International Institute for
Applied Systems Analysis

IIASA www.iiasa.ac.at

Supporting national climate policy in Brazil and beyond

IIASA provided Brazil with a clear, quantitative basis to its climate commitments, leading to robust policy that the government could be sure of delivering.

© Shutterstock.com

Summary

➡ IIASA research provided a sound scientific basis to **Brazil's climate commitments** for the **Paris Agreement**.

➡ To assess different **policy options** aimed at reducing **land-use emissions**, researchers used the IIASA **Global Biosphere Management Model**.

➡ IIASA worked with Brazilian research institutes to adapt the model, helping to **train local researchers** and build the country's **systems analysis capacity**.

➡ Close collaboration with Brazilian research institutes enabled strong links with **Brazilian policymakers**.

➡ Strong **science and policy links** meant that the models assumptions and scenarios were scrutinized by policymakers leading to **realistic, relevant policy assessment**.

➡ Demonstrating the **scientific basis** of its climate commitment strengthens **Brazil's negotiating position** on the international stage and helps build trust with other nations.

➡ IIASA has launched a new project **RESTORE+**, which will expand the work to **Indonesia** while continuing to support **Brazil** and the countries making up **the Congo Basin**.

➡ In the future, IIASA plans to explore the possibilities for working with other countries with similar issues, such as **Malaysia** and **Vietnam**.

The INDCs

The 2015 Paris climate talks yielded an unprecedented agreement, pledging to keep global warming well below 2°C, and endeavoring to limit it to 1.5°C. But these lofty ambitions must be backed up with clear action by all countries. Under the agreement, each country decides for itself how much it is willing to do to combat climate change—its Intended Nationally Determined Contribution (INDC)—and how it will reach those targets. At present, the INDCs are **not sufficient to reach even the 2°C** target, and there is a pressing need for clear, robust national policies. Identifying exactly where emissions savings can be made, in the most efficient and effective way, is a complex problem that requires a systems approach.

Brazil's land-use emissions

Brazil's rainforests provide globally important carbon storage, as well as harboring a substantial proportion of the world's biodiversity. However, high rates of **deforestation** have had severe impacts on these important resources, and as the country's agricultural sector continues to expand there is an important balance that must be struck.

In the run up to the Paris summit, Brazilian policymakers had an important but complex task: to produce ambitious but feasible climate policies that also allowed the economy to flourish. IIASA was uniquely placed to help with this problem: as an **independent, politically neutral research institute** it is also a world leader in systems analysis, the only tool that can provide robust policy guidance on such issues. To aid Brazil, IIASA researchers employed the institute's **Global Biosphere Management Model** (see *GLOBIOM* box) as part of REDD-PAC—an assessment center for policies aimed at reducing emissions from deforestation and forest degradation (see *REDD-PAC and the Tropical Futures Initiative* box overleaf).
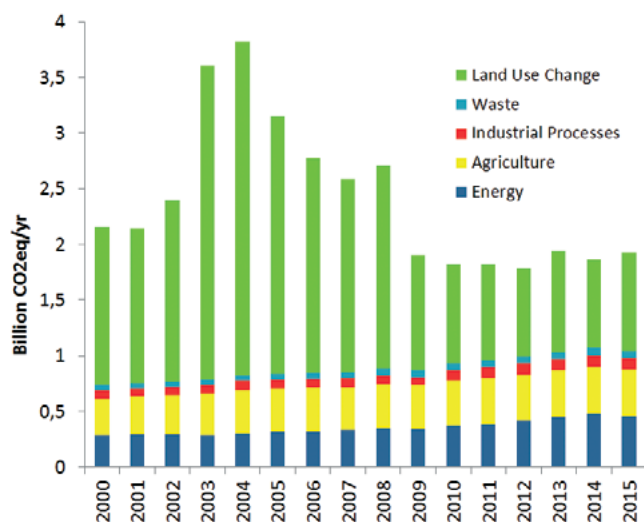

Figure: Although emissions from land-use change in Brazil have fallen since 2004 the sector remains the country's largest source of emissions.

Collaboration and capacity building

As a global model, **GLOBIOM** needed first to be adapted to Brazil's specific national-scale needs. To do this, IIASA researchers collaborated with leading Brazilian scientists and institutions. Working closely with local partners has several key advantages:

➜ IIASA researchers can train local modelers during the process, **building national capacity** in systems analysis and allowing them to tailor IIASA tools to their own country.

➜ For effective policy design, it is important that policymakers can interact with researchers who speak their language, are close geographically, and are aware of the national context. For example, in Brazil local researchers worked closely with Ministry of the Environment and the country's top climate negotiators to prepare the INDC.

➜ Collaborating with IIASA enhances the reputation of local researchers and ensures appropriate use and interpretation of the model.

➜ This collaboration ensures local context is taken into account—this means the models are built using the right assumptions and test **realistic policy scenarios**.

In Brazil, this process enabled the team to produce a clear picture of how measures to cut emissions from deforestation and other land-use change could contribute to meeting climate targets. These tangible actions with measurable effects clarified the options for policymakers.

