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Do command and control instruments for nature conservation on private property always fail?

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Abstract: Command and control instruments for the conservation of nature on private property are widely considered to be costly and inefficient at achieving significant conservation. In the city of Bonito (MS), an initiative called "Projeto Formoso Vivo", aimed at the protection of native vegetation, sought to promote rural techniques that significantly aid the protection and restoration of Permanent Preservation Areas and Legal Reserves in Brazil. The aim of this article is to analyze the reach of this project from landholders' perspective, focusing on the adequacy of rural properties to the current legal-environmental regime for native vegetation protection. Qualitative analysis was conducted through a series of interviews to gauge respondent's perceptions of the "Projeto Formoso Vivo" initiative. Results show that all respondents recognized the importance of the project and consider it possible to reconcile the economic value of private properties with the requirements of areas destined for conservation.

Keywords: Environmental policy; forest legislation; conservation on private land; Brazil; Forest Code.

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Introduction

Protected Areas are fundamental for biodiversity conservation, water supplies and energy production, food security, human health and well-being, and climate change mitigation (COSTANZA et al., 1997; MEA, 2005; METZGER et al., 2019; SNILSVEIT et al., 2018). To achieve internationally determined conservation goals, it is necessary to use additional measures to promote conservation on private property in addition to public protected areas (BINGHAM et al., 2017; KAMAL; GRODZIŃSKA-JURCZAK; BROWN, 2015; MITCHELL et al., 2018; STOLTON et al., 2014; SWIFT et al., 2004). These instruments can be mandatory (i.e., command and control), voluntary (i.e., with or without economic incentive), or educational/informative (aimed at modifying the agent's attitudes that cause environmental degradation through the increase in knowledge about the benefits of conservation). It is common for a combination of these instruments to be adopted in different situations, according to each specific reality (BARTON et al., 2014; DOREMUS, 2003; KOSTYACK et al., 2011; VAN GOSSUM; ARTS; VERHEYEN, 2012; YOUNG; BAKKER, 2015a).

In Brazil, the Federal Law no. 12.651/2012 (i.e., Native Vegetation Protection Act[1] - LPVN), establishes two important command and control instruments[2] (C&C) designed to promote the conservation of natural areas on private properties: Areas of Permanent Protection (APP) and the Legal Reserves (RL) (BRASIL, 2012). The APP is defined as follows:

> "Protected area, whether or not covered by native vegetation, with the environmental function of preserving water resources, landscape, geological stability and biodiversity, facilitating the gene flow of fauna and flora, protecting the soil and ensuring the welfare of human populations" (from Art. 3º, item II) (BRASIL, 2012).

The APP encompasses strips of land along river banks, springs, around lakes and reservoirs, steep areas with a slope > 45°, hill tops, and high altitude areas. Within APPs, human interventions that contribute to the suppression of vegetation or hinder its restoration are prohibited. The RL, in turn, is defined as:

> "Area located inside a rural property or possession (...) with the function of ensuring the sustainable economic use of the natural resources of the rural land, assisting the conservation and rehabilitation of ecological processes, and promoting the conservation of biodiversity, as well as the shelter and protection of native wild fauna and flora"

1 - The Native Vegetation Protection Act is popularly known as the New Forest Code, as it replaced Federal Law nº 4.771/1965, which was called the Forest Code.

2 - "Control instruments, or command-control, are defined as those that determine norms, rules, procedures, and standards for economic activities that ensure the fulfilment of a particular policy; for example, to reduce air or water pollution. Some authors call them instruments of direct control, based on prescriptions of administrative nature and police enforcement, whose noncompliance carries the imposition of criminal and administrative sanctions" (NUSDEO, 2006, p. 364).

(from Art. 3º, item III) (BRASIL, 2012).

The RL corresponds to a percentage of private property, which could be 20%, 35%, or 80%, depending on the biome within which the property exists. Unlike in the APP, human interventions, either with or without commercial purpose, is allowed within the RLs, provided the intervention is done through sustainable management practices (i.e., activities that do not compromise the protection of native species and ecological processes) (BRASIL, 2012). Agroforestry systems are an example of such practices, especially when composed of "richness and abundance of native species and its population dynamics over time"(MARTINS; RANIERI, 2014).

The LPVN has strategic importance for Brazil, protecting several ecosystem services[3] such as pollination, water conservation, climate regulation, pest, and disease regulation (METZGER et al., 2019). This rule was the result of a debate among several sectors of society based on the fact that the Forest Code of 1965 was being systematically disregarded, which predicted the figures of the APP and RL (BACHA, 2005; SPAROVEK et al., 2012). A survey conducted in 2017 pointed out that even with the restoration exoneration of large areas that were in irregular situations before the approval of the LPVN (about 41 million hectares), there was a national deficit of approximately 19 million ha of APP and RL in 1,9 million rural properties of which 11 million ha were RL and 8 million were APP (GUIDOTTI et al., 2017).

