

REGULARIZATION OF LEGAL RESERVE DEBTS: PERCEPTIONS OF RURAL PRODUCERS IN THE STATE OF PARÁ AND MATO GROSSO IN BRAZIL

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Introduction

The implementation of environmental policies is one of the major contemporary challenges in Brazil, and particularly land use regulation is a critical component for attaining effective forest governance and conservation strategies (STICKLER et al., 2013). The Brazilian Forest Code (law 12.651/2012) is the most important legislative instrument that regulates land use and forest management on private properties (SOARES-FILHO et al., 2014a). More specifically, the Forest Code establishes legal obligations for private properties in order to assure that economic activities (e.g. livestock and agricultural production, resource extraction, etc.) respect the importance of forests for climate regulation, biodiversity conservation and watershed protection. Among these legal obligations, the Forest Code demands the maintenance of Permanent Protection Areas (i.e. APPs) and a Legal Reserve, which represent “obligatory modalities of protected natural areas” (BRASIL, 2012a; SILVA; RANIERI, 2014, p. 116; MARQUES; RANIERI, 2012). Despite the importance of these instruments for the protection and restoration of essential ecological processes, various scientific studies observe a large quantity of Legal Reserve deficits on private properties (SOARES-FILHO et al., 2014a; SPAROVEK et al., 2012; STICKLER et al., 2013). As such, both the scientific community and

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non-governmental organizations start to question the effectiveness of environmental and territorial governance in Brazil.

The states of Pará and Mato Grosso contain the largest portions of Legal Reserve, and demand restoration in order to comply to Brazilian legislation (i.e. ± 1.5 to ± 6.3 Mha; see SOARES-FILHO et al., 2014b), particularly since these states are under high pressure from agricultural expansion in the so-called 'deforestation arch' (DOMINGUES; BERMAN, 2012). At the same time, however, these states also contain significant quantities of Legal Reserve surplus (i.e. ± 8.0 to ± 2.3 Mha, see SOARES-FILHO et al., 2014b), and are pioneers in implementing the Rural Environmental Registry (CAR) even in absence of federal level obligations (AZEVEDO et al., 2014). Furthermore, the federal government, the private sector and civil society organizations view these states as strategically important focus points for the implementation of forest law, and thereby exert additional pressure on rural properties in this region.

In order to comply with the Brazilian Forest Code, rural properties with a Legal Reserve deficit¹ must choose between recomposition, natural regeneration and/or compensation (BRASIL, 2012a). Concurrently, the decision-making processes related to regularization of rural properties containing Legal Reserve surpluses, as well as their willingness to trade these surpluses instead of legally deforesting them, remain uncertain, and strongly suggest that their behavior will directly affect the implementation of the Forest Code as well as forest conservation efforts. Several studies already estimate the quantity of Legal Reserve surpluses and deficits, as well as economic consequences thereof (SPAROVEK et al., 2010, 2012; STICKLER et al., 2013; SOARES-FILHO et al., 2014a), but research on the perceptions and behaviors of rural producers in relation to the implementation of the Brazilian Forest Code is scarce. Some scholars indeed suggest that understanding the factors that motivate rural producers to engage in conservation practices is key to addressing environmental challenges in the agricultural sector (THOMPSON; REIMER; PROKOPY, 2014) as well as formulating more robust public policies (POPPENBORG; KOELLNER, 2013). In this respect, understanding the behavior of rural producers in relation to their compliance to Legal Reserve requirements is crucial and desirable due to the social, economic, political and environmental implications thereof, especially in the states of Pará and Mato Grosso. This paper aims to understand central factors that motivate rural producers to regularize their properties (i.e. in case of deficit) or employ their potential (i.e. in case of surplus) with respect to Legal Reserve legislation for the states of Pará and Mato Grosso.

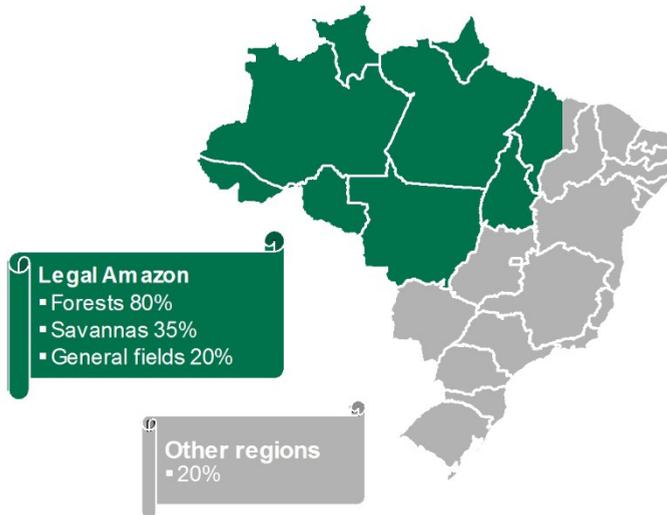
Background

Legal Reserve: legal requirements and noncompliance

The requirement to maintain a percentage of the total property area with native vegetation (i.e. Legal Reserve) was already established in the first Forest Code (i.e. decree 23.793) in 1934 (CAMPOS; BACHA, 2013; SELBACH, 2013; SENADO FEDERAL, 2011). While this percentage involved 25% for all properties, the Legal Reserve requi-

