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# Change in the protection regime of Permanent Preservation Areas in the 2012 Forest Code

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***Abstract:*** The parameter for delimiting Areas of Permanent Preservation (APPs) in the 2012 Forest Code is the edge of the regular stream bed, not its highest level. The objective of this study is to evaluate the loss of protected areas, framed the category of water APPs in the 2012 Forest Code, in the Cabaçal River. By means of spatial technologies, maps of vegetation cover and land use from 2012 and 2018 were prepared. The change in the Forest Code in 2012 caused the loss of 90% of the area previously protected by the 1965 Code, corresponding to the major waterbed of the Cabaçal River, especially in the lower course, located in the Pantanal plain of Mato Grosso. It was concluded that the vegetation cover in the Areas of Permanent Preservation was suppressed so that urban and agricultural uses could be implanted, characterizing them as conflict areas due to the flexibilization of the environmental legislation.

***Keywords:*** Protected area. Environmental legislation. Geotechnologies. Bioma Pantanal. Socio-environmental conflicts.

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**São Paulo. Vol. 26, 2023**

*Original Article*

**DOI:** http://dx.doi.org/10.1590/1809-4422asoc20190211r2vu2023L1OA

## Introduction

The advent of Law no. 12.651/2012 (BRASIL, 2012), known as the New Forest Code, changed the protection regime of Areas of Permanent Preservation Areas (APPs), especially water APPs, which refer to those located on the banks of natural perennial and intermittent water bodies, such as: those occurring along rivers or any watercourse; around ponds, lakes, or natural or artificial water reservoirs; and in springs and perennial water eyes.

The change in environmental legislation, according to Lopes et al. (2017), reflected the agribusiness *lobby* to reduce areas of protection and, in this perspective, introduced rules without scientific basis, indicating that the modifications would be more favorable to conservation. The change in criteria for delimiting water-based APP, from the edge of the regular riverbed, and the rule of recomposition of degraded areas, according to the size of the rural property, was a step backwards for environmental protection (SPAROVEK et al., 2012; METZGER, 2010; MONTEIRO et al., 2017).

The rule created by the 2012 Forest Code for the delimitation of APPs reflexively affected the wetlands, of which the Pantanal of Mato Grosso is the largest in territorial extension, since the calculation of the floodable areas of the watercourse was decisive for the delimitation of the larger riverbed and, consequently, of its APPs. There was a direct impact on these areas, which used to have a legal regime identical to that of APPs, with the imposition of full and permanent preservation of flora, when they were classified under "restricted use" by the current code (IRIGARAY, 2015).

Regarding the recomposition of native forests, the 2012 Code allowed owners of rural property areas occupied prior to July 22, 2008, that contained buildings, improvements or agrosilvopastoral activities to join the Environmental Regularization Program (PRA) through a term of commitment, allowing the adoption of a fallow regime in the latter case. Thus, the administrative penalties for irregular suppression of vegetation in APPs were suspended, and after compliance with the established obligations, the offender cannot be convicted for the practice of these illegalities.

This legislative innovation was challenged before the Federal Supreme Court in the trial of four ADIs (distributed under numbers 4901, 4902, 4903, and 4937), concluded on February 28, 2018, declaring the constitutionality of articles 59 and 60 of the 2012 Forest Code on the grounds that there was an amnesty for environmental damage, which would constitute an affront to the Federal Constitution. However, the Supreme Court recognized the flexibilization of the expedients foreseen in the previous legislation, interpreting it as an incentive to rural landowners for environmental regularization by signing a term that foresees the recomposition under the terms of the Forest Code in effect, of the vegetation and environmental damage caused, which according to Soares-Filho et al. (2014), favored about 90% of Brazilian rural properties.

The possibility of intervention in APPs was changed by the 2012 Forest Code, which maintained untouchability as a rule, adding other forms of exceptional interventions (public utility, social interest, or even activities of lower environmental impact defined), not provided for in the previous Code. As the rules for recomposition, the rules for in-

tervention in APPs were questioned in the Federal Supreme Court (through ADIs Nos. 4901, 4902, 4903 and 4937), which held that intervention for social interest or public utility was conditional on the inexistence of a technical or locational alternative to the proposed activity and excluded the case of works aimed at waste management and linked to the holding of sporting competitions.

Given this scenario, the APPs of the Cabaçal River were selected for analysis because its lower course presents a vast floodplain, which forms the Pantanal of Mato Grosso. At the same time, research points to the intensification of anthropization in the last ten years in the Cabaçal River Watershed (BHRC), resulting from the expansion of land uses, mainly agriculture and cattle ranching that have led to loss of vegetation cover (CARVALHO et al., 2014; LORENZON et al., 2015).

Given the territorial extensions of Brazil, environmental monitoring uses geotechnologies to assess the change in land use and its implications, especially in the suppression of vegetation cover, whose monitoring, through fieldwork, would require much time and cost (SOARES et al., 2011). This situation applies to the BHRC, which totals 5,662.11 $km^2$.