Command and control instruments, although quite common in the field of environmental policies (KONCHAK; PASCUAL, 2006), receive criticism for their ineffectiveness to promote nature conservation on private lands (COOKE et al., 2012; DOREMUS, 2003; SHOGREN; PARKHURST; SETTLE, 2003; SWIFT et al., 2004). Some authors (e.g. ENGEL; PAGIOLA; WUNDER, 2008; FERRARO; KISS, 2002, among others) argue that economic instruments (EI) designed to stimulate the adoption of specific behaviors by rural landholders are more efficient for this purpose. These instruments are voluntary and based on different methods of valuing ecosystem services; they have gained prominence in recent decades (PATTANAYAK; WUNDER; FERRARO, 2010; PIRARD, 2012; WUNDER et al., 2020; YOUNG; BAKKER, 2015b).

Payments for Environmental Services (PES) are an example of EI, and have been the subject of many studies in the world (BÖSCH; ELSASSER; WUNDER, 2019; GÓMEZ-BAGGETHUN et al., 2010); PES have become a trend in Brazil to address different environmental problems (ZANELLA; SCHLEYER; SPEELMAN, 2014). These payments include incentives for rural landholders to avoid deforestation or other forms of damage to native vegetation, and/or promote the restoration (i.e., revegetation) of areas for the purpose of protecting water resources, carbon sequestration, or to increase the availability of other ecosystem services.

There are still many questions regarding the determinant role of PES in the result of the increase or maintenance of forest cover (GONZAGA, 2016; MARTÍNEZ-ALIER, 2007; PFAFF; ROBALINO; ARTURO SANCHEZ-AZOFEIFA, 2007; YANG et al.,

3 - Ecosystem services are direct or indirect contributions from nature to human well-being (TEEB, 2010).

2013). Gonzaga (2016) compared the land-use change in three areas of Brazil (two with PES schemes and one with actions based on C&C) and observed that in the cases of PES there was little significant increase in forest coverage, while deforestation was prevented using command and control. Gonzaga (2016) found that further studies are necessary to isolate the effects of PES, since cases that studied payments to the landholders were also applied to mandatory conservation areas (i.e., APPs). This conclusion corroborates with the findings of Wunder et al. (2020) who argue that there are multiple analytical challenges that impact different intervention techniques where multiple instruments are used.

The case studied by Gonzaga (2016) was called "Projeto Formoso Vivo" (PFV), and is based on C&C alongside the complementary use of other instruments such as training, environmental education, and technical assistance. It was conducted in the municipality of Bonito, in Mato Grosso do Sul (MS), the PFV aimed to regularize the APP and RL to suit private properties adjacent to the Formoso river, and is considered a reference in the regularization of rural properties according to legislation that provides protection to native vegetation in Brazil (LOUBET, 2012; MPMS, 2020). Although the literature on this field is limited, this project is a notable case in the enforcement of conservation on private lands. Thus, the objective of this study is to analyze the scope of PFV regarding the adequacy of rural properties to the existing legal and environmental regimes that protect native vegetation from a landholder's perspective.

"Projeto Formoso Vivo"

Legal Context

After the Formoso Vivo Project was launched, the Federal Law no. 4,771 of 1965 (Forest Code) was in force. In 2012, this was replaced by the LPVN. To comply with the provisions of the Forest Code, rural landholders of the municipality of Bonito must include 20% of the total area of the property as RL and obey the rules regarding the AAPs.

In addition to the provisions of the federal rule, state and municipal laws must also be observed by the landholders. State Law no. 1,871 of 1998 defined a special protection area on the shores of the rivers Prata, Formoso, and their tributaries (MATO GROSSO DO SUL, 1998). Within this protection area, a 150 m wide margin prohibited "activities of agriculture, timber extraction, industry of any type and size, mineral extraction of any substance, creation of small animals" (Art. 2º). In addition, State Law no. 2,223 of 2001 defined what the "Scenic Rivers" are, and determined the responsibility of the landholders and tenants of rural and urban properties in their eventual pollution, and established limitations to certain economic activities in rivers so defined (MATO GROSSO DO SUL, 2001).

In a municipal context, the Organic Law of the Municipality of Bonito, in Article no. 179, defines that an APP must observe a minimum width of 50 m in rural areas and 30 m in urban areas of that municipality (BONITO, 1990). In turn, Municipal Law no. 989 of 2003 transformed the rivers basins of the Formoso, Prata, and Peixe into scenic

rivers within the limits of the municipality (BONITO, 2003), thus defining the application of environmental protection under State Law no. 2,223 of 2001, as mentioned above.