rements were altered during a revision of the Forest Code (decree 4.771) in 1965, and demanded 50% of Legal Reserve for forested areas and 20% for all other forms of vegetation. The requirements were again altered with the establishment of the new Forest Code (i.e. law 12.651) in 2012, and demanded differential Legal Reserve percentages per biome and region (see figure 1; BRASIL, 2012a; CAMPOS; BACHA, 2013).

Figure 1 – Legal Reserve requirements in Brazil (Lei 12.651/2012, art. 12).



Currently, a substantial quantity of private properties contains a Legal Reserve below the required percentages established by law. According to Azevedo, Stabile and Reis (2015), for example, about 65% of rural properties in the state of Mato Grosso demonstrated some degree of Legal Reserve deficit in 2014, which already takes into consideration that the new Forest Code exempts small properties (i.e. up to 4 fiscal modules) from restoring their Legal Reserve. This strongly indicates that Forest Code compliance is ineffective, and results in an increase of deficits throughout the country (CAMPOS; BACHA, 2013; METZGER, 2002; OLIVEIRA; BACHA, 2003; SILVA; RANIERI, 2014; SPAROVEK et al., 2011, 2012).

There are several factors for this ineffectiveness. First, the high percentages of Legal Reserve requirements (e.g. 80% in the Amazon biome) evokes criticism among land owners in the Legal Amazon as well as social resistance to maintaining their Legal Reserve (ALSTON; MUELLER, 2007). Second, high opportunity costs (i.e. costs associated with foregone benefits of alternative uses), particularly in regions of intensive land use, further enhances the attractiveness of non-compliance with the Forest Code (CAMPOS; BACHA, 2013; IGARI; TAMBOSI; PIVELLO, 2009). Third, the regularization costs (i.e. costs related to land restoration) pose a significant financial burden that falls entirely on rural producers, whereas the benefits of such efforts mostly belong to society as a whole (CAMPOS; BACHA, 2013; FASIABEN et al., 2011; IRIGARAY, 2007; SPAROVEK

et al., 2011). Finally, one could also attribute the lack of effectiveness to institutional factors, including (1) the contradictions between former development policy and current environmental policy, (2) the lack of law enforcement in the last decades (CAMPOS; BACHA, 2013; SCHMIDT; MCDERMOTT, 2015; SENADO FEDERAL, 2011; SILVA; RANIERI, 2014), (3) imprecise definitions of environmental requirements and (4) current relatively weak law enforcement by the public sector (SPAROVEK et al., 2011). These and other factors contribute to the low levels of compliance as well as the accumulation of deficits (SILVA; RANIERI, 2014). In this respect, Soares-Filho et al. (2014a) estimate an accumulated Legal Reserve deficit of 17 Mha of land that was deforested before July 2008, the cut-off date defined by the Forest Code for compensation. In order to mitigate the general resistance to the maintenance and restoration of the Legal Reserve in rural properties already in production (IRIGARAY, 2007), several options have emerged since the late 1990s that render the regularization of deficits more flexible (BONNET et al., 2006; CHOMITZ, 2004).

Alternatives for regularizing Legal Reserve deficits

The Forest Code offers three alternatives that aim to facilitate legal compliance, namely (1) recomposition, (2) natural regeneration, and/or (3) compensation (BRASIL, 2012a). More specifically, deforestation of the Legal Reserve before July 2008 can be regularized with the aforementioned options, but deforestation that occurred after this moment cannot be compensated and must therefore be recomposed or regenerated (AZEVEDO; STABILE; REIS, 2015; BRASIL, 2012a).

'Recomposition' refers to the restitution of degraded native vegetation to a non-degraded condition, which could differ from its original condition (BRASIL, 2012b; MMA, 2014). This means that Brazilian legislation allows recomposition to consist of a mixture of native vegetation and exotic species as part of agroforestry systems, in which exotic species may not exceed 50% of the total area to be recomposed (BRASIL, 2012a). This option did not receive much heed from land owners, since they were unwilling to recompose Legal Reserve parcels converted to pasture or agriculture (IRIGARAY, 2007). Natural regeneration involves the reestablishment of native vegetation through natural processes of partially or wholly deforested areas (GAMA et al., 2002). Such regeneration of secondary vegetation to a quality similar to primary vegetation may take up to a century (POGGIANI, 1989). This regularization option for Legal Reserve deficits is considered to involve lower costs in comparison with recomposition, but involves similar problems of non-deployment (IRIGARAY, 2007).

