Seeing the Forest for More than the Trees

A Policy Strategy to Curb Deforestation and Advance Shared Prosperity in the Colombian Amazon

Timothy Cheston, Patricio Goldstein, Timothy Freeman, Alejandro Rueda-Sanz, Ricardo Hausmann, Shreyas Gadgin Matha, Sebastián Bustos, Eduardo Lora, Sarah Bui and Nidhi Rao

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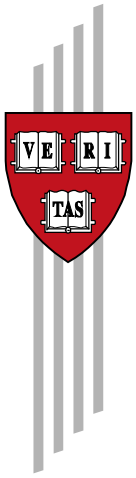

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Center for International Development at Harvard University

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Table of Contents

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Executive Summary

Does economic prosperity in the Colombian Amazon require sacrificing the forest? This research compendium of a series of studies on the Colombian Amazon finds the answer to this question is no: the perceived trade-off between economic growth and forest protection is a false dichotomy. The drivers of deforestation and prosperity are distinct – as they happen in different places. Deforestation occurs at the agricultural frontier, in destroying some of the world's most complex biodiversity by some of the least economically complex activities, particularly cattle-ranching. By contrast, the economic drivers in the Amazon are its urban areas often located far from the forest edge, including in non-forested piedmont regions. These cities offer greater economic complexity by accessing a wider range of productive capabilities in higher-income activities with little presence of those activities driving deforestation. Perhaps the most underappreciated facet of life in each of the three Amazonian regions studied, Caquetá, Guaviare, and Putumayo, is that the majority of people live in urban areas. This is a telling fact of economic geography: that even in the remote parts of the Amazon, people want to come together to live in densely populated areas. This corroborates the findings of our global research over the past two decades that prosperity results from expanding the productive capabilities available locally to diversify production to do more, and more complex, activities.

The Colombian Amazon today finds itself in the "lose-lose" scenario of high deforestation and low economic growth. The assumption that limiting the connectivity of Amazonian departments with the rest of Colombia will suffice to curb deforestation has not held: the alarming rise in deforestation recently has not been accompanied by greater economic growth. Despite the promise of rural transformation and state control over the forest with the Peace Agreement, forest loss rose to record rates, while the economy stagnated. The existing economic model in the Amazon – centered on extraction and agrarian colonization – has not generated prosperity for the people, all while failing the forest.

Deforestation in the Colombian Amazon is driven by two factors: proximity to tertiary roads and legal regimes that feature moral hazard with regard to land formalization. The majority of deforestation events occur within 2.3 km of a road. In addition, the vast majority of deforestation (90%) occurs outside of National Natural Parks (PNN) and Indigenous Territories despite the fact that they govern 59% of the land area. Despite the fact that 85% of the Colombian Amazon is under a legal status promoting environmental conservation, the same laws that provide for these protections also create a system of "subtractions" that allow for the removal of lands from the forest reserve for rural development purposes, including private use. These legal regimes governed by Forest Reserve Law of 1959 (*Ley Segunda*) introduce moral hazard in allowing for the benefits of deforestation while privately bearing none of its costs, to "deforest now, subtract later."

The low prosperity in the Colombian Amazon is driven by the lack of prosperous cities. Shared prosperity is easier to achieve in urban areas than in the forest. Public resources are being allocated in precisely the wrong direction in the Amazon, with scarce funds being spent at the most remote parts at the edge of the forest to build tertiary roads and bridges for a few families, while underinvesting in urban roads, water, sewage, and housing where the majority of people live. The solution to deforestation, as with that of creating shared prosperity, relies on generating better opportunities in cities to pull more people in from rural areas to reduce the pressure on expanding the agricultural frontier into the forest.

The cities of the Amazon are in a "connectivity trap": the lack of primary road connections with the rest of Colombia restricts the economic complexity of the Amazon and, in turn, the low complexity of the cities limits the returns to new investments. Transport costs to the rest of Colombia are

prohibitively high, even when controlling for distance. Transport routes often depend on a single route, for which any disruption (e.g., blockades) adds costs and uncertainty. This connectivity challenge adds to the underlying effects of remoteness of the Amazon, given the long distances to major markets. As a result, Amazonian cities do not export, in that they sell few things outside the city. This further limits the capacity to import those items the city does not produce.

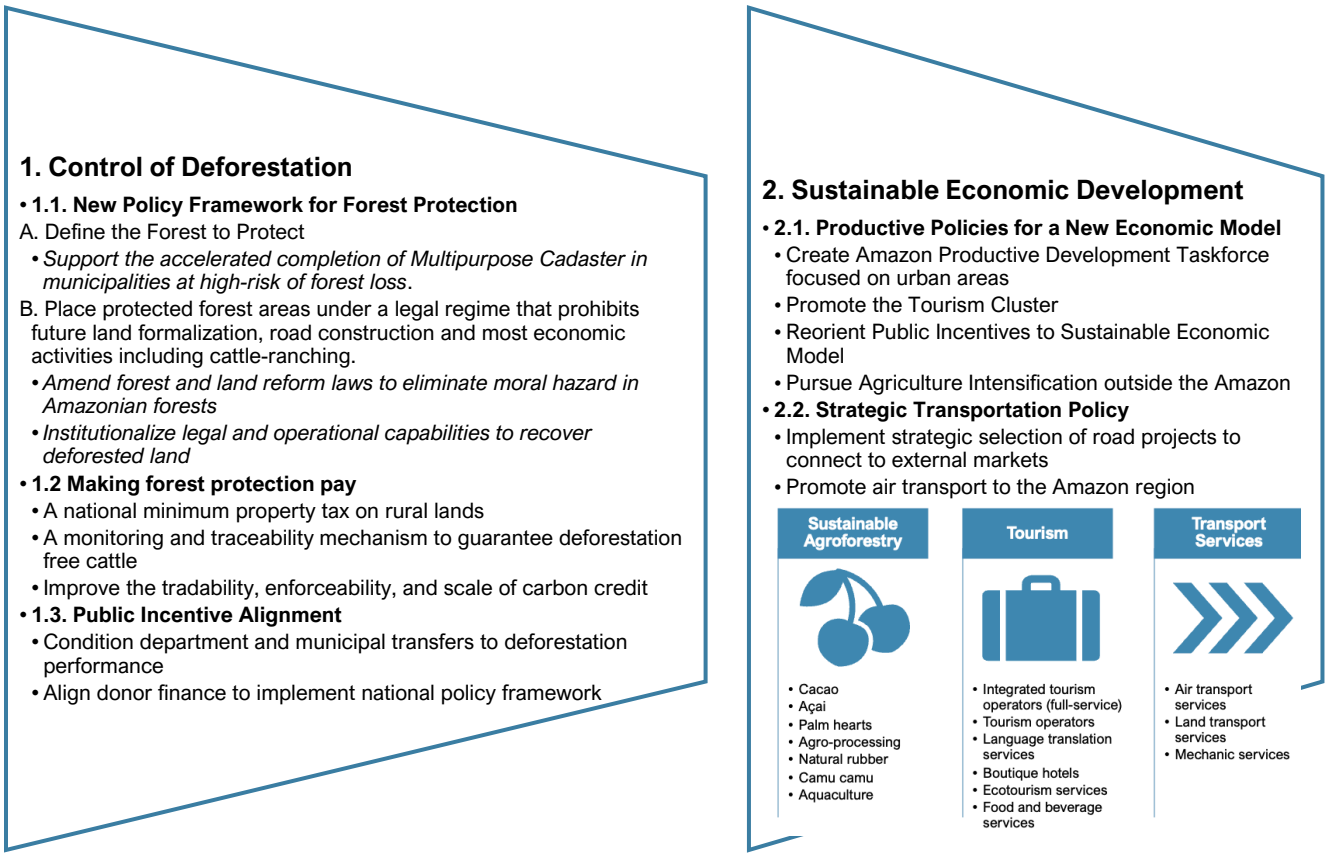
The Colombian Amazon needs a new forest protection law based on a simple premise: define the forest you wish to protect and put it under a legal regime that eliminates moral hazard. Officials should accelerate the completion of Multipurpose Cadaster in high-risk forested municipalities to define existing land use as a means to demarcate protected forest territory. The forest areas designated for protection should be placed under a legal regime that builds on the success factors of National Parks and Indigenous Territories, in prohibiting future land formalization, road construction and most economic activities including cattle-ranching. This legal regime should be supported by a coordinated approach to take legal action on, and operationally recover, land that has been illegally deforested. The law should also align incentives across levels of government to curb deforestation by conditioning departmental and municipal transfers to deforestation performance. By establishing a unified national policy framework to tackle deforestation, the government will be well-positioned to coordinate the financing of these plans with the donor community to ensure it pays for locals to protect the global public good of the Amazon.

Achieving shared prosperity in the Amazon depends on the connectivity and opportunity in its urban areas. The new forest protection law should also include a new economic strategy for the Amazon to coordinate new economic opportunity in its cities. A new pact must transition from the current extractive model to a model that finds opportunity in the forest's biodiversity and existing productive capabilities in urban areas. The strategy should be territorial across three geographies of opportunity: (i) ***in cities***, through tourism services, transport services, professional services, and agro-processing industry; (ii) ***in rural non-forested areas***, in more intensive crops and sustainable agroforestry; and (iii) ***in forest areas***, based on ecotourism, carbon markets for reforestation, and forest protection services. Achieving urban prosperity depends not only on improving the public services in cities but on enhancing the transport connectivity with other cities in Colombia and beyond. This extends beyond the control of governors in Amazonian departments, to improve the primary road infrastructure outside of their departments, as justifying the need for national-level coordination of strategic road projects that integrate environmental concerns. Inter-departmental road infrastructure is the key constraint to greater agro-processing and crop production for these departments to sell to external markets; improving the quality and service of air transport will be critical to expand tourism. The need for a coordinated approach to this economic strategy calls for the creation of an Amazon Productive Development Taskforce to coordinate national, departmental, and local government entities – as well as private and non-government organizations – to implement productive policies for the region. In the same way ProColombia aims to attract global investors to come to Colombia, so too must the Amazon Taskforce expand the local government's reach to attract investors from other parts of Colombia to come to Amazonian cities, in a way that recognizes the diversity of local productive opportunities across Amazonian departments, e.g., tourism in Chiribiquete National Park for Caquetá and Guaviare vs. professional services in Putumayo.

The ultimate promise for prosperity in the Amazon is by making forest protection pay, in realizing the potential of carbon markets. A series of "second-best" forest protection policies should aim to make forest protection more profitable than extensive cattle-ranching to create economic incentives to shift to forest protection. Reducing the viability of cattle ranching in forested areas should leverage technological solutions of tracing mechanisms to guarantee deforestation-free cattle. While reforestation is not profitable under today's carbon prices and with carbon titles that are unclear and costly to enforce, carbon prices that would transform incentives toward forest protection do exist globally ($80 per tCO2e in the European Union vs. $5 in Colombia). By

accelerating steps to make carbon credits tradable, to strengthen contractability using new technology for enforcement, and to build the necessary capabilities in reforestation, one can imagine a near future in which Colombia leads in making forest protection the preferred means to prosperity.

Figure i. Summary of Policy Options for the Colombian Amazon



1. Introduction

Colombia's Amazon rainforest is one of the richest and *most complex* areas in the planet in terms of its biodiversity; and yet, this biodiversity is currently under attack by some of the *least complex* economic activities, such as cattle-ranching. Rapid deforestation is occurring despite repeated public opinion polls laying clear that a majority of Colombians share a desire to save the forest (IPSOS 2020; 2022). Deforestation has risen despite increased attention and financial flows to the Amazonian departments after the start of the Colombian peace process. At the same time, the Amazon departments – amongst the last to be established in Colombia – remain some of the poorest and least populated in the country (Figure 1). The following report seeks to define a policy strategy to address the Amazon's dual environmental and economic challenge, by diagnosing the drivers of both deforestation and low economic development and defining policy options to achieve shared prosperity while preserving the forest.

The deforestation dynamics in Colombia have led to a perceived trade-off between economic development and the protection of the forest; our research finds this is a false dichotomy. Although economic and environmental goals are often held as incompatible in public debate, in practice, the acceleration in deforestation has not led to any convergence of economic outcomes between the Amazonian departments and the rest of the country. The expansion of cattle-ranching that has pushed the agriculture frontier into the forest is not economically complex: although it may have offered a subsistence activity to some of the region's landless peasants, it has failed to improve overall the economic development of the region.

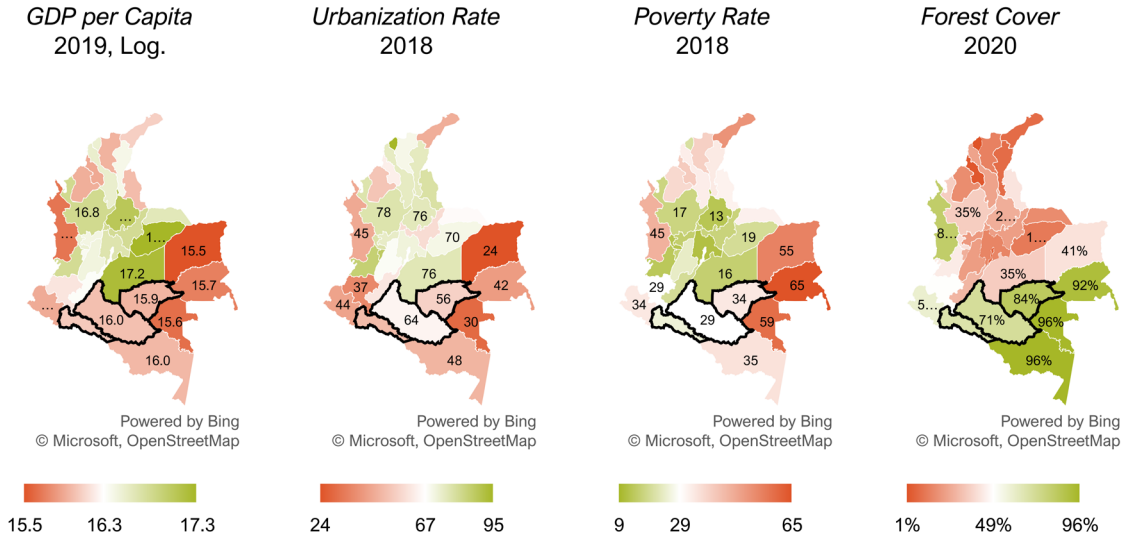
The low prosperity in the Colombian Amazon is driven by the lack of prosperous cities. Perhaps the most underappreciated facet of life in the three Amazonian departments studied is that the majority of people work in urban areas. This is a telling fact of economic geography: that even in the most remote parts of Colombia, people want to come together to live in densely populated areas. Colombians are voting with their feet, with significant population growth in Amazonian cities. Our global research finds that the secret to shared prosperity is productive knowhow – in expanding the range of specialized knowledge available, a society increases the diversity and complexity of its production. A place grows by expanding the diversity of knowhow available. To bring that scattered knowledge together in a firm, people must live near each other. Hence, cities form, affording a higher level of complexity and prosperity, and, crucially, in activities that do not sacrifice the forest.