From this perspective, the objective of this study is to evaluate the loss of protected areas, framed in the category of water-based APPs, due to the enactment of the 2012 Forest Code, adopting the Cabaçal River, located in the state of Mato Grosso, as the unit of spatial analysis, considering its contribution to the flood pulse, which is the ecological process that promotes the richness, diversity and fisheries production of the floodplain of the Pantanal biome. In addition, there is no agreement on the ideal size of the marginal strips called APPs so that they can fulfill all their ecosystem functions and the legislation does not foresee the variation of their width according to the biome or the size of the property where the protection strip is located.

## Summary of the evolution of APPs regulation in Brazil

The process of land occupation in Brazil was motivated by economic, political, and social interests, with tax incentives from the government and no compromise with environmental preservation and conservation. This fact can be observed in Amazon and Cerrado areas, especially in the 1950s and 1960s, according to studies by Martins (1989), Nunes et al. (2017) and Silva et al. (2011). In the Pantanal, the flood pulse has imposed restrictions on occupation and cattle ranching expansion. Irigaray (2015) points out that the balance of the Pantanal ecosystem is threatened by anthropic activities, such as the construction of dikes, drainage channels, alcohol and hydroelectric plants, waterways, deforestation, mining, pesticide use, predatory fishing and tourism.

Faced with environmental degradation and the finiteness of natural components, the legislation must protect the areas considered relevant to the ecosystem, limiting their use so that they continue to fulfill their environmental functions. The Federal Government used as a strategy to promote the sustainable use of natural resources the preservation of ecosystems and minimization of the impacts of anthropic activities (OLIVEIRA

et al., 2008).

Thus, under Brazilian law, specially protected areas have been created and regulated by Forest Codes, sparse federal, state and municipal laws, in addition to international treaties and conventions. This need to protect threatened areas and recover degraded ones was expressly foreseen by Law no. 6.938/81, dealing with the National Environmental Policy (BRASIL, 1981), which elected them as principles to be observed for the country's socioeconomic development, for the interests of national security, and for the protection of the dignity of human life.

The National Environmental Policy (PNMA) is considered a milestone in the protection of the environment, by treating it as public property to be protected for the entire community and using the creation of specially protected spaces by the federal, state, and municipal government as an instrument for its implementation. Since then, there has been an expansion of the list of protected areas, including APPs.

The regulation of the APPs was inserted, for the first time, in article 4 of the 1934 Forest Code (BRASIL, 1934), as protective forests; however, without determining their limits. After 30 years, Law no. 4.771 of September 15, 1965 (BRASIL, 1965), known as the 1965 Forest Code, established limitations on private property, considered absolute by the Civil Code of 1916 (BRASIL, 1916), in which water-based APPs were defined as forests and other forms of natural vegetation located along rivers or any other watercourse and innovated by establishing, in art. 2, the minimum limits of the preservation strips.

However, since the creation of the marginal strips called APPs, there is no consensus on the ideal size for them to fulfill all their ecosystem functions and, unlike what happens with the Legal Reserve areas (RL), the law does not foresee a variation in width according to the biome or the size of the property where the protection strip is located. The relationship between the river channel and the vegetation is a topic that has generated much discussion in the scientific community for quite some time, and there is no definition of the minimum strip of vegetation along the river necessary to protect the river environment (KOBIYAMA, 2003).

The 1965 Forest Code (BRASIL, 1965), before it was repealed, provided that the dimensions of the protection strips varied from 30 to 500 meters, according to the width of the watercourse, which was maintained by Article 4 of the 2012 Forest Code (BRASIL, 2012). The widths established by the 1965 Code, however, did not correspond to its original wording, as they had been altered by Law No. 7.511/86 (BRASIL, 1986) and later by Law No. 7.803/89 (BRASIL, 1989), which increased some of the widths of the marginal strips along rivers or any watercourse:

- 100 (one hundred) meters for waterways that measure between 50 (fifty) and 100 (one hundred) meters wide, modified to 100 (one hundred) meters in waterways that are 50 (fifty) to 200 (two hundred) meters wide;

- 150 (one hundred and fifty) meters for waterways that are between 100 (one hundred) and 200 (two hundred) meters wide; equal to the distance between the banks

for waterways with a width greater than 200 (two hundred) meters changed to 200 (two hundred) meters in waterways that are 200 (two hundred) to 600 (six hundred) meters wide; and

- added the strip of 500 (five hundred) meters for waterways that are wider than 600 (six hundred) meters.

According to Lopes et al. (2017), water-based APPs were created, above all, for the preservation of riparian forests that cover and protect the soil, so that they function as a sponge that absorbs rainwater. Studies show that the removal of riparian vegetation for the implementation and/or increase of agriculture and cattle ranching can compromise the quality of surface and underground water, as well as the replacement in aquifers, causing soil loss and degradation of springs (FREITAS et al., 2016). From the ecological and territorial perspective, Borges et al. (2011) add that APPs provide goods and services, such as: regularization of flow, sediment retention, soil conservation, groundwater recharge, climate regulation, maintenance of biodiversity, among others.

Due to the relevance of the functions performed by water-based APPs, Metzger (2010) advocates the need for strips of vegetation with connectivity of minimum limits of at least one hundred (100) meters (fifty meters on each side of the river), regardless of biome, climate, topography, rainfall, or vegetation. In the same vein, Vieira and Becker (2010) warn that the size of the strips provided by the 1965 Forest Code (BRASIL, 1965), in some cases, is insufficient, arguing for the need to expand them.