Formoso Vivo Project Description

The *Formoso Vivo* project was an initiative of the Office of State Prosecutor (MP) in partnership with an NGO called Neotrópica Brazil Foundation (FNB), proposing the adequacy of private properties adjacent to the Formoso river, located in Bonito/MS (see Figure 1). This is based on a legislation dealing with the protection of native vegetation, and to avoid or reverse the degradation caused by the inappropriate use of such areas. Using the legislative base of the federal, state, and municipal spheres, this project helped landholders comply with their obligations to the APP and RL schemes, coupled with financial and technical subsidies that originated from public and private sources.

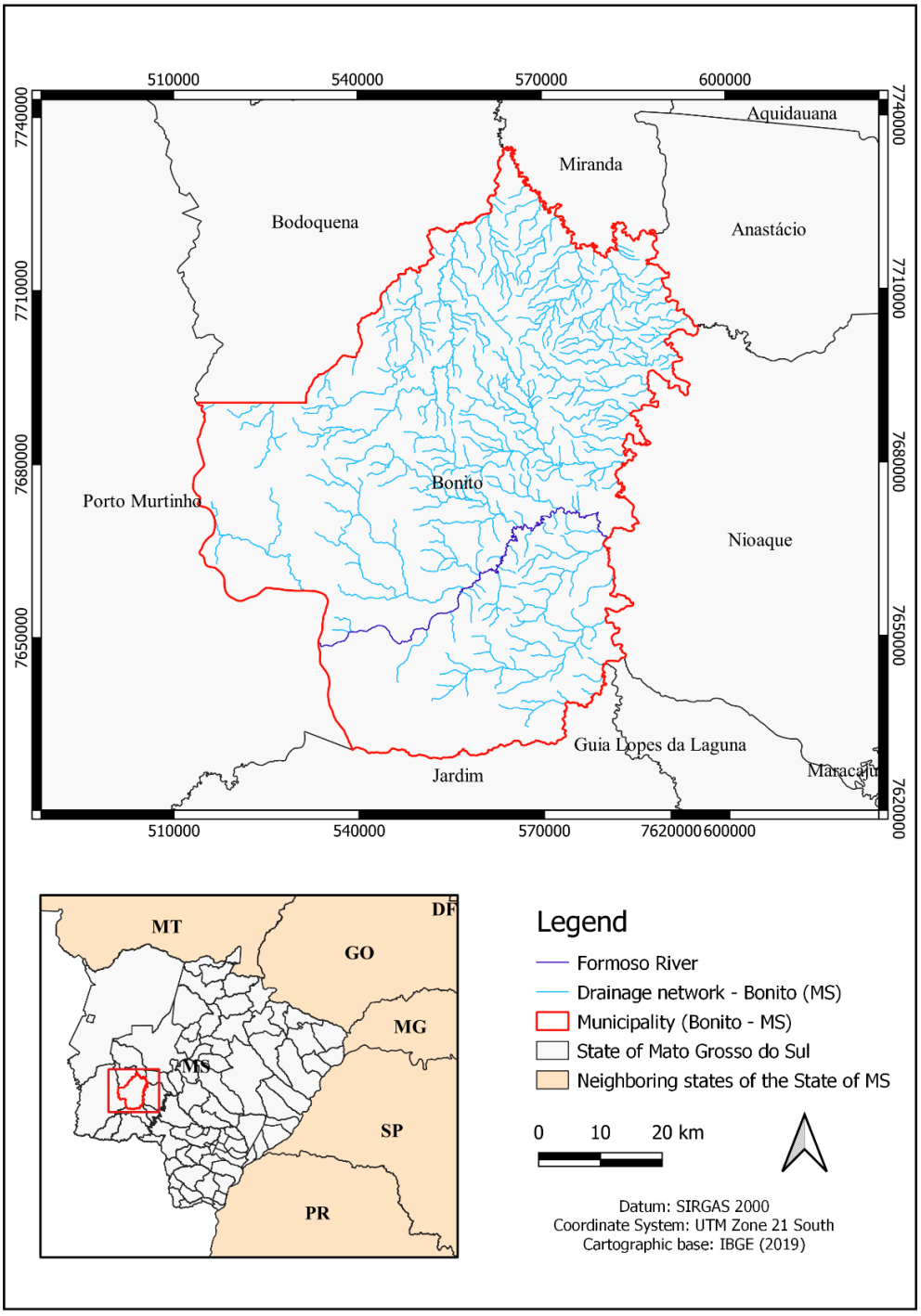
The project was carried out in three stages: 1) environmental diagnosis of the properties located on the banks of the Rio Formoso and its affluents, 2) the development of alternatives for the restoration of areas of disagreement with legislation and incentive/guidance for the creation of Private Reserves of Natural Patrimony (RPPN) [4], and 3) signing the Terms of Conduct Adjustment (TAC).