Shared prosperity is easier to achieve in urban areas than in the forest. The lessons from economic research detail numerous paths to prosperity in cities globally but few means to generate prosperity in the forest. Consider deforestation as a flat tire: just because the tire is flat at the bottom does not mean the hole is there, or just because deforestation occurs in the forest does not mean that the solution to deforestation is to spend more resources in the forest. Rather, the solution to deforestation, as with that of creating shared prosperity, relies on generating better opportunities in cities. Public resources are being allocated in precisely the wrong direction, with scarce funds being used to build tertiary roads and bridges to a few families at the forest edge, while underinvesting in urban roads, water, sewage, and housing where the majority of people live.

In the Colombian Amazon, the forces of economic development and deforestation are largely distinct: rising deforestation is not associated with higher economic growth. If anything, the opposite relationship exists. Cities are the economic motors of the Amazon, yet It is not in these cities where deforestation is happening. This holds across the Amazon, in Florencia, Colombia, as well as it does for Manaus, Brazil, or Iquitos, Peru. By not achieving greater complexity in its cities to attract more workers, the lack of alternatives in the cities in the Colombian Amazon is putting pressure on access to land by expanding the agricultural frontier into the forest. As a result, arresting deforestation should not have to come at the cost of halting growth. In the Colombian Amazon, there is still vast room for people to live more densely to pool resources, grow markets, and diversify knowhow to enter more complex activities. Deforestation, by contrast, is happening in a different locale, off at the agricultural frontier, as an investment, often informally or illegally, to secure land rights. These distinct drivers of development and deforestation also imply the need for two types of solutions across two geographies: one set for forest conservation, and one for urban prosperity and connectivity.

Amazonian cities remain disconnected from other parts of Colombia, as weak, costly connectivity presents a central barrier to competitiveness. The growth of cities depends on its capacity to import the things it does not produce. Imports require "exports" or transfers from outside the city. What a city is able to export or sell outside the city, in both quantity and complexity of goods and services, determines the success of the city. The economic challenge in the Amazon is that its cities do not export, in that they sell few things outside the city. These cities primarily live off fiscal transfers and local public employment. Transport costs from Amazonian departments to the rest of Colombia and its ports are exceedingly high, even when controlling for distance. Transport routes often depend on a single route, for which any disruption (e.g., blockades) adds costs and uncertainty. These connectivity challenges add to the baseline effect of remoteness, or the long distances to major markets of the Amazonian cities to make them less competitive.

Figure 1. Caquetá, Guaviare, and Putumayo in Perspective



Sources: authors' elaboration based on DANE (first and third panel), CEDE (second panel) and Global Forest Watch (fourth panel). Center of scale is set at the median department.

This report defines a policy strategy to tackle the Colombian Amazon's dual challenge of detaining deforestation and promoting sustainable economic development. The report is the last of a research series aims to diagnose the drivers of development and deforestation in the Amazon departments of Caquetá, Guaviare, and Putumayo. This report summarizes the policy strategy that results from a series of previous reports, with two objectives. The first is to disentangle the complex systems at play to explain the prevailing pattern of rising deforestation. The second is to question why alternative activities, of greater complexity and higher incomes, have not arrived in the Colombian Amazon despite increased attention on (and financial flows toward) the peace process and the forest. The proposed policy strategy builds upon previous analyses on Colombia's deforestation dynamics, the binding constraints to economic growth, and opportunities for productive diversification.

This report is presented as follows. The first section synthesizes the dynamics of forest protection, to diagnose the central dimensions under which deforestation has accelerated. The next section analyzes economic dynamics to identify the binding constraints to economic growth in the Colombian Amazon. Given the high-deforestation, low-growth equilibrium in the Amazon today, the third section outlines the new environmental and economic pact required to address the existing challenges in the Amazon. The final sections detail the policy options to address the dual challenges in sequence: to curb deforestation and advance new economic opportunities under a new economic model based on the productive capabilities of the urban areas in each department.

2. The Dual Challenge of Low Growth, High Deforestation in the Colombian Amazon

The research question of this study asks how to generate greater shared prosperity in the Amazonian departments studied and to do it in such a way that does not damage the forest. This reflects the two dimensions of policy focus: to enhance economic development and to protect the forest. The goal is not to create prosperity at the expense of the forest nor to save the forest by not meeting the economic needs of the people in these departments. The framing also reflects a common perception of a trade-off between these two dimensions, namely that achieving shared prosperity in the Amazon requires sacrificing the forest. This section aims to study the two dimensions separately as to the dynamics and drivers of economic growth and deforestation, to then study their interaction.

We conclude that there is not a trade-off between greater prosperity and protecting the forest, as each element has distinct drivers and geographies; and yet, the study finds that the current paradigm is not meeting either objective, as the Amazon is stuck in a low growth, high deforestation equilibrium. The following sections elaborate on policy options to deliver on both dimensions of shared prosperity and low deforestation.

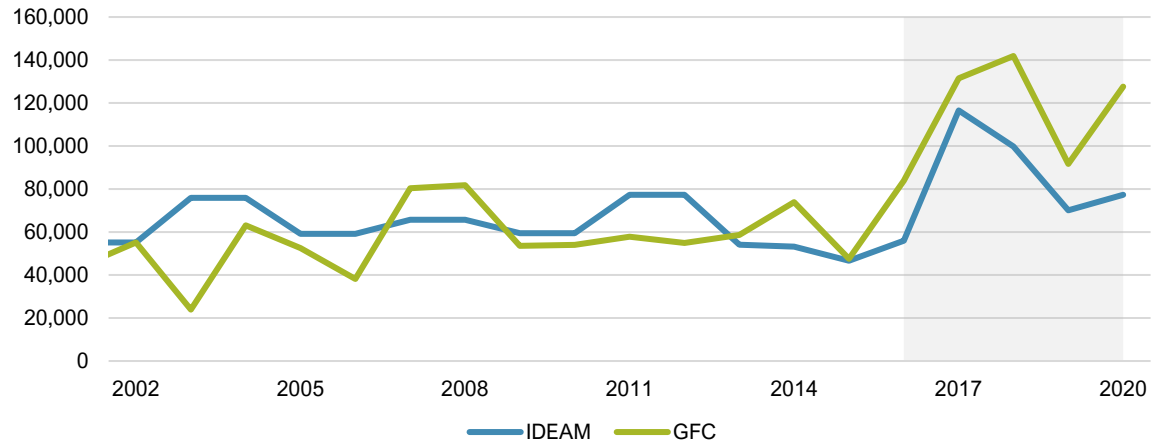
2.1. Environmental Outcomes

Deforestation has accelerated to alarming rates in the Colombian Amazon. Since 2016, deforestation rates have been higher than any year on record, according to both Global Forest Change and IDEAM satellite data (Figure 2). In IDEAM data, the deforestation peak happens in 2017, when close to 120 thousand hectares were deforested in just one year, more than twice the pre-Peace Agreement average. According to Global Forest Change figures, forest loss for

each of the last five years under the Peace Agreement has been higher than any year before peace. In both datasets, deforestation figures decline in 2019 before rising again in 2020, despite the global COVID-19 pandemic. The latest figures show alarming rates of deforestation remain in the Colombian Amazon.

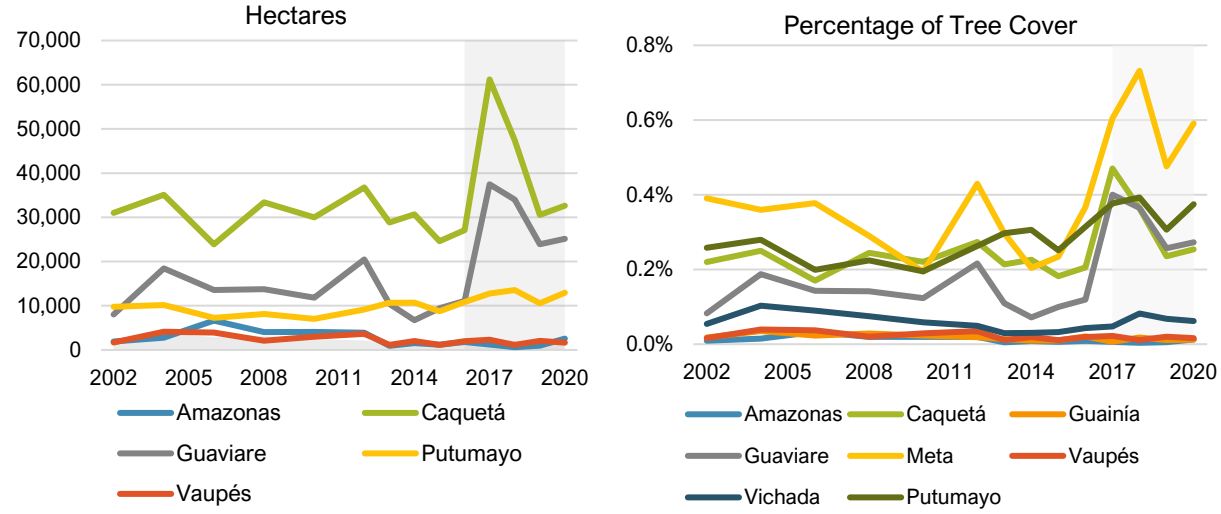
Deforestation in Colombia is not a random process happening at the same rate across all parts of the forest, but rather a highly differentiated process based on a few specific dimensions. Our research uses the approach of a differential diagnosis to identify a consistent set of signals that can isolate drivers of deforestation. Not every driver can account for the deforestation dynamics observed. For example, a significant fall in coca production was accompanied by the rise in deforestation. Similarly, a steep decline in violence occurred alongside the rise in deforestation. The reality of life with the Peace Agreement in the Colombian Amazon is that not all good things go together; but a data-driven approach to identify the drivers of deforestation can better align policy efforts to arrest deforestation.

Figure 2. Deforestation in Colombian Amazon (Hectares)



Sources: authors' elaboration based on IDEAM and Hansen Global Forest Change v1.8

Figure 3. Deforestation in Colombian Amazon by Department

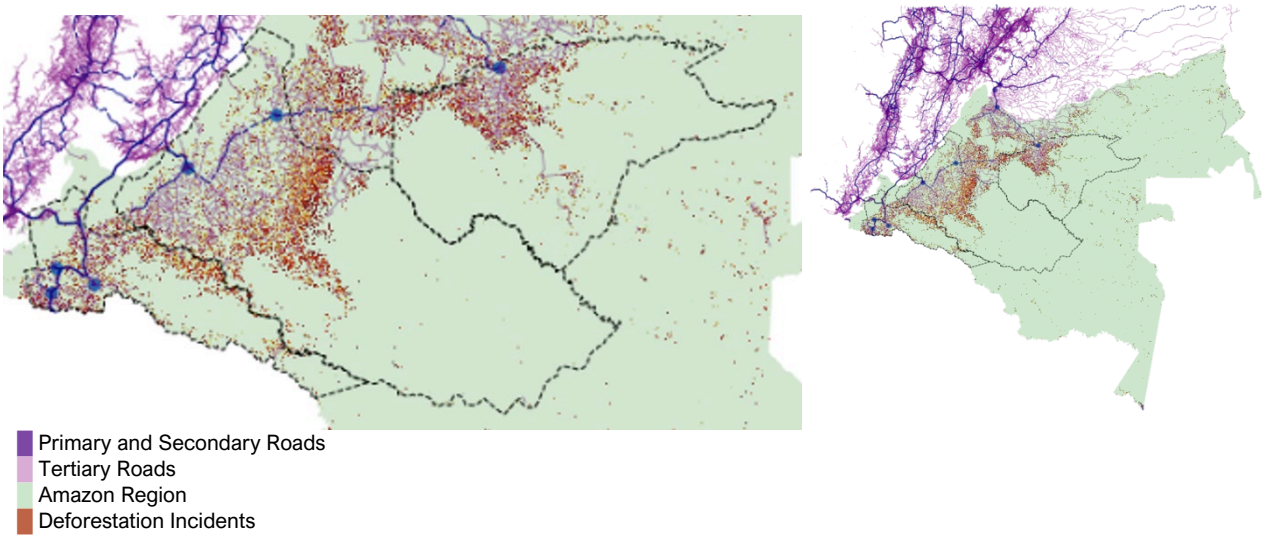


Sources: authors' elaboration based on IDEAM

Deforestation is spatially concentrated along the agriculture frontier or what is called the "arc of deforestation." As a result, deforestation is higher in Meta, Caquetá, Guaviare, and Putumayo (Figure 3). The other Amazonian departments beyond the agricultural frontier, Guainía, Amazonas, and Vaupés, have lower levels of deforestation. These deforestation dynamics are further replicated at the municipal level, as 1% of Colombia's municipalities account for 56% of forest loss. Five out of six municipalities with the highest rates of forest loss are in the three departments studied: San Vicente del Caguán and Cartagena del Chairá in Caquetá; San José del Guaviare and Calamar in Guaviare, and Puerto Guzmán in Putumayo (CONPES 2020).

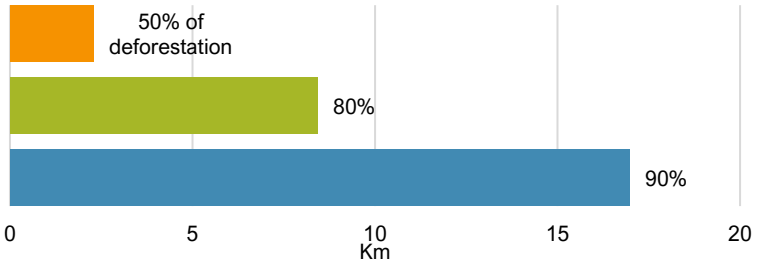
Deforestation happens in close proximity to road infrastructure, specifically tertiary roads. According to our analysis of satellite data, the majority of deforestation occurs less than 2.3 km from a road (Figure 4). Overall, 80% of deforestation incidents happen less than 8.4 km from a road (Figure 5). This is consistent with previous findings that deforestation and pasture expansions are less linked to market access or demand for beef than to investments in road infrastructure and the resulting land appreciation (Dávalos et al. 2014). The close proximity between roads and deforestation incidents is key to understand how additional public spending after the Peace Agreement may have driven new deforestation.

Figure 4. Roads and Deforestation, in CGP and larger region



Source: authors' elaboration based on OpenStreetMap and Hansen Global Forest Change v1.8

Figure 5. Distance from Tree Cover Loss Incidents to Closest Road
Average 2011-2019

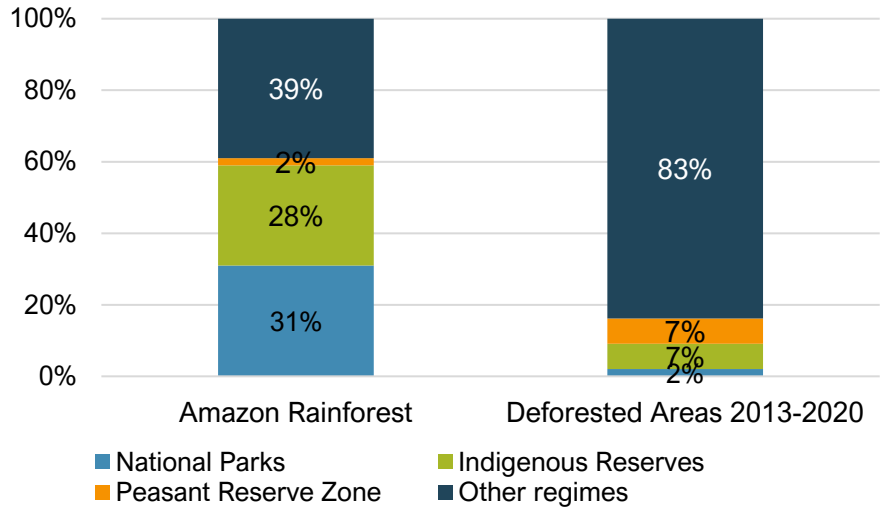


Source: authors' elaboration based on OpenStreetMap and Hansen Global Forest Change v1.8.

