New Forest Code effects on smallholder's intention to trade non-timber forest products

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Abstract. *Brites AD. 2020. New Forest Code effects on smallholder's intention to trade non-timber forest products. Asian J For 21: 41-45.* The Brazilian new Forest Code (NFC) allows the sustainable economic use of one of its main mechanisms for native vegetation protection: the Legal Reserves. This study aimed to investigate smallholders' intention to trade non-timber forest products (NTFPs) collected from the Legal Reserve areas. Data were collected through 350 in-person surveys in two municipalities from Bahia, Brazil. Outcomes showed that more than half of the respondents do not intend to trade NTFPs from their Legal Reserve areas. The lack of knowledge about the process to obtain government permission for the economic use of these areas was the main reason gave of their reluctance. Further, higher household incomes showed a negative correlation with the intention. Incentives from public or private policies and dissemination about the steps needed to obtain permission for Legal Reserve's sustainable use are needed for engaging smallholders in NTFPs trade. With these incentives, it would be possible to increase the NFC potential for adding economic value to the protected native vegetation and for linking conservation with the economic development of rural areas inhabitants. Thus, these outcomes add up to previous findings of the benefits of NTFPs trade, and in terms of practice and policy, they can help in the development of environmental policies that incentivize the NTFPs trade, contributing to increase landholders' incomes and to the NFC compliance.

Keywords: Environmental legislation, governance, legal reserve, native vegetation, New Forest Act

INTRODUCTION

Increasing rates of deforestation, land degradation and landscape fragmentation worldwide put conservation strategies on the spot of environmental policy discussions (Alencar et al. 2015, Keshtkar and Voigt, 2016). Public protected areas are therefore promoted as the counterforce to mitigate the detrimental effects of deforestation and land fragmentation to protect biodiversity and ecosystem services (Stolton et al. 2015). However, their existences are not adequate to avoid the great negative impacts of deforestation and land fragmentation, requiring complimentary options including the establishment of privately protected areas (Holmes 2013). Patches of native vegetation inside private lands may increase the connectivity among large, and frequently distant from each other, public protected areas, contributing to overall landscape conservation (Tambosi et al. 2013).

However, conservation policies inside private areas can restrict its use for economic activities, such as agricultural of livestock production, resulting in low acceptance by landholders (Stickler et al. 2013). Thus, strategies that combine conservation with economic development are the best option to promote a win-win scenario and maximize compliance, for example through the trade of non-timber forest products (NTFP). The commercial trade of NTFPs, such as fruits and seeds, from native vegetation patches, is acknowledged for its potential for adding value to standing forests (Shanley et al. 2015). The rationale of this strategy rests on the fact that harvesting NTFPs is already a long-practiced activity to rural inhabitants worldwide, who use NTFPs for subsistence and as a source of cash income through trading them in their natural form or being processed (Shanley et al. 2015). Moreover, NTFPs harvesting values the maintenance of natural ecosystems whose resources people rely on, and is less harmful to the environment than other activities that involve forest conversion, such as agriculture and cattle breeding (Vodouhe et al. 2016).

In Brazil, where more than 50% of the remaining native vegetation occurs inside private farms (Sparovek et al. 2015), the new Forest Code from 2012 (Brasil 2012) is the primary law that regulates the use and protection of these areas. Since Brazilian native vegetation remnants sustain essential ecosystem services, such as carbon sequestration and climate regulation (Zarin et al. 2016), and conserve 10 to 20% of the world's biodiversity (Giulietti et al. 2005), the new Forest Code has great importance in global environmental protection. Two of the main mechanisms for protecting native vegetation through the new Forest Code are the Areas of Permanent Preservation (mostly riparian vegetation) and Legal Reserves. The Legal Reserve is a portion of the farm that must keep a native vegetation coverage. The percentage varies from 20% to 80%, depending on the biome where the farm is located. To comply with the law, landholders who do not meet these percentages can opt to restore or regenerate native vegetation inside their property, or to compensate it in another land. The Legal Reserve area allows the sustainable management and economic exploitation of

natural resources as long as the activity has a management plan approved by government environmental institutions (Brasil 2012).