In the first stage, the participation of FNB's technicians facilitate the assessment of the environmental liabilities of properties that participated in the project (LOUBET, 2012). Supported by aerial photos and satellite images (using Landsat 5), the technicians visited various properties to generate reports for each one. The analyzed area of the properties was within the 150 m range and was located on the banks of the Formoso river (LOUBET; PAULINO, 2007).

In the second stage of the project, environmental reports indicate the actions necessary to adapt properties to APP and RL regulations. This step fell to the FNB with the help of the technicians from the city's Department of the Environment and IBAMA (Brazilian Institute of Environment and Renewable Natural Resources).

4 - RPPN é uma categoria de Unidade de Conservação definida pela Lei Federal nº 9.985 de 2000. É uma "área privada, gravada com perpetuidade, com o objetivo de conservar a diversidade biológica" (Art. 21).

Figure 1 – Geographical location of the municipality of Bonito and the river Formoso.



Source: own elaboration.

The third stage consisted of meetings with the FNB's technicians and the Prosecutor's Office of Bonito, with each of the rural landholders signing the TAC. The TAC is the instrument using which landholders commit themselves to carrying out conservation actions that are necessary for adequate functioning. The TAC negotiations were based on the reports produced in the aforementioned stages. During these negotiations, the landholder could agree to execute the proposed actions and agree to the conditions set out in those documents (such as the indication of the area to be allocated as the RL in the property and the restoration actions needed in those areas and in the APP), or choose to promote the suitability of the property without observing the provisions of the report (by allocating another area of his choice to RL and adopting other approach for restoration)[5]. The acceptance of the actions and conditions indicated in the report gave the landholders benefits of technical support (including aid in the demarcation of the area) and cost exemptions for the RL registration process[6]. In addition to seeking to avoiding conflict with the economic activities related to property, the recommendations defined by the technicians considered the situation of each property separately as well as the context in which it was inserted and formed ecological corridors and/or increased the Serra da Bodoquena National Park preservation range, among other adjacent Protected Areas. During the third stage, FNB and MP technicians guided the owners in the restoration of the areas and followed the actions agreed on the TAC for two years.

The PFV first covered 75 rural properties in the Formoso river trough, covering a total of 1031.38 ha of the APP and RL to recovery. The project further expanded to 47 properties along the Formosinho river and its affluents reaching a total of 122 properties. According to Loubet (2012), approximately R$ 926,000 was invested in the project for 9 years (2003-2012). The funds came from the conversion of environmental compensation (R$ 300,000.00), public funding (from the municipality and the Union, through the National Environment Fund), and private funding sponsored by the O Boticário Foundation and donations from rural landholders.

Methodology

To achieve the aims of this study, a descriptive, qualitative approach was adopted (SEVERINO, 2014), wherein primary data was obtained through questionnaires presented to interviewees in person. The interviewees were the rural landholders or, depending on the possibility of contact with them, the managers of the properties located on the banks of the Formoso river who were the target of the PFV. The interviews, conducted on the properties themselves, were conducted using a script composed of 16 closed questions with direct answers, although interviewee were encouraged to speak freely (justification for the closed answer was requested), as well as an open question (for final considerations). Open responses were recorded and later transcribed and analyzed based on content analysis (BARDIN, 2011).

5 - Angela Pellin (2020), oral communication.

6 - According to the law in force at the time, in any case the RL should be endorsed in the registration of the property in the notary.

Of the 75 rural properties in the first phase of the PFV, 40 landholders or managers of the property were interviewed. Another 19 were contacted, but there was no success in scheduling the interview, and 16 landholders could not be contacted. To meet the aims of this study, we analyzed the responses of 23 out of the 40 interviewees who met the requirement of having performed the APP and/or RL restoration actions established through the TAC; these sample corresponds to 36% of the properties and 34.6% of the total area covered by the project. The interviews took place between July 2014 and July 2015, slightly more than 11 years after the start of the project.

For analysis purposes, the properties were divided into 3 groups based on the fiscal module (MF) of the municipality of Bonito (1 MF = 60 ha): small (up to 4 MF), medium (4 a 15 MF), and large properties (above 15 MF)[7]. Of the 23 properties that were part of the analysis, 14 were small (11 of them with up to 1 MF), 4 were medium, and 5 were large. The definition of MF was based on law no. 8.629 (BRASIL, 1993), and the municipality's fiscal module was based on the "Basic Index Table of 2013" (INCRA, 2013).

Questionnaire Results

Closed questions answers

Table 1 shows the economic activities developed in the properties that were the object of the analysis. Of the total 23 properties involved, 13 were used for livestock (cattle), 10 for tourism (9 small properties and only one large), 5 for tenancy, and 4 for non-economic activities (family leisure). The analyzed properties were not used for agricultural and sheep farming activity, which were also carried out in the study area.

Table 1 - Number of properties analyzed by Formoso Vivo Project according to type of economic activity and size class.

