

Beyond zero deforestation in the Brazilian Amazon Progress and remaining challenges to sustainable cattle intensification

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Key messages

- A governance approach, combining public policy and private initiatives was effective in slowing down deforestation, but was unable to support a transition to more sustainable production systems.
- New technical intensification models must be identified for low-productivity systems in degraded lands, adapted to the biophysical and sociotechnical conditions of the Amazonian landscapes.
- Multiple constraints inhibit progress toward sustainable intensification of cattle ranching, and reversing them requires that all such constraints be addressed in a coordinated way.
- Designing options that work for all stakeholders, and monitoring and verifying progress of territories toward sustainability is essential to support current public policies and private initiatives.

Cattle ranching development and deforestation in the Brazilian Amazon

Cattle ranching has been the main cause of deforestation in the Brazilian Amazon since the frontier development of the 1960s. Pasture expansion for cattle raising is responsible for more than two thirds of total accumulated deforestation, mainly associated with large- and medium-scale ranching, but also involving smallholder farms (Godar et al. 2015). Much of the development of cattle ranching in the Brazilian Amazon has been characterized by very extensive, low-productivity cattle ranching systems, as a result of the abundance of cheap land and shortages of labor

(Hecht 1993). In a historical context where the Amazon territory was considered 'underdeveloped' from a technical, social, logistical and institutional point of view, extensive cattle ranching was not a very lucrative land use option, but it was considered a safe investment for ranchers and farmers of different types (da Veiga et al. 2004). This situation, however, changed gradually as ranching became more profitable in established agricultural frontiers better connected to the markets, and as improvements were made in pasture and herd management and in genetic progress (Pacheco and Pocard-Chapuis 2012). A portion of pasture lands were also taken over by continued soy expansion (Gibbs et al. 2015).

The expansion of cattle ranching has had contradictory outcomes. It has resulted in significant environmental costs, the highest when looking at the costs of natural capital compared with other activities – mainly due to greenhouse gas emissions (FAO 2015). Yet, it has also provided regular cash income benefits to a diverse range of farmers, and has contributed to rural

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development in frontier regions (Pacheco 2009; Caviglia-Harris 2016). As of 2015, the Brazilian Legal Amazon (comprising nine states in the Amazon Basin) hosted about 83 million head of cattle, 39% of the total Brazilian herd, while 40 years ago, this proportion was about 9%. The region has seen rapid growth in the last two decades, during which the Amazonian cattle herd grew by 46 million head, more than doubling the total herd in 1996 (37 million head), mainly in the states of Mato Grosso, Pará and Rondônia. In the same period, the cattle herd in the rest of Brazil grew by only 10 million head. The Amazon region is now the new cattle basin in Brazil, especially the forest biome, which contains 63% of the total Amazonian herd (IBGE 2015).

Despite the continued expansion of cattle herds in the Brazilian Amazon, the rate of deforestation in this region has fallen since 2005, which suggests some ongoing intensification of cattle ranching, and a delinking of cattle expansion and deforestation. This intensification is, however, largely limited to large-scale landholdings (Piketty et al. 2015). The gradual reduction of deforestation as a result of ranching has been due to a combination of public policies and regulations, and private commitments (Gibbs et al. 2016). Most efforts have focused on halting deforestation, however, and insufficient attention has been paid to adopting policy options that would foster more sustainable beef intensification.

Arrangements and initiatives for enhancing the governance of cattle ranching

Two arrangements have been adopted since 2009 to reduce the impacts of beef production on deforestation, both pressing the meat packing industry to place greater control on their suppliers. One is the Agreement for the Adjustment of Conduct (TAC) also known as the 'Public Cattle Agreement' involving most of the beef industry. The TAC defines responsibilities and obligations for the meat packing industry, regarding compliance with environmental law by their direct suppliers, so as to eradicate illegal deforestation from their supply chains. It entails two commitments: (i) to demonstrate through satellite imagery that suppliers comply with the new Brazilian Forestry Code and are not located inside conservation units or indigenous land; and (ii) to purchase animals only from suppliers

holding a Rural Environmental Registry (CAR) and a Rural Environmental License (LAR). In addition, the three major meat packing groups owning the largest number of slaughterhouses in the Amazon (JBS, Marfrig Group and Minerva) signed an agreement with Greenpeace with similar terms to those agreed under the TAC. The latter includes the industry's obligation to control indirect suppliers, including a large number of breeders selling calves to fattening ranches that in turn have direct contractual links with slaughterhouses.

Complementing these two agreements, other types of initiatives to support progress toward more sustainable intensification of cattle ranching have also emerged in the Brazilian Amazon. These initiatives are predicated on the understanding that delinking cattle ranching development and deforestation requires embracing cattle intensification and low-carbon development, so as to achieve simultaneously economic and climate change mitigation goals. Two kinds of initiatives are worth mentioning, and are discussed below.

