social protections such as environmental impact assessments, land use planning, creation of protected areas, Indigenous land titling, free, prior and informed consent, and participatory socio-environmental monitoring schemes among others. They have established or expanded the responsibilities of environmental governance institutions to review and approve environmental assessments and to monitor and sanction EII projects. In practice, however, enforcement capacity often remains weak, and as noted in prior sections, some of these responses are now under pressure and being diluted.

That said, there are important offices, agencies and initiatives within Amazonian governments that are addressing deforestation and rights violations in important ways. Across the region, Human Rights Ombudsperson offices conduct investigations into violations linked to EII. They have actively defended the human rights of Indigenous populations and identified deficiencies in proposed investments. However, in recent years these offices have been the target of political pressure under governments of different orientations (e.g. Bolivia, Ecuador, and Peru).

In Brazil, the Public Ministry (Ministério Público Federal, MPF) is an independent, fourth branch of the government with offices in all 27 states. The work of public prosecutors is dictated by the jurisdiction of the court in which they work (i.e. lower courts, appellate courts and superior courts). The MPF investigates, files criminal charges and brings cases to trial. The Ministry has a special focus to improve coordination among state actors to enforce environmental regulations in the Legal Amazon (Amazônia Protege). In recent years, they have been involved in high profile cases involving human rights violations linked to infrastructure and extractive projects. MPF attorneys were participants in the Munduruku Assemblies (Tapajós) to explain the international Convention on Indigenous and Tribal Peoples, ILO 169 (1989) and the free, prior and informed consent (FPIC) process. They played an important role in creating a protocol for consultation.

Across the Amazon countries, special government agencies and Ministries dedicated to Indigenous peoples' issues have focused on legal recognition of Indigenous territories as well as advancing Indigenous rights to FPIC processes. All countries have signed the ILO Convention 169, though only Peru has a law and supporting legislation to operationalize consultation processes.⁵³ Consultation processes are applied irregularly across the region and not all eligible groups have access to FPIC processes. For example, in Bolivia consultation is included in the Hydrocarbons Law and is conducted for hydrocarbons projects, but is not included in the new Mining Code (2014) and is applied irregularly to infrastructure projects. In Brazil, Indigenous and *quilombola* communities do not have adequate access to consultation processes.⁵⁴ In Colombia, consultation processes are led by companies but appear to have expanded opportunities for the public to participate in conversations about extractive industry. Across the region there is wide scope for expanding and improving FPIC processes, especially the capacity of Indigenous and other traditional forest-based populations to participate effectively.

In Brazil, FUNAI (The National Indian Foundation) is a public agency located in the Ministry of Justice and responsible for promoting and defending Indigenous rights according to the Brazilian Constitution. The agency's most important and controversial function is the demarcation, titling and protection of Indigenous territories. Given that the majority of Indigenous groups and territories are found in the Legal Amazon, FUNAI is a key actor in forest protection and defense of rights. FUNAI also coordinates other government agencies (and with

⁵³ Law No. 29785 (2011) and its implementing legislation (2012)

⁵⁴ A recent Due Process Legal Foundation (DPLF) and Network for Cooperation in the Amazon (RCA) Report found that the Brazilian government's actions are not consistent with Indigenous and traditional peoples' right to FPIC, especially with respect to the implementation of large-scale projects (133).

other governments) about potential impacts of development projects and extractive investments on Indigenous peoples, in particular around the environmental licensing process. FUNAI has a special unit to protect non-contact and initial contact Indigenous populations and oversees 14 million hectares of territory on their behalf (134). In 2016, the Brazilian government reduced FUNAI's budget and there has been controversy over the government's commitment to protecting Indigenous rights (see references to the UN Special Rapporteur's comments in Section D).

Governments have created an array of special funds, some using resources from extractive industry activity, to support Indigenous populations and local development. Funds focused on addressing deforestation are less prominent. One exception is the Amazon Fund (Fundo Amazônia), created in 2008 after the Norwegian government committed \$1 billion to support government actions to contain deforestation with payments based upon confirmed results. The Brazilian National Development Bank (BNDES) administers the Fund and serves as the financial institution responsible for mobilizing financial resources on behalf of the Fund. The purpose of the fund is to support efforts to curb deforestation, promote sustainable use of forests and biodiversity conservation, and support reforestation activities in the Amazon biome (including other Amazonian countries). The fund supports projects from all levels of government, as well as universities, public and private companies and civil society. As of June 2018, the Fund supported 100 projects for a total of R1.8 billion (135). In June 2017, the government of Norway threatened to cut funding to the Amazon Fund if increases in rates of deforestation in the Legal Amazon continued.

