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WORKING PAPER



Green, Clean and Safe

Analytical Dimensions and
Metrics for 21st Century
Brazilian Agriculture

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GREEN, CLEAN AND SAFE ANALYTICAL DIMENSIONS AND METRICS FOR 21ST CENTURY BRAZILIAN AGRICULTURE

Summary

The global trade in commodities is rife with illicit deforestation and environmental harm and crimes. There is growing recognition among consumers and across the private sector — from traders and investors — that agribusiness needs to become cleaner and greener. This is especially the case in the Amazon, home to almost 60% of the world's tropical forest and a major source of natural wealth. As the agricultural frontier continues to encroach on native forests, the Amazon risks passing a tipping point and succumbing to catastrophic die-back. Persistent challenges to preventing illegal practices and environmental harm include the disempowerment of environmental protection bodies, poor reporting and lack of validation of the Environmental Rural Registration System (CAR), the lack of policies addressing regional socioenvironmental needs and the persistence of slavery-like practices.

The Igarapé Institute has launched an initiative to enhance transparency, traceability and legal enforcement within complex commodities supply chains. It includes the development of new approaches to analytical dimensions and metrics — combining what for some is already consolidated compliance with good practices standards that are still to be adopted by most — to minimize illegal deforestation and promote sustainable practices. These metrics are essential to develop more practical ways of monitoring ESG (environmental, social and governance) and investment related compliance and performance. Priority areas include: ensuring monitoring and management of land occupation to enhance legal land tenure; sustainable environmental management; investment in human capital and nature-based solutions; ensuring the welfare and safety of livestock; eco-efficient production; and ensuring a high level of supply-chain traceability.

The private sector is waking up to the climate crisis

It is hardly a secret that illicit deforestation and environmental harm and crimes taint the trade in commodities. Indeed, the vast majority of deforestation of the world's tropical forests is illegal. While everyone has a role to play in greening global supply chains, the producers, investors, traders, intermediaries and consumers who move global markets and leave a heavy carbon footprint are responsible for leading the change.

If there is a green lining to the global climate crisis it is that the private sector is starting to walk the talk. A growing number of companies are calling for a transparent agenda that delivers sustainable and efficient production and real economic development while also respecting the land, social and environmental justice standards and the rule of law. The chorus for foundational change is growing louder.

A number of public and private sector-supported initiatives to curb global warming are gathering attention. Consider the recent pledge of over 100 countries to halt and reverse forest loss and degradation by 2030, including over \$12 billion in sovereign funding and \$7.2 billion in private investment.¹ United Nations Glasgow Financial Alliance for Net Zero, a group of 450 banks, insurers and asset managers spanning 45 countries, has also pledged support. With over \$130 trillion in collective assets, these financial actors are committing to transforming the global financial system to restructure the private sector for

a carbon-neutral future.² The challenge is to deliver zero deforestation and carbon neutrality without disproportionately burdening countries with natural resource-dependent economies that face high levels of inequality, impunity and compromised ecosystems.

The challenges in the Amazon are a case in point. The argument for action is straightforward: if the Amazon succumbs to “dieback” the world's largest rainforest could devolve into a savanna — undermining one of the world's last and best defenses against runaway atmospheric warming and dooming the Paris Agreement decarbonization goals.³ In a scenario where adverse natural events are expected to occur much more frequently and affect everyone, the stakes are dire, especially for the most vulnerable populations. In addition to the role of governments, how companies and financiers respond to these and other crises will also determine how far we are from the future we want and the steps we need to take to prevent more severe catastrophes.