The new Forest Code also sets different rules for the Legal Reserve of small farms. Smallholders are excepted to the need to restore or regenerate native vegetation to meet the Legal Reserve percentage of the new Forest Code. Thus, the Legal Reserve from small farms should be equal to the amount of native vegetation existing on July 26, 2008. Besides, the smallholders have the right of a simplified process for the approval of management plans for the sustainable use and economic exploitation of their Legal Reserves (Brasil 2012).

Another novelty brought by the new Forest Code is the "Rural Environmental Registry" (Portuguese acronym: CAR). CAR is a nationwide compulsory self-declared digital registry in which rural landholders must map and provide georeferenced data about the property boundaries, Areas of Permanent Preservation and Legal Reserves. By linking the landholder to the land use within a specific property, the registration allows to compile and systematize information and makes it easier to monitor the new Forest Code implementation (Gibbs et al. 2015).

Considering the Legal Reserve mechanism, we can argue that exploiting NTFPs from such areas can be a great opportunity for reconciliation native vegetation preservation with economic gains. Here, the relation between the smallholder Legal Reserve requirements and their intention to trade NTFPs from such areas was explored. The main reasons for trading NTFP from Legal Reserves and the main barriers to doing so were also analyzed. The initial hypothesis was that the acknowledgment of the area destined to Legal Reserve through the CAR registration would increase smallholders' intention to trade NTFPs of these areas. The outcomes of this study can help in the development of environmental policies that incentivize the trade of NTFPs, contributing to increasing their incomes and to the new Forest Code compliance.

MATERIALS AND METHODS

Study period and area

Data were collected through face-to-face surveys from March to May 2017 across two municipalities (São Desidério and Riachão das Neves) in the west of Bahia State, Brazil. São Desidério has a total area of 15,157 km^2 and approximately 33,000 inhabitants (IBGE 2019). The municipality is located about 27 km from Barreiras, the main town from Bahia west region. It has a tradition of trading crafts, household utensils, tools, and other objects made from "buriti" straw, an NTFP from a palm tree (*Mauritia flexuosa* L.f.) (Melo 2006). Its economy is mainly based on agriculture, especially soy and sugarcane production. Riachão das Neves has a total area of 5,840 km^2 and approximately 22,000 inhabitants. The municipality is located about 54 km from Barreiras. Tourism and agriculture are the main economic activities of the region (IBGE 2019).

Data collection procedure

An initial sample of 500 farmers that had already done their CAR was randomly selected. The selection was made among farmers that had already done their CAR registration with the support of a local firm (Ambientagro) contracted by the State government to assist smallholders with the CAR process. According to the Brazilian legislation, smallholders are farmers with properties up to four fiscal modules (Brasil 1993). The fiscal module varies across municipalities and depends on the minimum amount of land required for primary economic activities in the region. In both municipalities surveyed the fiscal module equals to 65 ha, thus farms up to 260 ha are considered as small proprieties.

Of the 500 selected farmers, 115 were not located at the farm and 23 refused to participate, giving a total of 362 completed surveys. To keep farmers anonymity and, thus, obtain more straightforward answers, their names or any other type of personal identification were not recorded in the survey sheets. Survey questions were made to gather if the farmer was aware of the total area of native vegetation that must be kept as Legal Reserve (i), aware of the possibilities of using the Legal Reserve area (ii), already trade NTFPs from the native vegetation assigned as the Legal Reserve area (iii), intended to start trading NTFPs from the Legal Reserve Area (iv), and reasons for opting or not for trading NTFPs from the Legal Reserve Area (v). In addition, smallholders' individual or household characteristics such as age, gender, education level, income, agricultural production, were also collected by the survey.

Data analysis

Descriptive statistics were used to: describe the sample (a), show the reported intention to trade NTFPs from the Legal Reserve areas (b), and show reported reasons for trading it or not (c). Then an exploratory model was constructed to investigate which factors best explain intention to trade NTFPs from Legal Reserve areas.

The dependent variable from the model was the intention to trade which indicates smallholders´ intention to start trading NTFPs from their Legal Reserve area and was based on their answers along a 5-point ordinal scale. The explanatory variables were total household income, total farm area and travel time from the farm to the nearest market. Control variables were gender, age, and education of the farm owner.

Due to the categoric nature of the dependent variable (intention to trade), an ordered logit regression model was used. Explanatory variables were included in the regression models in their standardized form to enable direct comparison of effect magnitudes from variables estimated in different scales (Zuur et al. 2009). The variables were standardized by subtracting their mean and dividing by two times their standard deviation. Variables thus have a mean of zero and take ± 0.5 standard deviation values, allowing a direct comparison between regression coefficients (Gelman 2008).

