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Rethinking the Brazilian Amazon

Sustainable development
for a thriving future

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Summary

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- The Brazilian Amazon has long been a symbol of natural and cultural wealth, suggesting mythical abundance and vast untapped potential.
 - Yet vast swathes of the tropical forest are destroyed each year, and it is at risk of turning into a degraded savannah.
 - The Amazon could support a rich bioeconomy, but this will not be accomplished without land-use planning that reflects the priorities of Brazil's diverse society and promotes a balance between environmental, social and economic goals.
 - Law enforcement, transparent land titling efforts and a broad economic and social agenda are all essential to advance the agenda of a sustainable Amazon – as is the active participation of indigenous and traditional populations in the design of lasting solutions for the region.
 - Implementation of Brazil's ambitious plans for the Amazon region have been hampered by a lack of government coordination at the national level, and several essential public institutions have been weakened, with reduced budget allocation and/or staffing.
 - The international community can help to address many of the underlying causes of deforestation, but a strategy for the Amazon needs to acknowledge the complexity of the region, including the balance between conservation and development goals. An international agenda to foster the conservation of the forest and its biodiversity, to reduce national greenhouse gas emissions and adapt to the impacts of climate change must be undertaken in partnership with the Brazilian people.
 - This paper is the result of a series of dialogues hosted by Chatham House with a range of stakeholders from the Amazon region, and in the international community. Their contributions enabled in-depth exploration of the diversity of opinions and suggested approaches to addressing the challenges of the Amazon region which shaped the findings and recommendations that were synthesized in this document.

01

Introduction

Given the complex and multifaceted nature of challenges facing the Amazon, reinvigorating a comprehensive development narrative will be pivotal for its future, as well as the future of its residents.

The Amazon, with the world's largest tropical forest, has an undeniable hold on the imagination of people around the globe and is famed for its exuberant and complex biodiversity, vast volumes of fresh water, mineral wealth and sociocultural diversity, and the rich ancestral culture of its indigenous population. The forest is also recognized as playing a key role in combating climate change – by removing carbon dioxide from the atmosphere.¹

Brazil prizes the national value and sovereignty of the Amazon, which makes up almost two-thirds of its territory. The rainforest is crucial in regulating rainfall in the central area of the country, enabling agriculture and the generation of hydroelectricity in the Central-West and Southeast regions. It also has the potential to promote a new bioeconomy linked to the sustainable use of its natural capital and ecosystem services.

¹ Gatti, L. V., Basso, L. S., Miller, J. B. et al. (2021), 'Amazonia as a carbon source linked to deforestation and climate change', *Nature*, 595, pp. 388–93, <https://doi.org/10.1038/s41586-021-03629-6> (accessed 30 Aug. 2021).

Box 1. The Legal Amazon

Nine states (Acre, Amapá, Amazonas, Maranhão, Mato Grosso, Pará, Rondônia, Roraima and Tocantins) make up the Brazilian Legal Amazon (*Amazônia Legal*). Together they cover 6.1 million square kilometres, or 60 per cent of the Brazilian territory – an area larger than India and almost as large as Europe. The Legal Amazon was created in 1966² as an administrative unit to enable specific socio-economic development plans. It comprises mostly tropical moist forest (Amazon biome) and savannah (Cerrado biome) in varying degrees of conservation, of which 1.2 million square kilometres are in conservation areas and indigenous territories. The Amazon also includes two of Brazil's largest cities, Belém and Manaus.³

While the majority – 61.9 per cent – of the Amazon rainforest is in Brazil, it also extends into the territories of Bolivia, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname and Venezuela.⁴

For all these reasons, conservation of the Amazon is vital. Yet vast swathes of the forest are being cleared every year and there are indications that the rate of destruction, if maintained, could pass a crucial tipping point, transforming the forest into a degraded savannah within the space of a generation. According to Brazilian climatologist Carlos Nobre, the tipping point may occur when 20 per cent of the Amazon is deforested,⁵ and this is already estimated at 17–18 per cent.⁶ After successful policies to contain deforestation in the early 2010s, the destruction has accelerated again since 2017. In 2020, 10,851 square kilometres (1.1 million hectares) were deforested, according to the National Institute for Space Research (Instituto Nacional de Pesquisas Espaciais – INPE).⁷

There is no simple solution to the many challenges facing the Amazon that suits all its residents and stakeholders. It is possible to identify at least nine distinct uses of the territory, in four distinct biomes, and a myriad of social actors, all with different needs and aspirations. Amazonians live with precarious social indices, as well as institutional weaknesses that do not favour conservation or compliance with the law.

² Presidência da República Subchefia para Assuntos Jurídicos [President of the Republic, Undersecretary for Legal Affairs] (1966), *Lei N 5.173, de 27 de outubro de 1966* [Law No. 5,173 of 27 October 1966], <https://legislacao.presidencia.gov.br/atos/?tipo=LEI&numero=5173&ano=1966&ato=12cgXRE1UMZRV5a5> (accessed 31 Aug. 2021).

³ Plataforma Amazônia Legal em Dados [Legal Amazon in Data] (undated), <https://www.amazoniaemdados.info> (accessed 2 May 2021).

⁴ Santos, D., Salomão, R. and Veríssimo, A. (2021), *Fatos da Amazônia 2021* [Facts of the Amazon 2021], Projeto Amazônia 2030, <https://amazonia2030.org.br/fatos-da-amazonia-2021> (accessed 3 Aug. 2021).

⁵ Lovejoy, T. E. and Nobre, C. (2018), 'Amazon Tipping Point', *Science Advances*, 4(2), eaat2340, 21 February 2018, <https://doi.org/10.1126/sciadv.aat2340> (accessed 6 Aug. 2021).

⁶ Spring, J. (2021), 'Amazon biome hurtles toward death spiral as deforestation jumps in 2020', Reuters, 27 January 2021, <https://www.reuters.com/article/us-environment-amazon-idUSKBN29W20T> (accessed 6 Aug. 2021).

⁷ Instituto Nacional de Pesquisas Espaciais [National Institute for Space Research] (INPE) (2021), PRODES Amazônia [PRODES – Amazon], <http://www.obt.inpe.br/OBT/assuntos/programas/amazonia/prodes> (accessed 8 Aug. 2021).

Box 2. The Brazilian Amazon's diverse population

The 29.3 million people⁸ living in the Brazilian Amazon are often grouped into the following populations:⁹

- Urban dwellers;
- Indigenous peoples from 365 different tribes and groups;
- *Quilombolas*¹⁰ living in about 1,800 communities, of which 10 per cent are officially recognized;
- *Ribeirinhos* – riverside dwellers;
- People who live by harvesting forest products;
- Rural settlers, who came to the Amazon as part of land-reform programmes;
- Rural producers, who occupy extensive areas for the production of soybeans and meat;¹¹
- Loggers, both legal and illegal;
- Miners, both legal and illegal.

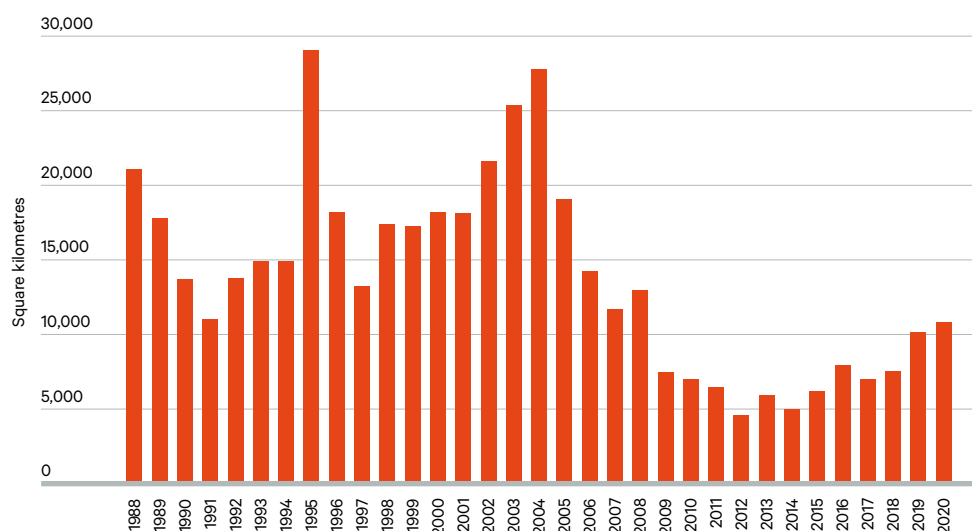
Traditional populations and communities are not isolated homogeneous groups, but comprise indigenous peoples, *quilombolas* and others practising many of the ways of life listed above. They are united by their use of the land and natural resources to sustain religious, cultural and economic activities that are closely tied to their territory and are not exclusively oriented to the market. Traditional populations present multiple identities, including political ones, that may overlap and change over time, with accompanying tensions and social conflicts. It is important to note that identity can be either imposed or self-assigned, and that some of these groups have had their identities denied, opposed or stigmatized.

⁸ Instituto Brasileiro de Geografia e Estatística (2020), Estimated population in the Amazon, <https://www.ibge.gov.br/en/home-eng.html>.

⁹ Alternativas Socioambientais (2020), *Amazônia Legal: Sociedade Natureza e Pessoas* [The Legal Amazon: Society, Nature and People], <https://concertacaoamazonia.com.br/wp-content/uploads/2021/06/Identificac%CC%A7a%CC%83o-dos-grupos-sociais-da-Amazo%CC%82nia-Legal.pdf> (accessed 6 Aug. 2021).