Deforestation differs significantly based on the legal status of land, concentrating in areas where economic activity is not restricted. The majority of forest land in Caquetá, Guaviare and Putumayo lies within a national park or indigenous reserve, which severely restrict economic activities. The only allowed activities in national parks are for conservation, education, and research. The remaining 39% of land – under other regimes such as *Baldíos de la Nación* that do not place explicit provisions against economic activity – account for 83% of deforestation in 2013-2020 (Figure 6). The share of deforestation that takes place in national parks (2%) and indigenous reserves (7%) is significantly below the zones' total forest area (31% and 28%, respectively) even when controlling for proximity to roads. Campesino reserve zones appear to be less effective in stopping deforestation, as they contribute to 7% deforestation, despite holding 2% of forest area. While no legal system for land has entirely eliminated deforestation, the rate of forest loss is significantly more alarming in spaces without well-defined restrictions on land sales and environmentally harmful activities.

The acceleration in deforestation occurred most in departments with a pre-existing presence of cattle-ranching. As Revelo-Rebolledo (2019) argues, even within the arc of deforestation, the cumulative rate of deforestation differs based on the depth and type of territorial integration of the department. The use of cattle-ranching as a means for territorial integration of the state is identified as predicting higher rates of cumulative deforestation. Deforestation accelerated after the Peace Agreement, but not in all areas of the forest. For those departments where deforestation was previously low, Guainía, Amazonas, and Vaupés, it remained low. In Putumayo, with a low presence of cattle ranching, the rate of tree loss rose only slightly. Rather, deforestation accelerated most in Caquetá, Guaviare, and Meta, the three Amazonian departments with the highest pre-existing levels of cattle-ranching. Across the Amazon, 80% of deforested land is linked to pastures for extensive cattle-ranching, according to IDEAM (Gonzalez et al 2018). This dynamic accelerated after the Peace Agreement, where deforestation is largely associated with the increase in livestock numbers (Botero 2020). In the municipalities alongside Chiribiquete National Park, heads of cattle increased by more than 690,000 between 2016 and 2019, while the same areas lost 290,000 hectares of forest cover (FCDS 2020).

Figure 6. Deforestation in CGP by Area and Property Regime
Percentage of Area



Source: authors' elaboration based on IDEAM, WDPA and SIAC

Box 1: Peace or the Forest? Exploring another false dichotomy

Peace presents a historic moment for the transformation of the Colombian Amazon. The Peace Agreement in 2016 drew an end to the longest internal armed conflict in Latin America. In the lead-up to the peace negotiations, officials touted the numerous dividends that peace would either directly or indirectly offer to the Amazonian departments: *environmental*, as peace would end the lack of state of control over the territory that enabled deforestation; *economic*, as peace would finally allow the economic integration of Amazonian departments with the national economy; *state capacity*, due to the expected increase in public spending that would accompany peace and provide infrastructure and public services for the region; and *access to land*, as the Peace Agreement includes provisions to grant land titles to rural peasants.

A fundamental assumption of the implicit promises of the Peace Agreement is that the dividends could all add up – or be compatible with one another. As a result, peace would allow for the construction of new roads and access to land, enable economic development *and* reduce deforestation. Six years after the Peace Agreement, it has become clear that the dividends of peace were not complementary but conflicting as currently implemented with shortcomings in achieving the environmental *and* economic objectives of peace.

The peace process increased the expected value of land in the Amazon, giving rise to land speculation from new financial forces, legal and illegal, local and global. The literature on deforestation in Colombia has partially attributed the accelerating trend in deforestation to the power vacuum and new opportunity for resource appropriation created by the peace process, which encouraged investors and FARC dissidents to finance cattle ranching for the purposes of land speculation in forested areas (Prem, Saavedra, and Vargas 2020; Vanegas-Cubillos et al. 2022; Rodríguez-de-Francisco et al. 2021). This new dynamic took place despite the environmental safeguards of the peace process. Cattle-ranching proved the most efficient form to claim land, as one million head of cattle entered the Amazon, nearly doubling the total, in only three years after the signing of the Peace Agreement (FCDS 2020). Land grabbing is facilitated by a legal framework, namely Law 160/1994 which allows landless campesinos to claim land in the forest reserve, as well as an informal land market. As the expected value of land increased, the cost of clearing and holding land remains low over time, due to low property taxes, ease of commercialization of cattle including subsidies for milk and cattle, making extensive cattle-ranching a more viable means for land speculation (Armenteras et al. 2019; Rodríguez-de-Francisco et al. 2021; Revelo-Rebolledo 2019). With the promise of greater security and public investment from the peace process, land grabbing targeted unclaimed forest areas near road infrastructure. Moreover, cattle represent a safe investment amidst repeated cycles of violence and threats. Although violence lessened in the years following the Peace Agreement, the recent rise in violence has raised the appeal of cattle, as cattle are mobile in an emergency, while more land-intensive activities, like crops, are not.

While the conflicting nature of the objectives behind the Peace Agreement was predictable, we conclude their conflicting nature is not inevitable – the Amazonian departments do not have to choose between peace and the forest. Rather, the current deforestation dynamics are a product of the political and economic institutions in place, specifically decentralized democracy, and a market economy. The acceleration of deforestation calls into question the assumption that peace alone would save the forest. Greater state control and inflow of resources in the region in recent years occurred alongside a period of rising deforestation. The aspects of the peace agreement that seem to contribute to deforestation, such as higher security leading to rising land prices, were more efficiently carried out than aspects of the peace agreement that would stop deforestation, such as enforcement of environmental policy, clarity over land tenure and developing new economic activities. Ultimately, rising deforestation and economic stagnation has

occurred *despite* peace, where the goal must be to strengthen the Peace Agreement by aligning policy priorities to protect forested areas and achieve shared prosperity in Amazonian cities.

Public and private institutions have implemented a variety of programs to curb down deforestation with different degrees of success. These initiatives range from militarized command-and-control missions (Operation Artemisa) to community forestry in peasant zones (*Zonas de Reservas Campesinas*), certificate programs and traceability (Rainforest Alliance), sustainable agroforestry (USAID and others), crop substitution (PNIS) and carbon offsets. Two initiatives are particularly prominent and wide-ranging. The first is REM – Visión Amazonía, which aims to achieve net-zero deforestation and is operated by the Ministry of Environment and Sustainable Development with funding from Germany, the United Kingdom and Norway. The program operates across five pillars: Forest Governance, Sustainable Sector Development (including territorial planning), Agro-Environmental Development, Environmental Governance with Indigenous Communities, and Forest/Results Monitoring ("Visión Amazonía" 2021). The second is the Amazon Sustainable Landscapes program as led by the Ministry of Environment in collaboration with the World Bank and other organizations. The program works to improve multi-stakeholder forest governance and to promote sustainable industries. Specific initiatives include protected areas management, forest governance and monitoring, intersectional pacts for deforestation control and forest restoration (Program 2021). These programs and policies have succeeded in controlling localized deforestation within specific boundaries. However, as seen in the continued high rates of deforestation, the deforestation dynamics that threaten the overall health of the forest continue.

This dynamic reflects that deforestation is not the action of large numbers of individuals across all areas of the forest, but the act of a few, large-scale actors for whom the returns continue to outpace alternative activities and the risks. In this context, environmental protection services are unlikely to make a sufficient dent in topline deforestation rates as large-scale actors would not be affected. Even environmental control and enforcement actions often punish small-holder actors and not the land speculators responsible for the incidents of large-scale forest loss. Rodriguez-de-Francisco et al (2021) conclude that the environmental law enforcement efforts of REM – Vision Amazonia and Operation Artemisa have proven unable to confront the actors of large-scale deforestation as such actors are well-positioned within political and economic systems of power. This is due to national-local state differences in actions that allow local deforesting actors to co-opt the local implementation of national efforts to protect the forest. Elsewhere, key departmental and municipal actions, such as the provision of tertiary roads, act as core deforestation drivers and remain outside the scope of REM – Vision Amazonia actions. Policy design should learn from the successes of previous initiatives but must acknowledge the need to address the root cause of deforestation.

The pattern of deforestation in Colombia is highly differentiated across time, space, proximity to roads, and the legal status of the territory. This differential pattern is good news for policymakers. Solutions do not have to try to protect the forest everywhere, across all factors, at all times. Rather, this calls for a targeted approach to address the primary drivers of deforestation. The findings point to several policy levers for consideration to reduce deforestation. Having multiple policy levers in play offers potential degrees of freedom to target those first and second-best policy options to reduce deforestation, while also minimizing the constraints placed on the economic potential of the region, as explored in the next sections.

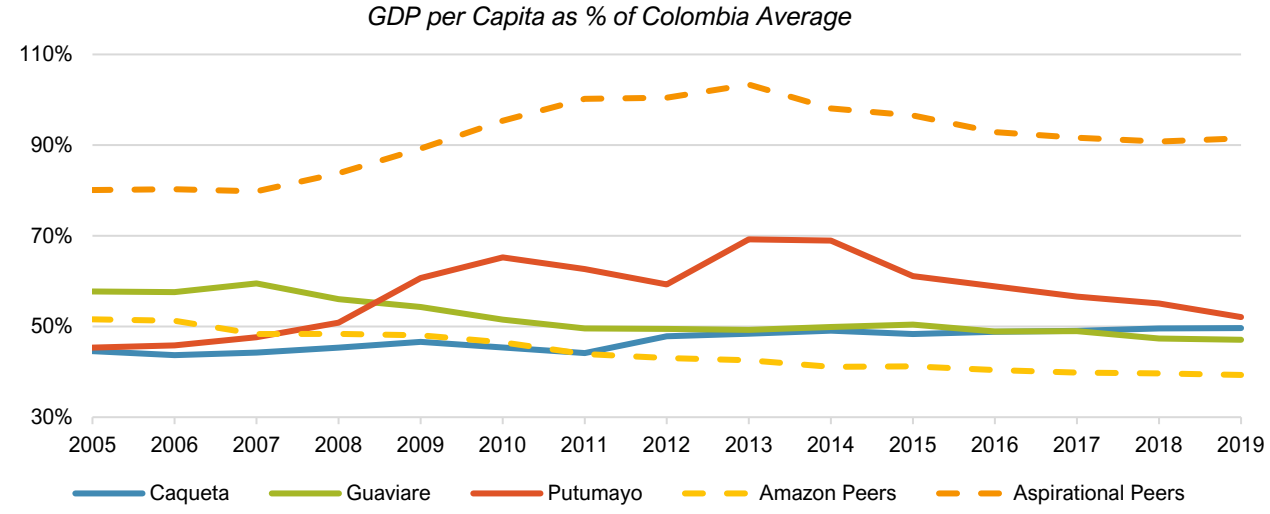
2.2. Economic Outcomes

Economic growth in Caquetá, Guaviare, and Putumayo has stalled. Historically, these departments ranked among Colombia's ten poorest departments. Despite the additional public resources and attention from the Peace Agreement, CGP departments remain in the same position among the poorest departments in Colombia, with Caquetá, Guaviare and Putumayo ranking as the 22nd, 25th and 31st highest per-capita income in 2019, respectively. The economic dynamic of each department differs within CGP, with Putumayo experiencing a volatile growth pattern reflecting the boom and bust of global oil prices. The economic growth pattern in Caquetá and Guaviare is best characterized as being "stuck" given the steady, low growth rate. The result of these disappointing growth trajectories has been a lack of convergence to the Colombian average income, as illustrated by Figure 7.

Economic growth patterns in the Amazon more closely follow national patterns of oil price volatility and fiscal transfers than the localized impact of the Peace Agreement. The sharp decline in global commodity prices in 2014 exposed Colombia's dependence on oil exports, reducing key fiscal revenue sources domestically. Growth figures nationally fell sharply after 2014, with the Amazonian departments not serving as exceptions to that pattern. CGP departments have experienced an even sharper growth slowdown than the Colombian average since 2014 despite significant effort from the government in expanding access to economic and social services.

An added challenge to CGP's lack of convergence to the national average is that Colombia itself has failed to converge to advanced economies like the United States. Colombia in 2019 has the same share of U.S. income, 21.8%, as it did in the 1950s (Figure 8). Colombia also has not caught up to the richer economies in the region. Given the close relationship between CGP's growth performance and the national average, part of the growth challenge lies outside of CGP, to improve performance in the growth poles in Colombia. New findings from Nedelkoska et al (2021) point to the missing "internationalization" of Colombia that has not tapped into its rich resources of knowhow flows to attract new capabilities to Colombia. Many of channels for technological diffusion are not adequately prioritized in Colombia. As a result, there is less diffusion of new technology from Colombia's higher-complexity cities to the cities in CGP.