Grassroots and rights-based responses, and civil society organizations and networks

Grassroots-based social mobilization continues and has been a driver of governance changes in public policy as well as policy changes in private companies. As a general pattern, in the Andes-Amazon countries, extraction has induced more social mobilization than infrastructure whereas in the Legal Amazon infrastructure projects, especially around hydropower, have induced more mobilization. The reasons for this difference may be linked to the long-term presence of industrial mining in the region and the fact that extractive companies such as Petrobras and Companhia Vale do Doce (CVRD), were state-owned companies when they established their presence in the Amazon.

Grassroots organizations and communities are on the front line of socio-environmental conflict linked to expanding extractive activity and large-scale development in the Amazon region. Either through representative organizations such as the Interethnic Association for the Development of the Peruvian Rainforest (AIDSEP) or the Coordinator of Indigenous Organizations of the Amazon River Basin (COICA), Indigenous groups seek to inform the public about threats to forests, territory and livelihoods from legal and illegal extraction. Region-wide forums and strong international contacts, including with international media, have helped to disseminate information on the impacts of ongoing projects and send out alerts about unfolding threats. In

some cases, international response has forced governments to act or reverse policy decisions, as in the case of RENCA in Brazil (see Section B).

Indigenous groups directly impacted by large-scale infrastructure and extractives have not waited for the government to introduce consultation mechanisms. Both the Wajãpi (Amapá) and the Munduruku (Pará), for instance, have been proactive and prepared their own consultation protocols in relation to proposed dam building in the Tapajós river basin. Elsewhere in the Legal Amazon, forest-based communities impacted by extraction, such as *quilombolam ribeirinho* and agrarian communities in Oriximiná (PA), have come together to form coalitions to strengthen land rights and community-based forest management practices. Indigenous groups in Maranhão train Indigenous forest guards to keep out illegal timber and charcoal extraction. Indigenous groups also collaborate in forest monitoring schemes to report gold mining and logging hotspots within their territories.

Two broader social movements have emerged around resistance to the expansion of large-scale mining and to defend land and territory: the National Committee in Defense of Territories Affected by Mining (*Comitê Nacional em Defesa dos Territórios frente à Mineração, CNDTM*); and the National Movement for Popular Sovereignty Against Mining (*Movimento Nacional pela Soberania Popular Frente a Mineração, MAM*). MAM brings together communities affected by mining from 16 different states. The CNDTM brings together diverse civil society organizations⁵⁵ and has been active, for example, in advocacy around reforms to Brazil's mining code, maintaining that the new bill must establish areas free of mineral extraction as part of land use planning (*zoneamento territorial*), include guarantees to encourage accident prevention, and ensure adequate plans for mine closure. They also insist that companies respect the rights of communities to be consulted, especially Indigenous and *quilombola* communities, in accord with International Convention ILO169, as well as the right to say no to projects.

There are many important local, national and continent-wide networks of grassroots activists and communities working at the crossroads of extractive industry, human rights, forest conservation, environmental contamination and social justice. These are often thinly supported as they work under the radar of most donors and international alliances. Often referred to as environmental defenders, these individuals and groups are highly vulnerable to acts of intimidation and violence (136).

Grassroots and larger movement responses to resource extraction and infrastructure development both involve and are complemented by a range of nongovernmental and networked responses. These are too numerous to note exhaustively here, though of particular interest is the number of networks and alliances organized around these issues – ranging from the more contentious to the more reformist. COICA works across the Amazon basin and remains the most important platform for coordinated, networked Indigenous responses to EII-

⁵⁵ Including the MST, the Pastoral Land Commission (CPT), the National Bishops' Confederation of Brazil (CNBB), the Movement for Mine Affected People, IBASE, ISA, INESC, Justiça nos Trilhos, FASE, the National Coordinator of Quilombola Communities (CONAQ) and the Articulation of Indigenous Peoples of Brazil (APIB).

driven forest loss with a capacity to project issues to wider audiences, including the United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP) process. Other relevant networks include: the Brazilian Coalition on Climate, Forests and Agriculture (an alliance of business and environmental groups), the Regional Coalition for Transparency and Participation, the Brazilian Network for Environmental Justice, the Coalition on Mining and Steelmaking Working Group, the International Network of Peoples Affected by Vale, and the Movement of Dam Impacted Peoples (MAB).