Facing up to the challenges in the Amazon

The health of the global environment hinges on the health of the Amazon. The 7 million square km biome is essential for climate and water resource maintenance, carbon sequestration and the safeguarding of at least 25% of global biodiversity.⁴ Yet due to unrelenting deforestation, the Amazon is changing. Studies suggest that between 2010 and 2017, the largest tropical forest on the planet released

1 Spring, Jake and Jessop, Simon. “Over 100 global leaders pledge to end deforestation by 2030.” Reuters (3 November, 2021). <<https://www.reuters.com/business/environment/over-100-global-leaders-pledge-end-deforestation-by-2030-2021-11-01/>>

2 “Alderman, Liz and Nelson, Eshe. “Global finance industry says it has \$130 trillion to invest in efforts to tackle climate change.” The New York Times (3 November 2021). <<https://www.nytimes.com/2021/11/03/world/europe/cop26-climate-change-finance-industry.html>>

3 Marengo, J.A., et al. “Changes in Climate and Land Use Over the Amazon Region: Current and Future Variability and Trends.” *Frontiers in Earth Science* 6:228 (21 December 2018). <<https://www.frontiersin.org/articles/10.3389/feart.2018.00228/full>>

4 “Why the Amazon's Biodiversity is Critical for the Globe: An Interview with Thomas Lovejoy.” The World Bank (22 May 2019). <<https://www.worldbank.org/en/news/feature/2019/05/22/why-the-amazons-biodiversity-is-critical-for-the-globe>>

annually hundreds of million more tons of carbon than it sucked out of the atmosphere.⁵ Parts of the forest have officially transitioned from being carbon sinks to carbon emitters.

The integrity of the rainforest itself is at risk. In 2021, the Amazon could lose another 860,000 hectares or more of forest cover, with Brazil accounting for 79% of the total potential loss, followed by Peru, with 7%, and Colombia, with 6%.⁶ Unless governments, companies, creditors and their customers at home and abroad embrace the best practices of transparency, accountability and green stewardship as the new business normal, there will be little prospect of preventing runaway deforestation or mitigating calamitous climate change. This will also put the security and wellbeing of local populations and indigenous communities at even graver risk.

Global demand for commodities and products from Brazil, home to 60% of the Amazon forest, is an important driver of deforestation of the tropical rainforests, adjacent cerrado tablelands and other biomes. These are regions where compliance with regulations is weak, inequalities abound and insecurity is widespread. This pattern of relentless predation means that the state and the private sector must take action to mitigate and prevent the criminal exploitation of the Amazon.

In Brazil, land cleared for the production of beef and soy is not the only problem. Other drivers of deforestation include illegal mining and infrastructure implementation, such as interstate highways and massive hydropower dams. However, land speculation, booming agribusiness, and especially cattle ranching — often rife with illicit practices — is one of the leading drivers of deforestation.⁷ Markets prioritizing ESG investment standards, such as the European Union, have raised concerns about products harvested from irregularly deforested land. A recent study concluded that roughly 20% of soy exports and at least 17% of beef exports from Brazil to the EU may be contaminated with illegal deforestation.⁸ For the global community, the message is clear: the need for transformational action is more urgent than ever.

Taking action to clean supply chains

Concerns over illegality in Brazil's Amazon-related supply chains have reached the offices of some of the world's top investors. In 2020, Finland's pension fund giant, Nordea Asset Management, eliminated Brazilian meat packer JBS from its holdings over suspected links to Amazonian deforestation⁹, initiating a much-needed response from JBS to address such links. Dutch and Japanese institutional investors are also weighing divesting from Brazilian holdings with alleged ties to rainforest felling.¹⁰ Governments have pulled back: in

5 Gatti, LV., et al. "Amazonia as a carbon source linked to deforestation or climate change." *Nature* 595 (July 2021). <<https://www.nature.com/articles/s41586-021-03629-6?proof=t>>

Pivetta, Marcos. "The Amazon is now a source of CO2." *Pesquisa FAPESP* (January 2020). <<https://revistapesquisa.fapesp.br/en/the-amazon-is-now-a-source-of-co2/>>

6 "MAAP #147: Amazon Deforestation Hotspots 2021 (1st Look)" *Monitoring of the Andean Amazon Project* (3 October, 2021). <<https://maaproject.org/2021/amazon-hotspots-2021/>>

