

# Traditional conservation strategies still the best option

The conservation movement has lost its critical edge by befriending agribusiness. With deforestation on the rise and a continuous roll-back of environmental protection, it is time to rethink this strategy.

Britaldo Soares-Filho and Raoni Rajão

Brazil has achieved unprecedented success in reducing deforestation in the Amazon. The precipitous decline in deforestation of 84% from 2004 to 2012 (Fig. 1) was largely attributed to a series of interrelated policies and actions, including: efficient satellite-driven enforcement by the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) to crack down on illegal deforestation and logging<sup>1</sup>; public prosecutors unveiling fraudulent environmental licenses and forcing the beef industry to exclude deforesters from their supply chain; banning credit for rural landowners in municipalities in the black list of top deforesters<sup>2</sup>; a moratorium on buying soy grown on recently cleared lands<sup>3</sup>; and a 60% expansion of the Protected Area (PA) network in the Amazon (Fig. 1). A new paradigm in PA

history, these areas were created in regions of intense land conflict, to act as green barriers against deforestation<sup>4</sup>. Overall, there was a systematic strengthening of environmental regulations, with new legislation enforcing zero deforestation in the Atlantic Forest and specifying environmental harm as crime. All these actions created a synergy to sustain further reductions, by spreading awareness among landowners that deforestation is a bad business.