RESULTS AND DISCUSSION

Sample characteristics

On average, farmers' owners were men above 40 years old and with more than 5 years of formal education (Table 1). Households' total income ranged from 1,874.00 to 7,496.00 Brazilian Reais. Farms had, on average, a total of 34.3 ha and were located, on average, from a 15 minutes car ride from the nearest market.

Legal reserve and intention to trade NTFPs

Only 3% of respondents were not aware of the farm area that they must set as Legal Reserve and 6% did not know that the Legal Reserve allows the sustainable commercial use of natural resources (N=362). A small percentage of the respondents already traded some type of NTFPs existent in their propriety (16%; N=362).

A total of 293 respondents knew their Legal Reserve area but do not trade NTFP from these areas. From these, 67.9% (n=293) showed a negative intention to trade NTFPs from their Legal Reserve in the future, i.e. do not intend or probably do not intend to trade. While 21.8% showed a positive intention and 10.2% did not know (Figure 1).

The most cited reason for intending to trade NTFPs was to obtain an extra income (58,.5%), followed by doing a traditional household activity (28.7%). Only a few smallholders answered that it would represent their main income (5.3%) or that they would do it for nature conservation purposes (7.4%) (Figure 2).

The most cited reason for not intending to trade NTFPs was the lack of knowledge about the process to obtain permission to use the Legal Reserve area (66.1%), followed by the belief that it would not be an economically valuable activity (13.4%). About 9% of the respondents stated that there would not be a market for the NTFPs (9.4%) or that do not have enough knowledge about NTFPs to explore it (9.1%).

The reported intention to trade NTFPs from the Legal Reserve area was negatively correlated to the household total income (Table 2). Thus, smallholders from households with higher incomes are less likely to show a positive answer towards the intention to trade NTFPs from their Legal Reserves in the future.

Thus, contradicting the study initial hypothesis, more than half of smallholders who know their Legal Reserve area showed a negative intention towards trading NTFPs. The lack of knowledge about how to proceed to obtain the government permission for sustainable use if their Legal Reserve area was the main reason given by them to justify the disinterest in the activity. Further, higher incomes were associated with the lowest interest in such activity.

Table 2. Outcomes from the ordered logit regression of the association between intention to trade NTFP and explanatory variables

Variable	Intention to trade
Income	-0.793 (1.65)**
Farm area	-0.007 (0.023)
Travel time	-0.352 (0.231)
Gender	0.165 (0.175)
Age	0.004 (0.010)
Education	0.020 (0.034)

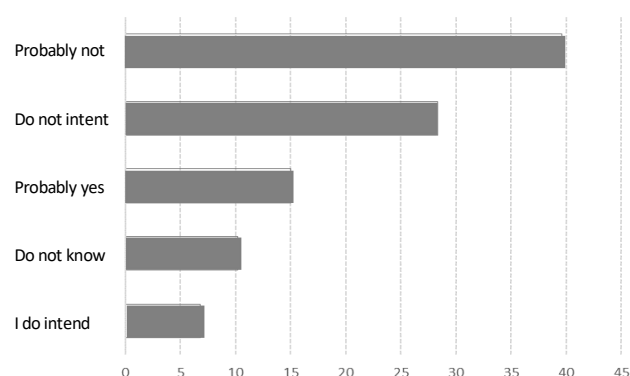Notes: a: Robust standard errors; * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Figure 1. Smallholders' intention to trade NTFPs from their Legal Reserve areas (n=293)

Table 1. Descriptive statistics of the variables included in the model

Variables	Definition/values	N	Central tendency	SD
Dependent				
Intention to trade	Ordinal scale from 1= do not intend to 5= intend	362	Me[a]=2.32	1.53
Explanatory				
Income	Household total income in minimum wage (from 1 to 10)	362	Me=4.32	3.87
Farm area	Farm total area (x 10 ha)	362	Me=3.43	1.02
Travel time	Travel time to the next market (min)	362	Me=15.58	4.67
Control				
Gender	Man=1; Woman=0 of the farm owner	362	Mo[b]=1 (75%)	[c]n.a
Age	Age in years of the farm owner	362	Me=48.73	13.2
Education	Number of years of formal education of the farm owner	362	Me=8.8	5.7

