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Rural Environmental Registry (CAR): A Tool to Help Combat Deforestation

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ABSTRACT

This article aims to gather and analyze the technical information that is available in government systems regarding the Rural Environmental Registry (CAR), and to analyze data regarding Brazilian rural properties that were obtained through consultation with the Brazilian Institute of Geography and Statistics (IBGE), thus being able to demonstrate its efficiency. This research is of a basic nature, with a quantitative approach and its objective is descriptive, using the technical procedure of bibliographical research. With the CAR, it is possible to form concrete databases to combat deforestation, making this research essential to understand the importance of this tool. Even with the large number of areas registered, the rate of deforestation, especially in the Amazon region, is still increasing. It was found that there is a surplus area when comparing the two tools used, which can be explained by a number of factors such as: incomplete registrations, technical difficulties, inspection and monitoring and a lack of incentive from public authorities.

1. INTRODUCTION

With the implementation of the new Forest Code, Law nº. 12.651, of May 25, 2012, which established the Rural Environmental Registry (CAR), within the scope of the National Environmental Information System (SINIMA), stages were defined for the implementation of the Forest Code: Registration, Analysis of the Registry, Environmental Regularization and Incentives for Producers. To this end, there was a need for a system of monitoring, control, environmental planning and, above all, the mapping of deforestation regions, thus helping to combat this practice. In this way, a number of rules have been defined that help to preserve the environment, as well as promote the development of the Brazilian economy, mitigating damage and seeking to recover areas that have already been degraded.

The aim of this research was to analyze registered areas and relate them to the fight against deforestation, based on data collected by the main current government tools.

To this end, the Rural Environmental Registry was created in response to the need to monitor and regularize rural activities in a sustainable way. Established by the new Forest Code, the CAR aims to promote the conservation of natural resources, protect permanent protection areas and legal reserves, as well as aiding environmental management.

With regard to the areas defined by Law nº 12.651/2012, with the creation of the CAR, there is the consolidated area, which is the area of the property occupied due to human action, be it with buildings, pastures, cultivation systems or animal husbandry. Following the areas defined by law, the area of remaining native vegetation is also established, which is the area with total primary native vegetation or regeneration. The Permanent Preservation Area (APP) is an area for preserving water resources, biodiversity, soil protection and preventing the silting up of rivers.

Thus, the CAR plays an extremely important role in preserving the environment, mapping and updating government systems on land use areas and their current situation (preservation or non-preservation), thus making it very effective in combating deforestation, as well as preventing it, If the landowner declares that he has remaining native vegetation and uses it to compose the legal reserve of the property in question or to compose it on another property that does not have remaining native vegetation, it is also possible to commit to the recovery of the areas when the landowner accepts the system itself, where it allows natural regeneration.

Through this registry, the government seeks to understand the distribution of native vegetation on rural properties, making it possible to devise efficient strategies for environmental preservation and the search for a balance between agricultural development and ecosystem conservation.

This work is of the utmost importance since deforestation in Brazil is growing and still uncontrolled, so by analyzing the areas already registered in the CAR as rural properties, monitoring and analysis by the inspection bodies becomes less complex.

2. METHODOLOGY

This research is of a basic nature, aiming to deepen and understand the interaction of the data obtained by consulting the National Rural Environmental Registry System (SICAR) and the Brazilian Institute of Geography and Statistics (IBGE). It uses a quantitative approach, aiming to examine the data obtained numerically and its objective is descriptive, clarifying the process of collecting and analyzing data in a transparent and systematic way.

The purpose of the research was to consult the occupation areas of Brazilian rural properties on the IBGE website, based on the 2017 Agricultural Census, the latest update available for consultation, so that they could be analyzed and compared with the other data.

The National Rural Environmental Registry System (SICAR) was also consulted, based on the Informative Bulletin of data declared up to April 6, 2023, which showed the areas already registered in the database system, from which it was possible to make a comparison between the IBGE and SICAR data, thus making it possible to compare these areas.

3. THEORETICAL FRAMEWORK

According to Margilus (2003), Brazil has the largest humid forest biome in the world, the Amazon Rainforest, which in all respects contains most of the remaining humid forests. Brazil therefore has a great responsibility to preserve this biome, since its contribution is global.

According to Carvalho (2012), deforestation has an intrinsic link with the expansion of agricultural activities, mining and logging, thus expanding the frontiers of land use areas. According to the researcher, in Brazil, this is a consequence of the regional division of labor,

shaped by the capitalist system. According to the researcher, in Brazil, this is a consequence of the regional division of labor, shaped by the capitalist system. Thus, based on capitalist parameters, for development it is increasingly necessary to increase the amount of production, thus increasing the agricultural frontiers, horizontally, demanding a greater amount of areas for productive purposes and consequently increasing the rates of deforestation.