In contrast, research by Valverde (2010) indicates that in other countries, such as the US, Canada, Finland, and Sweden, the width of these areas does not vary as much as in Brazil and they do not occupy a significant size. This same study pointed out that, unlike in other countries, in Brazil the peculiarities of states are not considered, and the laws cannot be contrary to the minimum established by the federal legislation.

Law No. 7.803, from 1989 (BRASIL, 1989), which amended the 1965 Forest Code (BRASIL, 1965), established the way to measure water-based APPs, starting from their highest level in a marginal strip. The regulation of this change in the 1965 Code occurred in 2002, when the National Environmental Council (CONAMA) issued Resolution No. 302/2002 (BRASIL, 2002) to establish the parameters, definitions and limits of APPs in artificial reservoirs and the use of the surrounding area. Later, Resolution 303/2002 (BRASIL, 2002) defined the highest level of the watercourse as that reached during the seasonal flooding of the perennial or intermittent watercourse, which can vary from year to year in lowland regions.

The definition of the highest level of the watercourse did not eliminate the technical difficulty in demarcating the APPs pointed out in the studies by Bruxel et al. (2006), Medeiros (2013) and Campagnolo et al. (2017), due to another scientific obstacle, which is the definition of seasonal and regular bed. Soares-Filho (2013) exposed that there is insufficient official data on the width of rivers, which makes it difficult to apply the rule provided in the 1965 Forest Code (BRASIL, 1965).

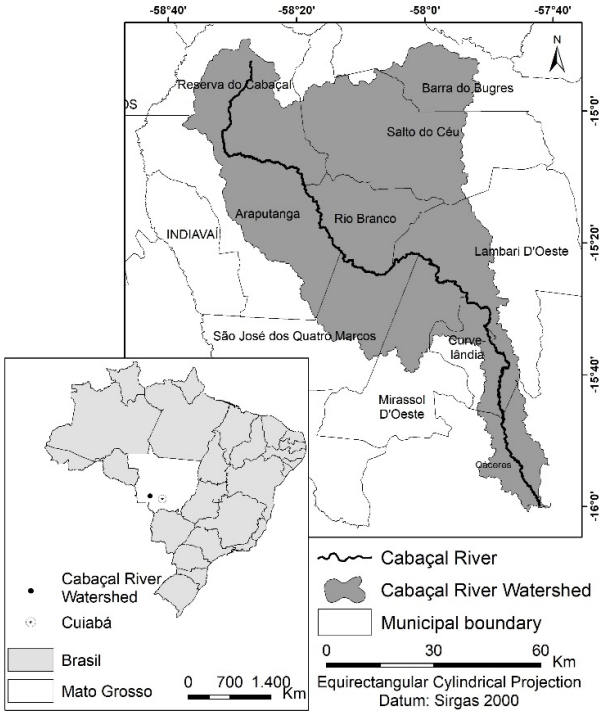
In the 2012 Forest Code, the reference "edge of the regular riverbed" was added as an alternative to simplify the way to demarcate the APPs (SPAROVEK et al., 2011), which are now located within the larger riverbed, normally occupied by the waters during flood periods.

**Material and method**

Site and location of the study area

The Cabaçal River, comprised in the BHRC - a hydrographic unit of the Upper Paraguay Basin (BAP) - constitutes one of the largest tributaries of the Paraguay River in the state of Mato Grosso, with a length of 303.43 km (Figure 1). Its sources are located in the Chapada dos Parecis and its mouth in the Pantanal plain, in Cáceres, MT, and its main tributaries are the rivers Branco, Vermelho and Bugres.

**Figure 1. Cabaçal River in the Brazilian, regional, state and municipal contexts**




Source: the authors (2018).

Municipal occupation in the BHRC began in the 1970s, from private colonization projects, forming towns with basic functioning infrastructure. The population of the municipalities with extension in the BHRC totals approximately 215,202 inhabitants (IBGE, 2019). The economy of the municipalities in the hydrographic unit is based on cattle-

raising, with Cáceres as the pole city, due to the provision of services (AVELINO, 2006).

**Methodological Procedures**

The execution of this research was structured through the following steps: sizing of the APPs according to the parameters defined in the Forest Codes of 1965 (BRASIL, 1965) and 2012 (BRASIL, 2012); elaboration of maps of vegetation cover and land uses of the APPs of the Cabaçal River and analysis of use conflicts in the APPs of the Cabaçal River.

**Dimensioning the APPs of the Cabaçal River**

The APPs of the Cabaçal River were dimensioned from the larger riverbed (according to the 1965 Forestry Code), using the elevations of the Paraguay River, measured at fluviometric station 66070004, in Cáceres, MT, monitored by the Brazilian Navy agency (BRASIL, 2018), due to the inexistence of flood data for the Cabaçal River and considering that it is one of the largest tributaries of the Paraguay River.