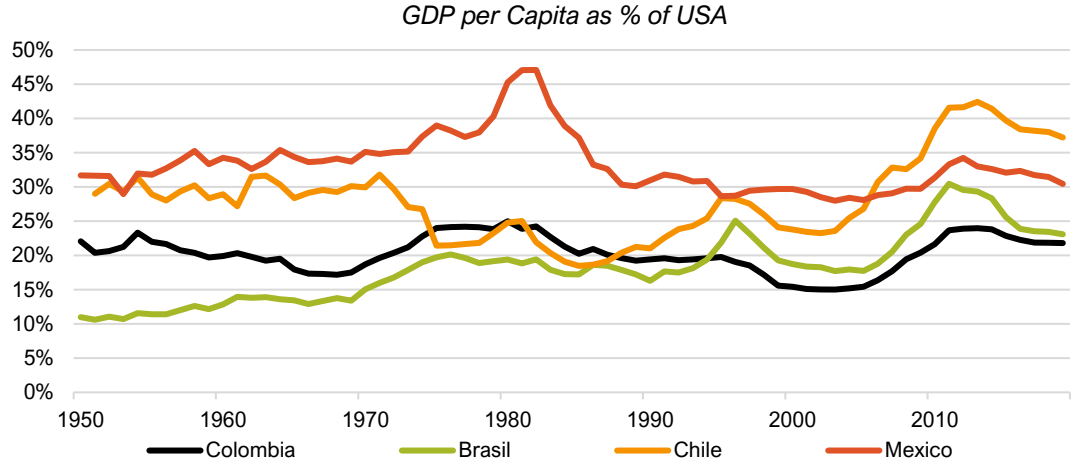
Figure 7. Income Convergence



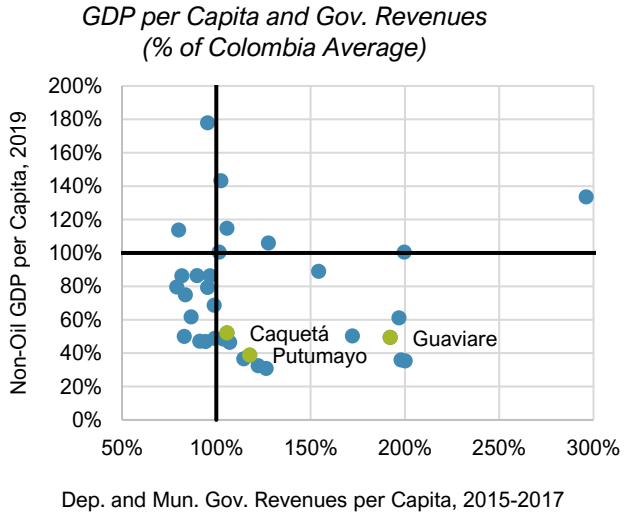
Source: authors' elaboration based on DANE and Penn World Table

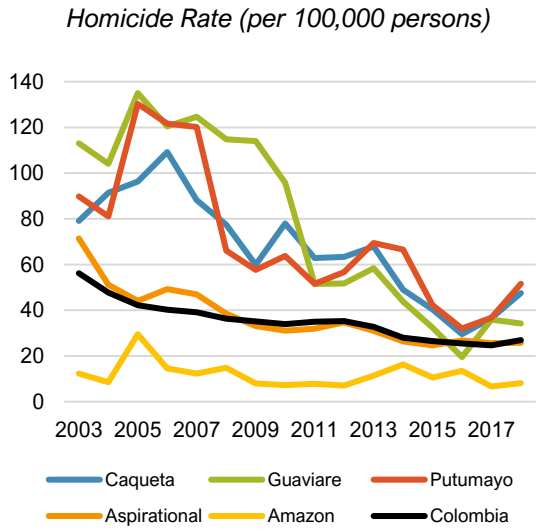
Public spending per-capita in Caquetá, Guaviare and Putumayo all stand significantly above the Colombian average. The rise in public spending across the oil and non-oil departments in the Amazon has been by the establishment of the new royalty distribution system (*Sistema General de Regalías)* in 2012 and progressive changes in the subnational revenue sharing system (*Sistema General de Participaciones*). Many social indicators of well-being, from security to education, have improved significantly over the period. Violence in CGP has seen a sharp decline over the decade leading up to the Peace Agreement, as measured by the department's homicide rate. There has been a notable increase in the education of the workforce, in line with the progress Colombia has made in improving educational achievements nationwide. Although these efforts have evidently improved the quality of life of the region's inhabitants, their contribution to the *economic* development of the region has so far been disappointing, as the region has still failed to convergence to the economic income of the rest of the country. Other indicators of labor market health, including employment and unemployment rates, and poverty indicators similarly failed to converge to the national average.

Figure 8. Income Convergence: Colombia vs. USA



Figures 9 & 10. Fiscal Stance and Violence





Source: authors' elaboration based on DNP (left-panel) and CPC (right-panel)

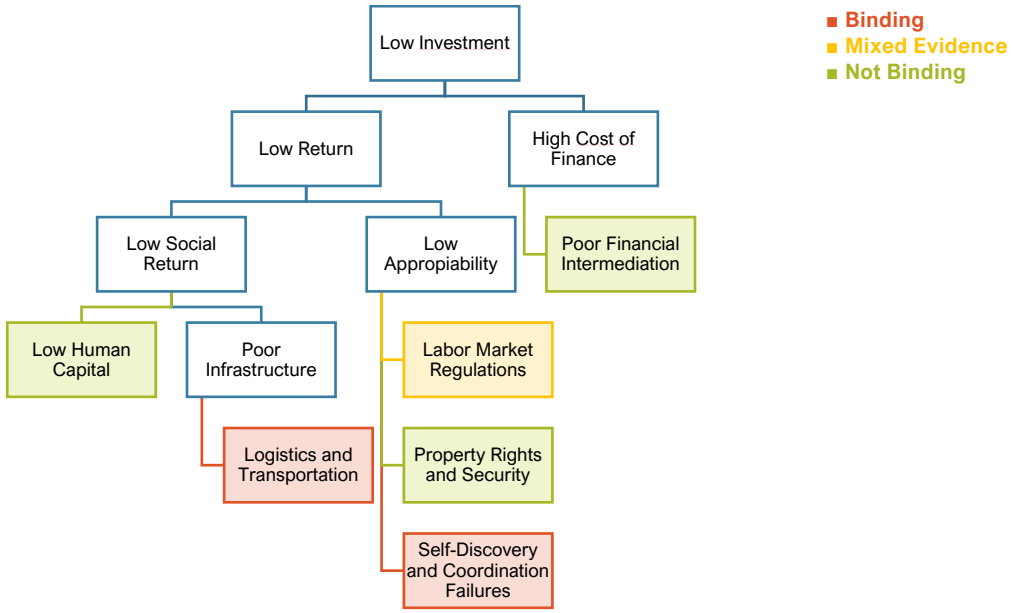
Policymakers cannot simply focus on expanding the current economic model in the Amazon as the current model is neither economically nor environmentally sustainable. According to the findings of our economic complexity report, the exceptional diversity of the Amazon's biome is not reflected in the region's economy. Conversely, the Amazon's economy is best characterized by its low diversity and low complexity, with economic activity concentrated in low-productivity agriculture and services. Since the first colonial expeditions to the region came in search of gold and the first settlements formed to extract rubber, the economic model of the region has overall focused on extraction. The mid-20th century added a new dimension to economic integration via peasant colonization of the forest, in particular through cattle-ranching. The cattle-based approach to territorial integration did not take root in each department but was used as a means to populate territory contested in the Colombia-Peru war of 1932, specifically Caquetá. The extraction model continues to some extent today – despite efforts in some government institutions and policies to revert it. Recent National Development Plans, up to and including the peace process, include these departments in two regional economic groups with a specialized focus on mining and natural resource development. The inherent contradiction between the objectives of the National Parks system, the Indigenous Reserves and Afro-Colombian areas – preserving the forest – and an economic strategy based on extraction of raw materials has never been directly addressed in the plans. The model has not only failed the Amazon environmentally, but also economically, leaving the Amazon region as one of the least economically complex in the country, dependent on extractive agriculture and mining sectors, and low productivity public and retail services (Figure 18). A sustainable economic development strategy cannot be based on *expanding* the current economic model but changing it.

The idea of regional specialization centered on raw material extraction is deeply held by policymakers globally and locally, but also happens to be one of the most dangerous ideas in development. While intuitively powerful, this conventional wisdom fails to prove true empirically. Individuals specialize, as often do firms, but what results is that countries and regions diversify. Greater individual specialization translates into the diversification of production at the regional and country levels. The idea of adding value to local raw materials is not wrong, but limiting, as few modern products are developed from a single raw material. The more successful approach taken by economic success cases globally is to start not from raw materials, but from local productive capabilities to identify new activities that also rely on those existing capabilities. Approaching the Amazon rain forest solely for its raw materials is limiting, considering that the greatest natural resource is the forest itself. A new approach is required, one that recognizes the potential economies of tourism and forest protection services as opening more opportunities than an extractive economy. The challenge is that tourism and environmental services require a distinct set of capabilities to those of extraction. Without a change in approach, the Amazonian departments are unlikely to realize shared prosperity from an extractive approach.

The low economic complexity and poor connectivity of CGP constrain the economic development of the Amazonian departments. In our growth Diagnostic report, we adapted the Growth Diagnostics tree to test constraints to economic growth in Caquetá, Guaviare, and Putumayo (Figure 10). We find that coordination failures, which drive capability or low complexity traps, are prevalent in all three departments and explain the region's lack of income convergence. Using the theory of Economic Complexity, we show that CGP's low base of capabilities is not only binding to the region's economic development but can explain some of the key structural features of the region's labor market, such as the region's high levels of

informality and the concentration of employment in public services and low-productivity retail and agriculture (as well as extractive activities in Putumayo). Interacting with the region's low complexity challenge, we also find that the region's remoteness, itself is a function of the particular geographical position of these departments and the quality and quantity of available logistics and transportation infrastructure, as also binding for the economic development of the region. Caquetá, Guaviare, and Putumayo have some of the longest travel times to major cities and ports of all departments in Colombia (Figure 12). The remoteness of the three analyzed departments implies significant costs to the movement of both goods and people that harm their competitiveness and shape their past, present, and future development trajectory. Improving the complexity of the department's productive structure will likely require improving the capacity of the departments to move people and goods in and out of the region. A development policy for the Amazon will require distinct instruments to focus and tackle these constraints.

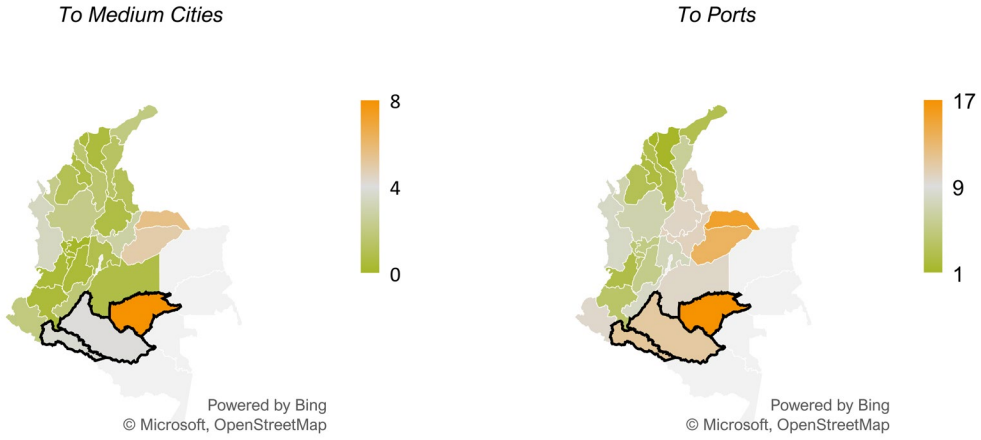
Figure 11. Growth Diagnostics Tree



Source: adapted from Hausmann, Rodrik, Velasco (2008)

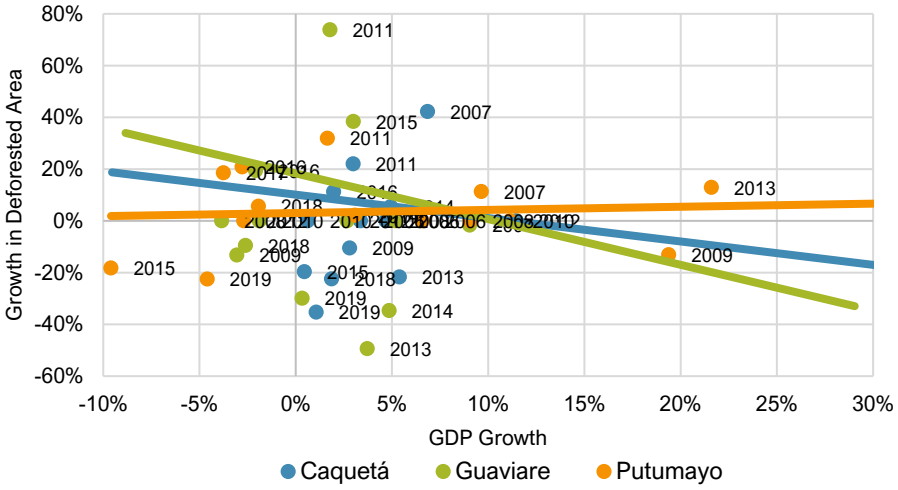
Rising deforestation has not led to economic convergence, which suggests a potential path to achieve economic development compatible with protecting the forest. Although a trade-off between economic development and environmental sustainability is often discussed in the context of the debate around the protection of the Amazon, there is little evidence that this trade-off truly exists in the analyzed departments. As suggested by Figure 13, there has been little correlation between income growth and increases in deforestation at the department-level, which implies that higher deforestation has not truly helped the departments develop their economies. This does not imply that *any* action to promote the economic development of the region would *per se* be deforestation-neutral, but that taking action to detain deforestation is unlikely to affect an already disappointing growth path, and that an economic strategy that does not foster deforestation is indeed a possibility and should actively be pursued.

Figure 12. Average Travel Times from Urban Areas (2019)
Hours



Source: authors' elaboration based on Global Friction Surface, Open Street Maps and Google Maps. Estimates excludes Amazonas and San Andres, outliers in the data.

Figure 13. Deforestation and Economic Growth



Source: authors' elaboration based on DANE and IDEAM

3. Towards a New Environmental and Economic Pact

The Colombian Amazon finds itself in the "lose-lose" scenario of high deforestation and low economic growth. The economic model in the Amazon – centered on extraction and agrarian colonization (before led by migrant colonizers, now by speculators) – has not generated prosperity for the people, all while failing the forest. Deforestation, in economic and ecological literature, is a clear example of the tragedy of the commons in which individuals acting in their own self-interest will deplete the resource. The "market" economy itself incentivizes deforestation – as the private returns to owning deforested land are higher than the social returns of keeping that land as a forest. In effect, the Peace Agreement further increased the private returns to deforestation due to greater security and investment in these areas. This increased forest loss as financial markets were more efficient in channeling finance toward new

land speculation than was the increased state capacity to enforce forest protection laws. The transformation of the Amazon has not come to pass. Achieving environmental and economic objectives cannot be achieved by technocratic tweaks, but a new political pact will be needed to put the region on the right track.

That deforestation occurs in places without clear legal status prohibiting the future appropriation of the land reflects the moral hazard in the law governing forested areas. The challenge in Colombia is not the absence of legal status for forest protection; by the latest estimates, 85% of the Colombian Amazon is under a legal status promoting environmental conservation (Guio and Rojas 2019). Rather, the challenge is in the plurality of legal regimes, which vary in the economic activities allowed and their enforcement. Forested areas in Colombia are governed by several distinct legal regimes, as defined by the Forest Reserve Law of 1959 (*Ley Segunda*). That law and subsequent decrees (e.g., Decree 0111 of 1959 or Resolution 110 of 2022) also create a system of subtractions (*sustracciones*) that allow lands to be removed from the forest reserve for rural development purposes, including for the appropriation of private property. These subtracted lands become *baldíos* subject to Law 160/1994 – which regulates land reform and rural development – which allows the National Land Agency (*Agencia Nacional de Tierras* or ANT) to allocate land titles according to demonstrated use, following local guidelines and providing farming plots that are sufficient to generate two minimum wages. After five years of demonstrated tenure and production over two-thirds of the plot's area, farmers are allowed to request a land title from ANT. Subtracted areas cover a significant part of the forest reserve, particularly at the edge of the agricultural frontier. The legal provision of subtraction creates moral hazard by allowing Colombians to deforest with the expectation of impunity and a legal means of future land ownership.

