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Natural Capital Valuation: An Incentive To Protect Nature?

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Key Takeaways

- The sustainable use of natural resources and the preservation of nature is increasingly becoming a mainstream concern for policymakers and investors.
- While the general decline in nature is a global phenomenon, its effects are especially acute in agricultural-forest frontiers, such as the Brazilian Amazon.
- Using beef produced in the Brazilian Amazon as a case study for pricing nature in nature-dependent supply chains, noting that beef production is a key driver of deforestation in the region, we estimate a hypothetical cost of nature loss for Amazonian-sourced beef of US$4 billion in 2020, or 12% of Brazilian beef processors' revenues for the same year.
- These illustrative hypothetical nature costs are currently not factored into the price of beef and are borne externally by society. Were these costs to be internalized in the price of beef, by using natural capital accounting pricing measures, they could potentially encourage more forest-friendly farming practices in the region.

The Increasing Relevance Of Natural Capital Accounting

Natural capital accounting is an attempt to include nature in the assessment of wealth. While GDP is a key measure of short-term macroeconomic activity, it is not a comprehensive indicator of the wealth of an economy's assets. For example, GDP may capture the economic output that is generated by deforesting nature and producing cattle, but it fails to account for the drawing down of the natural assets required to generate this productivity--world economic output is 15 times higher than the 1950s, but the biosphere (assets) that supports this output is being rapidly depleted, as the Dasgupta Review shows (see HM Treasury, 2021).

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The rationale for broadening the assessment of wealth to include all capital stocks--produced (machinery and buildings), human (knowledge and skills), and natural (plants, animals, and non-living elements, such as minerals)--is that it provides a more complete picture of prosperity. Equally, as the environmental and societal impacts of biodiversity loss become more evident, another potential avenue being explored by policymakers, regulators, and other stakeholders to arrest this loss of nature is to apply a price to it. Much like how carbon pricing seeks to internalize the impact of carbon dioxide emissions and to encourage better management of resources, a similar process could be adopted for nature through natural capital valuation.