Economic activity	Number of properties			
	Small (< 4MF)	Medium (4 a 15 MF)	Larges (> 5 MF)	Total
Only livestock	1	3	2	6
Only tourism	6	-	-	6
Only tenancy	1	-	-	1
Livestock and tourism	2	-	-	2
Livestock and tenancy	-	-	2	2
Livestock, tourism, and tenancy	1	-	1	2
Livestock and leisure	-	1	-	1
Non-economic activities	3	-	-	3
Total	14	4	5	23

Source: own elaboration.

Chart 1 presents the questions in the questionnaire and the answers that were obtained for the closed questions. Among the 23 properties analyzed, 4 were not profitable before the regularization of the APP and RL, 3 of which were dedicated exclusively to

7 - Federal Law nº 8.629/1993 define the size of the properties based on their tax modules.

the leisure of landholders and their families (see question II).

Chart 1 – Questions and answers from the 23 rural owners involved in the Formoso Vivo Project.

		Property Size	Small (14)		Medium (4)		Large (5)		Total (23)	
		Answers	Yes	No	Yes	No	Yes	No	Yes	No
Questions	I	Was it necessary to take any action to regularize the APP and RL?	14	0	4	0	5	0	23	0
	II	Was your property profitable before the regularization?	10	4	4	0	5	0	19	4
	III	Did you have any difficulty regularizing the APP?	4	10	1	3	3	2	8	15
	IV	Did you have any difficulty regularizing the RL?	9	5	1	3	2	3	12	11
	V	Did you have financial costs for the regularization of the APP?	9	5	4	0	5	0	18	5
	VI	Did you have financial costs for the regularization of the RL?	13	1	4	0	5	0	22	1
	VII	Did you have to change economic activity on the property to promote the regularization of the APP?	1	13	0	4	0	5	1	22
	VIII	Did you have to change economic activity on the property to promote the regularization of the RL?	2	12	0	4	0	5	2	21
	IX	Have you started to promote some economic activity in the APP?	2	12	0	4	0	5	2	21
	X	Have you started to promote some economic activity in the RL?	2	12	0	4	0	5	2	21
	XI	Did your property remain profitable after the settlement of APP?[1]	10	1	4	0	5	0	20	0
	XII	Did your property remain profitable after the settlement of RL?[1]	10	1	4	0	5	0	20	0
	XIII	Has the costs of the regularization of the APP and RL been or is it possible to be absorbed from the income of the property?[1]	10	1	4	0	5	0	19	1
	XIV	Do you believe it is possible to combine economic production with APP and RL?	14	0	4	0	5	0	23	0
	XV	Would the existence of any kind of incentive help in the regularization process?	14	0	4	0	5	0	23	0
	XVI	In general, is the initiative for the environmental regularization of properties important for the region?	14	0	4	0	5	0	23	0
	XVII	Generally speaking, do you have any other information you'd like to comment on, criticism, suggestions?	**Open question**							

[1] 3 properties that are for family leisure were not considered.

Source: own elaboration.

During the regularization process, 8 (i.e., 35%) of the respondents considered that they had difficulties in regularizing the APP and 15 (i.e., 65%) stated that they had no difficulties with them (see question III). Among those who declared difficulties in APP regularization, 2 were in the real estate group with up to 1 MF and both reported the maintenance of the plantation as the main problem found to promote regularization. The other 6 respondents who reported difficulties in regularization pointed out the following: fence cost (5 responses), manpower (3 responses), seedlings acquisition (1 response) and

seedlings planting (1 response). Regarding the RL (see question IV), 12 (i.e., 52%) of the respondents considered that they had difficulty in the regularization process of these areas, 9 being small properties.

When asked if there was a cost to regularize the APP and RL (see questions V and VI), the majority answered affirmatively to both questions, with 18 (i.e., 81%) being in relation to the APP and 22 (i.e., 96%) in relation to the RL. When we observed the responses grouped according to the size of the property, all those who answered negatively (i.e., who had no additional expenses to regularize the APP and RL) were small properties with less than 1 MF (6 negative responses among the 11 properties with up to 1 MF). Moreover, among all small properties (up to 4 MF), 6 (i.e., 43%) had additional costs for the regularization of the APP and 13 (i.e., 93%) had additional costs for the RL.

When we observed the economic activities, only 3 properties (all with up to 1 MF) reported changes after regularization (see questions VII, VIII, IX and X)— one promoted activity in the RL (without specifying the activity), one developed tourist activity both in the APP and in the RL, and one changed their economic activity from livestock to tourism in the form of tenancy, after considering tourist activity developed in the APP. The third respondent stated that he had abandoned the livestock industry because the RL regularizations made it impossible while tourism provided an increase in his income.

Disregarding the three properties used for leisure (which do not aim to generate income), all the others remained profitable after the regularization of the APP and the RL (see questions XI and XII). Only one interviewee stated that they could not absorb regularization costs through economic activities on the property (see question XIII).