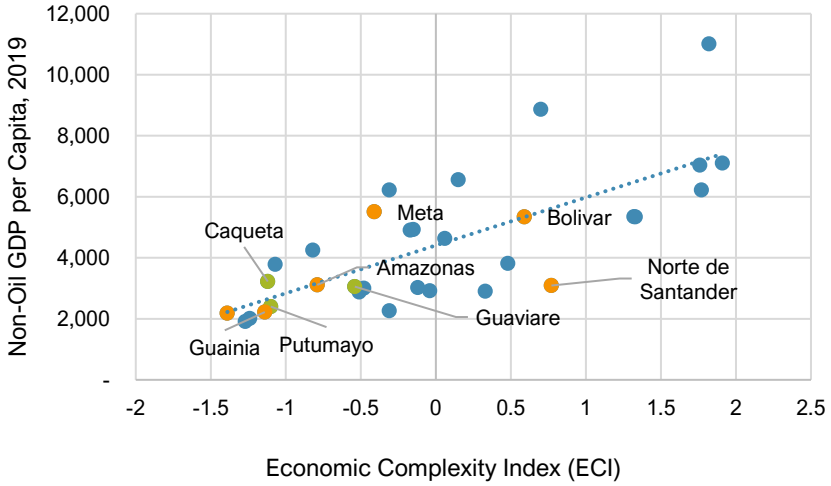
The moral hazard results from the ability for colonizers to derive the benefits of deforestation while privately bearing none of its costs. This moral hazard introduces uncertainty as to future possibility of subtractions that leads many colonizers to operate under the pattern of "deforest now, subtract later." If Colombia seeks to preserve the forest, there must be no ambiguity with regards to the ownership of the protected forest: current laws that allow for future land appropriation and settlement must not apply to areas for forest protection. As shown above, the legal regime matters for deforestation. Two regimes, National Parks and Indigenous Territories, outperform expectations, by having a smaller share of deforestation than expected for their land area. The success of these regimes is based on both regimes not allowing subtractions. In addition, National Parks severely restrict economic activities and tertiary road construction, and Indigenous Territories hold clear rules on conditions for land use.

The Colombian Amazon needs a new forest protection law based on a simple premise: define the forest you wish to protect and put it under a legal regime that prohibits future land formalization, road construction and most economic activities including cattle-ranching. To respond to the region's environmental and economic challenges, a nationally legitimized decision will be needed to empower policymakers to make the necessary changes to the current sets of regulations and incentives to unambiguously protect the forest.[1] Recently

[1] A new environmental and economic pact for the Amazon must present a nationally legitimized decision to protect the forest. Public opinion surveys show that a large majority of Colombians care about the Amazon and share the desire to save the forest. Nevertheless, Colombians have not given themselves the appropriate political and administrative means to do so. The current legal and regulatory set-up does not allow national preferences to ensure forest protection in the Amazon. Colombia's decentralized democratic system allows highly motivated actors who do not share the national aspiration of saving the forest to play an outsized role in department and municipal politics,

public discourse has begun shifting in this direction: President Petro ran his campaign on an environmental platform and during his inaugural speech he pledged to protect Colombian biodiversity and mitigate deforestation among his ten commandments (Portafolio, 2022). The new forest protection law would capture the interest of the Colombian people to preserve the Amazon, as the means to empower the national government to coordinate across ministries and levels (federal-departmental), with the necessary legal changes, the tools, and programs required to protect the forest. The law would center on local state capacity, combined with national-level planning and enforcement in order to align local and national incentives to protect the forest. Moreover, this law can complement community-based programs and agreements on the ground by raising awareness and scaling efforts to make forest protection pay.

Figure 8. Economic Complexity and GDP per Capita



Source: authors' elaboration based on GEIH and DANE.

Achieving shared prosperity in the Amazon depends on the connectivity and opportunity in its urban areas. The new forest protection law should also include a new economic strategy for the Amazon to coordinate new economic opportunity in its cities. Large cities in the Amazon

and shape policies in key areas such as land titling and secondary and tertiary road creation ("Land Grabbing, Cattle Ranching Ravage Colombian Amazon after FARC Demobilization" 2019). Recent corruption allegations have tied politicians to land grabbing and deforestation (Espectador 2020a), as well as political support for specific illegal roads cutting through the Amazon (Espectador 2020b). Interviews with Amazonian department governors have made clear that the vast majority of constituent requests are to build tertiary roads and bridges at the agricultural frontier, a key factor that this research has found to be a strong driver of deforestation. A decentralized democracy is seemingly destined to deforest, as local authorities will be subservient to moneyed political interests who may have preferences to deforest that differ from the nation's preferences. As long as the decision to build tertiary roads is local, it must respond to local demands. These dynamics underscore how the local demand and governance for roadbuilding is inconsistent with the national preference for forest conservation. With a new law placing the forest under a legal regime that eliminates forces of land speculation, it would free mayors and governors from these local political pressures and empower their ability to tackle deforestation and enhance focus on driving growth in urban areas. Aligning institutions and policies nationally will would allow Colombia to present this mandate on the international stage to pursue donor funding to support these actions to reduce deforestation. New funds could further be shared with departmental and municipal governments as tied to performance in reducing deforestation, while supporting their efforts to achieve shared prosperity in non-forested areas.

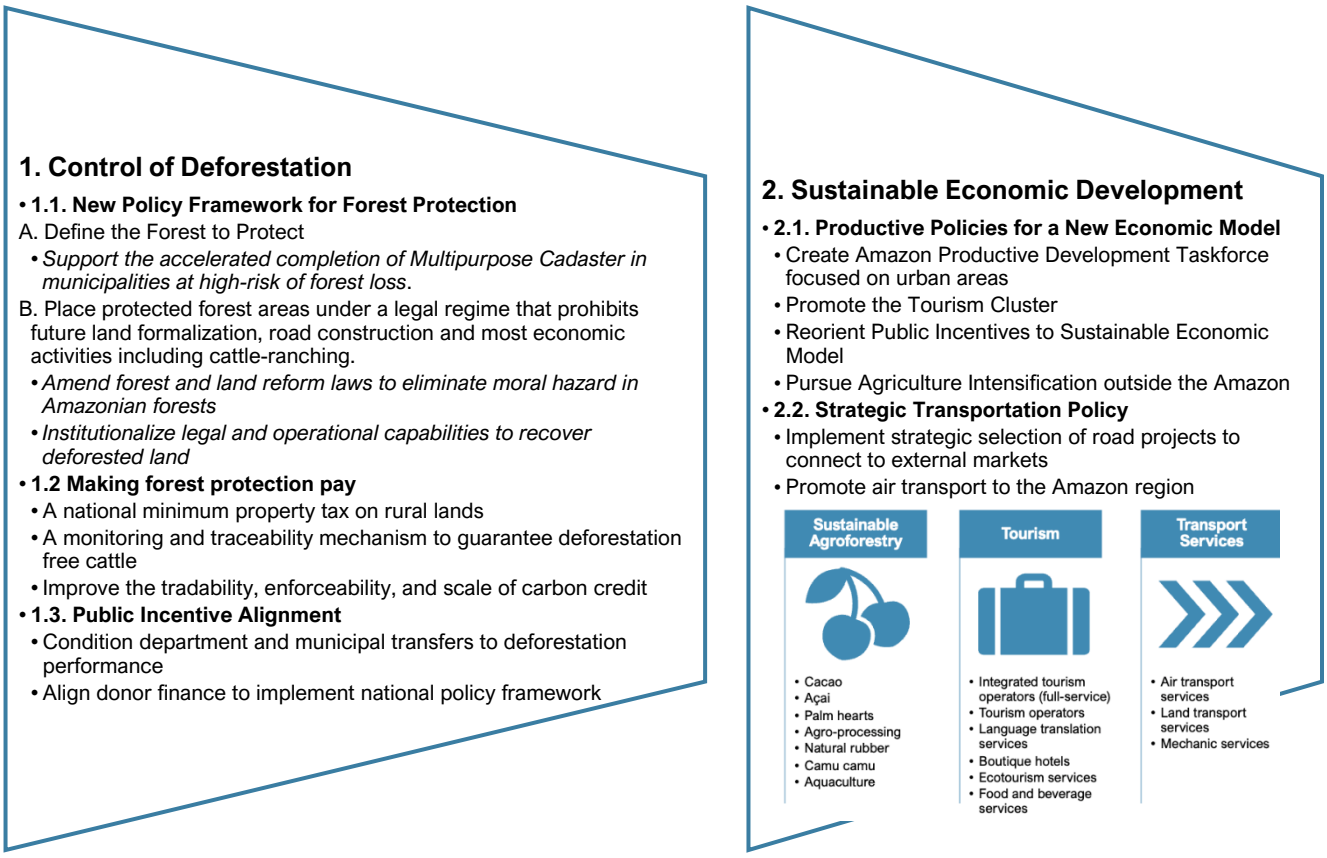
such as Florencia and Puerto Asís are an untapped source of prosperity[2] and can be core piece of the solution of achieving greater economic development without harming the forest. A new pact must transition from the current extractive model to a model that finds opportunity in the forest's biodiversity and existing productive capabilities in urban areas. The strategy should be territorial across three geographies of opportunity: (i) ***in cities***, through tourism services, transport services, professional services, and agro-processing industry; (ii) ***in rural non-forested areas***, in more intensive crops and sustainable agroforestry; and (iii) ***in forest areas***, based on ecotourism, carbon markets for reforestation, and forest protection services.

The vision of success in one in which greater opportunity in Amazonian cities will pull more people in from rural areas to live in the city, reducing pressure to expand the agricultural frontier into the forest. This migration to the cities further affords additional hectares to those who remain in rural, non-forested areas, while the profitability of reforestation will increase with carbon market development. Achieving urban prosperity depends not only on improving the public services in cities but on enhancing the transport connectivity with other cities in Colombia and beyond. This extends beyond the control of governors in Amazonian departments, to improve the primary road infrastructure outside of their departments, as justifying the need for national-level coordination of these projects. Inter-departmental road infrastructure is the key constraint to greater agro-processing and crop production for these departments to sell to external markets; improving the quality and service of air transport will be critical to expand tourism outcomes. Increasing the supply of flights to the Amazon should accompany a coordinated tourism strategy to increase demand. The need for a coordinated approach to this economic strategy calls for the creation of an Amazon Productive Development Taskforce to coordinate national, departmental, and local government entities – as well as private and non-government associations – to implement productive policies for the region. The challenge for the Taskforce will be to coordinate a unified approach that also recognize the diversity of productive opportunities across Amazonian departments, e.g., leveraging the global treasure of Chiribiquete National Park in Caquetá and Guaviare vs. building on the professional services related to oil and mineral sector in Putumayo to enter related professional services. This strategy also contrasts with the existing planning units in Amazonian departments which often serve existing industries, such as cattle-ranching, rather than coordinating investments in new economic activities. Pursuing the proposed strategy will require building new state capabilities and coordination across different levels of government.

The following sections specify policy options for a development strategy that can meet the dual objective of preserving the forest and attaining shared prosperity in the Colombian Amazon. The policy is summarized by Figure 15. Some of the policy options are novel and are inspired by the international experience in forest protection, others are known recommendations from local experts, and a final set are already being implemented in Colombia, where this report mainly points out to the need to *scale up* positive deviance. To a great extent, neither the deforestation nor productive challenges in the Amazon are about inventing new policy solutions but about setting the adequate political priorities at a national level, aligning incentives at departmental and local level, and consistently taking advantage of the technological, institutional and policy innovations that public, private, and non-governmental organizations have made over the last two decades.

[2] Previous literature has shown that urban employment can play a critical role in attracting labor from rural regions in the Amazon and lowering pressures for deforestation (Porcher and Hanusch 2021).

Figure 9. Development Strategy Summary



A development model for the Amazon cannot be reduced to a list of actions but must carefully consider the sequencing of policy actions. Individual items cannot be picked and singlehandedly implemented, as greater transport connectivity will not arrest deforestation by itself (and could otherwise accelerate it) nor will policies to control deforestation generate economic solutions for the region's inhabitants. Both types of policies are necessary because economic growth without environmental protection could lead to increasing incentives for deforestation (through, for example, the channel of land speculation), and environmental protection without economic support would condemn the region's citizens from improving their livelihoods. A development policy which has a *dual goal of detaining deforestation and achieving shared prosperity* will require *two types of instruments* to reach them.

4. Policy Strategy I. Control Deforestation

The Colombian Amazon needs a new forest protection law that clearly defines the forest to be protected and puts those areas under a legal regime that eliminates moral hazard. The analysis of deforestation trends in time and space shows that different legal regimes yield distinct outcomes in forest protection. Forested areas under the *baldío* regime, departmental forest reserves, and non-protected areas provide only limited protection for the forest, whereas national parks and indigenous territories have been significantly more effective in meeting this

objective. This differential rate of forest loss holds even when including the distance to roads for the areas in each regime, as well as the recent rise of deforestation in National Parks. To effectively protect the forest around protected areas, the legal regime should strictly prohibit economic activity. The goal is to free local authorities from the impossible task of protecting the forest and addressing constituent concerns. The current legal regimes of National Parks and Indigenous Territories provide a unified legal framework for the forest.

A policy strategy cannot be limited to regulatory and legal modifications and should provide the national and departmental governments with the necessary tools to uphold the law. The fact that deforestation still takes place in protected areas such as national parks and indigenous reserves – although far less than in *baldíos* – indicates that legal and regulatory regimes changes will not be sufficient to fully curb deforestation, and that the government needs to provide itself with the necessary tools to uphold its laws. Complementing this forest protection policy, this section discusses measures to both *operationalize* the protection framework regime and to *align the incentives of public, private, and international institutions* to strengthen the framework. Many of these of these policies already exist fully or in an incipient stage – see for example discussion in Clerici et al. (2020) – but others have not been implemented yet or could be further strengthened through additional funding and institutional support.

4.1. A New Policy Framework for Forest Protection

A new policy framework should align legal regimes to implement a new national mandate of forest protection. Initially, the government could incorporate the promise to draft and pass this law under the National Development Plan 2022-2026 to trigger legislative action during the next four years. The new forest protection law would delineate the forest for protection and the legal regime for that forest, along with the necessary tools and programs to coordinate, monitor, and enforce forest protection.

1. Define the Forest to Protect

Colombian public institutions have broadly defined an agricultural frontier using satellite data. However, there is very limited plot-by-plot information of who is in the frontier, current land values and how it is being used. To implement territorial organization strategies, the National and Local governments must have plot-by-plot information of ownership, physical features, land costs and boundaries of plots in areas at risk of deforestation.

A. Support the accelerated completion of Multipurpose Cadaster in high-risk forested municipalities

The completion of Colombia's Multipurpose Cadaster should be politically, financially, and administratively supported to clarify property rights and provide granular information of plots at the agricultural frontier. With rates of land informality over 50% (according to the Agricultural Rural Planning Unit or UPRA), property rights over private and public land in Colombia can often be under contention. Without defined land tenure, government agencies cannot appropriately enforce policies and regulations that explicitly depend on demarcating protected and unprotected territory. A functioning cadaster is the first step towards the implementation a forest protection policy framework as it allows the government to know where appropriation and economic activity are legal, or not.