An ambitious climate pledge

This combination of cutting-edge systems analysis, capacity building, and science-to-policy work gave the Brazilian government a **strong policy** that it knew it was capable of delivering. It enabled the country to set out an ambitious climate pledge for the Paris Agreement: Brazil's INDC states that it will cut its greenhouse gas emissions to 37% below 2005 levels by 2025, and intends to reach a 43% cut by 2030. As the first time a major developing country has committed to an absolute decrease in emissions, this is a historic step forward.

However, setting targets and constructing strategies are merely the first steps in a journey, and actually achieving the INDCs will be a long and complex process. IIASA research can also help countries monitor and assess their progress over time.

IIASA continues to support Brazil as it works towards its INDC, and one key aspect of this is implementing the country's **Forest Code**. This national policy, revised by parliament in
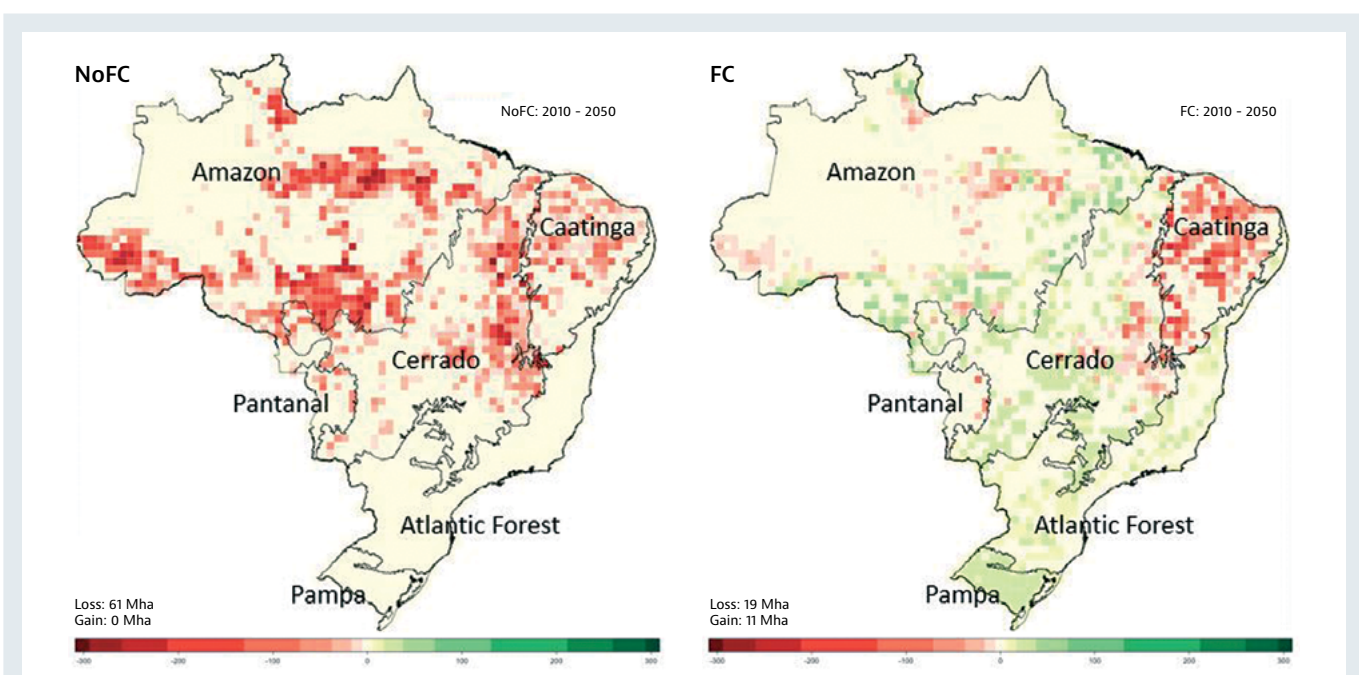
Figure: Forest loss is shown in red and forest gain in green, the two maps show Brazil's future with (right) and without (left) implementation of the Forest Code in Brazil.

2012, regulates land use and environmental management on private properties, which together contain more than 50% of Brazil's native vegetation. The Forest Code sets a minimum percentage of native vegetation to be preserved or restored, and gives environmentally sensitive areas permanent protection.

Effective implementation of the Forest Code is vital to Brazil's emissions targets, IIASA findings have shown. The Forest Code, if fully enforced, can bring about a 92% reduction in emissions by 2030, compared to 2000. Improving cattle ranch practices can lead to increased livestock productivity, thereby reducing pasture area and limiting the loss of natural land. With a combination of forest regrowth and reduced deforestation, **Brazil can reach zero forest-related emissions** after 2030.

Building on success

RESTORE+, a new project launched in 2017, will extend the work in Brazil, providing policy support for major players in global land-sector emissions: Brazil, countries that make up the Congo Basin, and Indonesia.

The project will focus on **degraded land**, first mapping its availability using a combination of innovative methods, such as simple games that citizen scientists can use to help validate

satellite imagery. Second, the project will assess the implications—for emissions, biodiversity, and the economy—of different uses of this degraded land. The importance of ecosystem restoration, combined with sustainable food and energy production, will be a central theme. At every stage IIASA researchers will work closely with local stakeholders, from policymakers, to non-governmental organizations, to the general public.