All interviewees stated that it was possible to reconcile economic production with the conservation of the APP and RL (see question XIV), and considered the initiative to regularize the project important for the region (see question XVI). In addition, it was unanimous among the interviewees that the presence of incentives in the regularization process is relevant (see question XV).

Interviewee's view of the project: open questions and comments

The comments made by interviewees in their answers to the closed questions as well as the answers given to the final open question (i.e., "In general, do you have any more information you would like to comment on, criticism, suggestions?", Question XVII, Chart 1) have been subject to content analysis. This analysis sought to identify the outlook of the interviewees in relation to native vegetation conservation instruments applied to private properties. Analysis was performed considering the views of the respondents in relation to actions based on C&C (in this case, the APP and RL), EI, and education/ information instruments (IEI).

The EI appear in responses of 15 of the 23 interviewees, who consider these incentives as good practices. The following policies were cited: "fiscal incentives" (e.g., reduction of Rural Territorial Tax - ITR), "facilitated financing lines", "compensation/ financial contribution", "financial incentives", "government aid" among other terms. Only

1 respondent explicitly stated that monetary compensation is not a good measure, but considered tax exemption or reduction a viable option, as noted in this excerpt:

> money is something that you cannot give to Brazilians. It would be to give a technical [aid]. But in Brazil it is difficult because if they give the technician then people do not value, they do not care. Because they give value for what they pay. If it hurts in the pocket. Maybe if it was free or at a small cost and with the prosecution office doing the same he does, with TAC, inspecting, but with some technical help to regularize it and provide support. (...) (Interviewee 14)

Among EI, aid strategies based on "raw materials" were cited as important, being exemplified as an aid of public or private origin, or to regularize areas (e.g., fence, fertilization, manpower, planting, machinery). Sometimes this subcategory was mentioned accompanied by the citation of measures of "technical advice" and "guidance" (herein classified as IEI). The following response of one of the interviewees exemplifies this view: "It lacks a little incentive. The city does not have to do it, but it must encourage the guy to do it, providing machinery, fertilization, guidance. But none of that is done." (Interviewee 19).

Explicit support for C&C appeared less frequently in interviewee responses. While 1 respondent explicitly defended the importance of conservation on properties under the LPVN, as well as the responsibility of the landholders to ensure their compliance, 4 of them said it required a strict enforcement of the law to ensure their fulfilment. On the other hand, problems related to the bureaucracy of the regularization process, difficult understanding of the law, and poor communication between the municipality, state and, federal government were some of the additional problems pointed out by the interviewees.

As for the IEI, they were cited by more than half of the interviewees, "technical advice" and "guidance" were mentioned as good measures to help the regularization (according to 9 interviewees). Although we consider "technical advice" and "guidance" as IEI, respondents sometimes mention this type of support as a necessity to comply with the legal norm. In other words: it is not possible to determine from some answers if greater support by means of technical guidance (IEI) would be enough for ensure greater protection (regardless of the obligatory imposition by C&C). Take as an example the following answer given by an interviewee:

> Perhaps a technical advisor who was already inside the Formoso Project. (...) I guess I could have a counselor guiding the landlord to direct solve the problem. A person not well informed would have difficulty. The paperwork that comes from IMASUL [state environmental office] is very difficult. (...) (Interviewee 1)

In addition to instructions related to the technical issues of the regularization process, there were respondents who defended the need to raise awareness about environmental protection, which would help achieve cooperation of landholders for actions of this nature. The following section exemplifies this vision:

> This awareness of the rural landholder is what should be more required. It is no use only create fine mechanism and inspect the rural landholder. The laws that come out are in the sense that if you don't have the environmental part, you get nothing. Always the law is to threaten the landholder and the awareness of preservation is what should be demanded. A team will arrive and explain what needs to be done because of this and that and if you don't make a deadline I'll come back and fine you... Explain that what is being demanded is for the benefit of him and his property. So, it would be much more reasonable than to arrive and penalize with imposition of some economic curtailment on his property. (Interviewee 1)

Among those who highlighted the favorable aspects of the IEI, 2 landholders criticized punitive command measures (i.e., fines), but only when these precede the orientation and awareness of the owners. According to them, the fine should be the last step among "guidance, supervision, and fines", as shown in the following excerpt from one of the interviews: "Guidance and charging by the government because only guide does not help. A project that made guidance, supervision, and punishment. In this order." (Interviewee 21).

It is interesting to note that 7 interviewees evaluated that the public prosecutor's presence was important for the success of the project, as exemplified in this answer:

> Here because we had the Formoso Project there was a greater concern in complying the TAC with the prosecutor. And the properties had to comply, and it was a solution for the Formoso River. I wanted all the properties of the country to have a project like this. (Interviewee 1)

In addition, 7 respondents commented on the relevance of natural protection, with different arguments, such as its importance for future generations, for water quality, soil maintenance, and tourism.