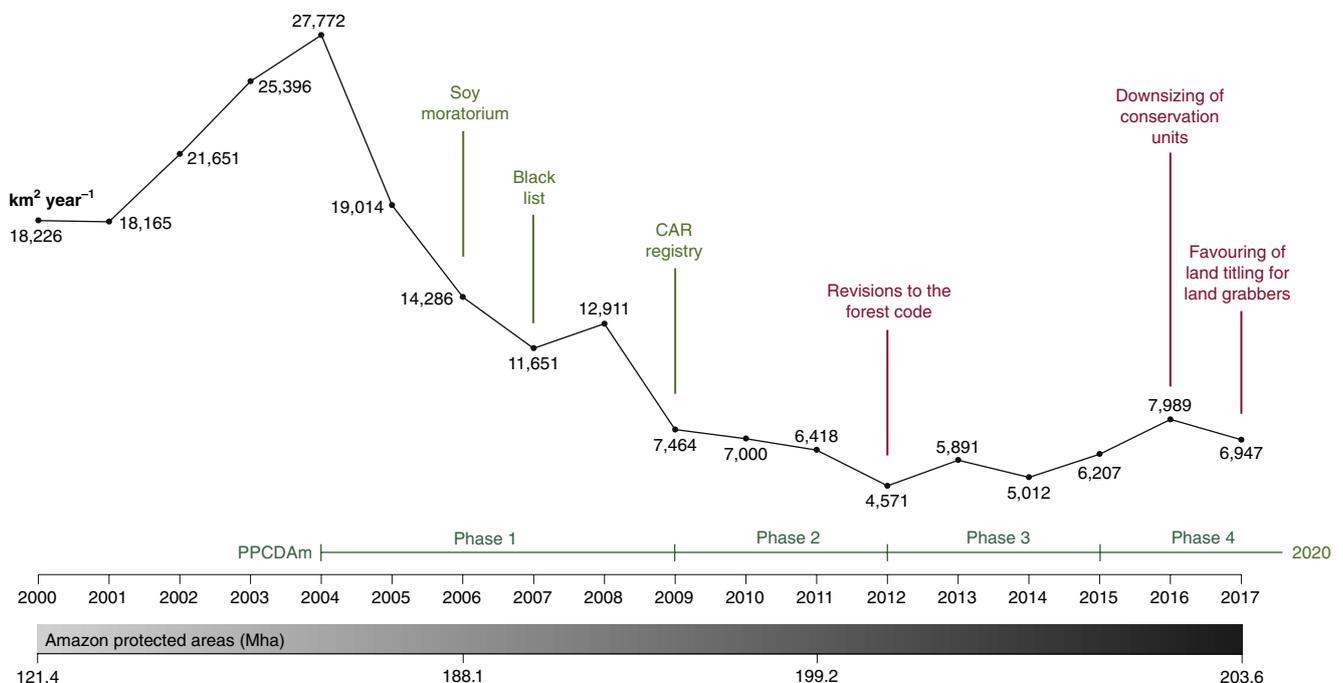
## Science in support of policy

Those actions and policies stemmed from over 20 years of environmental activism alongside policy-relevant science produced in the country. The synergy between non-governmental organizations (NGOs) and academia was instrumental in influencing the government. This is in part a legacy of

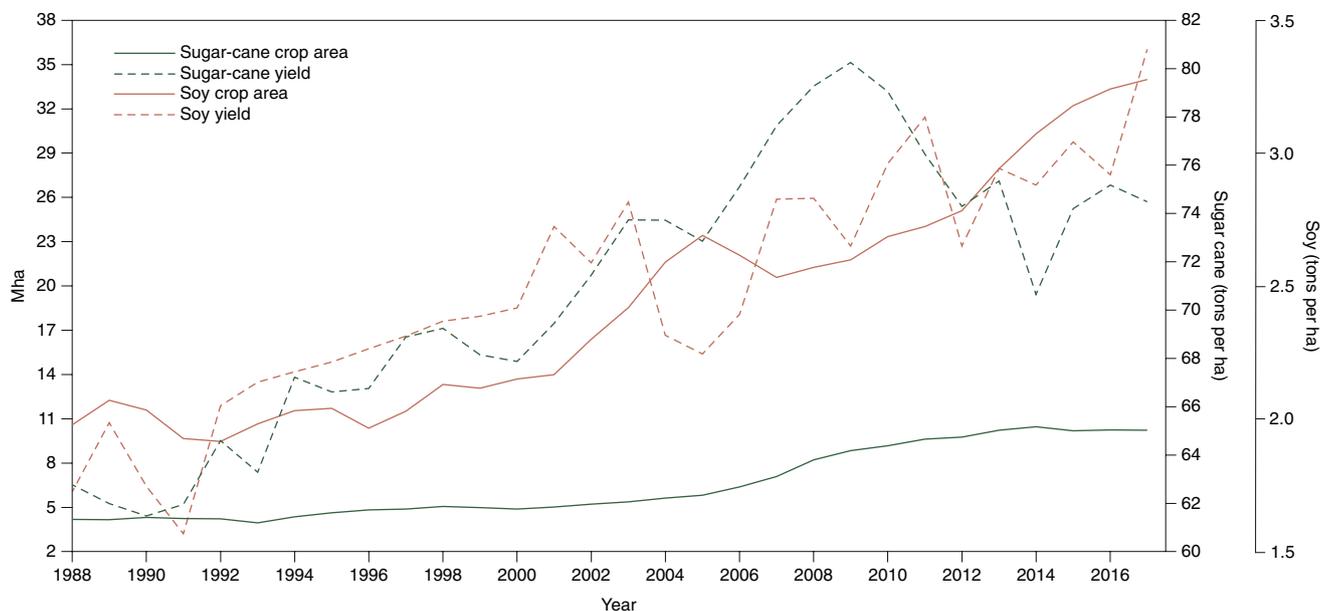
the LBA project (Large-Scale Biosphere–Atmosphere Experiment in the Amazon), which was pivotal to boosting policy-oriented science in Brazil<sup>5</sup>. LBA fostered broad-scope science at a breadth never experienced before in Brazil. As a result, a wide gamut of scientists at universities, research institutes and NGOs working in parallel or conjointly wrought an avalanche of ideas that populated the country's policy arena. Hence, a unique laboratory encouraged by government personnel — many of whom had come from NGOs and academia — helped to forge the policies that contributed a lot to Brazil's success in reducing deforestation.