The Paraguay River reached its maximum level on March 8, 2012, reaching 4.29 meters, a date before the 2012 Forest Code went into effect, and 30 meters was considered the average width for the course of the Cabaçal River, corresponding to a 50-meter marginal strip of APP. From these parameters, the APPs of the Cabaçal River and its major waterbed were sized in two scenes from the Resoursat 1 satellite, Linear Imaging Self-Scanner - LIS III sensor, of the green spectral bands (0.52-0.59 $\mu$m), red (0.62-0.68 $\mu$m) and near infrared (0.77-0.86 $\mu$m) spectral bands, with 23.5 meters of spatial resolution and 7 bits, from March 2012, obtained from the website of the National Institute for Space Research - INPE.

Next, the APPs were sized from the regular bed of the Cabaçal River, according to the parameter established in the 2012 Forest Code, observing the distance of 50 meters on each side (buffer), using the scenes 21LUC, 21LUD, 21LVC and 21 LVD, of the satellite Sentinel II, MSI sensor, of the blue (490 $\mu$m), green (560 $\mu$m) and near red (665 $\mu$m) bands, with 10 m of spatial resolution and 12 bits, from June 2018, obtained from the website of the National Institute for Space Research (INPE). The vector files (polygons) generated in both processes were integrated, enabling the measurement of the entire area destined for environmental protection.

For comparative analysis of the size of the marginal strips of the Cabaçal River for 2012 and 2018 the river was sectioned into upper, middle and lower reaches and then the size difference of the marginal strips that should be protected was calculated using the formulas proposed by Campagnolo et al. (2017):

To calculate the APPs, by the 1965 Code:

Where: FPP = Permanent Protection Zone;
LMH = Major Waterbed;

APP = Area of Permanent Preservation; and

To calculate the APPs, by the 1965 Code:

Where: FPP = Permanent Protection Zone;
NCF = New Forest Code;
LR = Regular bed;
APP = Area of Permanent Preservation.

The adoption of the methodology of comparative analysis of the dimensions of APPs, proposed by Campagnolo et al. (2017) applied in the investigation of the Cabaçal River (study area), made it possible to evaluate the loss of protected areas from the comparison of the dimensions of water-based APPs, riverbeds, and buffer strips in the sections (course) of the Cabaçal River (upper, middle and low) according to the criteria of the Forest Codes of 1965 and 2012 (BRASIL, 1965; 2012).

**Generation of the mapping of the vegetation cover and of the land uses of APPs**

To map vegetation cover and land use, we used the green (0.52-0.59 $\mu$m), red (0.62-0.68 $\mu$m) and near infrared (0.77-0.86 $\mu$m) of scenes 318/88 and 318/89, generated by the LIS III sensor of the Resoursat 1 satellite, with a spatial resolution of 23.5 meters, available on the site of the National Institute for Space Research - INPE. These images were mosaicked, cropped around the study area (spaces intended for APPs and the Cabaçal Riverbed), segmented and classified, according to the Technical Manual of Vegetation and Land Use (IBGE, 2012), at the scale of 1:25.000, in the SIG SPRING, version 5.5.5, of INPE (CÂMARA, 1996).

In the segmentation step the values of 10 for similarity and 10 for pixel area were adopted. Similarity refers to the minimum value needed for a given pixel to be added to an existing class or for a new class to be created from it, while the pixel area parameter defines the smallest amount of pixel area that will be needed to form a region (VASCONCELOS and NOVO, 2014).

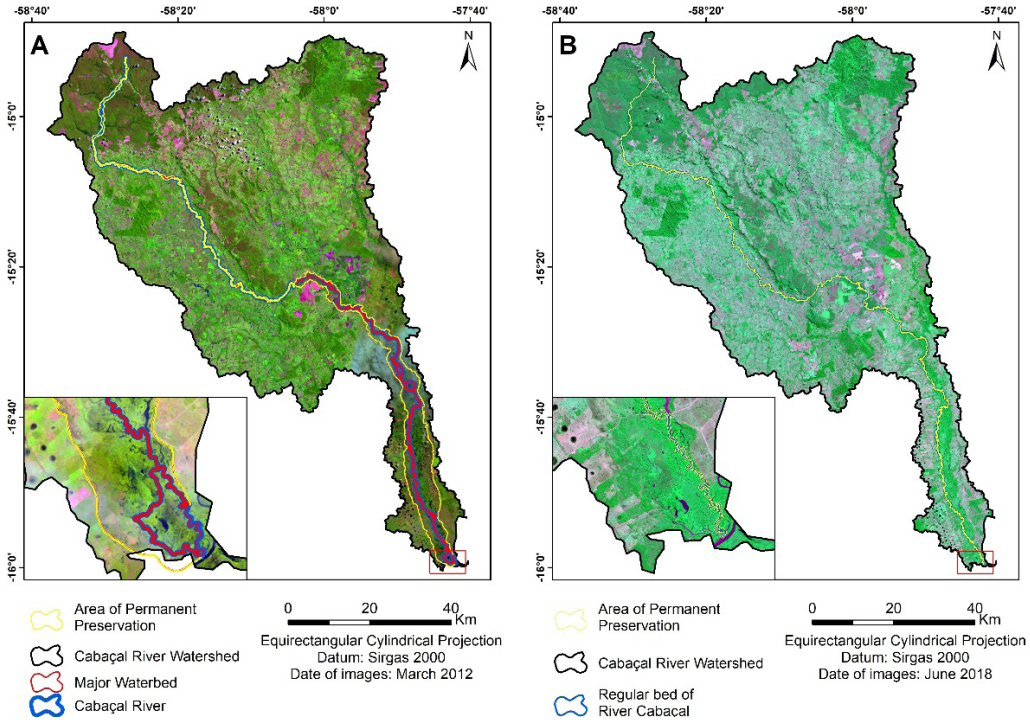
For the actual classification run, the supervised method, Bhattacharya classifier and a 99.9% acceptance threshold were used. Afterwards, the mapping to the thematic classes and the vector matrix conversion were performed.