With the advance of practices that contribute to environmental degradation, Griggs et al. (2013) advocate the need for a holistic and integrated approach that considers both human development goals and the ecological limits of the planet.

In his book Silent Spring (1962), Carson expressed concern about the impact of human activities on the environment and the need to recognize and understand the consequences of these actions so that irreparable damage to future generations and life, in general, can be avoided.

When analyzing public policies for the country's development, we notice that there is a forgetfulness and lack of concern for the environment, with only development being aimed at, rather than sustainable development (MACIEL, 2021).

With the advance of technology, it has been possible for there to be great development in terms of environmental monitoring tools, and the CAR is part of this. With the advance of satellite technology, which captures images of the land in real time, or periodically, it is possible for there to be continuous monitoring of the preservation areas of Brazilian territory. The CAR is an extremely important tool in the context of strategies aimed at environmental conservation and the sustainable management of rural areas. This mechanism has stood out, especially in nations characterized by the vastness of their agricultural and forestry areas, such as Brazil. Established by Law nº 12.651/2012, the CAR plays a significant role in enabling the unification of information on rural properties and possessions, with the primary aim of boosting environmental regularization, as well as the effective management and planning of natural resources.

The CAR, according to Laudares (2014), is an electronic registration system that is indispensable for all rural properties in Brazil, with the aim of listing information about the environment that is issued with regard to the situation of APPs, Legal Reserve (RL) areas, Forests, Remnant Native Vegetation, Restricted Use and Consolidated areas. In this way, through the data obtained with the CAR, all the information regarding the environmental situation will form part of a database,

with satellite images, available to the entire population, with the CAR being an instrument for fostering the formation of ecological corridors and for the preservation of natural resources, thus reflecting on environmental quality.

Luiz (2019) states that the CAR develops an innovative form of environmental management mechanism since it will contribute to the georeferencing systems of rural properties, and from this, verify the environmental information provided by the owner/possessor, through this information collected and checked, the state can measure the liabilities of the properties, facilitating the planning and execution of environmental recovery of degraded areas.

As Cabral (2013), until then the Secretary of Extractivism and Sustainable Rural Development, rightly assures us, with the CAR it is possible to build a database with satellite images from several years, thus assembling a set of images that will facilitate the monitoring and regularization of rural properties. One of the main areas of analysis is the Legal Reserve (RL), which is made up of the remaining native vegetation on each rural property, as well as the Permanent Protection Areas (APP), but the focus on the RL provides a broad overview of the problem of deforestation.

The Rural Environmental Registry plays a crucial role in land management and environmental preservation, contributing to the balance between rural production and the maintenance of natural resources. The success of the CAR rests on effective cooperation between the public and private sectors, as well as the active involvement of society in promoting sustainable development and ensuring the health of rural and forest ecosystems.

4. RESULTS AND DISCUSSIONS

Brazil, for all its biological diversity, is home to around 20% of the planet's species (SILVA et al., 2011), thus implying a greater responsibility for preserving the environment. It is therefore essential to continue with the Rural Environmental Registry in order to better describe the land cover of each region, as well as to monitor areas, emphasizing those with a more fragile ecosystem, Legal Reserves, Permanent Preservation Areas, and Conservation Units, among other areas specially protected by law.

These areas are mapped using satellite locations (GNSS), tracing polygons to determine the Total Area of the Property (AT), and from the main polygon defining the characteristics of the property, defining the areas as Consolidated Area (AC), Remnant Native Vegetation Area (RVN), Permanent Protection Area (APP), Administrative Servitude (SA), Watercourses (CD), among others.

The extent of the RL will be established according to the region and biome. If it is located in the Legal Amazon, i.e. in a forest area, 80% of the property will be set aside for RL; in a *'cerrado'* area, 35%, and 20% of the property if it is in other regions of the country (BRASIL, 2012).

In a one-year period (August 2018 to July 2019), the Project for Monitoring Deforestation in the Amazon by Satellites (PRODES) analyzed that 225,856 ha were recorded in deforestation in public forests (state and federal) not destined for agricultural or similar activities, with a significant increase in deforested areas of 420% compared to the previous annual interval (2017-2018), (OVIEDO, 2021). Oviedo also points out that around 29 million hectares are irregularly registered in the CAR since these areas registered by third parties can cause protected areas to overlap.

According to IBGE (2017), 5,073,324 establishments were reported as rural properties, corresponding to an area of 351,289,816 ha, while SICAR reported 6,978,135 establishments in the April/2023 Information Bulletin, corresponding to an area of 562,930,980 ha.

Based on the areas defined by the IBGE, their classifications and percentages are shown in Figure 1.