¹⁰ *Quilombolas* are descendants of African slaves who escaped and formed independent settlements (*quilombos*).
¹¹ One-third of Brazilian soybean cultivation happens at the fringes of the region; one-third of Brazil's cattle are raised in the region.

Figure 1. Deforestation in the Legal Amazon



Source: INPE/PRODES Amazônia (2021), 'Deforestation rates – Legal Amazon – States', TerraBrasilis, http://terrabrasilis.dpi.inpe.br/app/dashboard/deforestation/biomes/legal_amazon/rates (accessed 30 Sep. 2021).

Moreover, recent studies indicate that the Amazon is switching from being a carbon sink to an emissions source. Between 2010 and 2018, fires in the region released 1.5 billion tonnes of carbon dioxide (tCO₂) per year, while forest growth was able to remove only 0.5 billion tCO₂.¹²

Brazilians are aware of the risks associated with deforestation and have increased pressure on the government to address it while also promoting the social and economic development of the region.

This paper brings together elements for a strategy for the Amazon that acknowledges the complexity of the region, including the balance between conservation and development goals, in a democratic but still very socially unequal country. It does not aim to be prescriptive or conclusive, but tries to incorporate the diversity of approaches and visions, and to be respectful of the local context and reality. It reflects conversations with specialists, social representatives and business leaders, and presents proposals for an international agenda focused on partnering with Brazil to accelerate the implementation of its ambitious original nationally determined contribution (NDC) to reduce national greenhouse gas emissions and adapt to the impacts of climate change – while preserving the Amazon's biodiversity.

¹² Gatti et al. (2021), 'Amazonia as a carbon source linked to deforestation and climate change'; Carrington, D. (2021), 'Amazon rainforest now emitting more CO₂ than it absorbs', *Guardian*, 14 July 2021, <https://www.theguardian.com/environment/2021/jul/14/amazon-rainforest-now-emitting-more-co2-than-it-absorbs> (accessed 6 Aug. 2021).

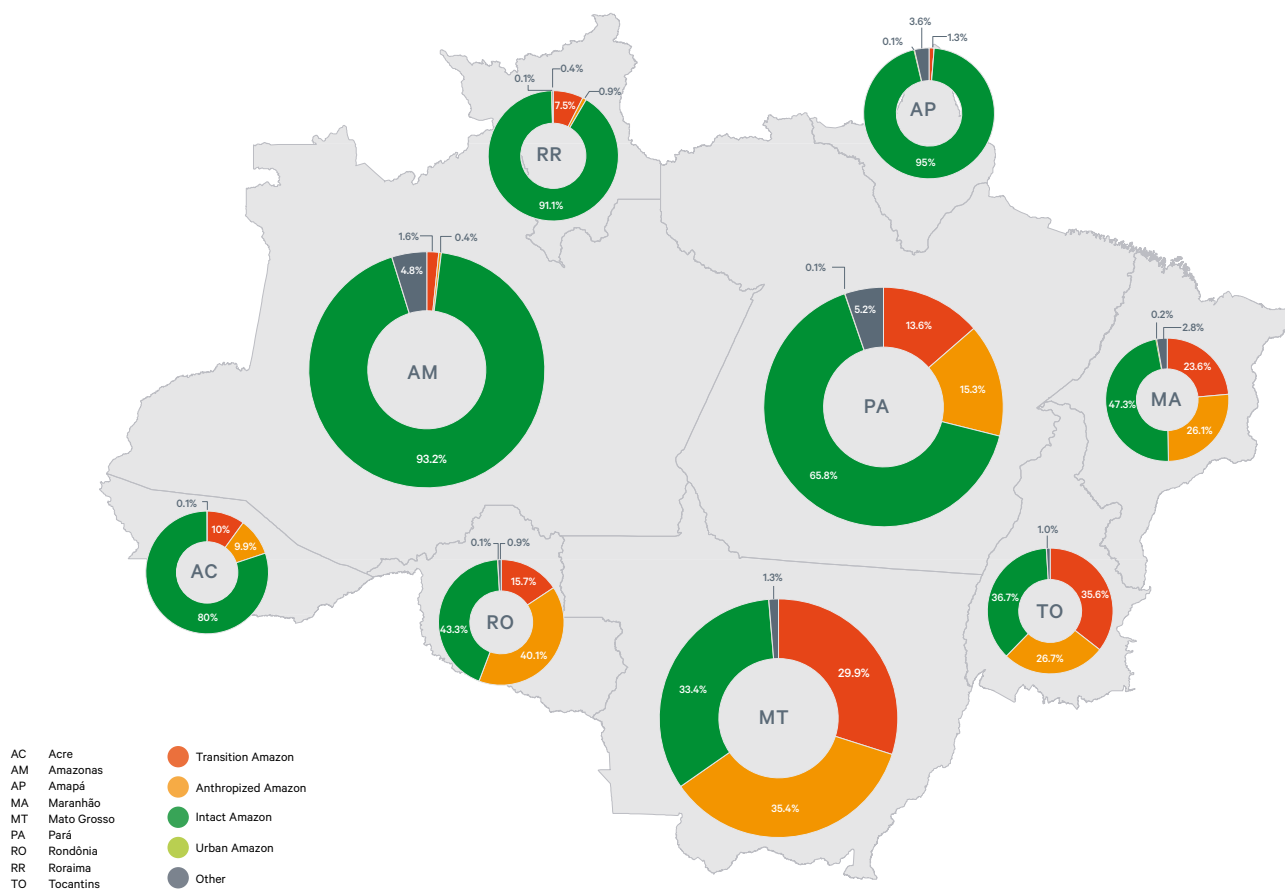
Four Amazons

The Amazon is not just a vast area of forest sparsely populated by indigenous populations: it comprises various biomes, peoples, cultures, urban areas and productive activities, all of which need to be taken into account when addressing environmental challenges and objectives. Without progress on the social and economic agendas, it will not be possible to provide lasting solutions to the environmental issues.

There are at least four identifiable ‘Amazons’:

- **Intact Amazon:** Areas still covered by intact forest, a substantial part of it in legally protected areas (some of which are under great pressure). This is found mainly in the states of Amapá and Amazonas, northern Pará and patches of Acre and Rondônia.
- **Transition Amazon:** Areas where new roads and infrastructure are being built, opening up new zones to the advance of agriculture and immigration. Such developments often impinge on protected areas, particular in the ‘arc of deforestation’ around the southeastern edge of the forest, mainly in southern Pará, Mato Grosso, Rondônia and Acre (see Figure 2).
- **Anthropized Amazon:** Areas deforested decades ago and transformed by human activity, with forest remnants and degraded areas, notably made up of former pastureland.
- **Urban Amazon:** Small, medium-sized and large towns and cities, where the vast majority of the 29.3 million residents of the region live most of the time. City dwellers make up 72 per cent of the total population, including one in four of the 430,000 indigenous people who inhabit the region.

Figure 2. Spatial distribution across the ‘Four Amazons’, 2019



Source: Plataforma Amazônia Legal em Dados [Legal Amazonia in Data] with data from MapBiomas (see <https://mapbiomas.org>, accessed 30 Sep. 2021). Note: ‘Other’ refers to areas that cannot be classified in any of the four categories.

The priority for the entire region is to avoid further deforestation and to expand forested areas. In the Intact Amazon, the specific challenge is to avoid deforestation while finding sustainable economic alternatives for the inhabitants, including traditional populations. In the southwest Amazon (Rondônia), large tracts of land have been abandoned since they were deforested in the late 20th century. But strengthening the economies of the areas outside the intact forest without addressing the land tenure issue may trigger further deforestation, as can be observed to the west of São Félix do Xingu in Pará.¹³

¹³ Prizibisczki, C. and Brito, B. (2021), *Debatendo o Plano Estadual Amazônia Agora na visão da Sociedade Civil e Academia* [Debating the Amazon States Plan from the Perspective of Civil Society and Academia], Belém: Imazon, <https://imazon.org.br/publicacoes/debatendo-o-plano-estadual-amazonia-agora-na-visao-da-sociedade-civil-e-academia-2> (accessed 26 Aug. 2021).

Economic activities – most notably agriculture, mining and energy production – characterize the Anthropized Amazon.¹⁴ These activities have not developed to their full potential, however, largely because of long-standing problems over land tenure, reflected in deficient property records and conflicting claims, which deter greater investment in agricultural improvement.

People in the towns and cities of the Amazon, as elsewhere, rely mostly on the services sector for jobs and income. Urban areas also represent an important part of the tax base of the region, especially because agricultural and mineral commodities are typically not subject to value-added tax.¹⁵ In addition, urban areas have strong connections with the hinterland, mostly based on the flow of products from and the provision of services to extractive, agricultural and cattle breeding activities in the interior of the region. City residents' family links with their original villages and towns along the rivers also play an important role in the region's society. In the state of Amazonas, for example, city dwellers commonly spend part of the year at their properties in the interior.

Thus, successful responses to the challenges presented in each of the 'Four Amazons' will depend on actions taken in the other three, striking a balance between conservation goals, local expectations and economic pressures, and the physical, social and economic interconnections and interdependences between the four. To date, responses to these interrelated challenges have been shaped to a considerable extent by the history of extractivism.

History of extractivism

The current state of the Amazon is the result of a historical process focused on extracting natural riches to sell as commodities. This model, driven mostly by forces outside the region, is inadequate to lift the standard of living of most Amazonians.