7 "New report examines drivers of rising Amazon deforestation on country-by-country basis." *Mongabay* (23 May 2019). <<https://news.mongabay.com/2019/05/new-report-examines-drivers-of-rising-amazon-deforestation-on-country-by-country-basis/>>

8 Rajão, Raoni, et al. "The rotten apples of Brazil's agribusiness." *Science* (16 July 2020). <http://www.lagesa.org/wp-content/uploads/documents/Rajao_20_Rotten%20apples_w_SM.pdf>

9 Holger, Dieter and Trevisani, Paolo. "Nordea Asset Management Drops JBS Over Deforestation, Corruption, Worker Health." *Wall Street Journal* (28 July 2020). <<https://www.wsj.com/articles/nordea-asset-management-drops-jbs-over-deforestation-corruption-worker-health-11595963107>>

10 "Investigation: Dutch, Japanese pension funds pay for Amazon deforestation." *Mongabay* (5 February 2021). <<https://news.mongabay.com/2021/02/investigation-dutch-japanese-pension-funds-pay-for-amazon-deforestation/>>

2019, Germany and Norway both suspended their disbursements to the Amazon Fund after deforestation spiked in the region.¹¹ These moves raise the risk of reputational damage for agribusiness companies, which face increasing pressure from investors.

Consumer concerns over illegal deforestation are also generating pushback. Several of Europe's largest supermarkets and food companies have threatened to boycott agriculture products from Brazil if the country continues to incentivize deforestation in the Amazon. At least 40 food suppliers, retail outlets and investment firms have called on Brazilian lawmakers to reject legislative proposals to legalize the private occupation of public land that has occurred since 2012. Major brands such as Metro, Aldi and Lidl, Tesco, Sainsbury's, Asda, Waitrose and Ahold Delhaize are ramping up their activism.¹²

So how can supply chains be more efficiently greened? There are several measures currently being applied to promote the responsible financing of agriculture and cattle ranching, along with best practices designed to transform today's troubling landscape. Getting agribusiness on board is key. Irregular or non-efficient Agro is not only one of the most significant drivers of deforestation, it is also arguably the most significant motor of Brazil's post-pandemic recovery. Fortunately, a forward-looking farm sector is starting to invest in innovative practices to reduce pressure on the land while also boosting productivity.¹³

Greening supply chains also requires more transparency, especially in the financing of agriculture. Brazil's rural economy features several forms of financing, from subsidized credits and conventional loans to debt securities in the capital market. All of these financial mechanisms are theoretically accompanied by a set of indicators designed to measure compliance with environmental regulations and labor standards. Yet due to the high demand for credit and the complexity of onsite inspection, these checks and balances are often side-stepped, thus crippling the sector's transition to a more inclusive and low-carbon economy. According to the Brazilian Central Bank's recently revamped rural loan regulations,¹⁴ financial institutions weighing agriculture transactions must be mindful of three specific challenges:

1. **Difficulties of environmental inspection bodies to enforce compliance:**

National and local authorities frequently resort to penalties to curb environmentally unsound activities and promote land recovery and soil regeneration. These legal measures are key to analyzing compliance of rural properties but are only as good as state strategic monitoring and field presence. Unfortunately, Brazil has seen a decline in boots-on-the-ground inspection teams and inconsistent allocation of environmental fines. These shortcomings have undercut official efforts to enforce compliance as well as the legal practices and procedures needed to protect investments and bring order to the rural economy.¹⁵ Little wonder that the record of infractions and penalties bears scant resemblance to the complex reality on the ground.