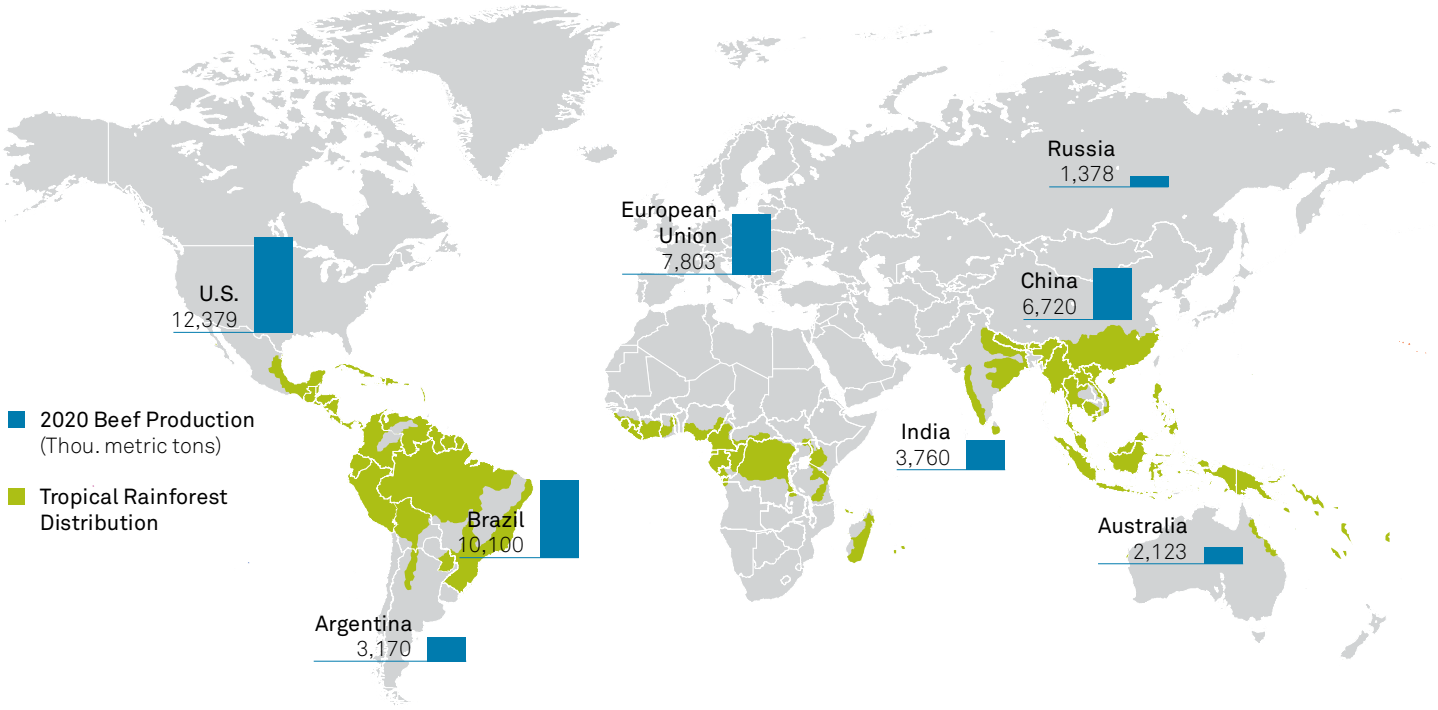
Ascribing value to a standing forest is not without its challenges. By assessing the services that intact nature provides--ecosystem services--and then putting a value on these, which can come from calculating how much it would cost humans to replicate nature's services, incorporating nature into the assessment of wealth becomes more tangible. Ecosystem services valuation is, however, currently an imperfect science. Even when data are robust, issues of comparability and ecosystem heterogeneity can limit their utility. Nonetheless, efforts are underway to assess companies' dependence and impacts on nature, such as through the Natural Capital Protocol and the Natural Capital Finance Alliance's ENCORE tool. Similarly, at the national level, the UN System of Environmental Economic Accounting provides a framework for incorporating natural capital into national accounting systems, with Brazil being one of the first countries in the world to pass legislation requiring an annual valuation of its natural capital be compiled.

Beef In The Amazon: A Case Study In Natural Capital Valuation

The Amazon contains around 40% of the world's remaining rainforest and 25% of the world's terrestrial biodiversity (World Bank, 2019). The rainforest plays a vital role in regulating the world's climate, yet deforestation in the Brazilian Amazon, which represents 60% of the rainforest, hit a decade high between August 2020 and July 2021, and recent research has found that extensive deforestation and climate change have turned parts of the rainforest into a carbon source rather than a sink (Imazon, 2021; Gatti et al., 2021). A key driver of this deforestation is beef (De Sy et al., 2015). Brazil is the world's second-largest producer of beef (figure 1) behind the U.S., and between 1991 and 2005 it is estimated that around 80% of deforestation in Brazil was linked to the expansion of pasture (De Sy et al., 2015).

Figure 1

Brazil Is The Second Largest Producer Of Beef In The World
Major beef producing countries and tropical rainforest distribution