## Conservation setback

However, the increased pressure on rural landowners to comply with environmental



**Fig. 1 | Annual deforestation rates in the Brazilian Amazon from PRODES project<sup>24</sup> with the main events that influenced deforestation reduction (green) and the recent reversal (red).** PPCDAm is the Portuguese acronym for Action Plan for Deforestation Prevention and Control in the Legal Amazon.



**Fig. 2 |** Crop expansion and yield growth of soy and sugar cane in Brazil. Data from IBGE<sup>25</sup>.

law caused a backlash. Rural lobbies considered it easier to relax the law rather than abide by it, and in 2012 influenced controversial revisions to the Forest Code (FC)— the legislation regulating forest management on private properties<sup>6</sup>. In addition to a large amnesty for landowners who had previously engaged in illegal deforestation, the revisions introduced the perception that the law can be altered again<sup>6</sup>. Further attempts, some of which were successful, to pass acts, decrees and even constitutional amendments aimed to lower environmental-licensing requirements<sup>7</sup>, suspend the ratification of indigenous lands, degazette protected areas and facilitate the obtaining of the deeds of illegally deforested areas by land grabbers<sup>8</sup>. In response to these signals, landowners are slowly beginning to defy the law by increasing illegal deforestation. Since the revised FC law was issued, deforestation rates in the Amazon have slowly but steadily picked up (Fig. 1).

### Agribusiness-friendly conservation

The recent uptick in deforestation trend in the Amazon belies the belief that deforestation and agricultural production have been decoupled in Brazil<sup>9</sup> thanks to the intensification of beef production and rising crop yields. Agribusiness and environmentalists alike celebrate Brazil as a global example of the idea that intensifying agricultural production spare land for nature conservation — the so-called land-sparing theory. However, there is no direct, measurable connection between increasing agricultural productivity and conservation

outcomes<sup>10</sup>. In fact, over the past 39 years, sugar-cane and soy areas — Brazil's major crops — have expanded by 145% and 221%, while yields have grown 33% and 97%, respectively (Fig. 2). There have been gains in beef productivity, especially in the midwest of Brazil, driven greatly by market investments in feedlots and supplementary feeding. But cattle ranching in the Amazon continues to be influenced by pasture expansion on newly deforested areas, where extensive ranching with low stocking rates is the rule<sup>10</sup>.

Higher productivity is an agricultural goal, not a conservation priority. Nevertheless, sustainable intensification of beef production has been promoted and even carried out by conservation practitioners, supported by conservation funding and with the aim of reducing the impact of cattle ranching on forest clearing and greenhouse gas emissions<sup>11</sup>.

Meanwhile part of the conservation movement, drawn to enlist the most powerful force on the planet, the global markets<sup>12</sup>, welcomed agribusiness companies at roundtables to promote clean supply chains, (products with no associated deforestation). The resulting soy moratorium in the Amazon has attained a relative success<sup>3</sup>, even without achieving zero property-deforestation<sup>13</sup>. Despite this success, the Brazilian Vegetable Oil Industry Association remains reluctant in endorsing the expansion of the moratorium into the Cerrado<sup>14</sup>, the most coveted biome for agricultural expansion. In this biome, only half of the original native vegetation

remains<sup>6</sup> and agricultural expansion could accelerate as China seeks alternative sources for soybeans as a response to their tariff war with the United States.

In turn, voluntary agreements around the beef industry have been fraught with many loopholes. These range from the ability of ranchers to conceal the origin of the cattle from embargoed areas<sup>15</sup> to the double role of big meatpackers<sup>16,17</sup>.

Agribusiness is yet to acknowledge this self-harming behaviour. Agricultural production relies on the vast forests and other native vegetation of Brazil, which still cover around 60% of the country<sup>6</sup>. In particular, soy yields in Mato Grosso are dependent on the rain cycled by the Amazon forest<sup>18</sup>. Further deforestation will only have a negative effect on yields, making agricultural expansion self-defeating — a future predicament aggravated by the tendency of climate change to shorten the rainy season across the highly productive double-cropping belt of North-Central Brazil<sup>19</sup>.