11 "Norway stops Amazon Fund contribution in dispute with Brazil." Reuters (15 August 2019). <<https://www.reuters.com/article/us-brazil-environment-norway/norway-stops-amazon-fund-contribution-in-dispute-with-brazil-idUSKCN1V52C9>>

12 Marshall, Claire. "UK supermarkets warn Brazil over Amazon land bill." BBC News (May 2021). <<https://www.bbc.com/news/uk-56989711>>

13 Anghinoni, G., et al. "Conservation agriculture to strengthen sustainability of Brazilian grain production and food security." Land Use Policy 108 (September 2021). <<https://www.sciencedirect.com/science/article/abs/pii/S026483721003148>>

14 "Resolução BCB No 140, de 15 Setembro de 2021." Banco Central do Brasil (15 September 2021). <<https://www.in.gov.br/en/web/dou/-/resolucao-bcb-n-140-de-15-de-setembro-de-2021-345119695>>

15 Amaral, Ana Carolina, et al. "Governo acelerou canetadas sobre meio ambiente durante a pandemia." Folha de São Paulo (28 July 2020). <<https://www1.folha.uol.com.br/ambiente/2020/07/governo-acelerou-canetadas-sobre-meio-ambiente-durante-a-pandemia.shtml>>

2. Improper reporting of the Brazilian Environmental and Rural Registration System, or CAR: CAR is the mandatory official environmental rural registry in Brazil. All landowners, including public lands, must join the registry and file information to demonstrate compliance with the national forestry code.¹⁶ Recognized as a pioneering tool for environmental management, the registry has become an important green economy guidepost for both the public and private sectors, and particularly for financial institutions analyzing rural credit. Still, the CAR is not foolproof: limited personnel and funding has jeopardized the validation of data submitted by landowners and undercut guarantees of farm-level commitments to environmental restoration. More than 7 million rural properties and over 540 million hectares are now included in the database with little or none CARs ultimately validated by environmental authorities.¹⁷ The deadline for registering properties has been extended five times since CAR was launched in 2014.¹⁸ Current data suggests that up to 30% of CAR properties are incorrectly or fraudulently registered, with overlapping areas and private claims on public preserves and parks.¹⁹

3. The persistence of slavery-like practices: Between 1995 and 2021, law enforcement officials rescued more than 50,000 laborers from slave-like conditions in Brazil.²⁰ According to data collected by the Federal Government and analyzed by the Pastoral Land Commission (CPT), more than half of the cases of slave labor flagged in Brazil during that period were linked to farming and cattle ranching.²¹ Since 2003, the Ministry of Labor has maintained a blacklist (*Lista Suja*) of companies and contractors implicated in such practices, offering the market a valuable tool to curb labor violations.²² While hailed as a pioneering initiative to combat rural labor violations, the *Lista Suja* remains a target of criticism and lawsuits by employers and business associations, who complain of overly severe penalties and allege that isolated cases and irregularities are being mischaracterized as crimes. Even as the pandemic reduced mobility and official budgets, labor authorities launched field inspections across Brazil last year, resulting in the rescue of more than 900 workers from conditions tantamount to slavery.²³

The diagram below demonstrates how Brazilian rural loans incorporate only few of the needed metrics, based not only on the current challenges from the current metrics above but also on other issues regarding the agricultural sector.

16 "Brazil's National Environmental Registry of Rural Properties: Implications for Livelihoods." *Ecological Economics* 136 (June 2017). <<https://www.sciencedirect.com/science/article/pii/S0921800916308758>>

17 "Números do Cadastro Ambiental Rural." Ministério da Agricultura, Pecuária e Abastecimento (11/3/21). <<https://www.florestal.gov.br/numeros-do-car>>

18 "Lei Nº 13,887/2019 de 17 de Outubro de 2019." <http://www.planalto.gov.br/ccivil_03/_ato2019-2022/2019/lei/L13887.htm>

19 "Florestas Públicas não Destinadas & Grilagem." IPAM Amazonia (11/3/21). <<https://ipam.org.br/florestas-publicas-nao-destinadas-e-grilagem/>>

20 "Observatório da Erradicação do Trabalho Escravo e do Tráfico de Pessoas." Smartlab (11/3/21). <<https://smartlabbr.org/trabalhoescravo>>