Guidelines, standards and pilot projects to support intensification of cattle ranching

The era of extensive cattle production has generated large areas of low-productive pasture under different stages of degradation. These degraded lands are candidates for pasture intensification through the adoption of improved technical models elaborated by public and private research aimed at introducing integrated production systems and cattle intensification. The Brazilian Agricultural Research Corporation (EMBRAPA) has taken a leading role in research, proposing two main technical models: (i) integrated production systems (for trees, crops and livestock); and (ii) the Good Practice Program for intensive pasture management. Some private pilot initiatives, such as the *Pecuária Verde* project in Paragominas municipality, have implemented intensive systems in experimental farms, involving nongovernmental organizations (NGOs), a producer union and private funds. At the national level, a *Guide of Principles, Criteria and Indicators* of good practices was formulated under the Brazilian Roundtable on Sustainable Beef Livestock (GTPS) and can be adopted by ranchers on a voluntary basis (GTPS 2016). These initiatives are mainly designed for large-scale farmers, with the exception of the *Balde Cheio* program, a good practices road map for milk production (not specific to the Amazon region).

Finance for sustainable intensification while embracing low-carbon agricultural practices

The Brazilian Government has developed a large credit plan for financing low-carbon agriculture and livestock practices, with ambitious objectives for supporting the reduction of greenhouse gas emissions through the Agricultura de Baixo Carbono (ABC) Program. Nonetheless, the ABC credit conditions (e.g. unattractive interest rates in comparison to other credit lines and low benefits perceived by the intermediary financial institutions) as well as the documentation requirements to access such credit, are very difficult to meet for farmers under the institutional conditions prevailing in the Amazon region, mainly with regard to land titling. The ABC credits thus have a very low rate of disbursement in the region (Observatório do Plano ABC 2016). Adoption of more intensive systems is costly. Thus, investors and financial service providers have the opportunity to play an influential role in orienting intensification processes in the Amazon. However, banks face relatively high financial and reputational risks when financing economic activities in the Amazon, since they can still be accused of promoting deforestation if they finance cattle ranching without adopting a rigorous screening process to manage these risks.

Potential and limits of current mechanisms for achieving sustainable cattle ranching

Sustainable cattle ranching in the Brazilian Amazon cannot be limited to the reduction of deforestation linked to increased intensification of the direct suppliers—mainly large-scale producers—of the meat packing companies. Sustainable beef production should aim to improve land, pasture and other economic assets to achieve a reduction in deforestation, while simultaneously improving the social, economic and environmental performance of cattle ranching production systems, including the restoration of environmental liabilities. This process must embrace not only the beef industry's direct suppliers but the vast majority of indirect suppliers, mainly medium-scale and smallholder farmers. Stakeholders, from farmers to industry and banks, increasingly realize that the latter challenge has to be tackled at wider territorial scales or at a landscape level across the different Amazon territories where cattle production is dominant,

acknowledging their contrasting social and ecological conditions.

Limits of the public and private cattle agreements

The Public Cattle Agreement is monitored by a working group comprising the federal prosecutors of the different states in the Amazon. The meat packing companies are subject to fines if it is proved that they purchased cattle in contravention of the rules established by the TAC. The companies are obliged to send to prosecutors twice a year an up-to-date list of their suppliers along with the georeferenced maps of the landholdings, as well as to perform annual independent audits to verify compliance with the agreement. Until the end of 2016, only the large companies (JBS, Marfrig and Minerva) were able to undertake annual independent audits, mostly because their agreement with Greenpeace had similar requirements. Small- and medium-scale slaughterhouse companies face technical and financial barriers to achieving this goal, and thus they tend to make use of more informal supply chain networks.

Regarding the bilateral agreement between Greenpeace and the three largest meat processing companies, Greenpeace showed its satisfaction with the evolution of the industry's control over direct suppliers (Greenpeace 2016). Existing information, however, does not suggest any progress in controlling indirect suppliers. This has become a major issue given the 'laundry' observed between cattle sourced from ranchers who do not follow environmental law that are mixed up with those of 'clean' suppliers (Gibbs et al. 2016). Moreover, both agreements have been unable to promote the restoration of environmental liabilities of cattle ranchers and the adoption of sustainable ranching practices.

Restoration of environmental liabilities: A long and unfinished negotiation

The 2011 Forest Code specified the key tools and parameters for defining what would constitute an environmental liability for every farm. These liabilities often constitute the conversion of legal forest reserves that must be restored. However, the time lines that farmers should follow in order to finalize the process of restoration have not been defined. In addition, farmers

have the option to compensate for their environmental liabilities by establishing contracts with other farmers (with a surplus of legal forest reserve) to provide an equivalent area of preserved forest, but the framework guiding the implementation of compensation mechanisms has not yet been regulated. These negotiations between representatives of the private and public sectors are still in progress, which creates some uncertainty and slows the process of implementation of the existing environmental legislation.

Are the proposed technical models well suited to promoting sustainable cattle intensification?

