

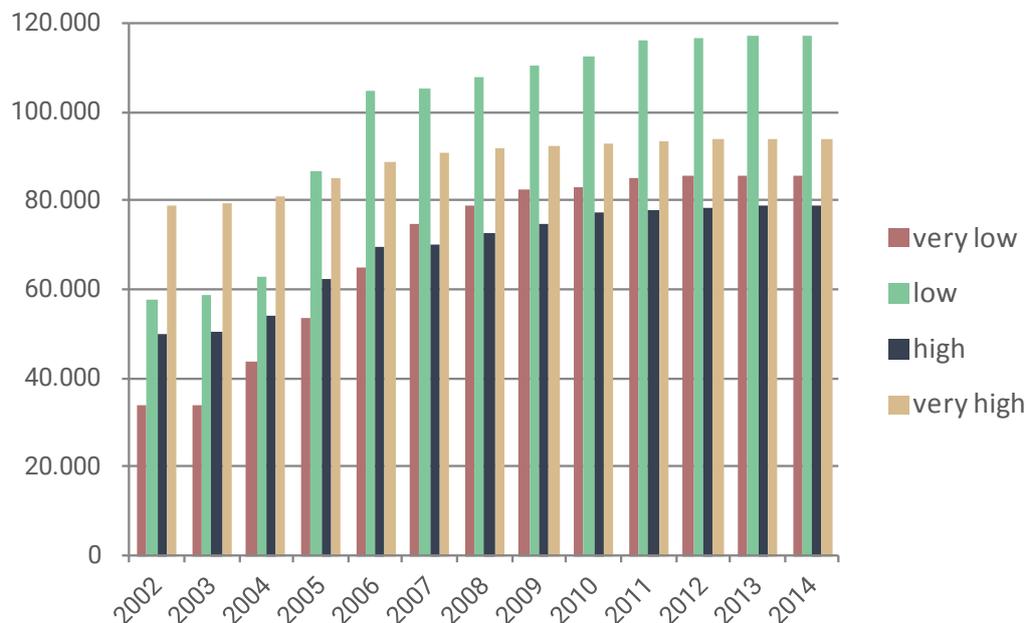
INSIGHTS

RURAL SETTLEMENTS AND SMALL-SCALE DEFORESTATION

NEW EVIDENCE CONFIRMS THAT RURAL SETTLEMENTS DRIVE 30% OF DEFORESTATION IN THE AMAZON BIOME

Since the 1970s, the Federal Government of Brazil has sought to colonize remote and sparsely populated regions while at the same time giving landless farmers access to land. This program, which is part of the agrarian reform efforts, provides farmers with a piece of land in rural settlements created by the government. It usually also includes financial and technical assistance for growing food and raising cattle. Rural settlements have expanded quickly in heavily-forest areas of the Amazon in the 2000s (Figure 1). In 2002, they covered only 4.8% of the Amazon, but by 2014 their coverage jumped to 8.3%, an increase of more than 70%.¹

Figure 1: Settlements Area in km², by 2002 Deforestation Rates



Note: The figure illustrates the total settlement area in square kilometers, in municipalities where deforestation share was very low (<0.05%), low (>0.05% and <0.37%), high (>0.37% and <1.23%) and very high (>1.23%) in 2002.

Source: INCRA and INPE.

¹ In 2002, rural settlements covered 220,000 km² of the Amazon and rose to 376,000 km² in 2014, an increase in area of 156,000 km², which is roughly the size of the state of Ceará.

During this same time, Brazil slowed deforestation significantly. Conservation efforts reduced deforestation from 2004 to 2014 mainly by curbing large-scale clearings through a satellite-monitoring and enforcement system known as DETER. Because DETER could detect large clearings relatively easily, these clearings received better protection; deforestation fell by as much as 80% overall. But smaller clearings, which DETER has a harder time detecting, rose during this period in some areas. Thus, small-scale clearings emerged as the new frontier in the fight against deforestation.²

Given this new focus on smaller clearings, which rural farmers and ranchers often instigate, INPUT researchers at Climate Policy Initiative (CPI)/ PUC-Rio investigated a critical question: do rural settlements cause deforestation?

Using a methodology based on econometric modelling, CPI found that rural settlements are responsible for 30% of deforestation in the Amazon

region in 2014. Moreover, CPI found that special settlements, which are designed to support environmentally-friendly practices, lead to an especially large impact; they account for 15%, or half, of the total deforestation caused by rural settlements in the Amazon.