More specialized coalitions have formed around specific issues and respond to mounting investment pressures, particularly to serve as watchdogs of investments in infrastructure development financed by international financial institutions (e.g. *IFIs en la Mira*), and to promote civic participation (Coalición Regional de la Transparencia y Participación⁵⁶ and GREFI)⁵⁷ In the early 2000s, the Bank Information Center created the BICECA program to track infrastructure development linked to IIRSA and disseminate information about investments across the Amazon region (137). The initiative gave rise to a regional coordination effort, the Articulación IIRSA, bringing together representatives to share and analyze information about potential trends and specific projects. The representatives also worked to strengthen IIRSA platforms in their respective countries. The coordination ended when project funding dried up. Indeed, many networks and coordinated initiatives are endangered by a combination of limited funding, domestic political pressures, and difficulties in responding to changing circumstances and needs. For regional networks, greater clarity in common, regional objectives can produce better results. National networks need support to forge relationships and build common agendas that identify priorities and avoid dilution of efforts and resources. In some countries, governments have closed civic space and threatened organizations who criticize government policy with closure. In certain situations, grassroots groups and civil society have joined forces to pursue strategic litigation and raise issues of human rights and environmental contamination linked to extraction (e.g. Chevron- Sarayaku in Ecuador; Oxy-U'wa in Colombia; Curinico, Morona y Chiriaco in Peru).

Research Institutes, Networks and Observatories

Understanding localized impacts of infrastructure projects through to interpreting how global phenomenon are transforming Amazonian forests is key to tracking the extent of forest loss and rights violations, better understanding the complexity of drivers in different sub-regions, and developing evidence-based interpretations of both adverse and positive impacts of particular investments. Research and dissemination have been fundamental to informed advocacy and policy debates. In preparing this report, we have seen how the work of certain individuals and

⁵⁶ DAR from Peru, Cedla from Bolivia, Conectas from Brazil and Ambiente & Sociedad from Colombia are members of Coalición por la Transparencia y Participación, monitoring extractives and infrastructure projects and policies in Amazon Rainforests. <https://coalicionregional.net/>

⁵⁷ DAR, FUNDAR; Ambiente y Sociedad and FUNDEPS are members of Grupo Regional sobre Financiamiento e Infraestructura, monitoring infrastructure investments in Latino American Region. <http://grefi.info/es/inicio/>

institutions has informed debates about the social and environmental impacts of EII activities in the Amazon basin. In academic research, Laurance's work on road and highway building, Fearnside's multi-decade analysis of dams, hydropower plants and industrial scale mining, and in the Andes-Amazon (138), Finer's mapping and monitoring work on hydrocarbons, dam-building, and small-scale gold mining all provide strong arguments for the need to address extraction and infrastructure development in the Amazon basin. In a more non-governmental research realm, the Instituto Socioambiental's work on mining and Indigenous peoples and RAISG's mapping and analytical work have been vitally important sources of information for a wide range of actors. RAISG's work is an international point of reference. These cartographic products have also played an important role in fostering public discussion and debate.

There is also much scope for initiatives combining non-government and academic analysis. In such work, access to remote sensing technologies and data has been vitally important. As one example among many, SarVision (<http://sarvision.nl/>), linked to the University of Wageningen in the Netherlands, tracks mining and forest clearance using an innovative combination of satellite imagery and radar to detect small-scale mining activity in the Guiana Shield.

Two other centers of knowledge production merit note. The Group on Politics, Economics, Mining, Environment and Society (Grupo Política, Economia, Mineração, Ambiente e Sociedade, PoEMAS: <http://www.ufjf.br/poemas/>), linked to the Universidade Federal de Juiz de Fora (UFJF), is a multi-disciplinary group of researchers and students (economists, geographers, sociologists and public policy) working on the environmental and social impacts of global production networks linked to industrial mining. In addition to research, the group conducts outreach work with NGOs, social movements, labor organizations and community groups to discuss the impacts of mineral extraction. These academic-community partnerships seek to contribute to a critical understanding of development models based on natural resource extraction. (The list of references at the end of this report includes a number of relevant works produced by PoEMAS).