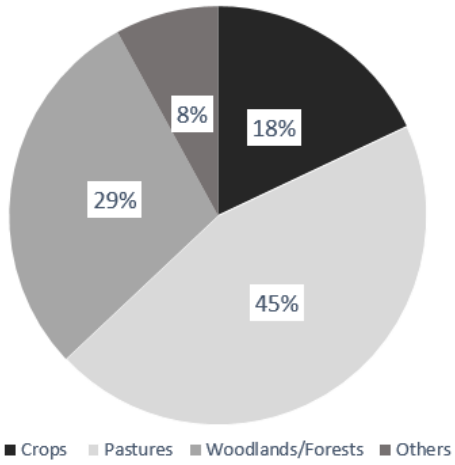

Figure 1- Land use in rural areas

Source: IBGE (2017).

Most of this area is used for pasture, corresponding to an area of 159,497,547 ha, mainly used for beef cattle and grain production (mainly corn and soybeans), which require large areas. Of this total, 30% is still natural pasture, 63% is planted in good condition, and the other 7% is pasture planted in poor condition.

With regard to the divergent value between the data sources, it is extremely important to take into account the time interval between the IBGE data, which is from 2017, and SICAR, as a more current data source, from April 2023, making a time interval of 6 years. However, based on this data, we can see an increase of approximately 60.25% in the areas titled rural properties in Brazil.

Based on what has been discussed, we can confirm what Oviedo (2021) says in his work, that around 29 million hectares were irregularly reported in SICAR, as well as incomplete registrations and technical problems, which can compromise the efficiency of measuring areas. As well as the issue raised by Camargo (2013), which raises the question of why it is not mandatory to have a technician responsible for preparing, collecting and filling in data in the system so that the owner can carry out these functions themselves.

What also explains this divergent value (IBGE x SICAR) is the annual rate of expansion of agricultural frontiers, which always tends towards horizontal growth of the production system, advancing over preservation/protection areas, with SICAR expressing this value in its figures.

According to Vieira Filho (2016), the expansion of this agricultural frontier was due to the integration of the *'Cerrado'* Biome into production and its increasing proximity to the limits of the Amazon region, thus generating concern about environmental sustainability. Regarding the growth rate of the agricultural frontier, the author states that in the period 1080 to 1985, it was 4.3% per year, while in the period 1985 to 1995 this rate fell to -1% per year, thus showing a reduction in the cultivated area, however, in the most current period, 1995 to 2006 this rate is 3.2% per year.

According to Vieira Filho (2016), Brazil had high rates of deforestation in the Amazon region, reaching a rate of 27,000 square kilometers per year in 2004. However, since the Action Plan for the Prevention and Control of Deforestation in the Legal Amazon (PPCDAM), this rate has fallen, reaching approximately 5,000 square kilometers per year in 2014.

5. CONCLUSION

Thus, it can be concluded that even though there is a large number of registrations made by SICAR, the system is still not as effective as expected, and apparently, little use is made of it to map and monitor areas of public interest, since the rate of deforestation in the national territory is still growing, especially in the Amazon region, reaching 21.97% in the period from August 1, 2020, to July 31, 2021, in relation to the same previous period (2019 - 2020) (INEP, 2021), however, according to the Protected Planet Report 2016: How protected areas contribute to achieving global targets for biodiversity Brazil has the largest national network of terrestrial protected areas in the world.

Above all, the CAR is still in the process of being created, and its functionality is not excluded, since it will form a database for possible recovery programs developed by the state, as well as mapping the areas where deforestation is most prevalent, and thus helping to recover them, becoming a fundamental source of data for Degraded Area Recovery Plans (PRAD), and contributing to greater inspection and monitoring so that compliance with environmental obligations can be guaranteed. In this way, the system still needs improvement, such as greater

investment in technology, where systems can be developed and implemented that are increasingly efficient and easy to use to facilitate the registration of areas, the professional improvement of employees, providing adequate training for activities, especially so that they are aware of the importance and responsibilities of the CAR, and also integration with public policies linked to the environment and agriculture in general, such as the Environmental Regularization Program (PRA).

Savian (2014) identifies that improvements in public policies, as well as environmental and economic planning for rural areas, have the potential to be achieved through the implementation of the Rural Environmental Registry (CAR) and the comprehensive registration of rural properties throughout the country.

According to Adrien (2021), it is possible to reduce the amount of overlap in the CAR system, in order to have more regular registrations that are consistent with the real situation and size of the property, based on a Dynamic Analysis system, allowing the analysis system to read the data provided after registration, and automatically, from the land use and occupation grid, make suggestions regarding the areas reported in the CAR registration, as well as uploading documents proving ownership and georeferencing the area, for a thorough analysis of each case.

This study provides an opportunity to compare current IBGE and SICAR data with future data to be made available by the next agricultural censuses and CAR newsletters.

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