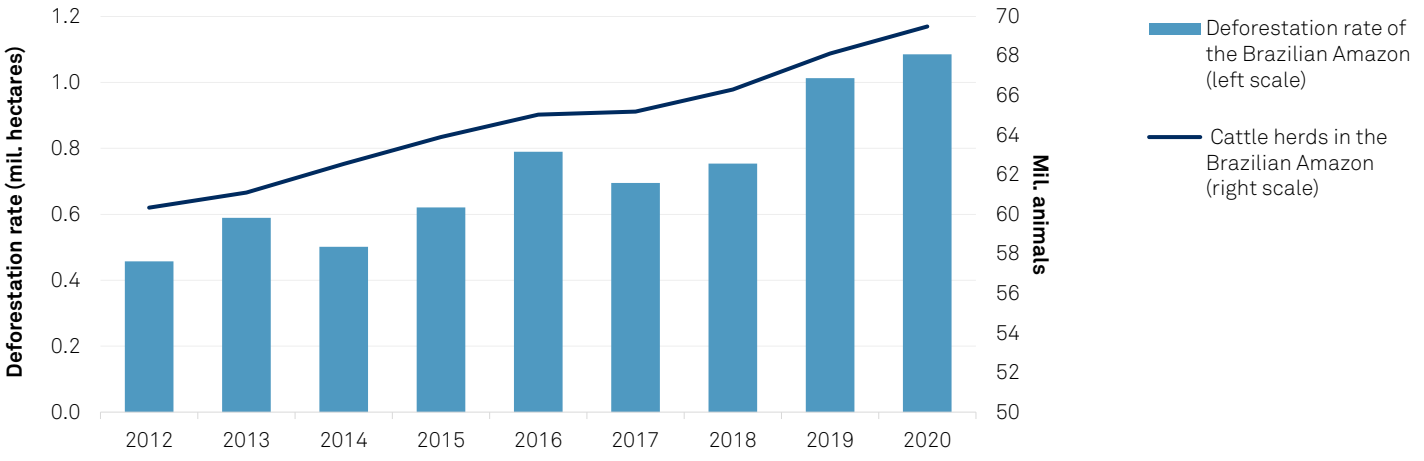


Source: NASA Earth Observatory (Tropical Rainforest), Foreign Agricultural Service/USDA Global Market Analysis, Dr. Thomas E. Lovejoy, S&P Global Ratings.

We estimate, using data from the Brazilian Institute of Geography and Statistics (IBGE), that from 2012 to 2020 the Brazilian Amazon saw a 15% increase in its cattle herd, from 60 million to 70 million animals (figure 2). Data from the Brazilian Institute of Space and Research (INPE) show that the rate of deforestation increased from 0.46 million hectares in 2012 to 1.085 million hectares in 2020.

Figure 2

Increasing Deforestation Trends Are Linked To Land Conversion For Pasture
Deforestation rates and cattle abundance in the Brazilian Amazon, 2012-2020



ha--hectare. Note: States considered for the Amazon Biome's cattle herd were Acre, Amapá, Amazonas, Maranhão, Mato Grosso, Pará, Rondônia, Roraima and Tocantins. Sources: INPE PRODES program (National Deforestation Monitoring System for the Amazon), IBGE, S&P Global Ratings.

The Ecosystems Services Valuation Database (ESVD), an open access repository of ecosystem services valuation data, conducted a review of the available scientific literature estimating the monetary value of the ecosystem services that the Amazon provides. The ESVD data indicate that a hectare of standing forest in the Amazon creates US$4,741 of ecosystem services per year (table 1; figure 3). In line with De Sy et al., 2015, we assume that 80% of the deforestation that occurred in the Brazilian Amazon in 2020 was driven by the expansion of pasture to produce beef. Using INPE data that estimate that 1.085 million hectares of the Brazilian Amazon was deforested in 2020, we estimate that about 0.9 million hectares of deforestation in 2020 was associated with the expansion of pasture to produce beef. Based on these data, we calculate a hypothetical cost of nature loss for beef produced in the Brazilian Amazon in 2020 of approximately US$4 billion.

Applying this hypothetical cost to the total revenue of beef processors from processing cattle in Brazil, which the Association of Brazilian Beef Exporters estimated at US$34.74 billion in 2020, suggests that had the cost of nature loss been incorporated as a cost of production it would have represented around 12% of these companies' revenues in 2020. In other words, for every US$100 sale of beef-related products in Brazil there is potentially an additional unpriced cost of US$12. Current financial accounting standards do not recognize this as an expense and, accordingly, it is not being factored into the final cost of the product. Even if this hypothetical external cost were at some future point applied to beef processors' income statements, the impact on the companies would be very difficult to estimate given that some, or most, of the costs would be passed on to customers, we assume. Indeed, such price increases might lead to changes in consumer demand, and therefore lessen the deforestation pressure of beef in the Amazon. It is also important to distinguish the difference between a non-cash accounting item in financial statements, and a cash outlay to pay for the deforestation of a hectare of forest, beef consumption tax, or nature credits, for example. This accounting difference further muddies the financial implications of the results presented here.