### The way forward

Fortunately, not everything is bad news: Brazil has the right tools to promote countrywide conservation while at the same time develop socio-environmentally responsible and low-carbon agriculture. Despite big losses for the environment, the revised FC introduced new mechanisms to address fire management, forest carbon and Payments for Ecosystem Services (PES), all of which could bring environmental benefits<sup>6</sup>.

The FC creates a market that allows landowners to trade forest quotas, namely forest in their property that could be legally deforested, to offset restoration requirements on another property. More importantly, this market could go beyond compensation by instituting a national mechanism of PES focused on biodiversity, water conservation and climate regulation<sup>6</sup>. Rather than awaiting an uncertain international carbon market for REDD+ (Reducing Emissions from Deforestation and Degradation), Brazil should prioritize an internal market based on the quotas potentially fostered with part of Norway's donation to the Amazon Fund.

The new law also established an online land-registry system (CAR) that streamlines the process for landowners to self-register their properties' environmental information. As of July 2018, 95% of Brazil's 5.5 million rural properties were in the system. But entering the CAR is not enough. The system has proven ineffective in deterring deforestation within registered properties<sup>20</sup>. There is a need to continue enforcing the FC by requiring properties below compliance to develop their programme of environmental regularization (PRA) aimed at undertaking onsite restoration. To this end, bank loans, notary transactions, and selling of agricultural products must be conditional to PRA progress. In order to enable traceability of this compliance in supply chains, the government needs to provide full transparency of the CAR dataset, including the ID number of landowners.

Although the CAR dataset has allowed researchers to refine previous estimates of the countrywide restoration required to comply with the FC (up to 20–25 Mha need to be restored)<sup>6</sup>, it is also necessary to develop tools to validate the big data from CAR alongside monitoring the myriad of properties undertaking the PRA. To do so, the country must invest in territorial intelligence underpinned by a systematic cartographic mapping at a scale of 1:10,000 or greater. This would also help to delineate the least-cost areas for natural regeneration<sup>21</sup>, which is key to meet Brazil's Nationally Determined Contribution (NDC)

target of restoring 12 Mha of vegetation. In addition, Brazil must adopt a long-term view by investing in large system modelling<sup>22</sup> in order to assess systematically alternative policy pathways<sup>8</sup> to achieve its ambitious NDC, a goal largely reliant on the land-use sector.

The rationale for privileging a land-sparing strategy and supply-chain agreements over traditional conservation approaches appeared appropriate to cement many of the victories of the previous decade. These could be part of the solution, but NGOs must have the courage to walk away from the table (as did Greenpeace in relation to the sustainable cattle working group in 2017) and reset the terms of conversation if needed. Indeed, with deforestation on the rise and a continuous roll back of environmental protection, it is time to rethink this strategy. Rather than delaying actions through protracted negotiations with agribusiness or assisting cattle-ranching intensification, the conservation movement should get back to basics. To this end, conservation and climate change mitigation resources should be invested principally in what has proven successful, mainly government regulation, monitoring and enforcement, and blaming and shaming actions. For example, the Greenpeace campaign 'Eating up the Amazon', challenged McDonald's for selling burgers with meat from animals fed with soy associated with deforestation, was influential in getting the soy moratorium signed<sup>23</sup>. Importantly, investments in cross-disciplinary science, such as the LBA project, influenced Brazil's conservation achievements greatly and can still do so. Finally, PAs are still the main conservation tool and there remain 40 Mha of undesignated land in the Amazon that must become protected (for example, national forests) to forestall land grabbing. Brazil has achieved substantial sustainability successes. But it needs the continued joint effort of researchers and practitioners, heeding what has worked, to sustain and build on these successes. □

Britaldo Soares-Filho<sup>1\*</sup> and Raoni Rajão<sup>2\*</sup>

<sup>1</sup>Center for Remote Sensing, Federal University of Minas Gerais, Belo Horizonte, Brazil. <sup>2</sup>Environmental

Services Management Laboratory, Federal University of Minas Gerais, Belo Horizonte, Brazil.