For the generated vector files, post-classification procedures were performed in ArcGIS, version 10.6.1 (ESRI, 2018), aiming at correcting errors that may have occurred during the classification steps. In the same GIS, the map layouts were generated and the vegetation cover and land use classes of the water-based APPs of the Cabaçal River were quantified.

## 2012 Forest Code and the loss of protection of marginal strips along waterways

The rule established in the 2012 Forest Code excluded from the calculation of the protection strips along watercourses the flood areas, corresponding to the major waterbed, unlike the rule of the previous Code, in which all floodable area should be untouchable, because the reference point for the demarcation of the APPs was the major waterbed. When applying the 1965 Code parameters to the Cabaçal River, it was found that in addition to the floodable areas, in periods of higher flooding, an additional 50 meters of distance from each bank should be protected (Figure 2 A).

**Figure 2. APPs of the Cabaçal River according to the Forest Codes of 1965 (A) and 2012 (B)**




Source: the authors (2018).

In this regard, Nunes da Cunha et al. (2014) have argued that the new way of defining the extent of riverbed APPs was arbitrary, suggesting that the delineation and protection of wetlands should be done at the regional level, based on robust information as a means to meet the peculiarities of the wetlands.

With the implementation of the legislation in 2012, only the areas measured from the edge of the river's regular bed (LR), on each bank of the water body, enjoy the environmental protection intended for water-based APPs. One can thus affirm that there

was a loss of protected areas (Table 1), because those located between the minor and the major seasonal riverbed were subjected to a less restrictive legal regime than the APPs.

**Table 1. Cabaçal River Protection Area in Mato Grosso in 2012 and 2018**

| Sections (Course) | 2012 | 2018 | Unprotected areas (km²) | APP (km²) | | Difference APP (km²) |
|---|---|---|---|---|---|---|
| | LMH* (km²) | LR** (km²) | | 2012 | 2018 | |
| Upper | 12.4 | 0.2 | 12.4 | 2.7 | 3.2 | 0.5 |
| Middle | 16.9 | 2.5 | 14.4 | 10.3 | 12.1 | 1.8 |
| Low | 342.1 | 6.9 | 335.2 | 10.0 | 15.6 | 5.6 |
| **Total** | 371.4 | 9.6 | 362.0 | 23.0 | 30.9 | 7.9 |

Source: the authors (2018).

In the case of the Pantanal biome and its floodplain, in which the lower course of the Cabaçal River is inserted (Figure 2 B), to compensate for the loss of protection of wetlands, it was foreseen in the 2012 Forest Code that these areas are of restricted use and can be exploited sustainably. In this perspective, the suppression of vegetation was conditioned to the authorization of environmental agencies based on technical recommendations from official research agencies.

The application of the current rule, in the lower course of the Cabaçal River, indicated that there was a loss of more than 300 km² of previously protected areas, while in the upper and middle course sections, located in the plateau part of the basin, where the river course remains embedded, the loss was less expressive (Table 1).

When applying the 2012 Code rule, in the upper and lower reaches, the loss of areas considered protected was more than 95%, when compared to the criteria of the 1965 Forest Code, while in the middle reaches the loss of protected areas was about 85% (Table 1). This result corroborates the argument of Nunes da Cunha et al. (2014) that there would be a 90% loss of protected areas for rivers located in the lowland area.

The increase in the APPs, mapped from the 2018 images compared to 2012 (Table 1), can be attributed to the difficulty in interpreting the images, which portrayed the environmental conditions of the rainy season, especially in the lower course that presents greater floodable area, in which reflectance of the targets suffer interference from that emitted by water. The period of highest average rainfall concentration (62.68%) in the Pantanal at Cáceres is from December to March, corresponding to the rainy period, however the water surplus occurs from January to March (NEVES et al., 2011; NUNES et al., 2014); June to August correspond to the dry period, occurring 4.9% of total annual rainfall. Monthly rainfall totals are indispensable indicators for determining surface water flows and, consequently, their availability for the management of water resources (SALGUEIRO, 2005).

The loss of protected areas through the delimitation of the marginal strip, using as

a parameter the level reached by the seasonal flood, is questioned by Borges et al. (2011) and Medeiros (2013), who alert to the possibility that the protection may fall over an area larger than necessary to fulfill its environmental functions. Scartazzini et al. (2008) criticized the use of the major waterbed in the calculation of the protection strips, under the argument that it penalized the extraction companies, whose areas would have exaggerated restrictions for licensing because they were inserted in APPs.