During the military dictatorship in Brazil (1964–85), a development strategy that aimed to create new economic opportunities and ensure the occupation of the region (also for national security purposes) had mixed results. Large projects based on monocultures in the jungle did not prove sustainable.^{16,17} The Zona Franca de Manaus (ZFM – the Manaus free trade zone), created in 1957, has had some success in boosting the region's economic development,

¹⁴ Neves, E. G. et al. (2021), *Chapter 8 In Brief: Peoples of the Amazon before European Colonization*, Science Panel for the Amazon, <https://www.theamazonwewant.org/wp-content/uploads/2021/07/Chapter-8-in-Brief-Peoples-of-the-Amazon-before-European-Colonization-FINAL.pdf> (accessed 26 Aug. 2021).

¹⁵ Alfnas, F., Cavalcanti, F. and Gonzaga, G. (2020), *Mercado de trabalho na Amazônia Legal – Uma análise comparativa com o resto do Brasil* [The labour market in the Legal Amazon – A comparative analysis with the rest of Brazil], Amazônia 2030 Project, 25 November 2020, <https://amazonia2030.org.br/mercado-de-trabalho-na-amazonia-legal-uma-analise-comparativa-com-o-resto-do-brasil> (accessed 24 Aug. 2021).

¹⁶ Some prominent examples of such projects include the timber and cellulose Jari project near Amapá, as well as large ranches bought by corporations (such as Volkswagen) using their tax obligations. Basically, instead of paying taxes to the government, companies could invest (part of) this sum in 'development projects' in the Amazon.

¹⁷ Acker, A. (2014), 'O maior incêndio do planeta': como a Volkswagen e o regime militar brasileiro acidentalmente ajudaram a transformar a Amazônia em uma arena política global' [The greatest fire on Earth: how VW and the Brazilian military regime accidentally helped to turn the Amazon into a global political arena], *Revista Brasileira de História*, 34(68), pp. 13–33, <https://www.scielo.br/pdf/rbh/v34n68/a02v34n68.pdf> (accessed 3 Aug. 2021).

although it promoted strong and almost unsustainable urban growth. The future of the zone is the subject of heated debate in Brazil (see Chapter Two below, under ‘Funding architecture’).¹⁸

Limited regard for sustainability is still pervasive across multiple supply chains, notably in the extraction of wood and to a varying extent in the production of meat, despite the involvement of big players in the latter sector.

Since the mid-1990s, ranching and agriculture, which require less government planning than industry, have been the main source of the Amazon’s economic growth. This expansion has benefited from low levels of taxation, cheap public credit and weak enforcement of forest protection laws – and has created a flow of farmers from other regions who often fail to respect local cultures and the environment. Recent energy projects have mirrored the large mining projects, providing little in the way of tax revenue and few permanent jobs.¹⁹ On balance, the model has not been socially inclusive and has had a negative impact on the environment, as well as on vulnerable groups such as indigenous peoples and other traditional populations.

Informal and even illegal activities have flourished in the Amazon alongside the disordered occupation of the territory. Limited regard for sustainability is still pervasive across multiple supply chains, notably in the extraction of wood and to a varying extent in the production of meat, despite the involvement of major players in the latter sector. The consolidation of meatpackers into a handful of big names such as JBS, Marfrig and Minerva, sponsored by the government since the early 2000s with funding from the Brazilian Development Bank (BNDES) and including major joint ventures combining many smaller players, has only recently been translated into efforts to ensure compliance with environmental and labour standards, in the wake of pressure from international clients and investors.²⁰ External pressure and support from trading companies were also instrumental in stopping the expansion of large-scale grain production in the region. There has been a high degree of compliance with the ‘soy moratorium’, which bans the purchase or export of grain planted in areas deforested in the Amazon biome after 2006.²¹

¹⁸ Holland, M. et al. (2019), *Zona Franca de Manaus: Impactos, Efetividade e Oportunidade* [The Manaus Free Trade Zone: Impacts, Effectiveness and Opportunity], São Paulo, FGV EESP, https://eesp.fgv.br/sites/eesp.fgv.br/files/estudos_fgv_zonafranca_manauas_abril_2019v2.pdf (accessed 31 Aug. 2021).

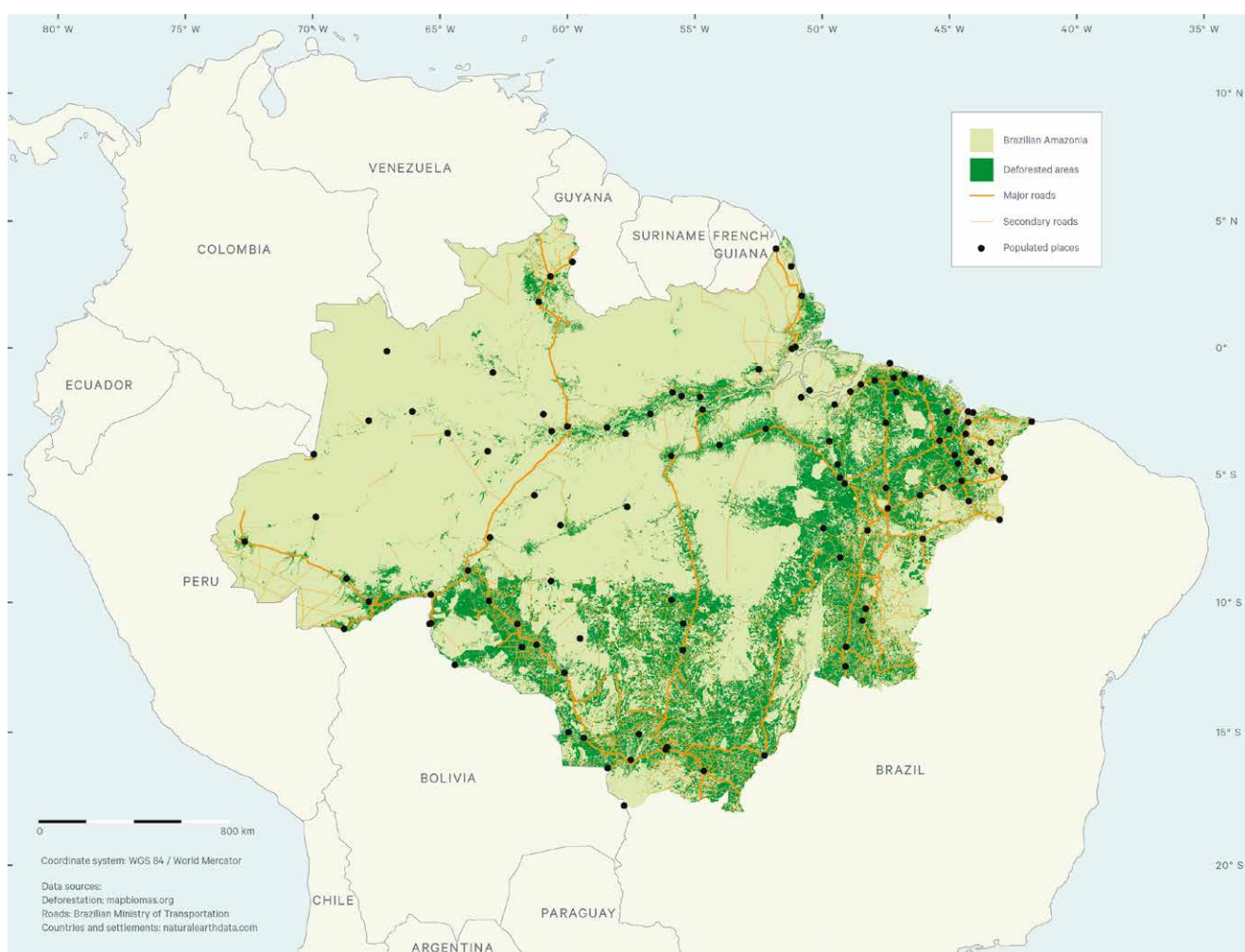
¹⁹ Moran, E. F. (2020), ‘Changing how we build hydropower infrastructure for the common good: lessons from the Brazilian Amazon’, *Civitas*, 20(1), pp. 5–15, <http://dx.doi.org/10.15448/1984-7289.2020.1.34643> (accessed 24 Aug. 2021).

²⁰ Pooler, M. and Terazono, E. (2021), ‘Brazilian meatpackers’ commitment to emissions targets under scrutiny’, *Financial Times*, 27 June 2021, <https://www.ft.com/content/03267414-b068-4b05-9d84-0caa794f8d57> (accessed 26 Aug. 2021).

²¹ Piatto, M. and de Souza, L. I. (2016), *10-Year of Soy Moratorium in the Amazon: history, impacts and expansion into Cerrado areas*, Piracicaba, SP: Institute of Agricultural and Forest Management and Certification (Imaflora), <https://www.imaflora.org/public/media/biblioteca/IMF-10-years-of-soy-moratorium-WB.pdf> (accessed 26 Aug. 2021).

In summary, neither the development strategy that was promoted during the military regime, based on large capital-intensive projects and the construction of highways (see Figure 3), nor the more piecemeal and disorganized occupation of the land based on beef production that has been typical since democratization has been sustainable. They have contributed to land speculation backed by extensive, low-productivity cattle ranching, and a host of informal or illegal activities, including logging and gold mining, which is conducted with great disregard for the rights of indigenous peoples and the preservation of streams and watercourses.

Figure 3. How highways drive deforestation



Sources: Climate Policy Initiative with data from the Brazilian Institute of Geography and Statistics, 2010; Brazilian Ministry of Transport, 2017; and the Mapbiomas project 4.1 in Bragança, A., Araujo, R. and Assunção, J. J. (2020), *Medindo os Efeitos Indiretos da Infraestrutura de Transporte na Amazônia* [Measuring the Indirect Effects of Transportation Infrastructure in the Amazon], Climate Policy Initiative, <https://www.climatepolicyinitiative.org/publication/measuring-the-indirect-effects-of-transportation-infrastructure-in-the-amazon>, accessed 30 Sep. 2021.