These findings reinforce those identified in a separate 2016 study by the Amazon Environmental Research Institute (*Instituto de Pesquisa Ambiental da Amazônia* – IPAM). IPAM researchers, using a different methodology, also showed that rural settlements represented as much as 30% of the total Amazon forest area cleared in 2014.³

CPI's research gives policymakers and stakeholders additional evidence for understanding the significant relationship between rural settlements and deforestation. It also highlights the need for further investigation of the environmental role and impact of special settlements in the Amazon region.

UNIQUE FINDINGS ON RURAL SETTLEMENTS AND DEFORESTATION

In order to estimate the impact of rural settlements on deforestation, it is important to account for deforestation that would have occurred in the Amazon area even if the settlements had not been established there. Moreover, the investigation needs to consider whether the settlers may have cleared forest outside – but still close to – the settlements, which is something that has not been done in previous research.

CPI explored these questions by using a rigorous approach that allowed for the estimation of the impact of settlements on deforestation across the Amazon.

CPI merged data on the area occupied by rural settlements, according to type of settlement, with data on municipality deforestation, which was obtained from satellite imagery.⁴

CPI concluded that rural settlements caused 30% of deforestation in the Amazon in 2014

2 <http://www.inputbrasil.org/wp-content/uploads/2015/11/Assuncao-et-al-WP2015-Deforestation-Scale-and-Farm-Size.pdf>.

3 IPAM (2016) *Desmatamento nos Assentamentos da Amazônia. Histórico, Tendências e Oportunidades* – available at <http://ipam.org.br/wp-content/uploads/2016/02/Desmatamento-nos-Assentamentos-da-Amaz%C3%B4nia.pdf>.

4 National Institute of Colonization and Agrarian Reform (INCRA) and National Institute for Space Research (INPE).

They then calculated the share of municipal area covered by settlements and deforestation from 2002 to 2014. CPI's methods allow for isolating the impact of rural settlements on deforestation from that of other possible contributing factors. They found that the greater the share of settlement area within a municipality, the greater the share of cleared forest annually.

Using this approach, CPI concluded that rural settlements caused 30% of deforestation in the Amazon in 2014. This takes into account the deforestation observed within rural settlements *and* in areas adjacent to the settlements. They confirm that a substantial amount of deforestation occurs in the Amazon because of the presence of rural settlements, and especially because of **special settlements**.

UNDERSTANDING DEFORESTATION IMPACT BY SETTLEMENT TYPE AND LOCATION

To understand better how rural settlements affect deforestation, CPI researchers examined the differences in deforestation depending on the location of the settlements and their type. Four types of settlements were considered: the **colonization rural settlements** (older settlements with no variation during the time period considered); **conventional rural settlements** (the more common ones); **state and municipal rural settlements** (created and mostly supported by states and municipalities – occupy a relatively small area); and **special rural settlements** (designed to promote more sustainable production techniques).

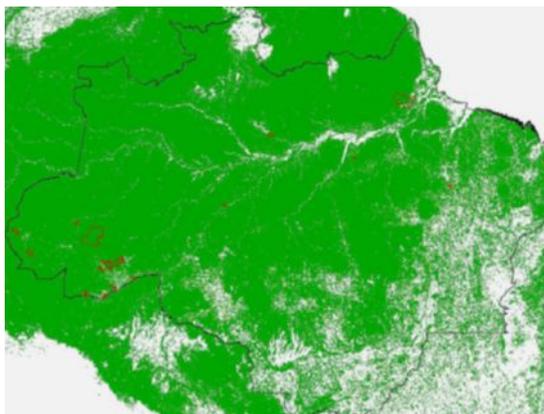
CPI shows that designating new, large tracts of land for rural settlements in rural forested areas causes a certain amount of deforestation due to human and economic activity. This is true *even if* those activities aim to be environmentally-friendly, such as those that occur on special settlements. These special settlements are designed to serve farmers who wish to work with more sustainable production techniques, such as using fewer or no pesticides, or who want to work in more sustainable extractive activities, such as renewable forestry. The special settlements were often concentrated in areas with very high forest coverage and with almost no previously detected deforestation (Figure 2). To establish agricultural activities in such regions, even with sustainable practices, farmers need a tract of cleared land to produce, and thus need to deforest, unless they are engaged exclusively in extractive activities. The researchers identified an increase in deforestation in these areas, showing that special settlements account for 15%, or half of the total deforestation by rural settlements, in the Amazon in 2014.