**Use conflicts in the APPs of the Cabaçal River**

The extensions of APPs devoid of native forest cover totaled 60% of the investigated area, when the major waterbed was considered, with cattle raising with secondary vegetation constituting the predominant land use in all sections of the Cabaçal River, with predominance in the middle course. The planted pasture was not identified in the upper course (Figure 3 A), a result similar to that found by Abrão et al. (2018) in the APPs of the Desbarrancando River, in Mato Grosso do Sul, where about 68% presented vegetation cover and by Pinto and Rossete (2012) diagnosed that, in the micro-basin of the Córrego Capitão Décio, in Nova Xavantina MT, 88.53% of the APPs present preserved vegetation.

In 2018, the conflict area was smaller than the one pointed out in 2012, because, by excluding floodable areas from the calculation of APPs, the Forest Code in force made land use classes present in this space fall out of the category of environmental transgression. In the delimited dimensions of APPs under the old rule, agriculture and forestry were present in the lower reaches; however, these classes were not mapped in 2018 due to the reduction of protected areas (Figure 3 B).

The process of anthropization in the APPs of the Cabaçal River was verified to a lesser extent in the upper course and the greatest conflicts in the middle and lower courses by cattle ranching with secondary vegetation. Likewise, the diagnosis of the APPs of the other watercourses in the basin attested to the predominance of use for livestock, with a clear decrease in the areas of wooded savanna with some forested savanna (Figure 4). The land use conflicts in the APPs of the Cabaçal River showed the existence of native vegetation liabilities to be recomposed, indicating the need for measures to maintain the hydrological dynamics.

The trend of reduction of anthropic use in the APPs of the Cabaçal River observed in 2018 does not show a change in the behavior of landowners or a reduction in environmental liabilities. On the other hand, it demonstrates that the 1965 Forest Code (BRASIL, 1965) was not respected, because there were degrading activities both in the larger hydrological bed and in the APPs and, if full compliance with the legislation were required, the cattle-raising activity (the basis of the Cabaçal River basin economy) would suffer the greatest impact.

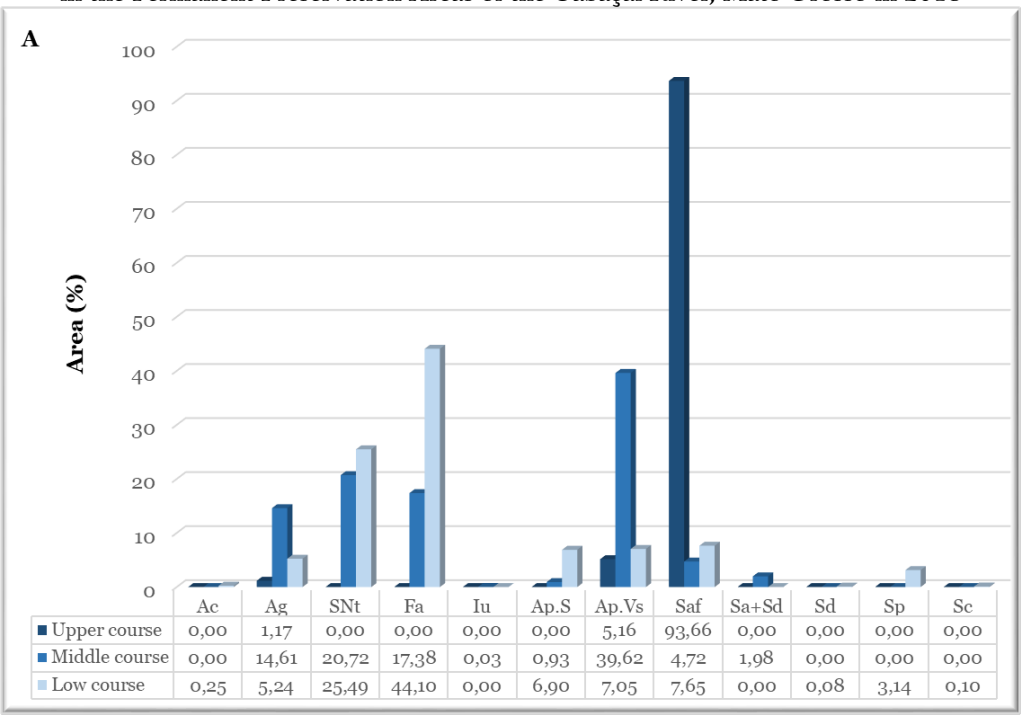
The conflicts of use pointed out can be solved by adapting the APPs to the rules of the 2012 Forest Code. However, the researchdid not quantify the degraded areas to be recovered, which vary from 5 to 20 meters in width according to the fiscal modules of the property, due to the lack of information regarding the size and perimeter delimitation

of these properties.