02 Principal challenges and solutions

New technologies and pioneering initiatives could address the interconnected development challenges, and promote sound policies that protect the future of the Amazon and prevent further deforestation.

The journey towards a stable and more productive economy which complies with the best environmental, social and governance practices remains long and difficult. However, there are encouraging developments. New technologies,²² such as satellite imaging with increased frequency and granularity, may transform some of the existing economic activities. For example, together with artificial intelligence, such technologies are now helping to improve the traceability of cattle to ensure they are not raised in recently deforested areas. Imagery has also been instrumental in monitoring deforestation, and isotope testing is increasingly used to verify whether timber matches its declared origin.

Outside the areas of the Intact Amazon, a combination of forest management, agriculture, cattle ranching and legal mining may be sustainable. Investment can increase productivity and break the ‘slash, burn and abandon’ pattern of land occupation,²³ freeing degraded pastures for reforestation, possibly with help in the form of payments for environmental services or carbon credits.

²² Do Pasto au Prato [From Pasture to Plate] (2020), ‘Um aplicativo criado para aumentar a transparência na cadeia da carne e apoiar o consumo consciente no Brasil’ [An application created to increase transparency in the meat supply chain and support conscious consumption in Brazil], <https://dopastoaoprato.com.br/index.html>; Previsia (2020), Previsia Initiative <https://previsia.org> (both accessed 31 Aug. 2021).

²³ Assunção, J. J., Gandour, C., Pessoa, P. and Rocha, R. (2017), ‘Property-level assessment of change in forest clearing patterns: The need for tailoring policy in the Amazon’. *Land Use Policy*, 66, pp. 18–27, <https://doi.org/10.1016/j.landusepol.2017.04.022> (accessed 23 Aug. 2021).

To prevent further deforestation in Pará, surrounding forests have to be formally set aside as conservation areas, and their protection has to be rigorously enforced, while minimum forest coverage is maintained in the developed areas. Fighting illegalities and providing adequate financing for producers who operate sustainably are crucial to making this strategy work.

Fighting illegalities and providing adequate financing for producers who operate sustainably are crucial to making deforestation strategy work.

Countering the abandonment of land in Rondônia after deforestation could follow one of two pathways: either restoration and regeneration into forests, or conversion into a new frontier of agriculture development.²⁴

In the east, where cultivation of pepper and other commodities has been successful in the last 40 years, other activities, such as the production of palm oil (e.g. for aviation fuel) on degraded land or legalized mining, could strengthen the economic fabric of the region, which is also anchored in important cities (including Paragominas, Altamira and Tailândia). There is still debate as to whether increasing productivity²⁵ will improve conservation outcomes.²⁶ Increasing agricultural productivity²⁷ and social inclusion could be the best approach for these areas, and would help reduce migration into the arc of deforestation and beyond.

In urban areas, tourism, information and knowledge economy activities are crucial to the success of the services sector. This requires a strong focus on improving educational levels, which remain below the average in Brazil.²⁸

Responding to these challenges requires strong law enforcement and an end to the culture of impunity, as well as effective land-use policies. It may also require payments for environmental services and incentives for low-impact forest management. The development of a bioeconomy supported by science could lead to the creation of new markets for forest products. The experience of long-standing and successful conservation projects in protected areas, such as the Amazon Region

²⁴ Carvalho, C. (2021), 'Projeto de polo de agronegócio no Amazonas, Amacro se transformou em nova frente de desmatamento na Amazônia' [The Agribusiness cluster in the State of Amazonas, Amacro, became the new deforestation frontier], *O Globo*, 26 June 2021, <https://oglobo.globo.com/brasil/meio-ambiente/projeto-de-polo-de-agronegocio-no-amazonas-amacro-se-transformou-em-nova-frente-de-desmatamento-na-amazonia-25068537> (accessed 25 Aug. 2021).

²⁵ Increasing the efficiency with which farmers use inputs (such as land, labour, capital, materials and services) to produce outputs (such as crops, livestock and wool). This has important consequences, for instance, on farm profitability and competitiveness.

²⁶ Pearce, F. (2018), 'Sparing vs Sharing: The Great Debate Over How to Protect Nature', *Yale Environment 360*, 3 December 2018, <https://e360.yale.edu/features/sparing-vs-sharing-the-great-debate-over-how-to-protect-nature> (accessed 31 Aug. 2021).

²⁷ Filho, F., Bragança, A. and Assunção, J. J. (2021), 'Um Novo Modelo de Negócios é Necessário para Aumentar a Produtividade da Pecuária na Amazônia' [A new business model will be necessary to increase cattle productivity in the Amazon], Climate Policy Initiative, <https://www.climatepolicyinitiative.org/pt-br/publication/um-novo-modelo-de-negocios-e-necessario-para-aumentar-a-produtividade-da-pecuaria-na-amazonia> (accessed 31 Aug. 2021).

²⁸ Plataforma Amazônia Legal em Dados (2020), *Radiografia da Amazônia Legal: Visão integrada dos estados da região* [An X-Ray of the Legal Amazon: Integrated vision from the states in the Amazon region], <https://concertacaoamazonia.com.br/wp-content/uploads/2021/06/Radiografia-da-Amazo%CC%82nia-Legal.pdf> (accessed 9 Aug. 2021).

Protected Areas Programme (ARPA), a joint initiative sponsored by government and non-government agencies including the World Bank, can contribute to such endeavours.

Given the interrelated nature of these challenges and their solutions, this research paper focuses on six specific areas where intervention has the potential to achieve lasting solutions. These are as follows: compliance and combating impunity; land-use planning, land titling regularization and transparency; economic development, in different areas such as timber, cattle ranching, agricultural commodities, mining and the forest bioeconomy, including through innovations in science and technology; funding architecture; infrastructure and communications; and the social agenda, including education.

Compliance and combating impunity

The social, economic and environmental challenges in the Amazon are exacerbated by weak governance.²⁹ There is widespread impunity³⁰ for all types of crime, including deforestation, illegal mining, land-grabbing, biopiracy and animal trafficking. Individuals and companies often cultivate permissive relationships with authorities. This situation drives away those investors and entrepreneurs who wish to operate under the rule of law and according to sustainability criteria.

Inequalities tend to create tolerance towards informal and even illegal activities, right across the economic spectrum. Those with greater economic resources claim that the complexity and inadequacy of laws make compliance with them impossible. Although this situation is not exclusive to Brazil, its implications for land-use planning and economic activities in the Amazon are broad and, at times, potentially devastating. It promotes impunity for illegal or criminal actions, sometimes under the excuse of fostering economic development, and encourages legal and regulatory changes that weaken social control and facilitate the grabbing of public property and the destruction of the environment.

Law enforcement has deteriorated since 2019. Environmental protection agencies have seen their already limited budgets being further reduced, and their enforcement actions restrained. A rhetoric that normalizes abuses and non-compliance with the law has also gained ground.

This scenario can be reversed. Brazil is recognized for the excellent environmental legal framework it created in the mid-1980s. New technologies allow greater transparency and better monitoring, and could facilitate the enforcement

²⁹ Werneck, F., Sordi, J., Araújo, S. and Angelo, C. (2021), *Passando a boiada: o segundo ano de desmonte ambiental sob Jair Bolsonaro* [‘Pushing the whole lot through’: The second year of environmental havoc under Brazil’s Jair Bolsonaro], Observatório do Clima, <https://www.oc.eco.br/wp-content/uploads/2021/01/Passando-a-boiada-1.pdf> (accessed 24 Aug. 2021).

³⁰ Human Rights Watch (2019), ‘Rainforest Mafias: How Violence and Impunity Fuel Deforestation in Brazil’s Amazon’, 17 September 2019, <https://www.hrw.org/report/2019/09/17/rainforest-mafias/how-violence-and-impunity-fuel-deforestation-brazils-amazon> (accessed 24 Aug. 2021); Abdenur, A., Ferguson, B., Szabo de Carvalho, I., Risso, M. and Muggah, R. (2020), *Crime Ambiental na Bacia Amazônica: Uma Tipologia para Pesquisa, Política Pública e Ação* [Environmental Crime in the Amazon Basin: A Typology for Research, Public Policy and Actions], Instituto Igarapé, Artigo estratégico 47 [Strategic Article 47], https://igarape.org.br/wp-content/uploads/2020/08/2020-08-19_E-47_Crime-Ambiental-Amazonia-Tipologia-PT.pdf (accessed 24 Aug. 2021).

of environmental laws while reducing the cost of compliance with them. Civil society organizations have built important databases about the region and created mechanisms for local people to take part in decision-making that affects them.³¹

Land-use planning, land titling regularization and transparency

Land-use planning is necessary to enable the Amazon to fulfil its potential. Such planning needs to reflect the priorities of Brazilian society inside and outside the region. It has to coordinate and balance environmental, social and economic goals and constraints to ensure the fair, robust and efficient allocation of land to various uses across the Amazon. Allocations must reflect the need to protect the forest together with the rights and needs of traditional populations and indigenous peoples, as well as providing the legal security required to stimulate new investment.

Strategic land-use planning of the Amazon has not been implemented or actively pursued, although it is envisaged by the Federal Constitution of 1988 (Article 21, 9).³² A land-use policy would establish guidelines for the organization and execution of a plan to implement the social, economic and environmental agendas, inform decisions on who has authority and enforcement capacity, and guide the creation of cross-cutting structural elements, such as investments in infrastructure, communication and technology.

In Brazil, a policy is usually more flexible and easier to approve than a national plan. Yet attempts to establish a national policy have so far resulted in only a few discussions and events, held in the first decade of this century. The widely differing expectations of different stakeholders have made it impossible to build consensus and progress the debate.