The Observatory of the Pre-Salts and Mineral Extractive Industry (*Observatório do Pré-sal e da Indústria Extrativa Mineral*) brings together a series of initiatives pursued by IBASE with the support of NRGi/Revenue Watch Latin America (and connecting this work to other NRGi initiatives in Latin America). The Observatory has a valuable web-page that houses information on legislation, research, and case studies etc. In 2013, IBASE launched its publication "Mapping Mines" ("Mapas das Minas") which grew out of a mapping research project supported by the Ford Foundation. This work seeks to interpret specific territorial conflicts over Indigenous, conservation and family farming areas within the broader context of the dynamics of the mining industry, infrastructural development, and transport integration. Another interesting initiative of the Observatory was the development of a proposal for the Mining Social and Community Fund of Brazil (Fundo Social e Comunitário da Mineração no Brasil) (139).

Finally, investigative journalism has focused public attention on the growing social and environmental impacts of extractive and infrastructure projects in Amazon basin countries. A steady flow of articles has been appearing in mainstream news media – in print, on the radio, on television and via social media. This coverage has been extremely important in bringing

attention to human rights violations and protecting the work of environmental leaders and advocates who are under increasing pressure.

These different initiatives draw attention to the centrality of knowledge production, analysis and communication in efforts to affect policy and public debates related to extractives, infrastructure, forests and community rights.

International organizations and philanthropy

International human rights organizations have been steadfast in their pressure on governments to respect international conventions and commitments to safeguarding vulnerable populations, and in particular Indigenous and traditional peoples.

The Inter-American Commission on Human Rights (IACHR) is an important actor and has on many occasions issued precautionary measures in support of Indigenous groups threatened by investments. In 2011, the Juruna people of Brazil successfully sought protection from the construction of the Belo Monte Dam. In this case, the IACHR measures raised concern around the lack of adequate and prior consultation, the lack of access to EIAs, and the need to protect Indigenous peoples' lives and lands.⁵⁸

In March 2016, UN Special Rapporteur on the Rights of Indigenous Peoples Victoria Tauli-Corpuz travelled to Brazil to meet with dozens of representatives of Indigenous Peoples organizations. The meetings brought forward a range of concerns regarding: the government's stalled efforts to demarcate Indigenous lands; the impacts of agribusiness expansion; the lack of FPIC processes linked to planned large-scale infrastructure projects; the government's failure to staff and fund FUNAI; and the lack of progress on issues raised in Special Rapporteur James Anaya's report of 2008. Following her visit, Tauli-Corpuz, joined by Special Rapporteurs on Human Rights Defenders Michel Forst, and Environment John Knox, and IACHR Rapporteur Francisco José Eguiguren Praeli issued a joint statement publicly claiming that "the rights of Indigenous peoples and environmental rights are under direct attack" (see Section D).

International donors have longstanding programs in the Amazon basin. This includes the work of CLUA members, the MacArthur Foundation's historical focus on biodiversity conservation, the Mott Foundation's longstanding work on IFI lending on energy and infrastructure, and the Rainforest Foundation's work on Indigenous rights. Other funders include the Andes-Amazon Fund, Rainforest Norway, etc. Much funding for work on deforestation in the Amazon has focused on the Brazilian Legal Amazon with fewer resources available to produce information, analysis and awareness in other Amazon regions. International donor organizations are in an especially good position to support more cross border work and analysis of drivers of deforestation and degradation that reach across the Amazon.

⁵⁸ Perhaps reflecting the Brazilian government's increasing hostile attitude toward the IACHR, the project received the necessary permissions to proceed.

The Extractive Industries Transparency Initiative (EITI) is a global initiative to create non-binding standards to support good governance of oil, gas and mineral resources. The initiative requires countries to make public a range of information regarding revenues collected, licensing processes, taxes paid by companies, and allocation of revenues to sub-national levels of government. Of the six countries in this study, only Peru and Colombia are members of EITI. However, EITI has yet to make much progress in including forest cover and human rights issues in its reporting processes.