The compensation system allows regularization to occur outside the property with Legal Reserve deficit, in which the land owner acquires or buys the 'right to deforest' from another land owner (MAY et al., 2015). Such compensation could occur through the acquisition of Environmental Reserve Quota (CRA) from properties with Legal Reserve surplus, standing vegetation on small properties (i.e. until 4 fiscal modules) or private properties within the interior of Conservation Units. In addition, compensation may also occur through leasing under the 'environmental servitude' regime or through registration

of another property under the same ownership (BRASIL, 2012a). This modality proves economically interesting for land owners with Legal Reserve deficit that wish to regularize their property, and is therefore their preferred option (IRIGARAY, 2007; RAJÃO et al., 2015; SPAROVEK, 2012). More specifically, compensation reduces the compliance costs, since it significantly reduces opportunity costs for land owners (BERNASCONI; ROMEIRO, 2011; BERNASCONI, 2014). In addition, it embodies the idea of 'paying for standing forests', and thereby mitigates the imperfections of command-and-control mechanisms (SPAROVEK, 2012). In this respect, the compensation option denotes a market-based instrument that involves remuneration of land owners through the acquisition or leasing of areas with vegetation (SPAROVEK, 2012; NUSDEO, 2007).

Adherence to environmental policies

Rural producers are decision makers that adhere to environmental policies based on complex cost-benefit calculations (CELIO et al., 2014). Their decisions could exert significant influence outside the rural property (EDWARDS-JONES, 2006), especially for ecosystem services such as biodiversity protection, water and nutrient circulation, and greenhouse gas storage (POPPENBORG; KOELLNER, 2013). Their decisions reflect their attitudes, perceptions, preferences and motivations in relation to the implementation of environmental conservation policies or programs (CELIO et al., 2014). Attitudes are tendencies to like or unlike something specific (ALBARRACIN; JOHNSON; ZANNA, 2005). Perception, according to Penna (1982), involves knowing and understanding objects and situations through the senses. The choice of one option instead of alternative options based on specific attributes reflects individual preferences (ADAMOWICZ; LOUVIERE; WILLIAMS, 1994). Moreover, some studies describe a substantial difference between preferences that individuals claim to have (i.e. stated preferences) and preferences revealed by their effective behavior (i.e. revealed preferences) (ADAMOWICZ et al., 1997). Motivation, finally, represents the underlying causes or motives for demonstrating a particular behavior (RYAN; DECI, 2002). This behavior refers to the evident action of an individual (ALBARRACIN; JOHNSON; ZANNA, 2005).

Several studies are currently being developed on perceptions, attitudes and motivations of rural producers that correspond with their behavior related to conservation practices and adherence to environmental policies. These studies include a broad range of topics, including deforestation restrictions (SCHMIDT; MCDERMOTT, 2015), forest restoration (GONÇALVES; GOMES, 2014), agroenvironmental measures (GUILLEM; BARNES, 2013; SCHROEDER, 2011), participation in environmental governance (ATARI et al., 2009; DAVIES; HODGE, 2006; DEFRANCESCO et al., 2008; GREINER; GREGG, 2011) and maintenance of ecosystem services (POPPENBORG; KOELLNER, 2013; VIGNOLA et al., 2010). These studies observe various factors that influence the rate and extent of the adoption of conservation practices by rural producers, including (1) economic and financial factors (e.g. income, productivity, opportunity costs) (GREINER; GREGG, 2011; POPPENBORG; KOELLNER, 2013), (2) sociodemographic factors (e.g. age, sex, experience, property size, etc.) (BURTON, 2014; CELIO et al., 2014), (3) ins-