Giving people titles to land boosts confidence and provides a means for economic independence.

In the absence of a national policy, a number of protected areas, designated as Conservation Units, had been established by the mid-2010s. Several indigenous territories have also been demarcated, giving indigenous peoples full rights over the area. However, this approach to conservation is weakened by the fact that large areas of public land still do not have any specific designation. Undesignated areas are particularly vulnerable to land grabs, land speculation and deforestation, because they are viewed by many as 'free' and unused. Much of the current

³¹ Morgado, R. (2020), 'The Use of Open Data to Tackle Illegal Logging in Brazil', Chatham House Forest Governance and Legality, 29 July 2020, <https://forestgovernance.chathamhouse.org/publications/open-data-in-brazil-the-challenges-and-opportunities-for-tackling-illegal-logging> (accessed 31 Aug. 2021).

³² World Intellectual Property Organization (2008), *República Federativa de Brasil, Constitución Política de 1988, con reformas de 1996, em inglês* [Federative Republic of Brazil, 1988 Constitution, with 1996 reforms, in English], <https://www.wipo.int/edocs/lexdocs/laws/en/br/br117en.pdf> (accessed 31 Aug. 2021).

deforestation is occurring in areas that have not been clearly designated.³³ Indeed, 5 per cent of the area classified as undesignated public forests had already been deforested between 1997 and 2018.³⁴

Land titling, which is of interest to many in the region, is a potential lever for more investment and higher agricultural productivity. It has to be addressed in accordance with land-use planning and be underpinned by very clear principles and objectives. Giving people titles to land also boosts confidence and provides a means for economic independence. But it cannot be approached in a narrow way, and it has to recognize the numerous forms of ownership in the region. It must respond to the specific needs of private as well as of collective ownership, including those arising in land settlements from land reform programmes and in *quilombos*. Land titling also needs to prioritize small producers and be backed up with penalties proportional to the size of the plots for failure to comply with conditions, especially with respect to environmental criteria. One of the starting points should be to address the gaps, overlaps and conflicts of ownership, especially in the Anthropized Amazon.

Effective and transparent land titling will require changes in the *cartório* or registry system for real estate, which is archaic and often fragile, despite the use of technology by some registries and the legal reforms that have been promoted during the last 45 years to modernize what is often a private service chartered by the state. Registrations are precarious, fragmented, incomplete and frequently conflicting, as well as being dispersed geographically, without comprehensive systematization or accessibility.

The digitization of registry data and a solid, transparent and agile infrastructure of registries, integrated with the data banks of the Environmental Rural Registry and the federal land settlement institute, INCRA (Instituto Nacional de Colonização e Reforma Agrária) and local land authorities, would help address some of these shortcomings. Satellite information can help with the verification of compliance filings and provide data about the conservation status of areas for which regularization is being sought.

³³ Kruid, S. et al. (2021), 'Beyond Deforestation: Carbon Emissions from Land Grabbing and Forest Degradation in the Brazilian Amazon', *Frontiers in Forests and Global Change*, 4, 645282, <https://doi.org/10.3389/ffgc.2021.645282> (accessed 3 Aug. 2021).

³⁴ Azevedo-Ramos, C. et al. (2020), 'Lawless land in no man's land: The undesignated public forests in the Brazilian Amazon', *Land Use Policy*, 99, December 2020, 104863, <https://doi.org/10.1016/j.landusepol.2020.104863> (accessed 3 Aug. 2021).

Box 3. Land tenure categories, Forest Code and the Environmental Rural Registry

Land tenure categories include indigenous lands, *quilombola* lands, Conservation Units, private properties and public forests.³⁵ Brazilian public forests, in turn, can be classified as:

1. Designated forests – with specific destination as Conservation Units, indigenous lands, rural settlements or military areas, among others;
2. Undesignated forests; and
3. Vacant lands – untitled federal lands.³⁶

The National System of Conservation Units (Sistema Nacional de Unidades de Conservação, or SNUC), established in 2000, provides a framework for coordinated management and implementation at different levels of government for both public areas and units proposed by private actors. There are 12 categories of Conservation Units, which can be divided into two broad groups: strict protection areas, with the primary objective of biodiversity conservation restricting direct use or consumption of natural resources; and sustainable use areas, primarily aiming at conservation but allowing human settlements and several uses of natural resources. This second category encompasses national forests, extractivist reserves and sustainable development reserves.³⁷

The Forest Code, updated in 2012, regulates private land management. It is another important piece of legislation, requiring a minimum percentage of the land area in private properties to be set aside as native vegetation. Such areas are denominated as Legal Reserves and the percentage is defined according to the biome. In the Amazon biome, landowners are required to set aside 80 per cent of their holdings in this way.

The Forest Code created the Rural Environmental Registry system (*Cadastro Ambiental Rural* – CAR), requiring landowners to register the georeferenced limits of their property and report on the areas dedicated to production and conservation. However, the CAR mechanism has been used by many to claim ownership over public lands.³⁸

There are 49.8 million hectares (mha) of so-called undesignated public forests (UPF), where neither the federal nor the state government has assigned a specific tenure status. These forests are highly susceptible to land-grabbing and therefore to deforestation.

A recent study found that between 1997 and 2018, 2.6 mha of the 49.8 mha of UPF had been deforested, releasing emissions equivalent to 1.2 billion tonnes of carbon dioxide (GtCO₂). The same study highlighted that 11.6 mha of UPF have been illegally registered in the CAR system as private property.³⁹

³⁵ Azevedo-Ramos et al. (2020), 'Lawless land in no man's land'.

³⁶ Moraes, I., Azevedo-Ramos, C. and Pacheco, J. (2021), 'Public Forests Under Threat in the Brazilian Amazon: Strategies for Coping Shifts in Environmental Policies and Regulations', *Frontiers in Forests and Global Change*, 4, 631756, <https://doi.org/10.3389/ffgc.2021.631756> (accessed 9 Aug. 2021).

³⁷ Government of Brazil (2000), Law No. 9.985 of 18 July 2000, *Diário Oficial da União* [Official Diary of the Union], http://www.planalto.gov.br/ccivil_03/leis/19985.htm (accessed 9 Aug. 2021).

³⁸ Azevedo-Ramos et al. (2020), 'Lawless land in no man's land'.

³⁹ Ibid.

Economic development

A range of options can be explored to promote the development of more sustainable economic activities in the different Amazon biomes.

Fiscal and economic incentives granted by federal and state governments usually have little to do with environmental conservation or the promotion of natural capital, and need to be reconsidered.⁴⁰ Policies and initiatives aimed at protecting or promoting the region's environmental, social and cultural assets need to be evaluated, together with the effects of interventions by commercial, as well as multilateral partners, and by foreign governments, with the intention of encouraging best environmental practices in the region. The following sections provide a brief overview of how this might apply to different economic sectors.

Timber

The immense potential of sustainable timber production, including as feedstock for bio-based materials that can displace plastics and other fossil fuel-based materials, is still mostly untapped. Although Brazil has developed an advanced Forest Concession Law, and detailed, high-frequency monitoring for forest cover change is possible and inexpensive, the degree to which this law has been implemented remains negligible compared with the level of illegality in the sector. Regulatory instability and the failure of public agencies to enforce the law undermine the incentives for efficient processing of wood and its use in the production of higher-value goods. Renewed pressure on domestic and international timber buyers to improve the supply chain is essential to achieving progress in this area.

Cattle ranching

Ranching, one of the most important economic activities in the Amazon, is increasingly geared towards international markets: domestic consumption of meat has stagnated in the last decade, owing mostly to increased international prices.

Making cattle rearing sustainable will require more intensive production, on better pastures, preferably as part of integrated crop-livestock agroforestry systems. This approach will free up land less suitable for farming for natural regeneration and forest restoration, while diversifying into different economic activities in a more efficient and intensive manner. It will require zero deforestation and full traceability of the supply chain, starting with calf producers, moving up to fattening farms and to final suppliers at meatpacking units. This is possible with current technology, and the cost of compliance, even for small producers, is relatively low, as the sector is taxed lightly. Since phytosanitary controls are already in place to satisfy international markets, every animal is already registered with the health authorities, although full

⁴⁰ Frickmann Young, C. E. (2013), 'Green economy policies in Brazil: challenges and opportunities', *Revista del CESLA*, 16, pp. 261–77, <https://www.redalyc.org/articulo.oa?id=243329724015> (accessed 25 Aug. 2021).

registration information is not available along the supply chain. It is encouraging that the largest meatpackers have recently announced ambitious plans to reduce the carbon footprint of their product and ensure the legality of their whole supply chains, as noted earlier.

Agricultural commodities

There is great potential to diversify the agricultural commodities economy. Income from forest products such as cocoa, Brazil nuts, cupuaçu (a rainforest tree related to cacao) and açaí (a palm tree cultivated for its fruit, leaves and wood) is still insignificant as a share of the region's economy. Despite their incipient success, these chains need to be better analysed to enable exploration of their potential for scaling up, industrialization and favourable access to international markets, while good waste management practices are developed and followed. The trajectory of more established commodities, such as pepper, should be studied and the production of biofuels (including jet fuel from palm oil) pursued in degraded areas, under socially inclusive arrangements.

The relationship of supply chains of soft commodities with their partners, clients and investors has developed over time. Compliance requirements in some markets and consumers' sustainability expectations have changed, as has the purchasing power of different regions around the world. Unfortunately, the incentives for best practices driven by consumers are not always consistent, especially when they are focused on excluding unsustainable producers from the market, with mechanisms to divest from and sanction producers. Incentives more focused on inclusion, addressing the complexity of the region and seeking solutions that assure compliance with the highest environmental criteria, typically gain greater local support, and can keep small producers within the supply chain without pushing them into unregulated practices. The two approaches are important, and are not exclusive, but they need a degree of coordination to be effective and to minimize the negative and unintended effects on the livelihoods and well-being of the local population.