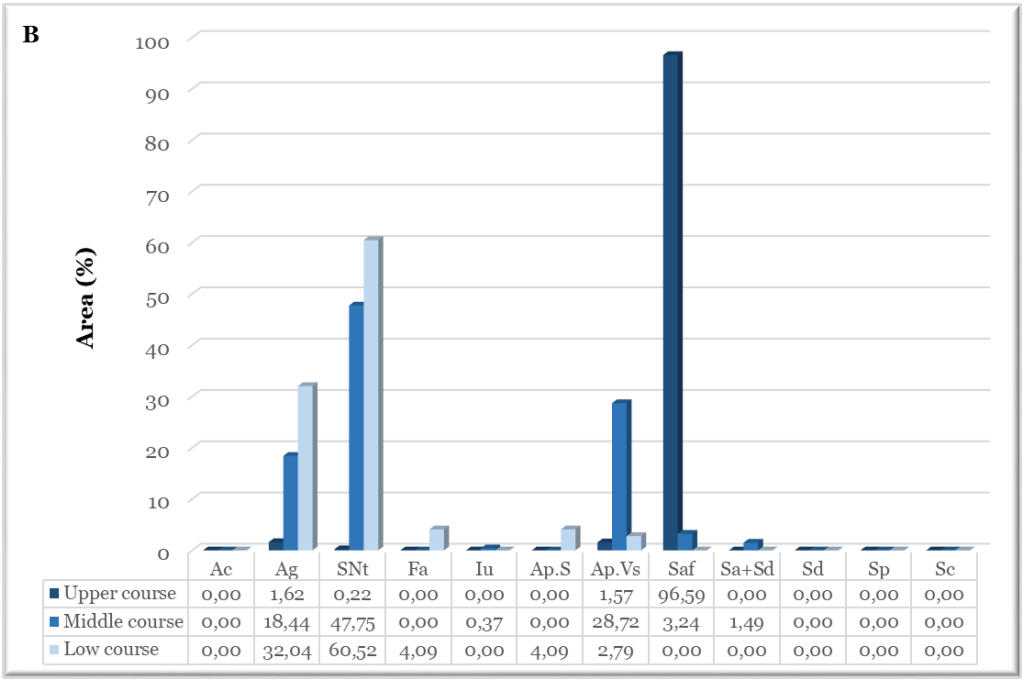
Of the 8,565 rural properties registered in the Mato Grosso System of Rural Environmental Registration - SIMCAR (MATO GROSSO, 2018), which are located in the municipalities with territorial extension in the Cabaçal River basin, 7,205 have up to four fiscal modules. Therefore, more than 80% of the landowners would be obliged to recover 5 to 15 meters of APPs that were totally deforested. In the case of the Cabaçal River, the native forest coverage should correspond to 50 meters of width.

Monteiro et al. (2017), when applying the new rule in a watershed located in the municipality of Itanhandu/MG, in which 95% of rural properties have less than four fiscal modules, based on data extracted from the CAR, found that water-based APPs to be restored in compliance with the 2012 Forest Code would be equivalent to 176 ha, which corresponds to 44% of the area that should be restored. The study warns that the variation in the size of the APPs on properties will make it difficult to inspect these areas and, for the effective application of the rule, it is necessary to reinforce the monitoring infrastructure of the environmental agencies.

**Figure 3. Quantifications of vegetation cover and land use: (A) Land use in the major waterbed and APP of the Cabaçal River, Mato Grosso in 2012. (B) Land use in the Permanent Preservation Areas of the Cabaçal River, Mato Grosso in 2018**



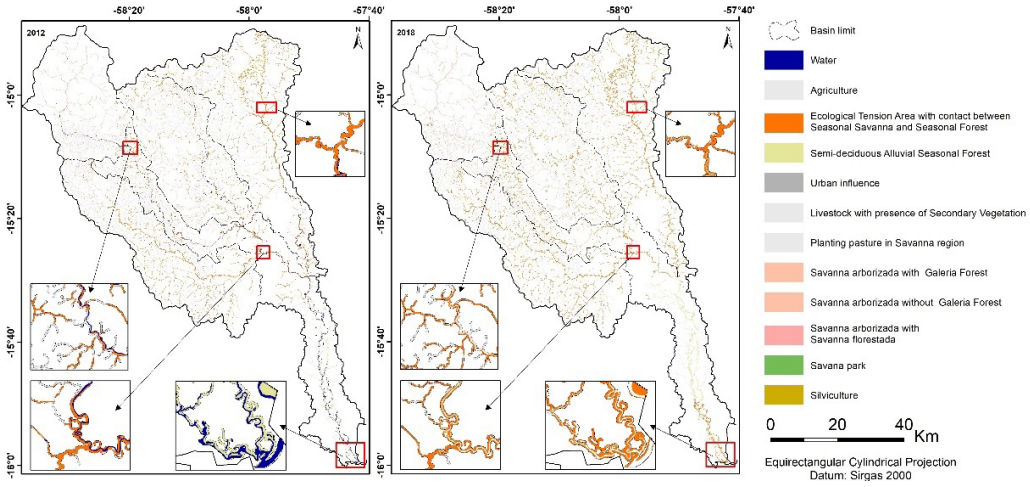

| | Ac | Ag | SNt | Fa | Iu | Ap.S | Ap.Vs | Saf | Sa+Sd | Sd | Sp | Sc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Upper course | 0,00 | 1,17 | 0,00 | 0,00 | 0,00 | 0,00 | 5,16 | 93,66 | 0,00 | 0,00 | 0,00 | 0,00 |
| Middle course | 0,00 | 14,61 | 20,72 | 17,38 | 0,03 | 0,93 | 39,62 | 4,72 | 1,98 | 0,00 | 0,00 | 0,00 |
| Low course | 0,25 | 5,24 | 25,49 | 44,10 | 0,00 | 6,90 | 7,05 | 7,65 | 0,00 | 0,08 | 3,14 | 0,10 |




| | Ac | Ag | SNt | Fa | Iu | Ap.S | Ap.Vs | Saf | Sa+Sd | Sd | Sp | Sc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Upper course | 0,00 | 1,62 | 0,22 | 0,00 | 0,00 | 0,00 | 1,57 | 96,59 | 0,00 | 0,00 | 0,00 | 0,00 |
| Middle course | 0,00 | 18,44 | 47,75 | 0,00 | 0,37 | 0,00 | 28,72 | 3,24 | 1,49 | 0,00 | 0,00 | 0,00 |
| Low course | 0,00 | 32,04 | 60,52 | 4,09 | 0,00 | 4,09 | 2,79 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |

Label: Ac: Agriculture; Ag: Water; SNt: Ecological Tension Area with contact between Seasonal Savanna and Seasonal Forest; Fa: Semi-deciduous Alluvial Seasonal Forest; Iu: Urban influence; Ap.S: Planting pasture in Savanna region; Ap.Vs: Livestock with presence of Secondary Vegetation; Saf: Savanna arborizada with Galeria Forest; Sa+Sd: Savanna arborizada with Savanna florestada; Sd: Savanna florestada; Sp: Savana park and Sc: Silviculture. Source: the authors (2018).

**Figure 4. Vegetation cover and land use in the APPs of the BHRC in 2012 and 2018**




Source: the authors (2018).

## Conclusions

The parameter indicated in the 2012 Forest Code for delimitation of APPs caused loss of areas that were previously protected, corresponding to the major waterbed of the Cabaçal River. Those occurring in the upper and middle course of the river were in smaller proportion when compared to those in the lower course, where greater flooding occurs in the flood period.

The flood areas of the Cabaçal River, which contribute to the formation of the floodplain of the Pantanal biome, lost the protection previously afforded to their APPs. However, its exploitation is subject to the legal regime of restricted use areas, as is the case of the area of the major waterbed (LMH).

The APPs of the Cabaçal River have presented conflicts in land use since the 1965 Forest Code, mainly due to its use for cattle ranching, indicating that the legislation was not being complied with by rural landowners. Therefore, the state of degradation of APPs in 2018 cannot be entirely attributed to the flexibilization of environmental legislation.

The reduction in cattle ranching from 2012 to 2018 and the decrease in deforestation in the APPs of the BHRC may be related to the new rule for delimiting APPs, and not to changes in landowner behavior. This indicates the need for further studies and continuous assessment of the conservation status of vegetation in protected areas.

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Submitted on: 14/10/2019
Accepted on: 03/10/2022
2023;26:e02112

AMBIENTE & SOCIEDADE 25 anos 25 años 25 years

SciELO

# Mudança do regime de proteção das Áreas de Preservação Permanentes no código florestal de 2012

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Jesã Pereira Kreitlow

***Resumo:*** O parâmetro para delimitação das Áreas de Preservação Permanentes (APPs) do Código Florestal de 2012 é a borda da calha do leito regular do curso d'água e não o seu nível mais alto. O objetivo deste estudo é avaliar a perda de áreas protegidas, enquadradas na categoria das APPs hídricas, em virtude do Código Florestal de 2012, no rio Cabaçal. Por meio das tecnologias espaciais, foram elaborados mapas de cobertura vegetal e uso da terra de 2012 e 2018. A mudança do Código Florestal em 2012 ocasionou perda de 90% de área anteriormente protegida pelo de 1965, correspondente ao leito maior hidrológico do rio Cabaçal, especialmente no baixo curso, situado na planície do Pantanal mato-grossense. Concluiu-se que a cobertura vegetal nas Áreas de Preservação Permanente foi suprimida para que os usos urbano e agropecuário fossem implantados, caracterizando-as como de conflitos devido à flexibilização da legislação ambiental.

***Palavras-chave:*** Área protegida. Legislação ambiental. Geotecnologias. Bioma Pantanal. Conflitos socioambientais.

**São Paulo. Vol. 26, 2023**
*Artigo Original*

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# Cambio del régimen de protección de las zonas de preservación permanente en el código forestal 2012

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São Paulo. Vol. 26, 2023
*Artículo Original*

***Resumen:*** El parámetro para delimitar las Áreas de Conservación Permanente del Código Forestal de 2012 es el borde del cauce del cauce regular y no su nivel más alto. El objetivo de este estudio es evaluar la pérdida de áreas protegidas, clasificadas en la categoría de APP de agua, debido al Código Forestal 2012 en el río Cabaçal. Los mapas de uso del suelo y cobertura vegetal para los años 2012 y 2018 se elaboraron utilizando tecnologías espaciales. La modificación del Código Forestal en 2012 provocó la pérdida del 90% del área anteriormente protegida por la de 1965, correspondiente al lecho hidrológico mayor del Cabaçal. río, especialmente en el curso bajo, ubicado en la llanura del Pantanal de Mato Grosso. Se concluyó que se removió la cubierta vegetal en las APPs para que se pudieran implementar usos urbanos y agrícolas, caracterizándolos como conflictos por la flexibilidad de la legislación ambiental.

***Palabras-clave:*** Área protegida. Legislación ambiental. Geotecnologías. Bioma Pantanal. Conflictos sociales y ambientales.