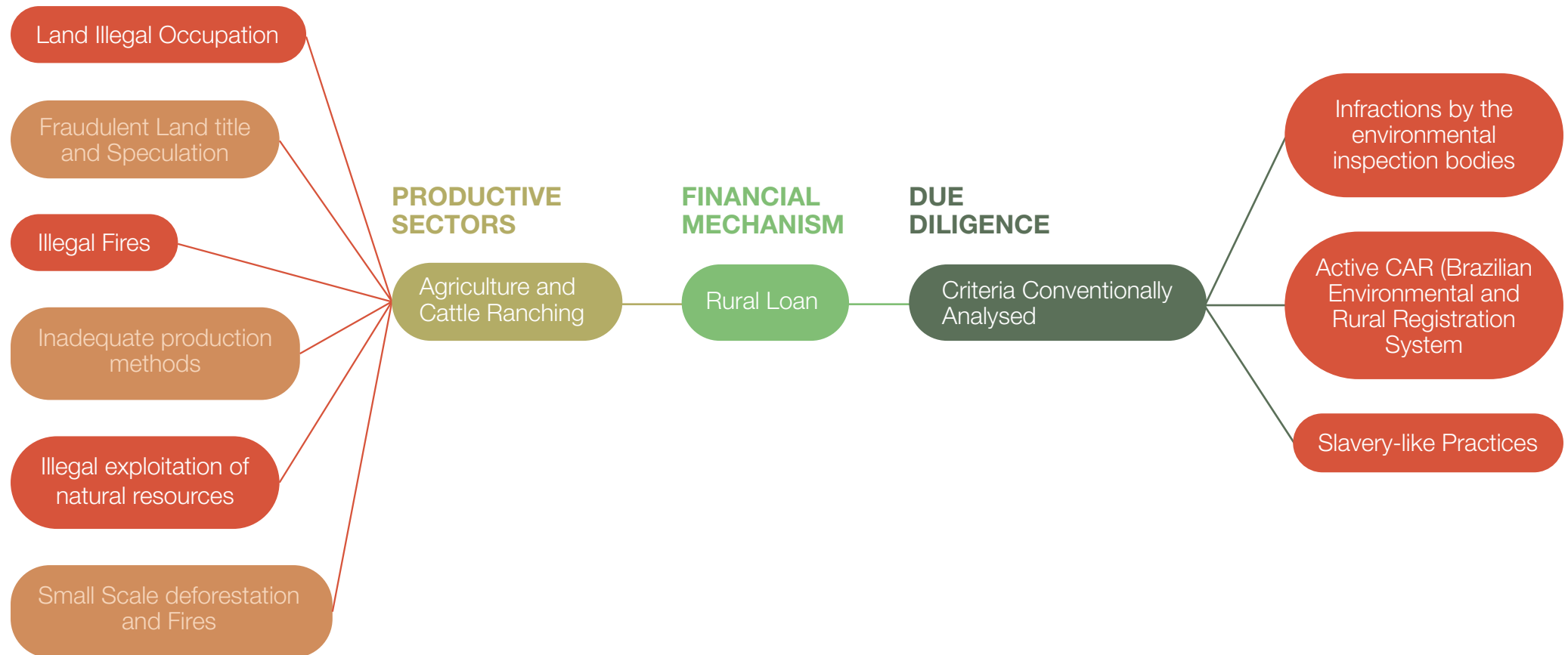
21 "Por Debaixo da Floresta: Amazônia Paraense Saqueada com Trabalho Escravo." Centro de Defesa da Vida e dos Direitos Humanos Carmen Bascarán & Comissão Pastoral da Terra (2017). <<https://www.cptnacional.org.br/downloads?task=download.send&id=14037&catid=77&m=0>> ; Relatório da 'Repórter Brasil' sobre trabalho escravo na pecuária tem repercussão internacional." *Reporter Brasil* (8 January 2021). <<https://reporterbrasil.org.br/2021/01/relatorio-da-reporter-brasil-sobre-trabalho-escravo-na-pecuaria-tem-repercussao-internacional/>>

22 "Radar SIT: foram realizadas 234 ações fiscais até setembro de 2021." Ministério do Trabalho e Previdência (5 October 2021). <<https://www.gov.br/trabalho-e-previdencia/pt-br/noticias-e-conteudo/trabalho/2021/outubro/radar-sit-foram-realizadas-234-acoes-fiscais-ate-setembro-de-2021>>