Mining

The extraction and industrialization of mineral products informed early strategies to create high-productivity activities in the Amazon, yielding an enduring production of iron ore and the vertical integration of the bauxite-to-aluminium process. Although results have been uneven, this approach holds some promise for the region.

The careful development of mineral activities, following good practices such as those supported by the Responsible Mining Foundation, and primarily taking place outside protected and indigenous areas, will continue to be important. It will respond to the growing demand for several minerals in the new low-carbon global economy, supplying producers of sustainable energy infrastructure

as well as data-processing and communication equipment. This development will require official agencies to resume both their research for new mineral assets and improvements in the current mining legal framework. Mining in forested land is a sensitive issue, and indigenous peoples and other vulnerable groups need to participate in decisions about it. The repression of illegal mining, as well as the design of adequate compensation schemes for legal mining – including fair taxation – are integral to nature-friendly progress in the sector.

Local processing of minerals will be dependent on a greater supply of cheap energy, which may be difficult to obtain in Brazil's competitive and integrated electricity market.

Forest bioeconomy

There is potential for Brazil to create a forest bioeconomy, harnessing its great natural wealth to develop pharmaceuticals, cosmetics, food, fabrics and other products. One vision for this is the so-called 'Amazon 4.0' project, which sees technological innovation being linked to social and economic development to make Brazil an environmental powerhouse. It aims to combine knowledge of Amazon's biodiversity with the technologies of the fourth industrial revolution – the ongoing automation of manufacturing and industrial practices, using modern smart technology.⁴¹ Significant investment in academic and technological research and time will be needed for this to become a viable alternative for the region.

The term 'bioeconomy' refers to economic activities involving the use of biotechnology and biomass in production, process and use. Its exact definition is still being debated and shaped. In the context of the Brazilian Amazon, the authors of this research paper propose the following working definition, based on a debate led by the Bioeconomy Working Group of the Amazon Concertation Network (*Uma Concertação pela Amazônia*).

⁴¹Nobre, I. and Nobre, C. (2019), 'Amazon 4.0 Project: Defining a Third Way for the Amazon', Medium, 25 September 2019, <https://medium.com/funda%C3%A7%C3%A3o-fhc/amazon-4-0-project-defining-a-third-path-for-the-amazon-f0412305f066> (accessed 6 Aug. 2021).

Table 1. A proposed working definition for the Amazonian bioeconomy

	Bioeconomy based on sociobiodiversity	Bioeconomy based on forest stewardship	Bioeconomy based on intense (biomass) production
Predominant activities	<ul style="list-style-type: none"> • Extractivism • Neoextractivism • Subsistence agriculture 	<ul style="list-style-type: none"> • Sustainable low-impact forest management 	<ul style="list-style-type: none"> • Planted forests • Commercial agriculture
Intensity of productive intervention	<ul style="list-style-type: none"> • Low 	<ul style="list-style-type: none"> • Medium 	<ul style="list-style-type: none"> • High
Relationship with biodiversity	<ul style="list-style-type: none"> • High dependency and high contribution to its maintenance 	<ul style="list-style-type: none"> • Medium dependency and contribution to its maintenance 	<ul style="list-style-type: none"> • Low dependency • Monoculture plantations and crops contribute little and can threaten biodiversity if not balanced with careful land/ biome management
Relationship with climate change	<ul style="list-style-type: none"> • Captures and stores atmospheric carbon dioxide. High resilience to the effects of climate change 	<ul style="list-style-type: none"> • Captures and stores atmospheric carbon dioxide 	<ul style="list-style-type: none"> • Products potentially reduce emissions since they substitute fossil-based fuels and materials; however, large-scale production away from degraded lands exerts pressure for the conversion of forests as well as on other resources

Source: Adapted by the authors from the 'Framework for a bioeconomy in the Amazon' proposed by the Bioeconomy Working Group of the Amazon Concertation Network (*Uma Concertação pela Amazônia*). See *Uma Concertação pela Amazônia*, Bioeconomy Working Group (2021), 'The value of diversity for the bioeconomy', Página 22, 9 February 2021, <https://pagina22.com.br/2021/02/09/the-value-of-diversity-for-the-bioeconomy> (accessed 6 Aug. 2021).

Funding architecture

Payments for environmental services are one obvious way to ensure the protection of forests. The concept has existed for many years, but schemes are often small-scale and incipient. If scaled up, they could help to avoid carbon emissions and to conserve biodiversity and soil, as well as protecting water resources and traditional knowledge.

In January 2021 a National Policy on Payment for Environmental Services was established by Law 14.119/2021; it follows the service provider/funding receiver and service user/funding payer principles to incentivize conservation and recovery of ecosystems throughout the national territory.⁴² It will be important to define the criteria for the eligibility of projects and activities to receive these payments, especially in the case of public payments. This agenda has a strong connection to international payments for environmental services arrangements, including the REDD+ mechanism for reducing emissions from deforestation and forest degradation (developed by the Conference of the Parties – COP – to the

⁴² Government of Brazil (2021), Law No. 14.119 of 13 January 2021, Diário Oficial da União [Official Diary of the Union], <https://www.in.gov.br/en/web/dou/-/lei-n-14.119-de-13-de-janeiro-de-2021-298899394> (accessed 6 Aug. 2021).

UN Framework Convention on Climate Change – UNFCCC), and future carbon credits within the framework of the Paris Agreement, which have raised great expectations in Brazil.

In the areas of the Urban Amazon, the economy is still highly dependent on resources provided by the federal government. These include states' and municipalities' Participation Funds, which help pay for the subnational civil service, and programmes such as the *Bolsa Família* (Family Grant) conditional cash transfers paid to households with very low income, as well as subsidies for the health and education systems.⁴³

Federal transfers also underpin the ZFM.⁴⁴ The strategy behind the zone's creation in 1957 – and its development over the following decades – was to provide the region with an industrial hub that could support high-productivity employment with the help of tax incentives. The role of the ZFM in the region remains important, but its survival will require an increasing volume of subsidies. It is a model that needs to be improved from the point of view of governance and efficiency, requiring a wider distribution of the income it generates for companies, and achieving a greater connection with the forest economy. Achieving a better alignment of the ZFM's industrial activities with net zero policies, and channelling a larger share of its profits to finance investments in science and technology – including biotechnology – should be fundamental and urgent priorities.

Despite the relatively large transfers from the central government, a substantial proportion of the population in the largest cities in the Amazon lives in 'peri-urban' areas (adjacent to the cities) without basic public services or opportunities for well-paid work. Although these are challenges common to all regions in Brazil, in the Amazon they are compounded by the great distances to major domestic markets, and the abundance of water which affects basic concerns such as sanitation and housing.

Infrastructure and communications

Investment in infrastructure is another crucial factor in promoting the economic development of the Amazon. Characterized by enormous distances and natural obstacles, such as the torrential rains that affect roads, the region faces sizeable challenges in transport, logistics and telecommunications.

As is typical in areas with a predominance of extractive activities, the logistics and infrastructure in the Amazon very often do not favour local development and local populations, but rather external demands. It is useful to distinguish between the infrastructure *in* the Amazon and that *for* the Amazon. While the former focuses on transporting products (including energy) to the rest of the country and abroad, often with negative socio-environmental impacts, the latter focuses on serving the local social and economic agenda, taking the environmental impacts into greater consideration.

⁴³ Alfnas et al. (2020), *Mercado de trabalho na Amazônia Legal* [The labour market in the Legal Amazon].

⁴⁴ Schutze, A., Holz, R. and Assunção, J. J. (2021), *Aprimorando a Zona Franca de Manaus – Lições da experiência internacional* [Improving the Manaus Free Trade Zone: Lessons from the international experience], Amazônia 2030 Project, <https://amazonia2030.org.br/aprimorando-zona-franca-manaus> (accessed 24 Aug. 2021).

The Trans-Amazonian Highway and the BR-319 federal highway, both of which were first constructed in the early 1970s, have led to the creation of so-called ‘fish bones’ (see Figure 3, ‘How highways drive deforestation’) – roads that branch out from the main highway into the forest, degrading the surroundings. It is estimated that there are between 50,000 and 75,000 kilometres of informal roads in the Amazon, which are used by illegal loggers and ranchers.⁴⁵ Decisions about planned road (and rail) routes continue to be made without integrated assessments of their costs and benefits, or of transport alternatives existing or being built in the country – or, in some cases, of major partners’ logistic preferences regarding routes to their markets.

The logistics and infrastructure in the Amazon very often do not favour local development and local populations, but rather external demand.

A number of other major infrastructure construction projects have created a host of problems that have been poorly addressed. The Belo Monte hydroelectric plant, for example, had a severe impact on the indigenous peoples and on the hydrological regulation of the Xingu river basin. It also attracted thousands of migrants, swelling nearby cities, which have seen a surge in violence and little improvement in infrastructure, despite large payments made by the plant’s builder to local governments.⁴⁶

Examples of infrastructure *for* the Amazon would be improvements in internet systems, satellite communication and also in river transport to take advantage of the profusion of watercourses in the region. Addressing the challenges for sanitation infrastructure caused by the abundance of water is crucial to the success of the large cities of the region and the preservation of the environment.