Discussion

Understanding the vision of rural landowners is key to formulating natural protection policies, as these are key actors for their success (PACHECO; SOARES-FILHO; HOFF, 2017). For the PFV, the results of the study demonstrate that landholders and managers of rural real estate considered the initiative of protection and rehabilitation of the areas as important, even though a section of them found difficulties while regularizing both the APP and the RL, with greater emphasis on the latter. The financial cost that rests on the landholder to carry out the mandatory actions of restoration and conservation is frequently pointed out in studies as the unfeasibility factor of command-and-control approaches (CAMPOS; BACHA, 2013; FASIABEN et al., 2011; GONÇALVES; CASTANHO-FILHO, 2006; IGARI; TAMBOSI; PIVELLO, 2009; SENADO FEDERAL, 2011; STICKLER et al., 2013). In the case of the sample analyzed here, i.e., rural properties covered by the PFV, it was possible to observe that the gains obtained from these activities

were sufficient to cover the costs for regularization in 19 of the 20 properties with economic activities. It is to be noted that landholders were not asked what proportion of such costs were reduced by the incentives offered by PFV. Another important piece of information obtained from the questionnaire was that, all properties remained profitable after the regularization of the APP and RL, according to the interviewees

In addition to these expenses, the main difficulties pointed out by landholders to promote regularization were the bureaucracy involved in the process, the difficulty of understanding the legal regulations, and the communication failures between the federative entities (i.e., municipality, state, and federal government). This finding of the interviewees is a vision shared by the representative bodies of the category (CONSELHO NACIONAL DO AGRO, 2012; SENADO FEDERAL, 2011) and is also pointed out in the literature (PACHECO; SOARES-FILHO; HOFF, 2017).

The success, in terms of reaching the objectives meant that the PFV was used as the basis for a state program that covered more than 30 municipalities and 1,500 km of rivers in the state of Mato Grosso do Sul (LOUBET, 2012; MPMS, 2020). One of the indicators of this success is the fact that in 2007, more than 50 of the 75 properties had signed the TAC (LOUBET; PAULINO, 2007) and in 2012, 116 of the 122 properties (considering the properties of the Formoso and Formosinho rivers and affluents) had signed the TAC (LOUBET, 2012). The reasons that may explain such success should still be studied, but some features of the project have the potential to clarify the positive results achieved.

One of the aforementioned characteristics was the participation of several actors with credibility in an adequate institutional arrangement. Studies indicate the importance of the articulation of actors involved in projects aimed at conservation in private lands (MAY et al., 2012; RISSMAN; SAYRE, 2012). In the case of the Formoso Vivo, it is interesting to observe that the interviewees saw the active presence of the Public Prosecutor's Office represented by the prosecutor as positive. In the closed questions, all respondents considered that property regularization is important for the region and in the open questions, 7 interviewees pointed the prosecutor played a central role in the articulation of the project.

Loubet (2012) argues that one of the main factors that led to the success of the Formoso Vivo project was the non-judicialization of the properties. From another angle, it may be conjectured that non judicialization is an indication that the institutional arrangement was adequate and contributed to the success. Observing the stages of the project, we noticed that certain actors evaluated the properties, pointed out the legal inadequacies, but without applying legal sanctions (commonly in the form of a fine) when the real estate presented irregularities. After the identification of such non-conformities and the proposition of actions for adequacy, regularization was sought through the TAC, thus allowing the treatment on a case-by-case basis according to the specificities of the landholders. This approach strengthened the view of authors who pointed out the need to pay attention to the reality and social context of policy implementation (DOREMUS, 2003; KAMAL; GRODZIŃSKA-JURCZAK; BROWN, 2015; RISSMAN; SAYRE, 2012).

Another feature of the project that can help explain its success was the

environmental awareness actions highlighted by the respondents of this study. Doremus (2003) pointed out that educational actions are crucial in the application of public policies, based on whether they were EI or C&C. Furthermore, PFV carried out specific actions involving technicians of the FNB and the Rural Union to raise awareness and for the guidance of the landholders, thus avoiding only command and control measures, "since, with greater awareness, less effort is needed to solve these problems" (LOUBET, 2012).

Awareness and the use of the Terms of Conduct Adjustment have an important consequence, i.e., the non-punitive character of the project. Interviewees stated that guidance and awareness about the best practices to be adopted for conservation should precede the imposition of a fine for non-compliance. This result reinforces the arguments presented by authors such as Kamal and Grodzi□ska-Jurczak e Brown (2015) which associated the adherence of landholders to conservation projects with their recognition about benefits they would enjoy in promoting protection. By attending meetings to clarify the actions to be adopted via TAC, the landholders had the opportunity to understand the technical background that supported actions necessary for the adequacy of a property.