We calculate a hypothetical cost of nature loss for beef produced in the Brazilian Amazon in 2020 of approximately US$4 billion.

The hypothetical cost we have presented here is an externality because it is borne not by the sector, but instead by society through the loss of ecosystem services. It may also be a conservative estimate considering the outsized role the Amazon plays in regulating the global climate, and its potential to trigger a cascade of climatic tipping points, whereby the loss of the Amazon could push the world onto an irreversible warming trajectory (Lenton et al., 2019).

Table 1

Monetary Value For The Ecosystem Services Of Tropical Forests In Brazil
US$/ha/year

Ecosystem Service	(US$)
Food	6
Raw materials	96
Genetic resources	554
Climate regulation	2,915
Moderation of extreme events	46
Regulation of water flows	3
Waste treatment	417
Erosion prevention	67
Pollination	216
Maintenance of genetic diversity	374
Existence and bequest values	47
Grand total (biome)	**4,741**
n-value (records used per biome)	124

ha--hectare. Source: ESVD.

What are Ecosystem Services?

Ecosystem services are the services and goods provided by nature, such as wild pollination, clean water and carbon dioxide sequestration that people, companies and nature rely on to function.

Types Of Ecosystem Services

Provisioning services

Material output from nature
(e.g., fresh water)

Supporting services

Processes that support the delivery of other ecosystem services
(e.g., habitat for species)

Regulating services

Services that regulate the environment
(e.g., carbon sequestration)

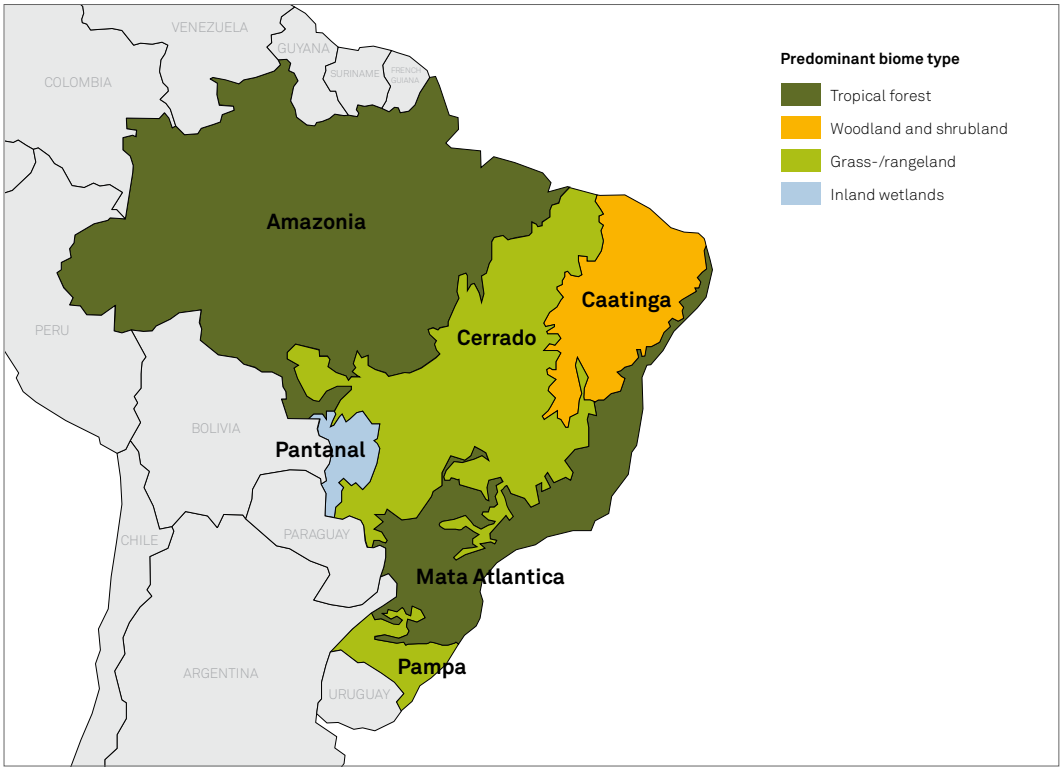
Cultural services

Non-material benefits
(e.g., spiritual)

Sources: Millennium Ecosystem Assessment, Natural Capital Coalition, S&P Global Ratings.