Ultimately, RESTORE+ will build on the successful techniques that were employed in Brazil, using systems analysis and national collaborations to create clear, robust policies that deliver vital progress towards a sustainable future.

GLOBIOM

GLOBIOM is a global economic model used to assess competition for land use between agriculture, forestry, and bioenergy. GLOBIOM-Brazil projects future land use and agricultural production for the whole country, taking account of both internal policies and external trade. To create GLOBIOM-Brazil, researchers used a dataset containing detailed information on forests, crops, and livestock, which also captured the role of protected areas in limiting agricultural expansion. After calibrating the model using a newly updated land-use map for Brazil for 2000, the team validated it by checking model results against 2010 data from the Brazilian Institute of Geography and Statistics. By showing how different policy options will affect emissions, agricultural production and biodiversity, the model results help decision-makers develop robust policies.

REDD-PAC and the Tropical Futures Initiative

REDD+ stands for Reducing Emissions from Deforestation and Forest Degradation plus conservation of forest carbon stocks, sustainable management of forests, and increase of forest carbon stocks. Policies to achieve these important aims must safeguard ecosystems and biodiversity while also being economically efficient. In 2011 IIASA joined a partnership with other leading policy and research institutes (the Brazilian National Institute for Space Research, the Brazilian Institute of Applied Economics Research, the Commission of Central African Forests, and the UN Environment Programme's World Conservation Monitoring Centre) to create the REDD-Policy Assessment Centre.

REDD-PAC's objective was to establish a culture of evidence-based policymaking in the land use/REDD+ sector under the UN Framework Convention on Climate Change. Brazil now serves as a best-practice benchmark for how to share and improve national deforestation information; how to develop methodologies for determining reference levels; and the best practices for national land use planning supported by models that are compliant to a global standard. IIASA continues to support Brazil and a new project with national partners—*Designing the future: policies to preserve the Amazon, meet the goals of the INDC and achieve low-carbon agricultural production*—will be launched in the near future.

Building on the success of REDD-PAC, IIASA also launched the Tropical Futures Initiative (TFI), bringing on board two additional Indonesian partners (the REDD+ Agency for Indonesia, and the Indonesian Delivery Unit to the President). Under the TFI, policy assessment and capacity building have been extended to Indonesia and will continue under the new project *RESTORE+: Addressing Landscape Restoration on Degraded Land in Indonesia and Brazil*. While work for the latter project is ongoing, new TFI developments will include looking ahead to working with other Southeast Asian countries, such as Malaysia and Vietnam.

Further information

Buurman M, Câmara G, de Carvalho AY, Jones J, Cartaxo R, Mosnier A, Pirker J, Andrade P, et al. (2015). *Description of the GLOBIOM-BRAZIL database available in the REDD-PAC WFS server.* REDD+ Policy Assessment Centre **[pure.iiasa.ac.at/13742/]**

Câmara G, Soterroni A, Ramos F, Carvalho A, Andrade P, Souza RS, Mosnier A, Mant R, et al. (2015). *Modelling Land Use Change in Brazil: 2000–2050.* NPE, IPEA, IIASA, UNEP-WCMC. **[pure.iiasa.ac.at/12115/]**

Câmara G, Soterroni A, Ramos F, Carvalho A, Andrade P, Souza RS, Mosnier A, Mant R, et al.(2016). *Modelling Land Use Change in Brazil: 2000-2050 (Dataset).* **[pure.iiasa.ac.at/13782/]**

Câmara G, Ramos F, Soterroni A, Cartaxo R, Andrade P, Buurman M, Affonso A, Espíndola G, et al. (2016). *Using Models to inform Policies that meet multiple Objectives. Assessing the Contribution of Brazil's Forest Code to Biodiversity Conservation.* INPE, IPEA, IIASA, UNEP-WCMC. **[pure.iiasa.ac.at/13772/]**

Forsell N, Turkovska O, Gusti M, Obersteiner M, den Elzen M, & Havlik P (2016). Assessing the INDCs' land use, land use change, and forest emission projections. *Carbon Balance and Management* 11 (1): p. 26. **[pure.iiasa.ac.at/14172/]**

Hasegawa T, Fujimori S, Boer R, Immanuel G, & Masui T (2016). Land-Based Mitigation Strategies under the Mid-Term Carbon Reduction Targets in Indonesia. *Sustainability* 8 (12): p. 1283. **[pure.iiasa.ac.at/14115/]**

MRE (2015). *Intended Nationally Determined Contribution: towards achieving the objective of the United Nations Framework Convention on Climate Change.* Brazilian Ministry of External Relations, Brasília.

Siagian U, Yuwono B, Fujimori S, & Masui T (2017). Low-Carbon Energy Development in Indonesia in Alignment with Intended Nationally Determined Contribution (INDC) by 2030. *Energies* 10 (1): p. 52. **[pure.iiasa.ac.at/14223/]**

www.iiasa.ac.at/impacts/indcs