23 "Resgates de trabalhadores em situação análoga à de escravidão crescem em diversos municípios e regiões no ano pandemia da COVID-19." Organização Internacional do Trabalho (11 May 2021). <https://www.ilo.org/brasilia/noticias/WCMS_791134/lang--pt/index.htm>

Diagram 1. Demonstration of how Brazilian rural loans incorporate only few of the needed metrics

MAIN ACTIVITIES WITH NEGATIVE IMPACTS



Enhancing transparency by developing new approaches to analytical dimensions and metrics

While the scale of these threats is unmistakable, governments, businesses and consumers lack tools to precisely measure the effects of an advancing agricultural frontier on critical ecosystems and vulnerable populations in the Amazon. New approaches to analytical dimensions and improved metrics are urgently needed to guarantee lawful production, investment and retail and ensure that “best practices” become the new standard in agribusiness. The development of these metrics will require reliable, high-quality data. A close examination of cases where agribusinesses have complied with legal standards can inform the development of these metrics. So, too, can decades of research by scientific and environmental organizations such as Embrapa (Brazilian public agricultural research corporation), Imaflo (Forest and Agricultural Management and Certification Institute) and the WWF (World Wide Fund for Nature). Technical studies supported by Brazilian Ministries of Environment and Agriculture and public-private-non-profit alliances such as the Coalizão Brasil Clima, Florestas e Agricultura (Brazilian Coalition on Climate, Forests and Agriculture) also constitute a valuable resource in designing this framework.

To support companies and investors to meet the global goal of zero deforestation and more responsible business practices, Igarapé Institute has launched an initiative to enhance transparency and traceability within complex commodities supply chains, starting by the development of new approaches to analytical dimensions and improved metrics to minimize illegal deforestation and promote recognized sustainable practices. Our proposition is to help enhance the rules of 21st century

agribusiness by improving: 1. monitoring and management of land occupation to enhance legal land tenure, 2. fostering environmental sustainability, 3. safeguarding human capital while increasing nature-based solutions, 4. protecting animal welfare and safety, 5. raising farming efficiency through smart tools, resource saving technologies and capacity building, and 6. demanding traceability all along the supply chain. To that end, we outline critical areas for review and reform on each of these six proposed dimensions, plus a series of initial recommendations to bring all sectors of the rural economy up to the standards of a greening world marketplace. We also developed an initial exercise (Table 1. *Existing and to-be developed metrics for agriculture financing analysis*) to bring together concepts for metrics — some already available — that could complement the current analysis for investment in the sector.

1. Monitoring and management of land occupation for legal land tenure:

– A transparent, integrated and reliable rural land titling process is essential to ending illegal deforestation of native forests while also ensuring the rights and responsibilities of landowners and legal security of interested parties in general. Too often in Brazil, a combination of greed and inequality have exacerbated property fraud, land speculation and illegal logging. Private farming operations must demonstrate proper deeds issued by an accredited agency — The Brazilian Institute of Colonization and Agrarian Reform, or INCRA, for example — as well as full compliance with current environmental legislation. In Brazil, sound land tenure requires developing a comprehensive system for vetting and validating CAR information, as well as integrating critical databases for cross-referencing property registration bases. All these databases must be fully transparent and integrated and must conform to existing legislation.