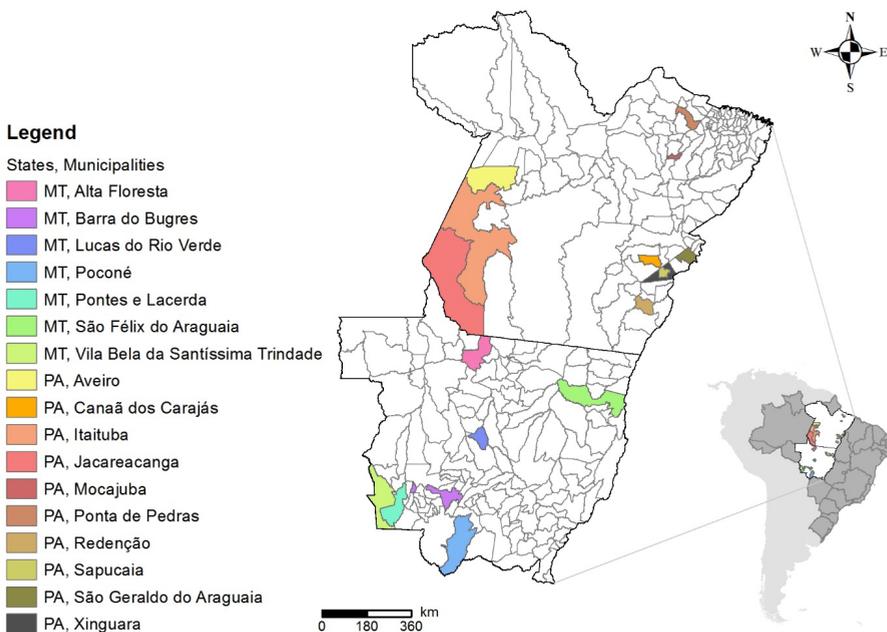
titutional factors (e.g. fiscal and cognitive incentives, instrument regulation, commercial support – establishment of patterns of practices and environmental quality) (GREINER; GREGG, 2011), and (4) cognitive factors (e.g. perceptions, values, beliefs and attitudes) (CELIO et al., 2014; SCHMIDT; MCDERMOTT, 2015; THOMPSON; REIMER; PROKOPY, 2014). In order to increase the adoption of environmental conservation practices that generate public benefits (e.g. ecosystem services), governments have used political conservation instruments as well as environmental regularization (GREINER; GREGG, 2011), but these efforts are not always successful (GREINER; GREGG, 2011; SCHMIDT; MCDERMOTT, 2015; STICKLER et al., 2013). This paper explores the dispositions and motivations of land owners with both deficit and surplus of Legal Reserve.

Methodological consideration

This paper builds mostly on the data collection from structured interviews with 77 rural producers in 17 municipalities in the states of Mato Grosso and Pará (see figure 2) conducted in October and December 2014 as well as January 2015. The selection of municipalities was based on sequential sampling with proportional probabilities with respect to the potential supply and demand for regularization of Legal Reserve deficits (LOHR, 2010). According to Rajão e Soares-Filho (2015), this approach favors municipalities with large numbers of properties with surplus or deficit (i.e. large supply and demand), and therefore attributes higher probability of being selected to these municipalities.

Figure 2 – Visited municipalities in the states of Mato Grosso (MT) and Pará (PA).

The structured interviews (i.e. questionnaires) addressed several important ques-



tions related to the properties, including identification, description, value, community association, production figures of both livestock and agriculture, and information on environmental regulation. Preceding the data collection in the states of Mato Grosso and Pará, this questionnaire was fully tested in other municipalities and (when necessary) adjusted in order to arrive at an adequate interview guide for data collection. The interview application adopted the format of open questionnaires in order to allow the interviewees to expose more completely their perspectives about relevant questions (REIMER; THOMPSON; PROKOPY, 2012). The interviewees were not presented with the various options for response in order not to influence their responses, and as such the interviewer noted the given answers on the questionnaire and complemented these answers with detailing observations about the opinions of the interviewees. This use of stated perceptions in individual interviews about preferences among various options allows for creating hypothetical questions about the regularization of Legal Reserve deficits and the deployment of Legal Reserve surpluses.

It is not possible to affirm that the results of this research are representative for all rural properties in the states of Mato Grosso and Pará due to data limitations. Firstly, the sample of municipalities is relatively small, and does not allow for calculating the external reliability of the data in terms of replicability with other data. In addition, secondly, other stakeholders related to large-scale agriculture, land speculation or land grabbing were not included in the data collection due to the difficulty of entering into contact with these groups. However, the observations and results of this research enhance our understanding of the perceptions and behavior of rural producers in relation to decision-making processes they apply with respect to environmental regularization of Legal Reserve deficits/surpluses.

Results and discussion

Rural producer profiles

Approximately 78% of the interviewees are located in the state of Pará and 22% in the state of Mato Grosso. About 51% of the sample (i.e. 39 rural producers) represent medium and large properties (i.e. areas larger than four fiscal modules¹, whereas 87% hereof (i.e. 34 rural producers) stated that they possess less Legal Reserve than legally required by the Forest Code (this represents 45% of all interviewees, see table 1). Surpluses of Legal Reserve are mostly found on small properties (86%) while only a few are found on large properties (3%). This paper considers the classification of law 8.629 established in 1993 for the definition of categories among rural properties, which distinguishes between small (i.e. less than 4 fiscal modules), medium (i.e. between 4 and 15 fiscal modules) and large (i.e. larger than 15 fiscal modules) properties. The analysis considers only interviewees with stated surplus or deficit, while statements indicating neither surplus nor deficit (10% of the sample) were excluded from the data analysis.