Colombia's most recent multipurpose cadaster policy was enacted in 2016 and was part of the signed Peace Agreement; the policy has received support from the World Bank and the Inter-

American Development Bank, amongst other donors and was later updated in 2019 as its rollout began. Although the cadaster has made significant progress since the start of the program, the cadaster is still incomplete in priority forested areas at highest risk of deforestation. For that reason, political and financial support is needed not only to complete the registry of land tenure, but also to build local capabilities to maintain and update it, prioritizing Amazonian municipalities (that are already among the prioritized PDET[3] municipalities). Although the cadaster fulfills multiple purposes both in urban and rural areas, it is important that resources prioritize deforestation hotspots to facilitate the rapid implementation of the deforestation policies by identifying what land has *already been legally appropriated*, and *what land is still legally unclaimed* and should be allocated to protection. Key existing proposals to strengthening the cadaster include integrating results with geospatial databases across agencies, strengthening regional cadastral capacities, and facilitating the use of technology related to changes in land usage and borders ("CONPES" 2019).

B. Place protected forest areas under a legal regime that prohibits future land formalization, road construction and most economic activities including cattle-ranching

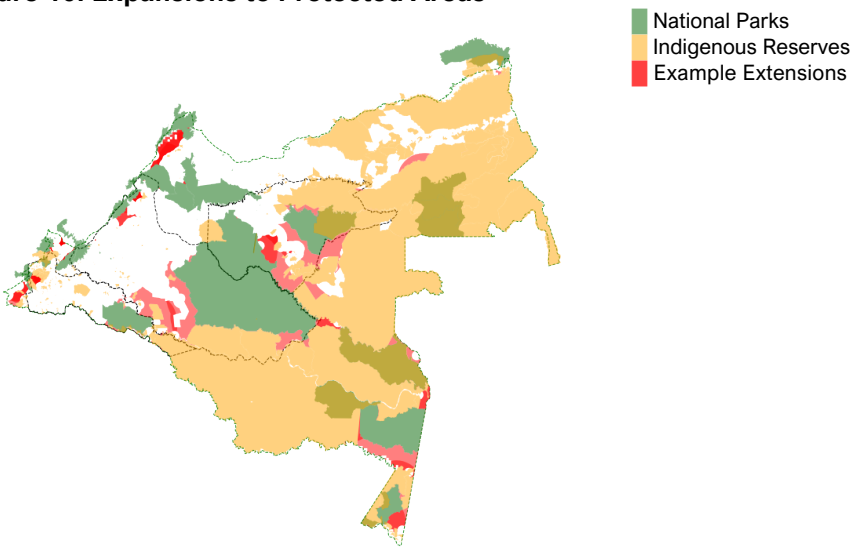
i. Amend forest and land reform to eliminate moral hazard

A regime that builds on the success factors of National Parks and Indigenous Territories should be defined and sanctioned to protect areas currently under: *Baldíos*, *Forest Law* regime, departmental forest reserves, and departmental park systems. As in the case of National Parks and Indigenous Reserves, this land figure should restrict land formalization only to current occupants who are grandfathered by the figure, restrict road construction, and explicitly prohibit most economic activities (with exceptions and bio-tourism, etc.), disincentivizing land speculation through *praderización.* With regards to current protected areas, land under the new regime adds an additional layer of legal and regulatory protection. The target areas must consider current occupant property rights and jurisdictions, and hence will benefit from the cadastral update, as discussed above. Those currently living within these areas must be accounted for, formalized, and informed of the strict limits on economic activities, while welcoming their incorporation into forest protection services. Upon completion of the cadaster, additional settlers would not be recognized as tenants and land transactions will be limited to those inside permit areas.

In essence, the Colombian government must include *all land* that it seeks to protect in such a regime. An example of the possible areas of stylized expansion of National Parks and Indigenous Reserves borders is illustrated in Figure 16, which expands every protected area (National Park or Indigenous Reserve) for 50 km along its borders, without overlaps with other areas, comprising *only* forested land at least 10 km away from the nearest road. Although the borders of the stylized expansion exercise are illustrative rather than prescriptive, it illustrates the potential of relatively small expansions in the protection regime, to areas under very high risk of forest loss.

[3] PDET: Planes de Desarrollo Rural con Enfoque Territorial – Territorial-bounded rural development plans, that cover the municipalities most affected by the armed conflicto as considered by the 2016 Peace Agreement with the FARC.

Figure 10. Expansions to Protected Areas



Source: authors' elaboration based on IDEAM, WDPA and SIAC

Under this territorial mandate the national government must empower the National Park and Indigenous Territory systems with resources and attention to achieve its forest protection goals. This policy strategy recognizes that possibly never in the six-decade history of the National Parks in Colombia have the parks been under as strong of a threat as in Colombia today, as armed groups have forced out park rangers from many Amazonian parks, leaving the parks without their guardians. The scale of deforestation occurring in parks, while above its historical average, remains below non-protected forests, in part because of the strict restriction of economic activities in the parks. While solving the National Park and Indigenous Territory challenges extends beyond the expertise of this report, the findings herewith reinforce the essential nature of the legal protections held in these systems that is worth reinforcing rather than abandoning.

Colombia's current forest and land reform regulatory regimes – which allow for forest land to be legally subtracted for productive use – should be adjusted to the areas determined for new protection. Subtractions regulated by Law 2/1959 (*Ley Segunda or Forest Law*) allow for removals of land from the forest reserve regime and become *baldíos* subject to Law 160/1994 – which regulates land reform and rural development – which allows the National Land Agency (*Agencia Nacional de Tierras* or ANT) to allocate land titles according to demonstrated use, following local guidelines, and providing farming plots that are sufficient to generate two minimum wages. After five years of demonstrated tenure and production over two-thirds of the plot's area, farmers are allowed to request a land title from ANT. These regulations have created moral hazard by which agriculture producers derive the benefits of deforestation while privately bearing none of its costs; existing regulations incentivized land speculation. If Colombia seeks to preserve the forest, there must be no ambiguity with regards to the ownership of the protected forest: current laws that allow for future land appropriation and settlement must not apply to the newly protected areas. Part of the success of lower deforestation rates in National Parks is the prohibition of settling there after the Park's inception, in addition to strict restrictions on economic activities and tertiary road construction.

ii. Institutionalize legal and operational capabilities to recover deforested land.

To disincentivize deforestation, it will not be sufficient to expand areas under protection if the mechanisms to enforce that protection are not in place. The Colombian government must develop coordinated institutions to pursue legal action on, and operationally recover, land that has been illegally appropriated, as well as to punish public officials that facilitate land appropriation and illegal economic activities. In the case of Brazil, the period of declining rates of deforestation under the Lula da Silva administration was driven by the national government prosecuting deforesting agents and corrupt government officials, and threatening prosecution to slaughterhouses and supermarkets selling deforested-land beef (Boucher, Roquemore, and Fitzhugh 2013). Part of the solution to deforestation must be from a coordinated legal response to exact new penalties of imprisonment and business closures to disincentive deforestation. To date, environmental law has mostly targeted farmers on the ground with few outcomes in following the money to those who finance and purchase products associated with the rise in deforestation. Environmental groups in Colombia should engage in a "name and shame" campaign to trace the finances behind deforestation agents and the banks that fund these actions against the national interest.

Colombia has an Environmental Crimes Law aimed at enforcing protection and the prosecutor's office recently charged the first offenders under the recent environmental crimes (Peña n.d.). Such judicial pressure should be continued and expanded to raise the legal ramifications of deforestation, reach those who finance deforestation and force improvements in product traceability in industries like beef. Further, the national government should use its available executive institutions to ensure that its forest protection regime is adequately implemented by officials at all levels of government. The Office of the Inspector General (*Procuraduría General*) and the Office of the Comptroller General (*Contaloría General*) should be mandated to oversee the implementation of the forest protection regime at both national but also subnational levels. Control and enforcement efforts must carefully consider how their efforts build distrust with local communities, especially when enforced solely against smallholder farmers and not land speculators that drive deforestation.

4.2. "Second-best" policies: Making forest protection pay

The bulk of deforestation in Colombia's Amazon is facilitated by extensive cattle ranching as a more profitable alternative to forest protection services. Colombia features diverse mechanisms to protect the forest that can one day be more viable than cattle-ranching. The goal of these policy options is to change the relative prices to make forest protection more profitable than cattle ranching as a means of land use.

1. A national minimum property tax on rural lands

Establishing a minimum property tax on land creates an incentive to use land much more intensively, thereby reducing expansionary pressures over the agricultural frontier. Colombia's current property tax is determined and collected by local governments, and it is an important source of revenue to finance local work beyond national transfers from the Central Government. Currently land taxes in Colombia range between 0.1 and 1.6% of the cadastral value of rural and urban plots (Law 44/1990). Annually, the tax is meant to capture increases in land values due to increased public goods availability, plot improvements or even higher expected values of land. Therefore, this tax has the potential to curb land speculation by cutting down the gains from price increases and encourage farmers to use land more intensively instead of incentivizing

extensive cattle as a form of holding land property rights. A critical component of this policy is the updating the multipurpose cadaster to tax more plots and do so based on updated valuations. To avoid an uncoordinated response or additional tax competition between municipal governments, a key policy is establishing a national minimum property tax in addition to the municipal tax. While each municipality retains the possibility to determine its own tax and revenue from the tax, a national minimum allows for better coordination and to think of national equilibria in allocation as opposed to a solely municipal perspective. The resources generated from this tax could be earmarked to be used in conservation and forest protection activities that protect additional areas of the forest.

2. A monitoring and traceability mechanism to guarantee deforestation-free cattle

Colombia is able to take advantage of technological innovations to improve its capacity to tackle deforestation. Two areas where innovative solutions could empower the government to are deforestation early-warning systems and cattle traceability programs. Cattle traceability systems contribute to prevent cattle raised in illegally deforested areas from reaching markets by allowing both government and consumers to know the origin of meat in markets. Traceability counters the practice of "cattle laundering", registering an animal on a legal plot only to be raised on an illegal plot. Such practices are pervasive in Colombia, with deforesting-beef integrated into supply chains (Environmental Investigation Agency 2020). A functioning cattle traceability system is needed to ensure cattle raised on illegally deforested land is not freely sold. For the traceability system to take function at scale, modern technologies such as QR codes to track individual animals, a comprehensive online registry, and geographic tracking software by plot are key building blocks (Viancha et al 2020). A local alternative is to formalize collaboration between IDEAM's geographic monitoring and Colombia's Agricultural Institute's (ICA) cattle vaccination records to identify cases where cattle is vaccinated against aphtose fever in the vicinity of forested areas.

A critical, if underutilized, tool to curb deforestation is the early warning system: Forest and Carbon Monitoring System (SMByC). SMByC is already in effect in Colombia, sending regular early warnings of new deforestation, from slash and burn techniques to illegal roads. The system allows the government to know the scale and location of deforestation even before the burning season, since the slashing or cutting of trees may occur months before the proper climate for burning (Cardona 2022). The system remains underutilized as it takes too long for local authorities to reach hot-spots and act after actions are taken and thereby prevent burnings or reclaim land. Especially where enforcement is risky, under-financed, and unaccountable, the technological solution of the early warnings system doesn't guarantee fast action. Early warning technologies afford a critical window of opportunity before burnings to seize land when integrated with other national mechanisms that feed information on current and potential hotspots to take preventive measures.

3. Improve the tradability, enforceability, and scale of carbon credits

Despite low pricing and certification reliability, Colombia is at the forefront of innovation in carbon market legislation among its peers. Colombia's tax code and recent laws created a carbon tax on domestic fossil fuels, jet fuels, and coal at $5 per tCO2e[4]. These policies are gradually building an Emissions Trading System (ETS) similar to the ones in more developed

[4] The carbon tax is set to increase annually with inflation (as measured by the CPI) and be expanded gradually to other sectors (i.e.: transport and agriculture) over time. Colombia proposed this tax as an initial measure to set up an ETS.

economies (World Bank, 2022 & Law 1931/2018). On the other hand, the voluntary market pays $20 per tCO2e in Colombia, with prices increasing commensurate with additional environmental initiatives such as agroforestry and additional premiums on social inclusion and biodiversity (Amazonía Emprende, 2023; Pachama, 2022). These include initiatives include Amazonía Emprende with local and international companies in Caquetá charging between $20-$35 per tCO_2e in voluntary markets with guarantees additionality and community impact on the ground.

Reforesting with carbon credits is not a profitable activity in Colombia at today's prices and with carbon titles that are unclear and costly. The carbon tax has created a market only for credits worth less than the tax of $5 per tCO2e to avoid overburdening local consumers with higher energy and gas prices. Unfortunately, the carbon tax value falls short of covering the CAPEX, operational, and certification costs of either REDD+ or reforestation initiatives. Despite higher prices, initiatives in the voluntary market might still be insufficient to cover a project's CAPEX and the opportunity cost of forest clearing with extensive cattle ranching. In addition, many voluntary market projects in Colombia have come under scrutiny due to poor oversight, difficulties in certification, and "greenwashing." These difficulties have made the National Government weary of voluntary carbon markets while favoring the carbon tax and setting up the national ETS.

Making carbon credits tradable, to take advantage of international carbon markets offer an enormous economic opportunity for the region while protecting and reforesting the Amazon biome. Other countries and regions have implemented ETS with prices of $80 per tCO2e or more, especially in more developed jurisdictions (i.e., EU, California, or Quebec) (World Bank, 2022). Although the domestic market for carbon credits in Colombia is relatively small in the size and share of local emissions covered and pays lower prices than others, the international market is growing rapidly. The voluntary carbon markets and the ETS are growing globally in line with corporations' and governments' continued pledges to offset emissions with carbon credit purchases (Ecosystem Marketplace). Colombia must take advantage of Article VI of the COP 26 Paris that pledges the integration of ETS across country boundaries to integrate carbon prices and markets globally and allow for better tradability. Once Colombia meets and exceeds its Nationally Determined Contribution (NDC), this will allow Colombian credit suppliers to take advantage of the large ETS markets that provide a high price per credit, especially the EU carbon market.

While today's prices remain too low to incentivize the shift toward forest protection, one can imagine a future in which carbon titles are readily contractable and sold in the global market at much higher prices. To capture the potential gains, Colombia can bolster its policy framework, certifications, oversight capabilities, and technologies to capture the large and growing voluntary market and commensurate elevated prices, that translate to higher local gains for the country and Amazonian departments. While Colombia develops its ETS, the country can learn from the variety of experiences in its voluntary market as a 'sandbox': to improve the local certification process, across land titling, registration, monitoring, and technology of the Ministry of Environment's registry (RENARE); funding research on local tree species management and their carbon capture potential; creating new financial vehicles to cover upfront costs of reforestation against future carbon credits; and community engagement schemes. Building improved institutional requirements, as detailed below, will allow Colombia to take advantage of higher prices in the voluntary market in the medium-term while preparing the industry and regulatory environment to integrate itself into a global ETS.