2. **Sustainable environmental management:** – Business commitment to prudent environmental management is crucial to ensuring compliance with the law as well as achieving greater farm-level productivity and efficiency. Environmental protection may also be stimulated through carbon credits, payments for ecosystem services and other financial and economic instruments. One way to do this is to require the adoption of technologies for greater energy and water efficiency. Another is the development of a greenhouse gas emissions inventory and sustainable pasture management practices. It is important to note that affordable, quality technical assistance and capacity building is essential to help landowners of all sizes deploy appropriate surveillance and measuring tools.
3. **Investment in human capital while increasing nature-based solutions:** – All agricultural investments must be monitored to eliminate child labor and slavery-like practices. Robust workplace health and safety measures grounded in current regulations are likewise essential, as are standards to lock in equal rights and opportunities for work regardless of race or gender. Investing in training and qualification for employees, and the timely adoption of sustainable production techniques can lift job productivity, while also strengthening workplace safety, security, traditional and local knowledge and practices with a view of nature-based solutions. Decent housing and ready access to education for employees' dependents are proven measures for enhancing socioeconomic well-being and welfare.
4. **Ensuring the welfare and safety of livestock:** – Ensuring adequate sanitary practices to produce animal protein is bare minimum. National producers should upgrade animal welfare measures to international standards, such as the technical guidelines of the World Organization of Animal Health (OIE) and other animal welfare rules. Adoption of natural food supplementation, low-carbon diets to reduce climate-warming methane gas, and trauma-free pre-slaughter management practices, such as peaceful and comfortable transport is essential. Another upgrade could be requiring certificates to show that a property is free from livestock epidemics such as brucellosis, tuberculosis, and Foot and Mouth disease. Consumers also play a critical role in reviewing their food habits, ranging from the demand for information on the food origin and applied techniques to decrease animal protein consumption.
5. **Eco-efficient production:** – The adoption of new and local technologies to boost farm efficiency and productivity without degrading the soil, must also be accompanied by verifiable reduction of farms' greenhouse gas emissions and ecosystem gains as evidence of water conservation and biodiversity preservation. The deployment of these methods and tools can be implemented on family farms and medium-sized properties by means of capacity building. They can also be pursued on a large scale, driving down production costs, in addition to easing access to markets with more demanding standards. Some of the techniques warranting attention are:

- **Crop, livestock and forestry integration:** This method allows increased productivity, reduces production risks, and adds value while improving environmental stewardship. It also calls for management techniques and technologies for the recovery of degraded areas.
- **High precision agriculture:** Relying on management techniques and technologies to make farming more precise, automated and independent. Examples include soil analysis, efficient application of fertilizers, harvesting with productivity sensors, localized application of pesticides and crop monitoring to map pests and diseases.
- **Agroforestry systems:** Combining agricultural crops with forest and fruit trees in the same area to promote a more efficient use of soil, water and energy. These systems also generate benefits for cattle raising.
- **Biological nitrogen fixation:** Planting species rich in the microorganisms that capture life-giving nitrogen for crop nutrition. After photosynthesis, nitrogen uptake is the most important biological process for plants.

6. Ensuring a high degree of traceability: – Traceability is often understood more as a monitoring tool than as an evaluation criterion. Even so, a reliable system to track products from farm to market across long and often complex supply chains is essential to ensuring the integrity of products and processes, especially in agribusiness. Market commitments are the foundation for the development of monitoring technologies to detect and eliminate trade in products that are directly linked to illegal appropriation of land and deforestation. In Brazilian

agriculture, this means paying close attention to two already existing signature agreements – the Soybean Moratorium and *TAC da Carne* (Term of Conduct Adjustment for the beef chain) – both of which subject important commodities to legal restrictions and uphold industry commitments to zero deforestation.

Although the aforementioned measures are broad in scope, they will serve as the foundation for enhanced metrics to flag and curb illegal practices, as well as help identify and benefit producers who are already exhibiting best practices. Banks, funds, credit unions and other market players can go further by adopting these guidelines to provide specialized services to their customers and reduce their exposure to social and environmental risk and default, specially under Brazilian environmental rule of law, whereby even financial entities may, in some cases, be held liable as indirect polluters.

The Table 1. *Existing and to-be developed metrics for agriculture financing analysis* is a first exercise to outline some of the potential applications of these categories and metrics. It calls attention for which analytical measures are already in place and working, and how far we still need to go. It is important to note that larger financial companies have already adopted some of the criteria, using more robust checking methods like remote sensing service providers or even simple internal forms. Nevertheless, indicators that go beyond regular compliance are not often used for credit restrictions, pricing or client advisory. Smart and viable metrics will be in high demand given the shifts underway in the financial sector, including recent commitments from global asset managers to eliminate commodity-driven deforestation from their investment portfolios by 2025, launched at COP26.²⁴ Therefore, we aim at elevating the parameters for risk management as well as incorporating best practices aspects in regular investment analysis.