Conclusions

Upon analyzing project Formoso Vivo, we observed the legal requirement protection of the RL and APP areas and the enforcement of the agreed actions (C&C) as the structural basis of the project. Awareness and guidance meetings with landholders and technical assistance (i.e., education and information tools) and indirect economic incentives in the form of restoration project, georeferencing, machinery, and cost exemption (i.e., economic incentive instruments) were optional to landholders and functioned in a complementary way, thus assisting in the fulfillment of legal obligations. Despite the presence of technical aid and subsidies, most landholders had costs to regularize, but considered that these did not make the rural property economically impracticable. The strategy of adopting a mix of instruments has been presented as an appropriate solution to achieve good levels of environmental conservation (BÖRNER; MARINHO; WUNDER, 2015; MAY et al., 2012). It should be noted that these complementary actions result in higher overall transaction costs.

It is noteworthy that the interviewees agreed on the importance of regularizing the region's properties and protecting the rivers, which is in line with the results of similar studies in other regions of Brazil, such as that by Pacheco, Soares-Filho and Hoff (2017). Responses highlight the importance given by the interviewees to procedures of economic incentive and guidance with technical assistance to regularize the properties, using sanctions only as a last resort.

Results achieved by the project Formoso Vivo presented here are opposed to the fatal impracticability of the command-and-control instruments for the achievement of conservation objectives in private lands, as recurrently pointed out in the literature.

It is important to highlight that the study area is in a region with a strong tourist activity and seems to be far from the main economic vectors; the most expensive

opportunity costs for conservation in the state of Mato Grosso do Sul (i.e., areas for grain cultivation, sugar production and ethanol). Even if these characteristics are not common to the whole national territory, this is not an isolated case. In this sense, the lessons learned from the Formoso Vivo can serve as reference for other initiatives.

Finally, questions that arose during the development of this research and were not explored here may be the subject of future works. These include: (i) Would tourist activity have any effect on the intensity of land use, or would such activity contribute to income generation, thus enabling owners to retain the APP and RL?, and (ii) Is it possible to identify effects of size and type of economic activity on compliance with legal devices, as suggested by Leite et al. (2020)?

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SciELO

Instrumentos de comando e controle para a conservação da natureza em terras privadas sempre fracassam?

Lauro de Camargo Neto
Eleri Muniz Paulino
Victor Eduardo Lima Ranieri

Resumo: Os instrumentos de comando e controle destinados à conservação da natureza em propriedades privadas são considerados por muitos autores ineficientes e custosos para atingir níveis elevados de proteção. No município de Bonito (MS), um exemplo de iniciativa voltada para a proteção e recuperação da vegetação nativa, denominado "Projeto Formoso Vivo", buscou promover a adequação de propriedades rurais trazendo bons resultados na proteção e recuperação das Áreas de Preservação Permanente e Reservas Legais. O objetivo deste artigo é analisar, a partir da percepção dos proprietários, o alcance do Projeto Formoso Vivo no que tange à adequação dos imóveis rurais ao regime jurídico-ambiental vigente que trata da proteção da vegetação nativa. Foram realizadas entrevistas, possibilitando análise qualitativa descritiva da percepção dos respondentes. A análise mostrou que todos os entrevistados reconhecem a importância do projeto e consideram possível conciliar a produção econômica da propriedade rural com as exigências de áreas destinadas à conservação.

Palavras-chave: Política ambiental; legislação florestal; conservação em terras privadas; Brasil; código florestal.

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AMBIENTE & SOCIEDADE 25 anos 25 años 25 years

SciELO

¿Los instrumentos de comando y control para la conservación de la naturaleza en predios privados siempre fallan?

Lauro de Camargo Neto
Eleri Muniz Paulino
Victor Eduardo Lima Ranieri

Resumen: Los instrumentos de comando y control para la conservación de la naturaleza en propiedades privadas son considerados por muchos autores ineficientes y costosos para lograr altos niveles de protección. En el municipio de Bonito (MS) una iniciativa orientada a la protección y recuperación de la vegetación nativa, el "Projeto Formoso Vivo", buscó promover la adecuación de predios rurales logrando buenos resultados. El objetivo de este artículo es analizar, desde la percepción de los propietarios, el alcance del Projeto Formoso Vivo en cuanto a la adecuación de las propiedades rurales al actual régimen jurídico-ambiental que se ocupa de la protección de la vegetación nativa. Los datos fueron colectados por medio de entrevistas. Las respuestas muestran que todos los encuestados reconocen la importancia de las iniciativas de conservación en terrenos privados y consideran posible conciliar la producción económica de la propiedad rural con los requerimientos de las áreas destinadas a la conservación.

Palabras-clave: Política de medio ambiente; legislación forestal; conservación en tierras privadas; Brasil; código forestal.

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