A key constraint in improving carbon credits in Colombia is land registration. The cadaster update in Amazonian frontier municipalities will ensure tenure security for long-term projects (Asocarbono, 2021). Land registration will ensure the government can track which lands are currently deforested to create an initial tree cover baselines of standing forest and deforested lands. In addition, Colombia needs to bolster institutional verification and monitoring mechanisms to prevent "greenwashing" to ensure that reforested plots stay forested, REDD+ schemes remain protected, and parallel initiatives deliver on their conservation benefits. The tradability of carbon credits hinges on the certification that projects are genuine and that the forest will remain standing upon payment. Both certified voluntary markets and ETS buyers require high verification standards to participate. Officials at the Interinstitutional Carbon Market Taskforce (Mesa interinstitutional de Mercado de Carbono - MIMC) should invest in monitoring and verification systems to make carbon titles easier to emit through new technology and know-how in this area over time. The centralization of such a market will allow carbon credit suppliers to take advantage of the scale required for proper verification and monitoring as well as act as a negotiator for high-quality carbon purchase agreements in the voluntary market with foreign businesses and governments. MIMIC and other organizations can take the lead on supporting the diffusion of reforestation knowhow to entrepreneurs and civil society across the Amazon and beyond to ensure carbon credits scale at the quality standards required by international carbon credit verifiers, to the benefit of locals.

Forested areas of the Amazon that are not directly at risk of deforestation cannot be a part of carbon markets, despite providing the world with critical environmental services. Recognizing the Amazon as a global public good requires recognizing the value and importance of these services to protect them accordingly. Colombia already has the legal framework to do this nationally, allowing Colombians to compensate communities conserving protected areas. Globally, this policy area requires further innovation make forest protection pay. The *Bancos de Habitat* (Habitat Banks) provide an initial framework to establish these models and provide payments for the bioeconomy in places that provide many bio services. Colombia can further lead global discussions with innovative regimes, including Climate and Green Bonds, Payment for Environmental Services, and biodiversity credits to compensate for the full benefits of forest protection.

4.3. Public Incentive Alignment

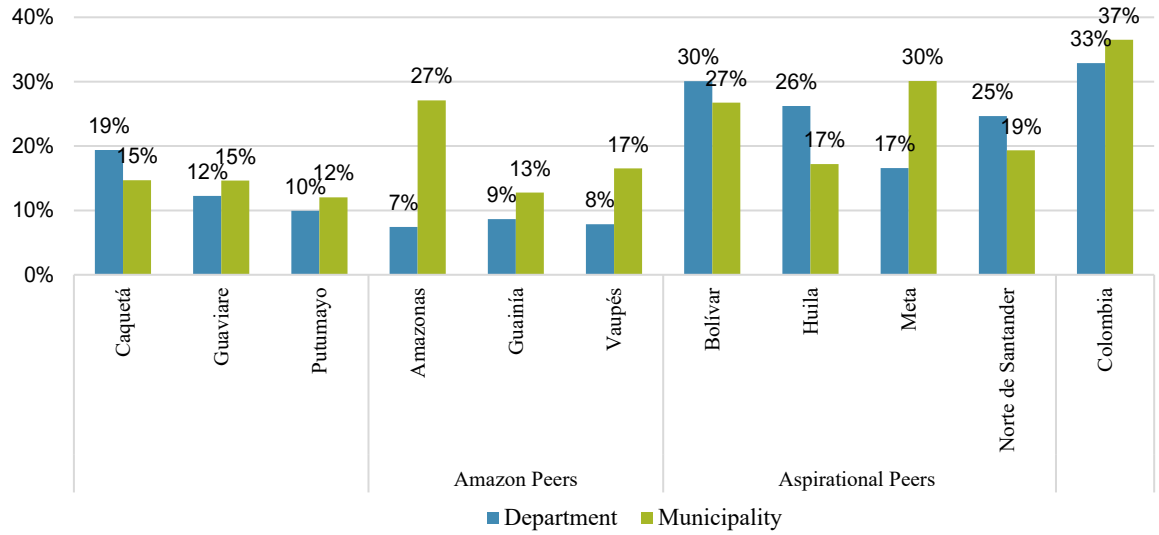
The national government will additionally have to use its available administrative and legal tools to align incentives at the departmental and municipal level, as well as with international donors, to adequately implement its policy framework and protect a global public good:

1. **Condition departmental and municipal transfers to deforestation performance**

The national government should not provide government funding for either productive support or infrastructure construction inside protected areas. The recent resolution by the Colombian Agricultural Institute that annuls sanitary authorizations to commercialize meat for livestock activity inside National Parks is a step in the right direction (Instituto Colombiano Agropecuario 2022). Departments and municipalities in Colombia in 2018 executed 34% of general government expenditures and collected only 23% of revenues, according to the IMF Fiscal Decentralization database. Colombia's decentralized fiscal system results, in practice, in low levels of revenue self-sufficiency for departments and municipalities, particularly at the economic periphery of the country. As Figure 17 illustrates, the Amazon departments and municipalities have self-sufficiency ratios at half the Colombian average, which implies the

national government provides the vast majority of their funding. The fiscal support provides an opportunity for the national government to condition a share of capital transfers to departments and municipalities based on deforestation outcomes. The effort should learn from recent experience in conditioning education spending to departments (stoplight system). In addition to losing funding for poor deforestation performance, the effort should facilitate additional funding to finance policies that achieve curbing deforestation and economic development in urban areas (e.g., completing the cadaster, community development plans). These efforts should learn from the General System of Participation (SGP), which prioritizes funding to municipalities in economic distress, without accounting for performance. The General System of Royalties (SGR) allows municipalities to apply for funds on a project-by-project basis, which may consider a structure for funding based on deforestation outcomes.

Figure 17. Departmental and Municipal Government Revenue Self-Sufficiency
Subnational Government Tax Revenues over Total Revenues, 2015-2017 Average



Source: authors' elaboration based on DNP

2. Align international donor finance to implement national policy framework

By establishing a unified national policy framework to tackle deforestation, the government will be well-positioned to better coordinate the donor community around a common goal. The policy strategy is essentially to realign incentives to create a strong system for forest protection by moving responsibilities to the national level, to then go international to secure funding to protect what is a global public good. Through a national political action reaffirming the people's desire to protect the forest and an accompanying set of actions to put a new system for forest protection in place, the government should tell donors what they are doing and what it costs to protect the forest. Donors should include national governments and multilateral bodies, as well as NGOs, foundations, and private actors who may support the effort. Further, the national framework should also focus on inclusive growth in non-forested areas to incentivize local populations to engage in economic activity outside of deforestation. Beyond traditional industries, elements of this economic growth strategy should include environmental protection services and reforestation efforts to increase value of carbon markets in Colombia. Regarding carbon markets, for instance, our findings make clear that carbon offsets currently are not a viable occupation in Colombia by themselves, as they do not afford sufficient income by

themselves given that carbon prices are often ten to twenty times higher in Europe than Colombia ("Carbon Pricing Dashboard" 2022). Scalability and validation challenges remain before carbon prices offer financial viability to support reforestation and forest protection. By enacting a national policy framework, Colombia should also aim to be the global leader in financing to end deforestation and advance shared prosperity in the Amazon.

5. Policy Strategy II. Sustainable Economic Development

A policy strategy for the Colombian Amazon cannot limit itself to providing environmental solutions for the protection of the forest without rethinking the region's economic and social needs. By expanding protected areas and limiting economic activity in them, the proposed environmental policy could in principle *reduce* economic opportunities for the region's inhabitants. The knee-jerk response is to merely compensate the region for these limits on land use in these departments, which has merit to ensure local political buy-in and to disincentivize communities from illegal crop and informal deforestation. However, compensation will not solve the underlying causes of low levels of economic and social development in the Amazon region. Therefore, empowering local authorities with a sustainable development strategy is an essential component of the shift in the Amazon's governance.

Promoting a new economic model in the Amazon will require both attracting new productive capabilities to the region and finding new, environmentally sustainable solutions to the region's connectivity challenge. Beyond analyzing what a future sustainable economic outlook for the Amazon could look like, it is vital for a development strategy to tackle the constraints that could jeopardize that future. Our Growth Diagnostics exercise finds that both complexity traps and low connectivity (or remoteness) were the most binding constraints to economic development in the region. Consequently, the policy proposal below includes policy actions that can put the region on a path to acquire the capabilities it needs for a new economic model, as well as policies that can help the region overcome its remoteness.

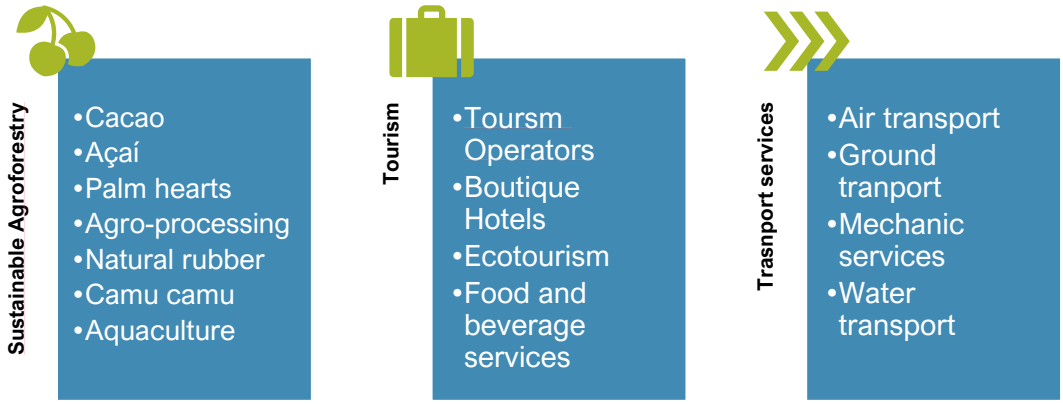
Colombia's current bottom-up approach to productive policy may not be suitable to tackle the challenge of entering new productive sectors. Colombia's productive policies have evolved over the last decade from a cluster-based approach to an approach that prioritizes regional strategies. Productive policy has become progressively more place-based over time with key roles to institutions such as the Regional Commissions for Competitiveness (OECD/UN/UNIDO 2019). The National Council of Economic and Social Policy (CONPES) currently establishes policy priorities for the 2016-2025 period, centered on prioritizing local comparative advantages and regional differentiation, as well as coordination between national, regional, and private sector entities. Although the movement towards to a "bottom-up" or participatory approach emphasizing public-private collaboration is likely to be effective at the national level in improving the performance and accountability of national policy, the approach might not be suitable for the objectives of economic policy in the Amazon. The economic challenge in the Amazon is the absence of a diversified economy that requires attracting new economic activities that do not currently exist. An approach that prioritizes actions based on the preferences of local actors may not yield new diversification, as the "absent" firms will, by design, not be consulted. Transforming the economic model from an extraction-based model to a capability-based approach will require local buy-in as to the target sectors for diversification, but also must aim to learn from would-be investors what constrains their investment in the Amazonian departments to coordinate actions to address constraints and accelerate new investment and business creation. In the same way ProColombia aims to attract global investors

in promising productive sectors to come to Colombia, so too must the economic branches of Amazonian departments create a ProCaqueta, ProPutumayo, and ProGuaviare that reaches to other parts of Colombia to attract investors to come to their department.

The Economic Complexity report identifies a set of promising industries (Figure 18) to diversify CGP departments to build on existing capabilities. The new economic model would be based on three pillars:

- ***Sustainable agroforestry***: intensifying agriculture to enter new areas of the bioeconomy, to scale those agricultural products, and their processed potential, that thrive in the given soil type of non-forested areas of the departments. This includes a focus in maximizing yields, where crops consistently afford higher value than extensive cattle-ranching, to integrate the environmental sustainability of new activities.
- ***Tourism***: while a base exists, the study found missing coordination of a strategy to provide a more complex ecosystem of high-value industries of tourism operators, hotels, restaurants, and related services limits the volume of visits and spending in the sector.
- ***Logistics services***: transport services were found to be a critical missing input that hinder the complementary profitability of new industrial sectors.
- ***Professional services***: in specific instances with the presence of the oil industry in Putumayo, related professional services were not well represented, but offer areas for employment growth.

Figure 18. High-potential Diversification Opportunities for CGP



5.1. Productive Policies for a New Economic Model

An economic development policy strategy for the Amazon needs to include active productive development policies to attract the capabilities the region needs for a sustainable economic model:

1. Create an Amazon Productive Development Taskforce focused on generating opportunity in urban areas

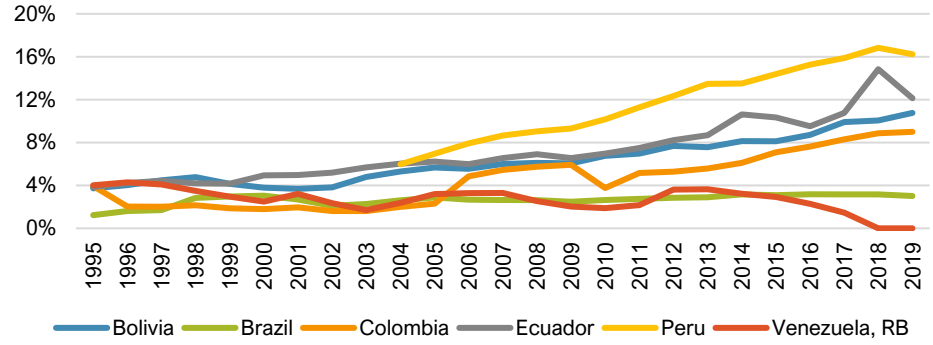
An Amazon Productive Development Taskforce should be established to coordinate national, departmental, and local government entities – as well as private and non-government associations – to implement productive policies for the region. Given the need to shift productive development policy to a new economic model for the Amazon, the departments must diversify their economies, to do new things, which, by definition, they do not currently

know how to do. This approach calls for a centralized taskforce under the National Department of Planning (DNP) that can coordinate and prioritize interventions in the Amazon could contribute to align policies to a new objective. The focus of the taskforce must be in coordinating new investment along with the technical and operational knowledge from elsewhere in Colombia or through the investing firm. The need to coordinate new knowhow and investment calls for a national approach to prioritize these departments and to coordinate new know-how. Colombian productive development policy currently depends on a complex architecture of planning and implementing institutions that work in a variety of areas (e.g., export promotion, competitiveness reforms) and sectors (e.g., tourism, agriculture). DNP and CONPES have taken steps in the direction of coordinated strategy for Amazonian departments, such as the CONPES Document 4050/2021, which provides policy guidelines for protected areas, prioritizing actions to increase natural heritage and cultural conservation, increase connectivity in the areas, boost the effectiveness of the system of protected areas, and increase partnerships between productive sectors. Moreover, the national government – through the Ministry of Trade, Industry and Tourism (MINCIT) and the iNNpulsa agency, alongside local chambers of commerce – has promoted other coordinating initiatives such as the transversal Amazon Regional Pact (*Pacto Región Amazonía*) under DNP's National Development Plan and sectoral clusters in some of the Amazon departments such as the dairy cluster in Caquetá and the tourism cluster in Putumayo. Finally, the Development Programs with Territorial Focus (*Programas de Desarrollo con Enfoque Territorial* or PDET) have been implemented as part of the Peace Agreement's strategy to stabilize and transform the municipalities that have been most affected by violence in the context of the country's armed conflict, and currently include a variety of interventions in the Amazon departments. To maximize the impact of funds dedicated to the economic development of the Amazon and ensure that these are aligned to the region's environmental and economic priorities, it is vital that a centralized taskforce coordinates and prioritizes these.