The average age of rural producers with deficit and surplus was 56 years and 55 years, respectively, and the majority of them have their primary and high school degrees. The economic activities of interviewees are quite diverse, and includes small family far-

ming to large commercial agriculture (e.g. soy, corn, rice and black pepper), explorative forestry and livestock production. Among these activities, the latter was predominant in the sample, representing about 72% of all interviewed rural producers. Half of rural producers with either deficit or surplus stated that they have 'very little' knowledge about the Forest Code. About two thirds of rural producers with deficits claim to have already registered in CAR. Over 60% of rural producers with surplus did not have such registry, of which 45% said to take the necessary provision on short notice. Approximately 70% of rural producers with surplus possess about 100 hectares of standing natural vegetation, while 70% of rural producers with deficit claim to have between 100 and 500 hectares of Legal Reserve deficit.

Rural producer perceptions

In general, data analysis detects a certain demotivation among rural producers with respect to environmental legislation, the main factors of which involve disagreement about the demanding percentages of Legal Reserve requirements, contradictions between past colonization policies and current environmental policies (see also SCHMIDT; MCDERMOTT, 2015), as well as high regularization costs especially for restoration of degraded lands (STICKLER et al., 2013). While some rural producers disagree with the demanding Legal Reserve requirements of the Forest Code, and see these as development barrier (SPAROVEK et al., 2012), various others are able to identify the importance of protecting native vegetation as a contribution to agricultural production (e.g. wood for application in building fences and stables, water for various purposes on the property, circulation of nutrients and soil formation, etc.) as well as existential and cultural values of non-utilization (e.g. landscape beauty, patrimonial heritage and status).

It was possible to observe from the statements of rural producers that, in addition to legal requirements, they need to adhere to market demands in order to be able to sell their products (e.g. soy and beef). However, compliance with the demands of soy and beef moratoria, for example, does not necessarily entail compliance with the Legal Reserve requirements of the Forest Code (AZEVEDO; STABILE; REIS, 2015). Market demands are not only susceptible to external pressures from environmental movements and consumer choices, but also to governmental pressures (e.g., Ministries, IBAMA). Moreover, observations suggest that there exists a relation between market demands and governmental requirements, such as the registry in CAR for selling soy and beef to large slaughter houses (GIBBS et al., 2014, 2015).

With respect to options for regularization of Legal Reserve deficits, some rural producers, especially those in livestock production, indicated a preference for, firstly, enclosing low productivity areas and/or areas of limited access in order to allow natural regeneration. This was especially true for pastures with high reform costs due to, for example, hilly terrains and rocky surfaces, and therefore regularization of these areas incurs lower costs. Another preference, secondly, involves the purchase of a forested property in the same biome in order to compensate for Legal Reserve deficits. At the

Table 1 – Characteristics of interviewees

	Producers with deficit		Producers with surplus			
	n = 34	%	n = 35	%		
Age (years)						
≤ 40	3	8,8	5	14,3		
40 -- 60	22	64,7	19	54,3		
> 60	9	26,5	11	31,4		
Education (not completed completed)						
Primary school	4	5 11,8	14,7	12 5	34,3	14,3
Secondary school	7	10 20,6	29,4	3 10	8,6	28,6
Higher education	2	6 5,9	17,6	1 4	2,9	11,4
Type of production activity						
Agricultura familiar	-	-	8	22,9		
Agriculture (soy and corn)	2	5,9	-	-		
Agriculture (pepper) and livestock	2	5,9	1	2,9		
Agricultura (rice) and livestock	1	2,9	-	-		
Livestock	29	85,3	21	60		
Forest extraction	-	-	5	14,3		
Level of Knowledge about FC						
None	6	17,6	1	2,9		
Very little	17	50	19	54,3		
Reasonable	8	23,5	10	28,6		
Good	3	8,8	4	11,4		
Very good	-	-	1	2,9		
Registration in CAR						
Yes	24	70,6	12	34,3		
No	10	29,4	23	65,7		
Property size (FM)						
≤ 4 (small)	-	-	30	85,7		
4 -- 15 (medium)	22	64,7	4	11,4		
> 15 (large)	12	35,3	1	2,9		
Area of deficit/surplus (ha)						
≤ 100	3	8,8	25	71,4		
100 --- 500	24	70,6	7	20		
500 --- 2,000	6	17,6	3	8,6		
2,000 --- 3,000	1	2,9	-	-		

FC – Forest Code; ha – hectares; FM – fiscal module.

same time, however, these preferences are subject to market pressures and governmental incentives, which implies the challenge of normalizing laws and decrees that regulate compliance processes with respect to Legal Reserve deficits as well as public policies that stimulate this compliance. On the other hand, interviewees with Legal Reserve surpluses have demonstrated their interest in ‘renting standing forests’ (i.e. CRA; see RAJÃO; SOARES-FILHO, 2015) in spite of their limited knowledge on this mechanism, stating that “it seems like an interesting instrument” that allows those land owners with excess forests to earn an income “as if it were a bonus for forest conservation while also allowing other farmers to become compliant with the Forest Code”. At the same time, however, they underscore that CRA is still a “new issue” that evokes much uncertainty, and which “in principle is a little hard to understand”.