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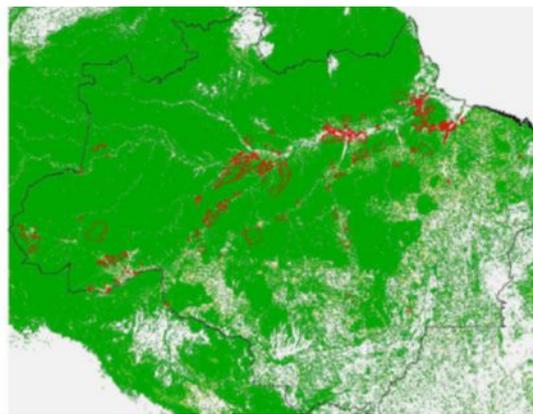
Figure 2: Settlement Area in the Amazon



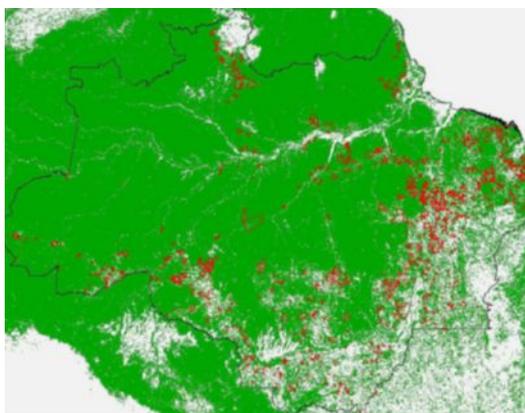
(a) Special Settlements 2002



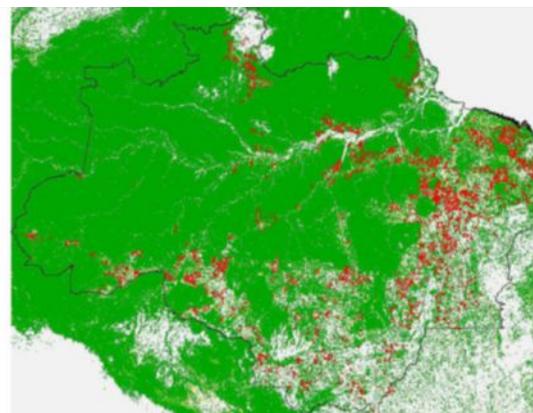
(b) Special Settlements 2011



(c) Conventional Settlements 2002



(d) Conventional Settlements 2011



Note: The figures illustrate the evolution of settlements by type in relation to the forest coverage in the legal Amazon between 2002 and 2011.

Source: INCRA.

Though deforestation also takes place in traditional rural settlements (conventional settlements and state and municipal rural settlements), the researchers show they are not the driving force behind it. The correlation that has been identified in the past between conventional settlements and deforestation seems to be motivated by the presence of factors that affect both deforestation and the creation of this type of rural settlements, such as location in areas of strong agriculture expansion.

These findings emphasize the significant role that special settlements played in deforestation in the Amazon from 2002 to 2014. The study offers important insights on how other government policies affect small-scale deforestation and suggest a need to take a more holistic approach for targeting small-scale deforestation in Brazil.

AUTHORS

Juliano Assunção

Climate Policy Initiative (CPI) & Núcleo de Avaliação de Políticas Climáticas da PUC-Rio (NAPC/PUC-Rio),
Department of Economics, PUC-Rio
juliano.assuncao@cpirio.org

Romero Rocha

Department of Economics, UFRJ
romero.rocha80@gmail.com

SOURCE

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Media Contact

Mariana Campos
mariana.campos@cpirio.org

www.inputbrasil.org

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The **Land Use Initiative (INPUT - Iniciativa para o Uso da Terra)** is a dedicated team of specialists who work at the forefront of how to increase environmental protection and food production. INPUT engages stakeholders in Brazil's public and private sectors and maps the challenges for a better management of its natural resources. Research conducted under INPUT is generously supported by the Children's Investment Fund Foundation (CIFF) through a grant to the Climate Policy Initiative.