The social agenda

The precariousness of much of the Amazon’s agriculture and cattle rearing activity, combined with the poor living conditions and sanitation in cities, infrastructure that does not always meet the region’s needs, and generalized failures in public management, all mean that the nine states comprising the Legal Amazon have lower standards of living than the national average. According to data from 2017, the Legal Amazon had a Human Development Index score below 0.750, compared with 0.778 for Brazil as a whole. The index measures the local quality of life, taking into consideration education, income and longevity.⁴⁷

⁴⁵ Ribeiro, J., Nunes, S. and Souza, C. Jr, (2018), *Estradas Não Oficiais em Áreas Protegidas* [Unofficial roads in Protected Areas], Imazon, <https://imazon.org.br/PDFimazon/Portugues/outros/OEstadoAPs ESTRADAS.pdf> (accessed 25 Aug. 2021).

⁴⁶ This phenomenon is documented in Altamira, the largest city around Belo Monte, in Instituto de Pesquisa Econômica Aplicada (IPEA – Federal Research Institute) and Fórum Brasileiro de Segurança Pública (2019), *Atlas da Violência 2019 Retratos dos Municípios Brasileiros* [The Map of Violence 2019: Portrait of the Brazilian municipalities], https://www.ipea.gov.br/portal/images/stories/PDFs/relatorio_institucional/190802_atlas_da_violencia_2019_municipios.pdf (accessed 4 May 2021).

⁴⁷ AtlasBR (undated), ‘Atlas do Desenvolvimento Humano no Brasil’ [Atlas of Human Development in Brazil], <http://www.atlasbrasil.org.br> (accessed 4 May 2021).

In 2018, the Legal Amazon also scored lower than the national average on the Social Progress Index – 56.52, compared with 67.18. This index includes 43 indicators covering three dimensions: basic human needs (nutrition and basic medical care, water and sanitation, shelter and personal safety); foundations of wellbeing (education, access to information, communications and environmental quality); and opportunity (personal rights and freedom of choice, inclusiveness and access to higher education). The region scored lower than the national average on almost all of the indicators.⁴⁸

A similar pattern is seen across several other indicators. Life expectancy in the Legal Amazon rose from 70.5 years in 2010 to 72.8 years in 2019, but over the same period life expectancy increased from 74.4 to 77.1 years for the rest of Brazil.⁴⁹ With regard to homicide rates, only the northeast fares worse; and in terms of education quality, the Legal Amazon scored lowest in the Basic Education Development Index.⁵⁰

Improving primary and secondary education is a priority, and is essential for training the workforce to meet the challenges of the local and global economy. There are numerous initiatives to improve the management of education and its methods, many involving civil society. For instance, *Nosso Ensino Médio*⁵¹ is a training scheme for high-school teachers and school managers, aimed at promoting the professional development of educators and the implementation of new secondary education curricula in public state schools; and *Jovem de Futuro*⁵² – a partnership between education departments and the Brazilian foundation Instituto Unibanco – aims to strengthen school management through technical assistance, training, mobilization and knowledge management. These efforts need to be supported and scaled up. Improving technical training is another vital component of any economic improvement strategy. The network of technical schools and federal universities expanded around 2010 and can now play an increasingly important role in providing a trained labour force.

The indigenous peoples are among the most severely affected by poor living conditions, especially since President Jair Bolsonaro pledged, soon after taking office, not to demarcate any more indigenous lands during his term. Furthermore, these populations have been highly vulnerable to the virus causing COVID-19.⁵³

The regulatory uncertainty is having a negative impact on efforts to address the social needs of the region. This also extends to the issues around land titling, which in recent years has been inclined towards private ownership, handicapping the regularization of small farmer and *quilombola* settlements. This trend highlights the importance of establishing a clear land management strategy and a solid, transparent and agile infrastructure of registries.

⁴⁸ Santos, D. et al. (2019), *Executive Summary – Social Progress Index in the Brazilian Amazon: IPS Amazônia 2018*, Imazon/Social Progress Imperative, https://s3-sa-east-1.amazonaws.com/ipsx.tracersoft.com.br/documents/2018/publicacoes/EXECUTIVE_SUMMARY_versao_final_1_5.pdf (accessed 6 Aug. 2021).

⁴⁹ Plataforma Amazônia Legal em Dados (2020), *Radiografia da Amazônia Legal: Visão integrada dos estados da região* [An X-Ray of the Legal Amazon: Integrated vision from the states in the Amazon region].

⁵⁰ Ibid.

⁵¹ See <https://nossoensinomedio.org.br>.

⁵² See <https://www.institutounibanco.org.br/iniciativas/jovem-de-futuro>.

⁵³ Instituto Socioambiental (2016), 'COVID-19 and Indigenous Peoples', <https://covid19.socioambiental.org> (accessed 30 Apr. 2021).

03

How the international community can help

The international community can help to address many of the underlying causes of deforestation and social inequality, and contribute to the future health and prosperity of the Amazon. Strengthening dialogues with diverse stakeholders will be key.

The crucial first step to addressing the issues facing the states of the Amazon is to recognize that global climate and biodiversity goals will only be achievable if the interests of the Amazon's people are an integral part of every policy or action directed to achieve those goals. Developing a dialogue with a broad set of actors across Brazil is key to the success of any strategy, and will reinforce the message that development of the Amazon and an improved standard of living for its population can be achieved while conserving the existing forest.

International stakeholders could strengthen dialogue with multiple actors from Brazilian society, including social movements and non-governmental organizations, subnational powers, the private and financial sectors, and academia.

Defining the interests of local people and wider society requires embracing the diversity of actors and cultures in the country. Brazilian society, through its many representative organizations and bodies, is prepared, vocal and resilient.

There are many institutional and informal channels for dialogue in Brazil. One example is the Forum of Governors. Since 2019 this has brought the nine Legal Amazon states into an Interstate Consortium to work on the green economy; competitiveness and innovation; regional integration; territorial and environmental governance; public management and governance; and public services. Other established associations include the Network of Mayors and the Brazilian Association of State Entities for the Environment (Abema), which supports local actions more directly. The Biden administration in the US has been notably successful in establishing communication channels on climate issues with groups of state governors.

Defining the interests of local people and wider society requires embracing the diversity of actors and cultures in the country. Brazilian society, through its many representative organizations and bodies, is prepared, vocal and resilient.

Brazil is a federation in which state and municipal entities, even those in the poorest municipalities, have equivalent status to the central government and enjoy substantial autonomy. Checks and balances across government branches (including public prosecutors) work well. Therefore, supporting the state and municipal branches of government can be an effective way to help fight impunity in the Amazon. It will help stakeholders understand the capabilities of subnational public actors in the areas of public security, the economy, health and education. It will also promote new dynamics at the municipal level, mobilizing local forces to support compliance with environmental and business laws and regulations.

04 Priority areas for international engagement

Given the magnitude of the challenge that Brazil is facing, the international community needs to undertake a prioritization exercise to concentrate efforts on the root causes of deforestation.

The contributors to this research paper have identified seven key areas in which the international community can influence efforts to address the drivers of deforestation, in partnership with the Brazilian stakeholders. These are as follows: command-and-control policies, and the rule of law; science, technology and innovation; economic activities; financial and trade instruments; land-use planning, and land titling regularization; infrastructure; and social issues.

Box 4. Task list for international stakeholders

- Support to strengthen the environmental protection and land management agencies, especially at the subnational state level;
- Funding for maintenance and expansion of Conservation Units and indigenous territories, and establishment of Conservation Units in land belonging to states, with strong enforcement of their protection;
- Land regularization and support for the digitization and integration of land registers, as part of land-use planning reform;
- Support for state governors' green recovery plans;

- Expansion of green finance, conservation efforts, and payment of environmental services, including through carbon credits;
- Investing in innovative start-ups in the bioeconomy;
- Full implementation of traceability efforts on supply chains;
- Investment in education, science and technology.

Command-and-control policies and the rule of law

An urgent prerequisite for addressing all the issues is the solidification of Brazil's environmental command-and-control policy⁵⁴ and the enforcement of rule of law that were effective in slowing deforestation until 2014. This will involve:

- Integrating security and military forces to support, but not replace, environmental protection agencies in tackling illegal deforestation, mining and drug-trafficking, especially where these activities threaten the indigenous population;
- Restoring adequate funding and resources for federal and state environmental protection agencies;
- Committing to revert deforestation to below the 2012 level (4,500 square kilometres); and
- Supporting full traceability in supply chains, for example by making livestock documents available to meat processors.

Science, technology and innovation

Private and public sector support for scientific collaboration between international academia and local partners can foster the progress of science and technology required for the blossoming of the Amazon bioeconomy. It can stimulate innovation within the institutions linked to the region's natural capital and to the knowledge of the traditional populations, *quilombolas* and indigenous peoples, helping to realize the promises of the bioeconomy and Amazon 4.0. It can strengthen value chains for native fruits and nuts, and materials for the net zero local and global economy.

⁵⁴ Brazil has taken several actions in recent years to combat deforestation, mostly via command-and-control policies, supply chain interventions and the establishment of a large network of protected areas. The command-and-control policies involve monitoring and law enforcement in order to prevent the loss of hectares of the Amazon rainforest.

Economic activities

A diversified portfolio of economic activities should be fostered in the region, according to the 'Four Amazons' categorization (see Table 2, below).

Financial and trade instruments

The international community can promote mechanisms that increase the adoption of environmental, social and governance best practices in the Amazon. Investors and business partners are well placed to take the lead. These actions should focus on specific, measurable objectives which do not have a negative impact on the majority of the population of the region and avoid giving unintended competitive advantages to the less transparent economic agents inside or outside Brazil. The increasing number of commitments regarding the traceability of cattle and the long-standing moratorium on soya production in areas deforested in the Amazon biome after 2006 are two examples of successes in this sphere.