These observations suggest that the issue of knowledge dissemination to land owners and the correspondent lack of information in this process directly affect decision-making processes of rural producers with respect to adopting conservation practices (GUILLEM; BARNES, 2013). This limitation greatly complicates effective compliance with environmental policies, and directly interferes with the performance of deforestation control instruments. In this respect, it is clear that these challenges require explicit delivery of information to the relevant communities of rural producers. Such effort could positively influence the implementation of the Forest Code, since increases the awareness of rural producers with respect to the environmental, economic and social advantages of environmental policies. As a consequence, those rural producers that are currently viewed as the deforesting villains may become allies of forest conservation.

Dispositions of rural producers with Legal Reserve deficits

During the interviews, rural producers were asked “when they would restore or compensate their Legal Reserve deficits”. The analysis of their answers identifies four categories that reflect their disposition to regularize their properties, which qualitatively reflect their respective socioeconomic and environmental circumstances.

Positive disposition (6%)

Rural producers that demonstrated willingness to take the necessary provisions for regularization have already registered in CAR or are in the process of doing so, and their knowledge about the Forest Code varies between ‘very little’ to ‘reasonable’. This group composes of young to middle aged people (<52 years), intend to work longer years on their properties, and wish to avoid the risk of penalization (e.g. fines, difficulty in selling their product, etc.). Furthermore, they tend to own low value lands (<R\$2,548/hectare), and have proportionally small areas with deficit higher incomes (>R\$67,4/month/hectare). As such, rural producers in this category have only small Legal Reserve deficits, and consequently they will have lower regularization costs in comparison with other categories.

Another influential factor for rural producers in this category involves the low value of forested areas on their properties, which may incentivize them to purchase other properties in order to compensate for their deficits. This practice occurs with various rural producers in the state of Pará, who own properties with surpluses in order to compensate for deficits on other properties of their ownership. As such, one may call this category “proactive and risk averse”, since their decision-making processes are not subject to direct external pressure. In other words, these rural producers know the legal requirement to regularization that will be enforced sooner or later, so they decide to comply to these norms in order to avoid the risk of ‘head-aches’ in the future. According to the classification of Morris and Potter, these rural producers could be labeled ‘actives’, because they adopt provisions on a voluntary basis considering both environmental and financial factors.

Relative disposition (53%)

More than half of land owners with Legal Reserve deficit declared only to regularize conditionally on the basis of market or government pressures (e.g. regularization demands for commercializing agricultural products), which may therefore be labeled ‘reactive’. Rural producers that claim to react to government requirements (44%) are already registered in CAR or are in the process of doing so, and their knowledge about the Forest Code varies between ‘none’ to ‘good’. They represent a mixed age category that tends to own low value lands (<R\$2,547,95/hectare) with lower deficit areas in relation to land price ratios (>R\$10.6/hectare). Rural producers that respond to market pressures (9%) own high value lands that are all registered in CAR, and are 59 years of age. Following the classification of Morris and Potter (1995), these rural producers could be labeled ‘passives’, since they adopt provisions mainly on the basis of financial motivation.

Imprecise dispositions (32%)

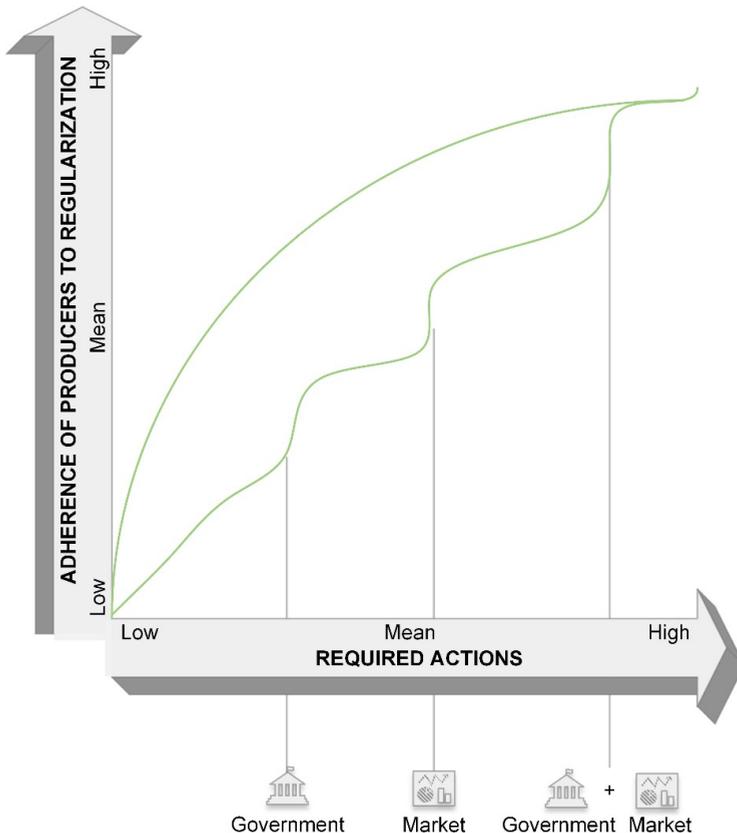
This category of rural producers deserves specific mentioning, because it represents almost a third of the interviewees with Legal Reserve deficits. They are well informed and have good knowledge about the Forest Code, but fear legal insecurity. As such, they may be labeled ‘discrete’ or ‘observant’ as they have many doubts and prefer not to share their position or interests with respect to regularization, observing the developments while awaiting the outcome. This results from many insecurities with respect to regulatory norms that become concerns among rural producers, since it may pose a potential problem for the diversity of rural producer profiles in this category. In this context, the practices of these rural producers will depend on clarification not only of the implementation strategy but also of the regulations with respect to the Forest Code, namely what benefits it will have and how clearly these are communicated. In other words, these rural producers are insecure about what is still legally uncertain, and therefore remain suspicious and prefer to wait.