The Brazilian Amazon still has significant potential for biomass production, higher than other Brazilian regions, especially for the production of forage, grains, perennial crops and timber. The proposed technical production models aim to maximize land productivity with relatively high costs of labor, equipment and inputs, and are very demanding in knowledge and labor quality (Bendahan 2015). These technical models have been developed by input provider companies and some large-scale farmers supported by academic research organizations and NGOs, each with its own rationale for achieving and promoting cattle production intensification. Two main consequences can be foreseen: (i) new environmental risks associated with a likely massive use of synthetic molecules contained in the chemical inputs; and (ii) new social risks due to a likely exclusion of less resource-endowed farmers who will not be able to adopt the recommended production systems given the investments required.

Moreover, intensification processes tend to occur in more fertile and accessible lands, which are not necessarily the degraded lands in need of investments to recover their productivity. These processes may also put stronger pressure on remaining forests located on fertile soils that are more suitable for intensive agricultural production (Piketty et al. 2015). Degraded pastures are mostly unable to pay for the costs and deliver the economic returns demanded by the currently promoted intensification systems (Dias-Filho 2006). Alternatives have not been sufficiently explored that may be better adapted to degraded lands, small-sized farms, and taking advantage of existing natural resources and ecosystem services (Poccard-Chapuis et al. 2015). These alternatives, which have not been

developed in the Amazon, are those compatible with the concept of agroecology, in contrast to the high-input models.

A proposal for action to advance sustainable cattle intensification

Achieving a sustained post-zero deforestation situation in the Brazilian Amazon's agricultural frontiers requires not only public–private institutional arrangements aimed at enforcing compliance of the environmental laws, but also incentives and reward systems that facilitate the uptake of improved production practices, thus fostering a transition from production systems that negatively affect natural resources to systems that use natural resources more efficiently. In addition, there is a need to restore the confidence of investors and financiers, while lowering the risks of investing in the Amazon. This could increase the attractiveness of the Amazon territories, thus motivating financial service providers and investors to support farmers in the transition toward more sustainable and intensive land use and cattle production systems. Three complementary actions may contribute to achieving this goal.

The first action is to **develop and operationalize adapted technologies with the potential to better utilize the existing natural resources** in the Amazon (e.g. soil fertility, hydric resource availability) rather than using massive chemical inputs. This approach has the capacity to support a large number of less resource-endowed farmers rather than only a handful of large-scale well-capitalized cattle ranchers, and is adapted to vast areas of degraded land. An essential aspect to consider is the spatial configuration of these systems at the landscape scale, which should match with the location of natural resources in order to build eco-efficient landscapes. For example, forage forest, protein banks, silvopastoral integration and multi-strata legume associations, are practices that can be adopted under more adapted systems. In addition, financial services providers must adjust their lending schemes to support these adapted production systems, and the government must adopt such schemes in their restoration plans as a way to blend public resources with private finance to restore landscapes and make them more productive.

The second action is to **design and put in place reliable monitoring systems that empower local**

actors, and are able to determine progress toward sustainable cattle intensification as part of broader territorial performance monitoring. This monitoring, however, should not only assess performance on the achievement of some sustainability indicators but also determine how some constraints preventing the adoption of improved practices are overcome over time, in order to support local learning. Jurisdictions capable of measuring progress in their performance, attesting that they are doing their part in embracing more sustainable development trajectories, such as enabling sustainable intensification of cattle ranching, will likely become less risky and more attractive to investors, and can help to prioritize public interventions (e.g. land regularization, public credit lines). Monitoring and certifying progress achieved toward territorial sustainability in specific jurisdictions, however, is a process that requires important collective action involving all local stakeholders, including large- and medium-scale ranchers, smallholder farmers, banks, state agencies, municipal government and civil society groups.

The third action is to keep **fostering institutional arrangements between public and private actors through more explicit territorial approaches**, to achieve sustainable cattle intensification as part of a wider improvement of territorial performance in subnational jurisdictions, such as municipalities. It is at this level that achievement of sustainability (including social inclusion, gains in productivity and maintenance of environmental services) and trade-offs can be better specified, and it is likely that they will vary across jurisdictions. In addition, territorial approaches have the potential to articulate efforts from a diverse range of actors, such as those from farmers to embrace adapted technologies, government to halt deforestation and promote soil and forest restoration, the meat packing industry to clean up their supply chains, and financial service providers to support low-risk investments. Territorial approaches can also support interactive arrangements and partnerships with the potential to stimulate innovations in the intervention to improve territorial sustainability. In addition, these approaches can provide orientation on improved practices, stimulate mutual learning and foster alignment of diverse sociotechnical options, making sure that sustainability and social inclusion are achieved.

In our view, these three sets of actions—aimed at improving the uptake of adapted eco-efficient technologies, monitoring and certifying progress of territorial performance toward sustainability, and enhancing institutional arrangements to trigger innovation and mutual learning—are the constituent pieces of an approach aimed at achieving ‘territorial sustainability’ in specific jurisdictions. The development and adoption of such an approach could not only stimulate the improvement of territorial performance but in so doing increase the attractiveness of the territory to private investments. It could also guide public investments in support of actions contributing to the achievement of concerted goals, while fostering innovations in governance and sociotechnical systems options.

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