Support for the region and incentives for best practices can be expressed through trade agreements, investments or financial products that promote sustainable production and contribute to well-being on both sides of supply chains. Of particular interest are ways to recognize the value of different types of nature-based solutions, including maintenance of standing forest, natural regeneration and restoration. These include the development of financial instruments that remunerate such services and that are available in domestic and international markets, subject to objective criteria of integrity and additionality, as well as rigorous compliance mechanisms.

Financial instruments that encourage forms of performance-based payments for environmental services at the state and municipal level can strengthen the protection of the intact forest, including in the western Amazon. Lessons can be drawn from the Funbio⁵⁵ (Brazilian Biodiversity Fund), a Brazilian non-profit organization created in 1996 to contribute to the implementation of the Convention on Biological Diversity. Funbio has provided resources for biodiversity conservation in Brazil for 25 years. One of its programmes, ARPA (see also Chapter Two), is the world's largest conservation initiative on tropical forests. With an innovative public-private funding mechanism, ARPA connects public and private entities, the Ministry of the Environment, Funbio and executing agencies. Impact investment could also be extended to support the provision of and access to education, health, security and sanitation services to the local population in ways that are tied to conservation.⁵⁶

⁵⁵ Funbio (2021), 'Arpa Program', https://www.funbio.org.br/en/programas_e_projetos/arpa-program (accessed 31 Aug. 2021).

⁵⁶ World Wide Fund for Nature (WWF), FUNBIO and the Moore Foundation (2017), *The Impact of the ARPA Program on the Management Effectiveness of Amazon Protected Areas*, https://d3nehc6yl9qzo4.cloudfront.net/downloads/wwf_folder_ingles_paginas_2.pdf (accessed 6 Sept. 2021).

Land-use planning and land titling regularization

The international community can support the efforts of Brazil's government and civil society to improve the land titling process. In particular, stakeholders can help to mobilize the means, technology and knowledge skills required to improve the property registration system, working directly with the state agencies and local registry offices, for example, to digitize, consolidate and systematize registrations, and integrating this information with other databases. This support has to be attentive not to weaken the regulation that protects small landholders and traditional populations, and be vigilant not to legitimize amnesties for areas that have been illegally deforested through speculation and land-grabbing. Advances in land titling can be most effective if allied to plans to promote the designation of state-owned land as protected areas, ensuring a balance between economic growth and the protection of nature.

Infrastructure

Infrastructure planning must be integrated and coordinated with spatial planning. It must be based on strategic land-use planning that allocates areas for conservation, production and urbanization. In the case of infrastructure *for* the Amazon, the focus should be on providing high-quality, reliable access to public services such as health, water, sanitation and education, including the internet and energy. As for provision *in* the Amazon, the focus should be on the development and implementation of clean infrastructure, with minimum environmental and social impact, that reduces greenhouse gas emissions and ensures the use of material with low embodied carbon.

Social issues

International stakeholders must take account of the expectations and desires of the Amazon's residents. International involvement in the region should incorporate efforts to address the challenges faced by those living in the small towns, cities and municipalities across the Amazon. Provision of health, sanitation and education services, and access to infrastructure including digital infrastructure, remain critical and essential. Special care should be given to the protection of indigenous communities while ensuring their fair participation in the economic and social fabric of the region.

There is a need for public health and water, sanitation and hygiene programmes both to control the COVID-19 pandemic and to improve the living conditions of the more than 29 million inhabitants of the Amazon, including the indigenous peoples and the traditional populations. The international community can contribute through protection programmes and by supporting the civil society organizations that work with these groups.

A sustainable improvement in the educational attainments of children and adolescents is a further priority. The international community can finance states and municipalities, as well as the organizations that work on these issues.

Another important contribution is to support technical professional education related to the region’s natural resources and resource management, to create a cadre of specialized workers with knowledge of the local context. Public servants working for local government agencies also need training and support in this respect.

A varied portfolio of measures is needed

Sustained conservation of the rainforest in the Brazilian Amazon will require recognition of the complexity of the region. This has the potential to support a rich bio-based economy, but the goal will not be achieved without land-use planning that reflects the priorities of Brazilian society and promotes a balance between the environmental, social and economic needs of the 29 million people that live in the region. A differentiated approach is required for each of the ‘Four Amazons’, with a varied portfolio of economic activities and financial instruments. A successful outcome in one Amazon will depend on the successes achieved in the other three, as they are interdependent and interconnected. Table 2 below proposes some ‘building blocks’ that would help to achieve these long-term, sustainable socio-economic outcomes.

Table 2. A proposed framework for the ‘Four Amazons’

	Intact Amazon	Transition Amazon	Anthropized Amazon	Urban Amazon
Key premise	<ul style="list-style-type: none"> Protected and intact forest 	<ul style="list-style-type: none"> Natural regeneration and forest restoration 	<ul style="list-style-type: none"> Full supply-chain traceability with full compliance with regulation 	<ul style="list-style-type: none"> Sustainable urban development
Key outcomes	<ul style="list-style-type: none"> Conservation of standing forest and biodiversity, with enhanced protection of indigenous population 	<ul style="list-style-type: none"> Zero deforestation, accompanied by forest regeneration in land freed from cattle rearing and adoption of a mosaic of land use 	<ul style="list-style-type: none"> Economic development with increased social progress to reduce the pressure on other areas of the Amazon, accompanied by significant restoration and expansion of remnants of the native forest 	<ul style="list-style-type: none"> Improved social and economic conditions, based on biotech innovation and climate-aligned manufacturing and circular economy
Key activities	<ul style="list-style-type: none"> Forest conservation Socioeconomy and bioeconomy 4.0 	<ul style="list-style-type: none"> Forest restoration and integration of forest, crop and cattle production; agroforestry and socioeconomy 	<ul style="list-style-type: none"> Sustainable agriculture and mineral commodities production 	<ul style="list-style-type: none"> Services and industry, including a reformed ZFM
Specific activities	<ul style="list-style-type: none"> Economic activities Start-ups and accelerators that support small business in the bioeconomy 4.0 Forest protection economy in indigenous territory and Conservation Units Sustainable tourism 	<ul style="list-style-type: none"> Forest management, agroforestry, forest, crop and cattle integration Plantation of native species Forest restoration and regeneration Sustainable tourism Strengthening of indigenous, local agro-food systems 	<ul style="list-style-type: none"> Commodity supply chain with minimized negative externalities, with full compliance with the existing land-use regulation 	<ul style="list-style-type: none"> Service and manufacturing industry Public and private partnerships to deliver urban infrastructure and sanitation

	Intact Amazon	Transition Amazon	Anthropized Amazon	Urban Amazon
Specific activities	<p>Science, technology and innovation</p> <ul style="list-style-type: none"> • Basic science of the Amazon biome 	<ul style="list-style-type: none"> • Research and development (R&D) focused on native species plantations and their use • Sustainable low-impact forest management • R&D applied to low-impact bioeconomy 	<ul style="list-style-type: none"> • Technological innovation in traceability and hypertransparency (including in blockchain, remote sensing, big data and the Internet of Things) 	<ul style="list-style-type: none"> • Waste management, circular economy and renewable energy solutions
	<p>Financial instruments, strategies and policies</p> <ul style="list-style-type: none"> • Go beyond carbon financial instruments that will support conservation efforts (including biodiversity and other co-benefits) • Expand ARPA-like instruments to cover states and municipalities that expand protected areas in land they own or control 	<ul style="list-style-type: none"> • Payments for environmental services • Fiscal incentives for low-impact bioeconomy • Insertion in carbon markets • Impact investment focused on climate and biodiversity outcomes and supporting higher productivity and social progress 	<ul style="list-style-type: none"> • Financial instruments for environmental services • Investment funds focused on low-carbon agricultural practices, soil organic carbon and other forms of nature-based solutions • Insertion in biofuel global programmes observing high standards of integrity and additionality 	<ul style="list-style-type: none"> • Incentives to support conservation activities • Distribution of benefits to other regions in the Amazon • Incentives to promote circular economy
	<p>Spatial planning</p> <ul style="list-style-type: none"> • Consolidate existing Conservation Units and indigenous territory • Demarcate new protected areas • Allocate non-demarcated areas as new Conservation Units or indigenous territory 	<ul style="list-style-type: none"> • Create Conservation Units and forest concession areas • Resolve conflicting land claims, supporting the digitalization of registers and integration of environmental and land-management data banks 	<ul style="list-style-type: none"> • Create clarity on land titling and registry • Ensure full compliance with the Forest Code 	<ul style="list-style-type: none"> • Strengthen urban planning and land ownership and use
	<p>Infrastructure</p> <ul style="list-style-type: none"> • Low-impact infrastructure to ensure access to basic social services and education 	<ul style="list-style-type: none"> • Low-impact infrastructure to ensure access to basic social services and education • Clean logistics, with minimum environmental and social impact at implementation; adoption of low-carbon materials with minimum greenhouse gas emissions in construction 	<ul style="list-style-type: none"> • Adherence of investors, trading companies and international customers to green infrastructure requirements, especially with respect to logistics 	<ul style="list-style-type: none"> • Investment in water, sanitation and hygiene, focusing on low impact infrastructure • Green/natural infrastructure, such as parks and green areas to regulate heat and flooding • Green and circular urban development

Source: Authors' compilation, based on plenary discussions at the Amazon Concertation Network (*Uma Concertação pela Amazônia*) <https://concertacaoamazonia.com.br/en/home>, accessed 30 Sep. 2021.

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Cover image: Workers with fish ready for sale at the historic river market in Belém, Pará state, Brazil, in June 2019.

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