F. Summary of findings

Historically, the impacts of extractive industry on forest loss and forest degradation in Amazonia have been limited. The principal exceptions have been industrial mining in eastern Brazil, small-scale mining in south-eastern Peru and parts of Brazil, and oil extraction in the Putumayo, Oriente, and Marañon basins of southern Colombia, eastern Ecuador and northern Peru where the impacts of extractive activity have extended far beyond the footprint of the mine or the oil and gas well. In contrast, large-scale infrastructure development, in particular road building and hydropower, have induced human settlement, forest clearance and an aggressive expansion of the agricultural frontier across substantial parts of Amazonia. The synergies between agriculture and infrastructure are important, particularly in the Legal Amazon. The scale of future changes in forest cover will depend on where and how infrastructure investments move forward.

While individual EII projects may not appear to pose significant risk of forest loss, taken together from a basin-wide optic, the combined effects of EII investments have the potential to catalyze significant human settlement and forest clearance. Examples of these powerful synergies can be found in Madre de Dios, Peru with the construction of the Southern Inter-Oceanic Highway and the surge in ASGM in the region; in the Xingu River basin between hydropower and mining; and in the Tapajós River basin between dam building, waterway and road construction and gold mining. In cases such as these, infrastructure renders extractive industry investment more feasible, while the potential for extractive industry activity further enhances the financial case for infrastructure. Maps of planned investments in roads, waterways and rail, together with the geographical distribution of applications for mining licenses and proposed hydrocarbon lots, suggest that the potential for future synergies across more parts of the basin is real and significant. The expansion of infrastructure into remote areas is of particular concern because it can lead to secondary roads, logging, land speculation and chaotic settlement. The existence of trunk roads also facilitates the entrance of other forms of investment by reducing transportation costs.

ASGM is both a current and increasing threat to forests and freshwater aquatic systems as new, primarily gold frontiers are identified. Such mining is associated with illegal and unplanned roads that can contribute to forest loss and encroachments into protected areas including Indigenous territories. The environmental damage provoked by uncontrolled mining activity, including soil and water contamination, persists over time. Understanding the presence of small-scale mining and impacts on forest and water resources across Amazonia is urgent. New technologies offer

opportunities for forest-based communities to monitor activities and discourage illegal activities. It is also important to recognize that some members of these communities are themselves involved in such mining.

While investments in industrial mineral extraction and hydrocarbons will depend on international commodity prices, foreign direct investment, and whether private companies will successfully gain subsoil rights under currently protected areas, there is little doubt that Amazonia contains significant hydrocarbon reserves and deposits of iron ore, bauxite, copper, and gold in addition to a range of other minerals. Chinese investment in mineral (copper and iron ore) and oil concessions is strong. In the wake of the Lava Jato scandal, Chinese interests are looking not only to invest in infrastructure projects linked to priority commodities it needs but also to buy up the distressed assets of Brazilian construction firms.

Maps of concessions reflect significant overlaps with Indigenous territories, national parks and other regimes of protected areas which will likely give rise to new rounds of socio-environmental conflict. Special interest groups will continue to pressure governments to roll back environmental and social protections which they argue are overly bureaucratic and obstacles to achieving national development goals. PADDD events are likely to increase. Governments, responding to political or economic pressures or a combination of both, will invoke national security or public interest arguments to override protections and fast track investments.

Lack of access to information about EII concessions and contracts, and the constant shifting of plans and projects, as well as frequent mergers and acquisitions among companies, makes identifying and analyzing the combined impacts of EII extraordinarily difficult. Nonetheless, the various mapping, observatory and coordinated advocacy efforts of some actors have provided important timely information in support of the defense of forests and of community rights.

The erosion of rights of forest peoples is of growing concern. In addition to resource tenure and livelihood rights, EII investments almost always raise human rights concerns given the frequency of overlaps between concessions, Indigenous and traditional peoples and other forest-based communities. The lack of information and adequate consultation processes in a context in which protest is increasingly criminalized and threats of violence are frequent, has drawn the attention of international human rights organizations. Among global ecoregions, Amazonia has seen by far the most killings of environmental defenders.

The efforts of public and private organizations to respond to forest loss and threats to community rights are diverse and evolving. Efforts to stem forest loss have largely focused on pursuing carrot and stick initiatives around logging, limiting agricultural expansion, land titling and territorial recognition, and engaging with actors along commodity chains. With respect to EII, efforts have tended to focus on a single high-profile project or set of proposed investments within a sector. Rarely have responses taken up the potential synergies between investments in hydropower, roads and mines and potential impacts on forests and forest-based peoples. Indeed, much of the focus of understanding potential EII impacts has been centered on the Legal Amazon with less exploration of how regional integration initiatives drive investment elsewhere, especially in remote border regions of the Western Amazon.