Figure 3

Locating The Brazilian Amazon And Other Brazilian Biomes



Note: The regions comprise multiple biomes and ecosystems. We illustrate the most prominent biome type based on system descriptions on the reviewed scientific literature for this research and on Mapbiomas' annual land use and land cover data for Brazilian biomes. Sources: ESVD Biome & Ecosystem Classification and MapBiomas Project (Collection 6.0 of the Annual Series of Land Use and Land Cover Maps of Brazil).

Brazilian beef processors are increasingly aware of the impact their cattle supply chains can have on the Amazon rainforest. Some companies have achieved full monitoring of their direct suppliers in the region, which ensures that they are not directly sourcing cattle from illegally deforested areas of the rainforest. The Brazilian Forest Code (2012) is the key law requiring landowners to maintain a minimum percentage of native vegetation of their property. However, as cattle supply chains in Brazil are fragmented, with smallholder farmers breeding animals before selling them to larger farmers who then sell directly to the beef processors, it can be difficult for beef processors to ensure that each farmer in the supply chain has abided by this law. This traceability problem is further compounded by the scale of this indirect supply chain, which can be up to five times larger than the direct supply chain.

How Valuing Nature Could Incentivize Its Protection

Our research has shown that one potential pathway to strengthen incentives that protect nature is to account for the ecosystem services it provides, and the negative externalities associated with its loss. For example, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services suggests that payments for ecosystem services could be a potential way to encourage more forest-friendly farming practices. Such methods of paying farmers to protect nature could in turn lead to wider benefits for society, such as maintaining the rainforest and reaping the benefits of the ecosystem services, like climate regulation, that it provides. In turn, more comprehensive supply chain monitoring by the beef processors, as each is striving to achieve, and a more rigorous application of the Forest Code could offer further protection for nature in Brazil. Moreover, the Glasgow Leaders' Declaration on Forests and Land Use, which has

For every $100 sale of beef-related products in Brazil there is potentially an additional unpriced cost of $12.

Indonesia and Brazil as signatories—Indonesia has high rates of deforestation linked to palm oil concessions—could be a critical juncture in stemming nature loss, globally.

As the Taskforce for Nature-related Financial Disclosures is currently being developed to enable investors to more accurately appraise their exposure to nature-related risks, further enhancements to natural capital accounting, such as detailed assessments of deforestation rates and comprehensive ecosystem services valuations, may be a next step. Natural capital principles could equally be applicable to other industries that depend heavily on nature (fisheries, for example) reinforcing how this accounting approach may be a useful tool in highlighting nature loss across multiple nature-dependent supply chains.

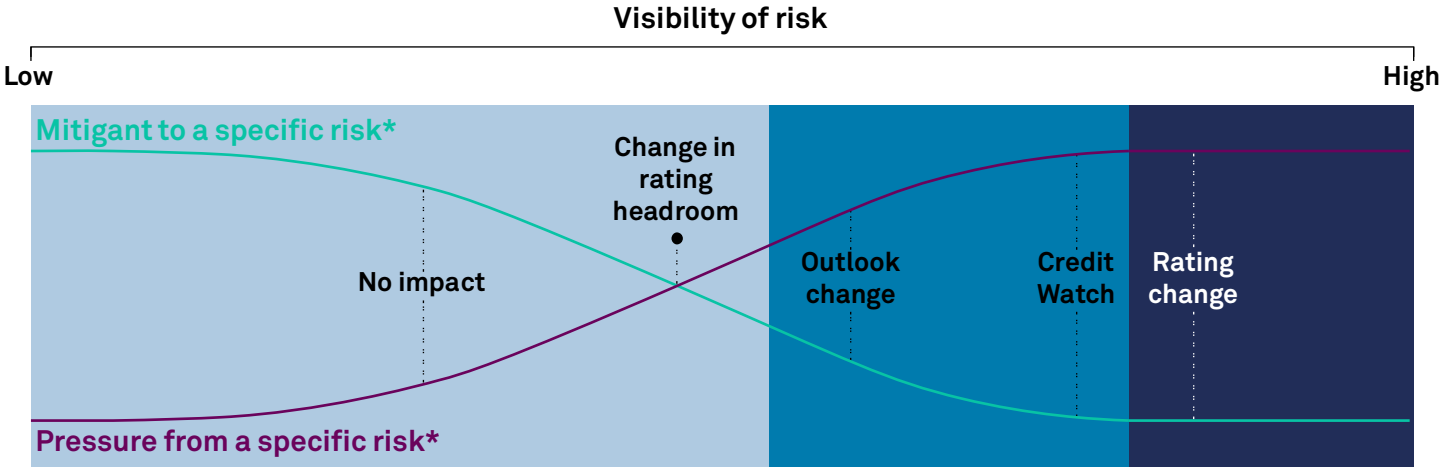
Natural Capital Factors In Credit Ratings And ESG-Specific Evaluations