2. Promote the Tourism Cluster

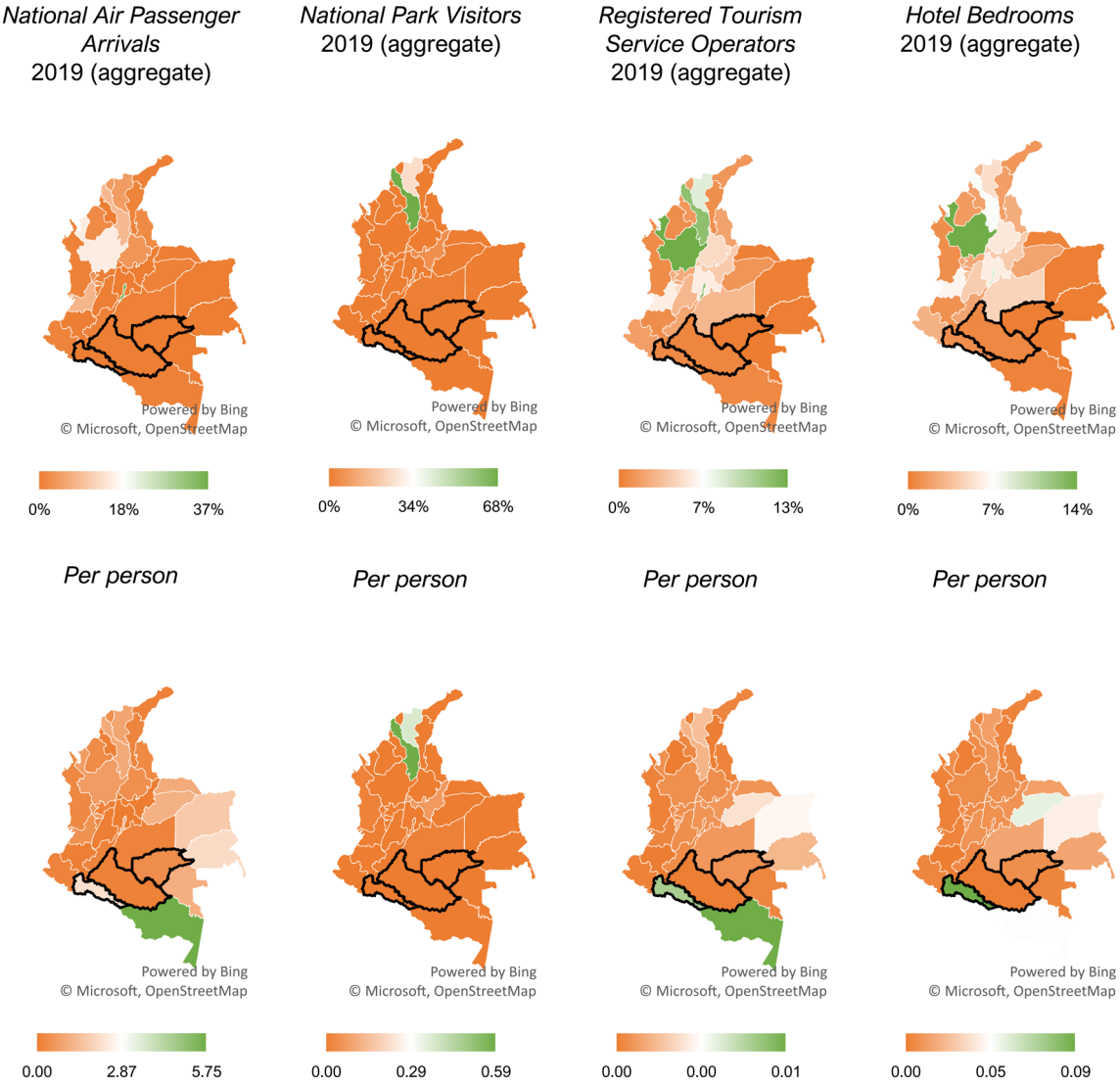
An Amazon Productive Development Taskforce should have as one of its initial objectives to create the mechanisms to incentivize the development of a stronger tourism cluster in the Amazon. Tourism, particularly eco-tourism, is not only a key sector for the region's economic paradigm shift but is also a testing case for the government's ability to deliver on the necessary public-public and public-private coordination. Eco-tourism differs from other conventional forms of tourism with is focus on the underlying conservation-oriented travel motivation, and for the ways it serves for both environmental conservation and employment generation. The eco-tourism ecosystem includes a variety of industries that are currently not developed to their full potential in the Amazon region, such as tourism operators, accommodations and hotels, ecotourism services and restaurant and beverages establishments. The sector is rife with coordination failures, where the ecotourism services, hotels, and restaurants may exist but cannot take off if the tourism operators lack the know-how of how to cater to foreign tourists, such as having bilingual materials and guides, as was found by an evaluation by Pontificia Universidad Javeriana. An advantage of the tourism sector is that it has the potential of generating employment both in urban areas – in terms of transportation and operator services as well as accommodations – and in rural and forested areas for ecotourism services.

Figure 19. International tourism markets
International tourism, number of arrivals as percentage of country population



Source: authors' elaboration World Bank World Development Indicators.

Figure 110. Tourism Statistics in Colombia

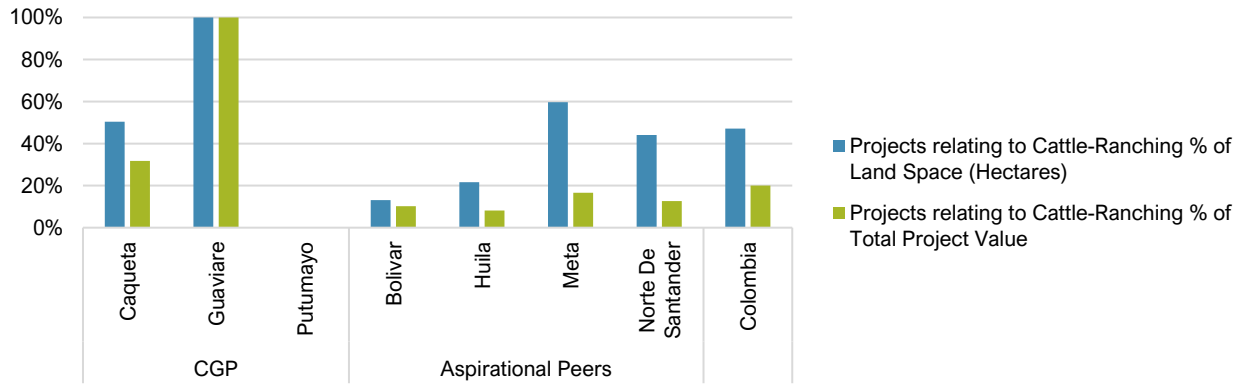


Source: authors' elaboration based on CITUR and GEIH.

3. Align Public Spending Incentives toward a Sustainable Economic Model

Colombia's system of public incentives should gradually be realigned to promote a sustainable economic model in the Amazon. This implies prioritizing program funds for incipient rather than existing economic activities. The most emblematic case is the one of the PIDAR rural development funds that are implemented by the Agency for Rural Development under the Ministry of Agriculture and Rural Development. As Figure 21 shows, PIDAR funds oriented to livestock activities explain a larger share of total program funding in the Amazon departments than in the rest of the country, both in terms of project value and hectares under the program. This pattern replicates in the RedCluster program, an effort targeted at boosting regional productive bets through economic clusters. Caquetá's only documented cluster is the Dairy cluster with more than 90 companies registered with the Chamber of Commerce, representing a public incentive for livestock farming (Guaviare does not belong to any clusters and Putumayo is well-aligned in the tourism cluster). Worse yet, the cluster documentation makes no mention of silvopastoralism as a preferred method of livestock rearing ("Red Cluster Colombia" 2022). Further, price supports in Colombia for milk and beef total in the hundreds of millions of dollars per year ("Country Results" 2022). Subsidization should be geared towards building demand for sustainable Amazonian products and industries, rather than reinforcing the current cattle ranching equilibrium. Reorienting financial support toward activities that are more consistent with an environmentally sustainable economic development model will contribute both to disincentivize the continued expansion of cattle-ranching across the agriculture frontier and could offer new tools to incentivize the development of new industries within agroforestry in non-forested areas.

Figure 21. PIDAR Projects by Department
Share of Land Space and Project Value



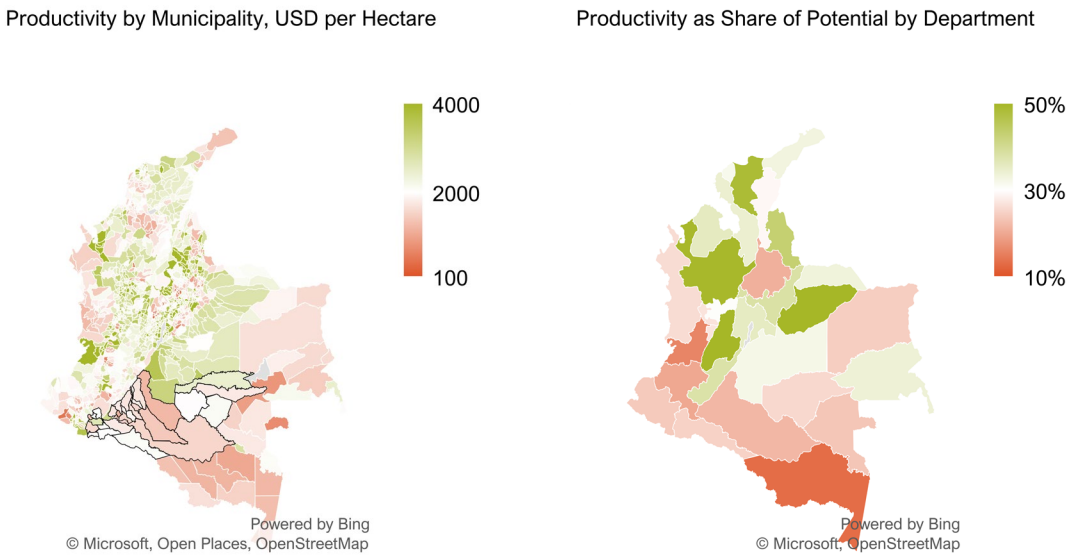
Source: authors' elaboration based on PIDAR data. Cattle-ranching projects are identified by including keyword "ganaderia" and its derivatives. There is no data available for other Amazon departments.

4. Pursue Agriculture Intensification outside the Amazon

Colombia has an enormous, unmet agricultural potential – outside of the Amazon. Given Colombia's land size and soil quality, Colombia should not be an importer of food. This depends on land policy to reach the agricultural potential of the most fertile lands in Colombia: Altillanura. A strategy of agriculture intensification in territories outside of the Amazon that allows for a more productive use of the land in the country will reduce pressure for land distribution in the

Amazon. As Figure 22 suggests, although the productivity gap with respect to agriculture potential is significant in the Amazon, many of the highest productivity areas of Colombia have unmet potential. Rather than focusing on the extensive margin of expanding the "agricultural frontier", the real potential in Colombia is in the intensive margin of increasing the yields of existing land to match its potential. A top-bound approximation of the effect of reaching production potential in the deforested areas of CGP suggests this would only add 0.18% of GDP, whereas reaching potential in Altillanura (Meta, Casanare, Arauca, and Vichada) would add 0.79% and in Altillanura plus the non-Amazonian departments of the country, it would add 4.5%. This is key to avoid the Amazon from becoming a victim of Colombia's land distribution challenge. The land bank included in the Peace Agreement should center on the potential value of the land. In this way, reclaiming the wastelands (*Baldíos de la Nación*) should focus on those lands with the greatest gap between current yield and their potential. Landless migrants who are currently moving to the Amazonian departments in the hope of being granted access to land should be incentivized to relocate to the areas in Colombia with the greatest gap in their potential – outside the Amazon. Inward migration is still much needed in the Amazonian departments, but uniquely to the urban areas to bring new skills and capabilities to help diversify the cities; migration for access to land should be concentrated in other areas of Colombia with unmet agricultural potential. Efforts to support rural transformation to reach agricultural potential should not end with land titling, but should be accompanied by technical assistance, rural extension services, and infrastructure connectivity investments. In addition, land rental policy should be reexamined for underutilized plots to incentivize a more productive use of high-productivity areas. Argentina and Brazil have addressed unequal land ownership through a more efficient system for renting land to allow landless citizens access to productive agriculture. Rental markets that are better able to realize the true productivity of the land offer greater potential than policies that allow for the extension of agricultural frontier through the forest.

Figure 22. Aggregate Agricultural Productivity by Municipality, 2013
USD per hectare



Source: authors' elaboration based on DANE agricultural census (2014), FAOSTAT crop prices (2013), and FAO GAEZ V4 (2009-2010). Crops are aggregated using producer prices per ton for aggregate productivity measures. Actual productivity is compared with average attainable yields. Analysis is limited to staple crops.

5.2. Strategic Transportation Policy

A sustainable economic policy will have to provide a solution to the region's remoteness with limited deforestation impact:

5. Implement strategic selection of road projects to connect to external markets

Road projects in the Amazon region outside of NZFP should also be strategically selected, considering environmental costs (probable deforestation and damage to ecologically sensitive areas) and social costs (damage to indigenous reserves) as well as their economic benefits. As outlined above, first priority is to define the forest and to set a system of control that prohibits economic activity and tertiary road building within the forest. Once the forest is isolated with its own set of policies that diminish incentives to land speculation, addressing the lack of connectivity between the non-forested areas of the Amazonian departments and other cities and markets in Colombia and globally shifts the cost-benefit calculus in favor of greater connectivity. Although the benefits and costs of road building are hard to quantify due to the complex channels through which they affect development, Vilela et al. (2020) have advanced a prioritization of road projects with a high efficiency ratio of expected economic benefits to economic and environmental costs, and including buffer areas around proposed roads to project roads' deforestation effects. The current Amazon Intermodal Transportation Plan (PATIS) provides a similar direction as a planning guide for both national and regional governments to develop sustainable transportation infrastructure in the Amazon, using land use planning, field work, scenario modeling, socio-economic and environmental evaluation of road projects, and a business plan (KFW-Visión Amazonía 2020). In addition, the Green Road Infrastructure Guidelines (LIVV) provide a framework to evaluate the environmental impact of road projects and the development of sustainable transportation infrastructure guidelines at each stage of project development, from feasibility analysis to construction and dismantling (Ministerio de Transporte 2021; World Wildlife Fund 2021).

6. Promote air transport to the Amazon region

Due to its potential to improve the movement of people and goods across the country and facilitate activities such as tourism, air transportation could be an important channel for sustainable growth in the region. As our Growth Diagnostics has shown, air connectivity in the Amazon is low, which limits the development of new activities in the tourism sector. Areas in the Brazilian Amazon that developed air transport infrastructure are found to have lower deforestation rates than peer regions that developed road networks, while allowing for the growth of high-value added industries (Fenley, Machado, and Fernandes 2007). Additionally, air transport cultivated additional economic growth through the construction of airports, indirect industries, and related employment (hotels, restaurants, etc.) in Manaus, Amazonas. Promoting air transport in the Amazon region can be a sustainable connectivity solution for the region. Prioritizing alternative forms of transportation over road transportation is in line with the current PATIS program.

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