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Appendix 1: Key Highway and Rail investments in Amazonia

Highway/Railway	Country	Comments
BR-163	Brazil (Mato Grosso, Pará, Amazonas)	The existing highway will be upgraded and paved as part of the COSIPLAN multi-modal (road and waterway) soy export corridor. Increased highway traffic will pressure Jamanxim National Forest (now partially protected but recent policy changes leave area open to EI activities) and the territory of the Kayapó Mekrãnoti. This is a key piece of the road network, reducing transport costs of local soy growers in central-west/northern region of Brazil. BR 163 connects to highway BR-230 ⁵⁹
BR-319	Brazil (Trans Amazon Highway)	The existing Porto Velho-Manaus highway, 870 km long, is considered a future deforestation hotspot. Plans are to upgrade and pave the road. Once paved, the road would open up large areas for settlement and facilitate illegal gold mining and logging and land speculation. The highway will link to BR-174 (see below) which runs from Manaus north to Brazil's border with Venezuela.
BR-364	Brazil (Acre, Rondônia)	The existing Rio Branco-Cruzeiro do Sul highway will be upgraded and paved with funding from the National Department of Transportation (DNIT) and the State of Acre. First constructed in 1970s, highway upgrades will expand tourism and agro industry activities, and improve the regional transport system. ⁶⁰ In 2016, DNIT signed 10 contracts for road maintenance and services. ⁶¹
Corredor Reposo (multi-modal)	Peru	The corridor El Reposo-Puente Nieva-Saramiriza, Puente Wawico-Santa María de Nieva-Saramiriza and Juan Velasco Alvarado-Nuevo Seasmí is part of a multi-modal IIRSA axis connecting Pacific ocean ports with Brazil's Atlantic ports via the Marañón and Amazonas rivers. Construction and improvements to the system began in 2013 and are projected to continue through 2018. ^{62,63}
BR-174	Brazil (Amazonas/Roraima) and Venezuela	The Caracas-Manaus Highway is a massive longitudinal highway project. The highway intersects an Indigenous reserve (Roraima) and led to a series of conflicts.

⁵⁹ http://www.iirsa.org/proyectos/detalle_proyecto.aspx?h=34

⁶⁰ http://www.iirsa.org/proyectos/detalle_proyecto.aspx?h=920

⁶¹ <http://www3.transparencia.gov.br/jsp/licitacoes/licitacaoBuscaAvancada.jsf>

⁶² http://www.iirsa.org/proyectos/detalle_proyecto.aspx?h=20

⁶³ http://www.mtc.gob.pe/transportes/caminos/normas_carreteras/obras_mapas/Amazonas.pdf

Highway/Railway	Country	Comments
		Maintenance connecting BR-174 in southern Amazonas through Manaus, to BR-401, to Macro BV-8 at border of Venezuela. ⁶⁴ Connects to smaller segment near Venezuelan border, BR-432, maintenance in 2016 ⁶⁵
Marginal de la Selva Highway	Colombia, Ecuador, Venezuela	A proposed \$1 billion highway project, financed with IFI monies, would pave road connecting the three countries. The highway forms part of Colombia's Intermodal Transport Plan. It creates a land passage connecting Atlantic and Pacific ports via the Colombian Amazon, avoiding the Andes mountains. Most of the road is complete except for a section between national parks. ⁶⁶ Potential impacts to the Chiribiquete Natural National Park and the Macarena National Park are significant. Satellite imagery confirms area as deforestation hotspot. ⁶⁷
Integration of Northern Bolivian Amazon Region	Bolivia	The Bolivian government announced a series of highway investments to integrate the northern Amazon region with the rest of the country. The proposed \$2,000 million in investments will channel significant resources for road building, bridges, and management plans. ⁶⁸ The three proposed longitudinal roads include Apolo-Ixiamas-Tumupasa-Chivé-Porvenir (La Paz-Pando); Trinidad-La Moraña-Guayaramerín (Beni) and Santa Rosa de la Rica-Puerto Villazón (Santa Cruz-Beni) and impact recognized Indigenous territories and protected areas.. Funding for the highway projects is projected to come from Chinese loans.
Central Highway (Carretera Central)	Peru	Tingo María-Pucallpa Highway, a COSIPLAN project that connects to Ucayali waterway, expands capacity of bulk transport (agricultural and forest products) through Peru's Carretera Central. ⁶⁹ Highway is under construction. Lima-Ricardo Palma road, COSIPLAN project, alternative, lower-cost route for vehicles (instead of Carretera Central) improving efficiency of roads and connecting forest and mountains with central region. ⁷⁰ Road is under construction.
Proposed road connecting Pucallapa (Ucayali,	Peru, Brazil	COSIPLAN project, initial stage, China funded study to evaluate rail link instead of highway, intersects Serra do Divisor National Park, and impacts Ucayali and Jurauá river basins. ⁷¹ Project would also impact Isconhua (non-contact) population. This road could potentially link to BR 364.