Negative disposition (9%)

Some rural producers have indicated not to regularize, and in spite of their registration in CAR, they have little knowledge about the Forest Code. Their properties have a relatively high value (>R\$2,54.95/hectare) and their average Legal Reserve deficit is large. Consequently, regularization of their properties will be costly. In addition, they represent mostly high age pioneers that on principle do not intend to get involved with bureaucratic issues. As such, these rural producers may be labeled 'legislation opposing'.

In general, the interviews allowed for a partial understanding of the future dynamics related to regularization of Legal Reserve deficits from the perspective of decision-makers (i.e. rural producers), which are directly linked to the requirements of market and government organizations. On this basis, and on the basis of socioeconomic and environmental characteristics of rural producers in the states of Mato Grosso and Pará (as observed in secondary data), one may argue that the degree of adherence to regularization by rural producers increases as market requirements and governmental enforcement pressure becomes more demanding (see figure 1).

Figure 3 – Willingness of landowners to comply with the Forest Code in relation to different law enforcement and market scenarios.



Preferred alternative for regularization

When posed the question to rural producers with Legal Reserve deficit “whether they would adopt CRA as a regularization mechanism, about 44% stated that they would. The decisive factors for this affirmative response depended on (1) opportunity costs of alternative forms of regularization (e.g. restoration or regeneration), (2) continuity of production in consolidated Legal Reserve areas, (3) the probability that restoration costs exceed compensation costs, and (4) the potential price of CRA based on land prices, with the added benefit of non-responsibility of maintaining the area represented by the acquired quota. Conversely, important factors for not adopting CRA (56% of rural producers) involve (1) purchase of other property, (2) preference to naturally regenerate due to cost minimization in the context of low-rentability lands and multiple income sources, (3) probability of insufficient resources to finance CRA, (4) disagreement with environmental legislation, and (5) preference to await development of circumstances.

Based on the aforementioned data, compensation by means of CRA is linked to large land owners, particularly due to the income that their consolidated Legal Reserve areas offer. One of the factors observed in the interviews is that the purchase of CRA is related to the price for which it is supplied. If this price is higher than the price for forested land, the rural producer will prefer to purchase another property in the same biome in limited access areas where the price per hectare is relatively low. In other words, some rural producers agree to purchase CRA if the total acquisition costs for compensating Legal Reserve deficits are lower than or equal to the sum of the costs for acquiring another (forested) property and maintaining its standing vegetation.

Dispositions of rural producers with Legal Reserve surplus

Rural producers with Legal Reserve surplus responded to the question of “whether they intend to use their surplus for production (e.g. agriculture, livestock, etc.) or for sustainable use (e.g. CRA)”. About 40% of them declare not to have an interest in converting their surplus in CRA in order to become supplier to the regularization market, because they deem the creation of CRA unviable due to the small size of their surplus, or because they have an interest in deforesting and expand their productive area (e.g. pasture, agriculture). Rural producers with an interest in converting their surplus into CRA (29%) instead of alternative uses or ‘doing nothing’ adhered to the following argumentations: (1) non-utilization of areas with native vegetation and lack of interest in alternative use, (2) motivation to maintain standing forests from a conviction that it is their responsibility to protect natural resources for current and future generations, (3) the location of the property within a Conservation Unit that has not yet been expropriated, and (4) the possibility of obtaining financial returns from standing forests in addition to helping other land owners to regularize their deficits. The remaining rural producers (31%) stated that they ‘may’ convert their surplus into CRA depending on future circumstances.