\*e-mail: [britaldo@csr.ufmg.br](mailto:britaldo@csr.ufmg.br); [rajao@ufmg.br](mailto:rajao@ufmg.br)

Published online: 13 November 2018

<https://doi.org/10.1038/s41893-018-0179-9>

## References

- Börner, J., Kis-Katos, K., Hargrave, J. & König, K. *PLOS One* **10**, e0121544 (2015).
- Arima, E. Y., Barreto, P., Araújo, E. & Soares-Filho, B. S. *Land Use Pol.* **41**, 465–473 (2014).
- Gibbs, H. K. et al. *Science* **347**, 377–378 (2015).
- Soares-Filho, B. et al. *Proc. Natl Acad. Sci. USA* **107**, 10821 (2010).
- Davidson, E. et al. *Nature* **481**, 321–328 (2012).
- Soares-Filho, B. S. et al. *Science* **344**, 363–364 (2014).
- Fearnside, P. M. *Science* **353**, 746–748 (2016).
- Rochedo, P. et al. *Nat. Clim. Change* **8**, 695–698 (2018).
- Macedo, M. N. et al. *Proc. Natl Acad. Sci. USA* **109**, 1341–1346 (2011).
- Merry, F. & Soares-Filho, B. S. *Elementa Sci. Anthropol.* **5**, 1–12 (2017).
- Programa Novo Campo: Praticando Pecúária Sustentável na Amazônia* (Instituto Centro de Vida, 2014); <https://go.nature.com/2QO39la>
- Clay, J. *Not Price, but Availability is the Future Issue* (Future of Food Seminar, 2010); <https://go.nature.com/2PycWMg>
- Gollnow, F., Hissa, L. B. V., Rufin, P. & Lakes, T. **78**, 377–385 (2018).
- Moratória da Soja Não é Necessária no Cerrado, diz Abiove* (Escola Superior de Agricultura Luiz de Queiroz, 27 October 2016).
- Klingler, M., Richards, P. D. & Ossner, R. *Reg. Environ. Change* **18**, 33–46 (2018).
- Maisonnave, F. IBAMA action against deforestation impacts JBS meatpacking plants. *Folha de São Paulo* (23 March 2017); <https://go.nature.com/2Ey8CeC>
- Runyon, L. JBS, world's largest meat company, mired in multiple corruption scandals in Brazil. *Harvest Public Media* (3 August 2017); <https://go.nature.com/2IZLxVN>
- Oliveira, L. J. C., Costa, M. H., Soares-Filho, B. S. & Coe, M. *Environ. Res. Lett.* **8**, 024021 (2013).
- Abrahão, G. M. & Costa, M. H. *Agric. Forest. Meteorol.* **256–257**, 32–45 (2018).
- Azevedo, A. et al. *Proc. Natl Acad. Sci. USA* **114**, 7653–7658 (2017).
- Nunes, F. S. M., Soares-Filho, B., Rajão, R. & Merry, F. *Environ. Res. Lett.* **12**, 2–10 (2017).
- Boyd, I. L. *Nature* **540**, 520–521 (2016).
- Adario, P. *The Soy Moratorium, 10 Years on: How One Commitment is Stopping Amazon Destruction* (Greenpeace, 2016); <https://go.nature.com/2PHu1n6>
- Projeto PRODES — Monitoramento da Floresta Amazônica Brasileira por Satélite* (Instituto Nacional de Pesquisas Espaciais, 2018); <https://go.nature.com/2P07jt1>
- Instituto Brasileiro de Geografia e Estatística* (Produção Agrícola Municipal, 2017); <https://go.nature.com/2Ad200X>

## Acknowledgements

We acknowledge support from the Climate and Land Use Alliance, Conselho Nacional de Desenvolvimento Científico e Tecnológico and Fundação de Amparo à Pesquisa de Minas Gerais. B. S.-F. is also supported by the Alexander von Humboldt Foundation.