⁶⁴ <http://www3.transparencia.gov.br/jsp/licitacoes/licitacaoExtrato.jsf?consulta=2&CodigoOrgao=39252&idLicitacao=2404353>

⁶⁵ <http://www3.transparencia.gov.br/jsp/licitacoes/licitacaoExtrato.jsf?consulta=2&CodigoOrgao=39252&idLicitacao=2404352>

⁶⁶ <https://news.mongabay.com/2017/06/new-highway-brings-deforestation-to-two-colombian-national-parks/>

⁶⁷ <http://maaproject.org/2018/chiribiquete-colombia/>

⁶⁸ http://www.abc.gob.bo/sites/default/files/informe_de_gestion_final_2016.pdf

http://www.la-razon.com/economia/Gobierno-destina-MM-integracion-paceno_0_2433956611.html

⁶⁹ http://www.iirsa.org/proyectos/detalle_proyecto.aspx?h=27

⁷⁰ http://www.iirsa.org/proyectos/detalle_proyecto.aspx?h=33

⁷¹ http://www.iirsa.org/proyectos/detalle_proyecto.aspx?h=29

Highway/Railway	Country	Comments
Peru) with Cruzeiro do Sul (Acre, Brazil)		
Transnordestina Railway	Brazil (States of Bahia, Pernambuco, Ceará, Piauí, Maranhão)	Phase one of the railway: Suape - Salgueiro/Pecém - Eliseu Martins is for bulk transport of agricultural and mineral commodities. Rail would connect with North-South Railway EF-151. Investment by Concessionária TLISA ⁷² Phase two (Eliseu Martins-Porto Franco). Railway EF-232, connecting states of Maranhão and Piauí, with Cerrado region designated for expansion of soy, ethanol, and corn production. ⁷³
BR-222, BR-135	Brazil (States of Maranhão, Pará, Ceará, Piauí)	Upgrade highways for transport of goods to the port of Itaqui , BR-222 starts in Fortaleza (CE) and ends in Marabá (PA), crossing states of Piauí and Maranhão ⁷⁴
BR-230	Brazil (States of Maranhão, Pará)	Highway linking Balsas (MA) to Marabá (PA) and Marabá (PA) to Itaituba (PA). ⁷⁵ Contracts to LCM Trade and Construction (2016-2018) to maintain segment BR-153 (B) / 222 / PA-150 (Marabá) -Rio Cajazeiras and to pave segment from Tapajós River ^{76,77}
BR 163	Brazil Sinop (MT) – Itaituba (PA)	Concession for highway BR 163 (2016-2020). Project will improve 976 km highway linking center of soy production with northern ports in Pará. ⁷⁸

⁷² http://www.iirsa.org/proyectos/detalle_proyecto.aspx?h=1376

⁷³ http://www.iirsa.org/proyectos/detalle_proyecto.aspx?h=1379

⁷⁴ http://www.iirsa.org/proyectos/detalle_proyecto.aspx?h=1387

⁷⁵ http://www.iirsa.org/proyectos/detalle_proyecto.aspx?h=1389, http://www.iirsa.org/proyectos/detalle_proyecto.aspx?h=1388

⁷⁶ <http://www3.transparencia.gov.br/jsp/contratos/contratoExtrato.jsf?consulta=3&CodigoOrgao=39252&idContrato=494502>

⁷⁷ <http://www3.transparencia.gov.br/jsp/contratos/contratoExtrato.jsf?consulta=3&CodigoOrgao=39252&idContrato=494499>

⁷⁸ “Corredor Logístico Multimodal Do Arco Norte” (May 2017).