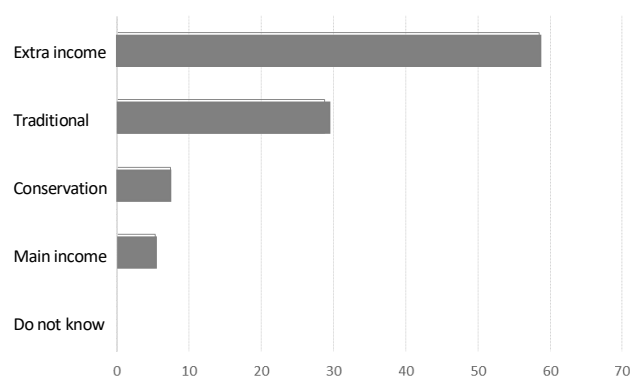Notes: [a] Me: mean; [b] Mo: mode and percentage in parentheses; [c]n.a: not applicable

Figure 2. Reasons given by smallholders to trade NTFPs from their Legal Reserve areas (n=94)
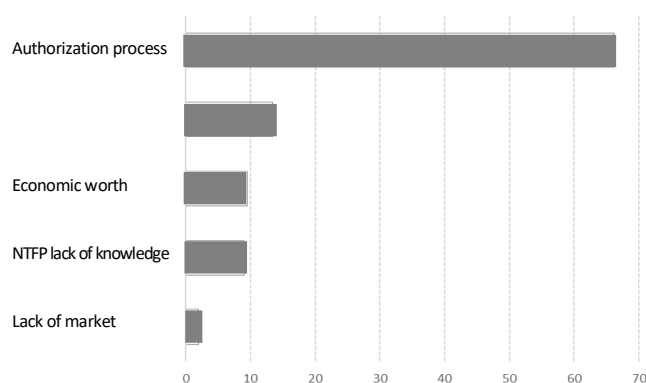

Figure 3. Reasons gave by smallholders to do not trade NTFPs from their Legal Reserve areas (n=199)

Although trading NTFPs is a strategy recognized by its potential to value standing forests (Shanley et al. 2015), it seems that it does not fit in the study context. One of the main claims of farmers during the process of the new Forest Code revision was that the previous law did not allow the country economic growth since the land use was very restricted (Brancalion et al. 2016). Thus, strategies to increase the protected land capacity of generating income would be expected to be welcomed by landholders. The fact that NTFPs income represents, in general, a small number of households' total gains and is a strategy used mainly by traditional communities or in places of high levels of poverty (Kusters 2006, Rizek and Morsello 2012), could explain the low interest observed. The decrease in interest according to the income increase, also seems to corroborate with this explanation.

In this case, strategies to add value to NTFPs could lead to an increase in farmers' intention to engage in its trade. Policies promoting incentives or financial support for the trade (Tewari, 1998), increasing the NTFP value trading processed products rather than in raw materials (Prasad et al. 1999) and promoting green market initiatives (Shanley and Laird 2006), could help in this sense. In addition, strategies to familiarize smallholders with the process of obtaining government permission allowing the economic

use of the Legal Reserve could also improve their intention to trade NTFP. Promoting on the ground activities to explain these procedures, or hiring firms to help smallholders in this process, in a similar way to what was done for CAR registration, could improve farmers' willingness to trade NTFPs and consequently, improve their protected vegetation economic value.

Future studies could focus on which one, or which set, of incentives would work better to improve farmers' intention to trade NTFP from their Legal Reserve area. Once the most promising strategies are accessed public and private policies could be designed to incentive such trade increasing the new Forest Code capacity of adding value to protected vegetation.

In conclusion, since the Brazilian new Forest Code allows the sustainable economic use of Legal Reserves, the trade of NTFPs from these areas of protected vegetation could represent an opportunity for linking nature conservation and economic gains. However, outcomes from this study showed that smallholders do not intend to do so. Thus, incentives from public and private policies are needed to engage farmers in NTFPs trade. Further, to better explain the steps needed to obtain permission to trade and to facilitate the process to do it could also increase the probability of engagement. Once these barriers are overcome, the trade of NTFPs can be a strategy to enhance the new Forest Code potential of valuing the native vegetation remnants.

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