24 Hodgson, Camilla. "COP26: Global leaders sign pledge to halt deforestation." Financial Times (2 November 2021). <<https://www.ft.com/content/be933d15-8f28-4ef6-8e0c-4e7fedc37e7b>>

Table 1. Existing and to-be developed metrics for agriculture financing analysis

	CONVENTIONAL INDICATORS APPLIED FOR RURAL LOANS	AVAILABLE INFORMATION THAT COULD COMPLEMENT INVESTMENT DECISIONS	INDICATORS THAT REQUIRES FURTHER DEVELOPMENT
MONITORING AND MANAGEMENT OF LAND OCCUPATION	Active Environmental Registration for Rural Properties (CAR)	Compliance with the Legal Reserve definition (amount of land that should be preserved)	Validated Environmental Registration for Rural Properties (CAR)
		Compliance with the Permanent Preservation Area (APP) limits	Monitoring of the Environmental Regularization Program (PRA)
		Adoption of Environmental Regularization Program (PRA)	Official land title issued by INCRA (National Institute for Colonization and Land Reform)
SUSTAINABLE ENVIRONMENTAL MANAGEMENT	Environmental Infractions	GHG Emissions	Amount of land exceeding Legal Reserve
		Water Resource's Use	Renewable Energy Generation
		Energy Consumption	
INVESTMENT IN HUMAN CAPITAL	Blacklist of Slavery-like Practices	Compliance with health and safety standards	Education and Technical Training Index
		Brazilian Rural focused Human Development Index (IDHR)	Access to affordable and quality housing
			Pay Equity
ENSURING THE WELFARE AND SAFETY OF LIVESTOCK	None	Health Surveillance Certificate	Adoption of OIE criteria
		Certified Epidemic Control Property	Cattle Stocking Rate
			Methane gas reduction
ECO-EFFICIENT PRODUCTION	None	Farming Productivity	Identification of Agroforestry Systems
		Fertilizer consumption	Identification of Crop, Livestock and Forestry integration system
		Beef Cattle Efficiency	Investment in new technology for precision agriculture
ENSURING A HIGH DEGREE OF TRACEABILITY	None	Animal Transit Guide	Remote monitoring of production and associated deforestation
		Beef chain Term of Conduct Adjustment Monitoring	
		Soy Moratorium Monitoring	Livestock monitoring devices adoption

Ensuring stakeholder buy-in and compliance to more sustainable agribusiness practices will be challenging. Notwithstanding several recent and important pledges, questions linger: how will these companies achieve their goals and what solutions will they deliver? There is no quick path to reinventing sustainable agriculture. To get there, we need more creative tools to measure, evaluate and transform the industry and its social and environmental impacts. These proposals may not only improve sustainable practices, but will likely also generate value and economic gains to all.

There are no shortcuts to an environmentally sound and equitable farming or ranching industry. A rigorous grasp of the scope and complexity of the challenges ahead, from global warming to the pressures of global markets, is crucial to guide this transformation. The Igarapé Institute is already on board. We are committed to promoting simple, data-driven solutions that set the bar for a greener, cleaner and more responsible economy where everyone prospers.

Brazilian producers have overcome extraordinary adversity to create a global breadbasket. Now they must go further and show the world that they can fill silos, sluiceways and shipping containers while generating value and still complying with the rights and obligations that accompany this bounty. This means nothing less than the creation of a profitable, socially and environmentally sound agricultural paradigm. It means enhancing transparency and traceability, capacity building, and assuring fair play and workplace civility throughout the supply chain. Brazil, boasts one of the world's most advanced suites of environmental laws and protections. Now it must go further to sow the confidence and robust compliance systems and legal security that investors and lenders need, and global customer's demand.

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