Final considerations

It is not a novelty that the regularization of Legal Reserve deficits is a common challenge in Brazil, especially in the Legal Amazon, due to the demanding legal requirements of the Forest Code. In areas where the Legal Reserve must represent 80% of the total property area, the rural producer is obligated to maintain four hectares of standing forest for each deforested hectare (i.e. alternative use), while sustainable forest management is still permitted conforming to authorization of environmental governmental organizations (BRASIL, 2012a).

The observations in this paper indicate that rural producers may indeed choose to voluntarily regularize their Legal Reserve deficits without conditional factors, but this tends to involve only a small number while regularization in reaction to market and government requirements is the dominant rationale among rural producers. With respect to their preferences, the results in this paper confirm that rural producers tend to choose for compensating their Legal Reserve deficits by means of purchasing other properties among regularization options outside the respective property, and the option of natural regeneration is preferred when regularization occurs within their properties. Among the rural producers with surplus, the preferences with respect to land use are quite mixed, ranging from doing nothing to sustainable use to alternative use.

The analysis of rural producer perceptions contributes to an understanding of the various perspectives of rural producers with respect to normative requirements as well as offer a behavioral indication with respect to the adoption of regulatory measures and forest conservation. As such, these observations are an important point of departure for reflecting about decision-making processes of rural producers as well as the environmental regularization of Legal Reserve deficits. Furthermore, it serves as an initial approach for future research on these issues.

Notes

- i Area with insufficient vegetation for legal compliance with Legal Reserve norms.
- ii Agricultural standard of measurement instituted by law 6.746 in 1979.

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REGULARIZATION OF LEGAL RESERVE DEBTS: PERCEPTIONS OF RURAL PRODUCERS IN THE STATE OF PARÁ AND MATO GROSSO IN BRAZIL

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Abstract: The native vegetation on private land is considered a key component in the supply of ecosystem services, so the Forest Code establishes the Legal Reserve. While some studies have showed that non-compliance is common, so far no study has analyzed the willingness of producers to settle this liability. This study aimed to investigate in an exploratory way the stated preferences and the motivating factors of producers in the settlement of liabilities and use of Legal Reserve surpluses. With this purpose this study has collected primary data through structured face-to-face interviews with 77 producers in 17 municipalities in the states of Pará and Mato Grosso. The results showed four available classes of producers in regulation (positive, inaccurate, inaccurate and negative) and suggest that age, income and the type of agricultural activity are important factors in the decision-making process of farmers in relation to environmental regularization of their legal reserves.

Key-words: Brazilian Forest Code. Environmental regularization. Deficit Legal Reserve. Perception. Stated preference of farmers.

Resumo: A vegetação nativa em terras privadas é considerada um componente fundamental na oferta de serviços ecossistêmicos, assim, o Código Florestal estabelece a necessidade da manutenção de uma Reserva Legal. Alguns estudos mostram que os níveis de não conformidade são altos no país, porém, ainda não existem dados sobre a disposição dos produtores em regularizar seus passivos ambientais. Este estudo investiga de modo exploratório, as preferências declaradas e os fatores motivadores dos produtores na regularização do passivo e uso do ativo de Reserva Legal. Para isso, foram coletados dados primários através de entrevista estruturada face a face com 77 produtores de 17 municípios nos estados do Pará e Mato Grosso. Os resultados demonstraram quatro classes de disposição dos produtores (positiva, relativa, imprecisa e negativa) e sugerem que a faixa etária, renda e atividade

agrícola são fatores centrais na tomada de decisão dos produtores com relação à regularização da Reserva Legal.

Palavras-chave: Código Florestal. Regularização ambiental. Déficit de Reserva Legal. Percepção. Preferência declarada dos produtores rurais.

Resumen: La vegetación nativa en tierras privadas es esencial en el suministro de servicios ecosistémicos, el Código Forestal Brasileiro establece la conservación de una reserva. Estudios muestran que el incumplimiento es alto en el país, sin embargo, no existen datos sobre la disposición de los productores para regularizar sus pasivos ambientales. Este estudio investiga de modo exploratorio, las preferencias y motivaciones indicadas de los productores de la cancelación de pasivos y uso del activo de la Reserva Legal. Para ello, se recogieron los datos primarios a través de entrevistas estructuradas cara a cara con 77 productores en 17 municipios de los estados de Pará y Mato Grosso. Los resultados mostraron cuatro clases disponibles de productores (positiva, relativa, inexacta y negativa) y sugieren que la edad, el ingreso y la actividad agrícola son factores centrales en la toma de decisiones de los productores con respecto a la regularización de la Reserva Legal.

Palabras clave: Código Forestal Brasileiro. La regulación ambiental. Déficit de Reserva Legal. Percepción. Preferencias declaradas de los agricultores.