Environmental, social, and governance (ESG) factors, which include natural capital, can influence credit ratings when we deem them sufficiently material to affect our view of the creditworthiness of an issuer (see "Environmental, Social, And Governance Principles In Credit Ratings," published Oct. 10, 2021).

Natural capital issues related to the direct or indirect loss of nature associated with an issuer's activities or supply chain, have, to date, rarely been a material factor in our assessment of an issuer's creditworthiness. This limited credit materiality also reflects the uncertainties surrounding the likelihood, timing, and magnitude of potential credit materialization triggers taking place such as changes in regulation and/or customer behavior or the development of litigation risks (figure 4).

Figure 4

Visibility Of Risks: Impact On Ratings



*Both the pressure from the risk and the mitigants to the risk can change or stay the same over time. This chart shows how the influence of a specific ESG risk--or opportunity--may change over time as visibility increases. Source: S&P Global Ratings.

In contrast, the ESG Evaluation is a more qualitative ESG opinion, providing a forward-looking assessment of an entity's ESG impact and dependencies on broader stakeholders, including its relative performance and ability to prepare for future risks and opportunities. The ESG Evaluation considers the impact and dependency of an entity and related stakeholders on the environment and society; it is not a credit rating, measure of credit risk, or a component of our credit rating methodology (see "S&P Global Ratings' ESG Roadmap And Reminders About Our Approach," Oct. 5, 2021).

We analyze how an entity is exposed to ESG issues along its value chain and its ability to manage future disruptions. Our ESG Evaluation uses ESG data inputs and responses collected in the Corporate Sustainability Assessment as a starting point, and places greater emphasis on entities' forward-looking management programs to address the longer term ESG issues that have the biggest impact on stakeholders. For example, we analyze whether a company has identified that, through the procurement of certain raw materials, it could be putting pressure on an ecosystem (through the deforestation associated with some of its soft commodity suppliers). We then analyze its commitments and procedures to eliminate or minimize its exposure and remediate damage to the affected ecosystem.

Appendix

Limitations

Deforestation and representation of the sample

Supply chain monitoring involves the use of tools derived from satellite and terrestrial data, which can be costly and require a high degree of specialization to be appropriately used. Such costs and skills limitations are challenges for the monitoring of soft commodity supply chains, such as beef. In Brazil, these challenges are even greater because large tracts of land in remote areas of the Amazon have yet to be legally registered (Azevedo-Ramos et al., 2020).

Monetary value attributed to each Brazilian biome

The studies used for this research present publicly available scientific information on the socio-economic benefits provided by the biomes assessed here. We expect the reported values to change as more data and relevant studies become available. Therefore, the values presented here should not be considered final. We note that natural capital accounting is evolving and the ESVD plays a central role in the standardization of ecosystem valuation research and methodologies. The data contained here are subject to ongoing review by ESVD expert reviewers (de Groot et al., 2020).

Natural capital accounting

The research concentrates on the negative externalities of meat processing (loss of nature attributed to the conversion of land to pasture) rather than the positive externalities (gains from the maintenance of preserved areas) given the current rates of deforestation of the Brazilian Amazon.

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Related Research

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