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APRESENTAÇÃO

A presente obra, que se oferece ao leitor, nomeada como “Ecologia, Evolução e Diversidade” de publicação da Atena Editora, aborda 24 capítulos envolvendo estudos biológicos em diversos biomas do Brasil, tema com vasta importância para compreendermos o meio em que vivemos.

Esses estudos abrangem pesquisas realizadas em ambientes aquáticos e terrestres, com diferentes classes de animais e plantas, relatando os problemas antrópicos e visando melhorias e manejo da conservação dessas espécies e seus habitats naturais. Temos também pesquisas com áreas de botânica, questões ambientais, tratamento de água e lixo.

Atualmente essas pesquisas ajudam a nortear uma melhor conservação sobre ambientes em que vivemos e consequentemente melhoram nossa qualidade de vida, aumentando a qualidade de vida em conjunto com uma sustentabilidade socioambiental.

Este volume dedicado à Ecologia traz artigos alinhados com pesquisas biológicas, ao tratar de temas como a conservação de hábitats, diversas comunidades e populações específicas e sobre qualidades de questões ambientais. Apesar dos avanços tecnológicos e as atividades decorrentes, ainda temos problemas recorrentes que afetam nosso ambiente, causadores de riscos visíveis e invisíveis á saúde de todos os seres vivos. Diante disso, lembramos a importância de discutir questões sobre a conservação desses ambientes.

Aos autores dos diversos capítulos, pela dedicação e esforços sem limites, que viabilizaram esta obra que retrata os recentes avanços científicos sobre conservação e os sinceros agradecimentos dos Organizadores e da Atena Editora.

Por fim, esperamos que este obra possa colaborar e instigar mais estudantes e pesquisadores na constante busca de novas pesquisas para a área de Ecologia e, assim, garantir a conservação dos ambientes paras futuras gerações de forma sustentável.

Patrícia Michele da Luz

SUMÁRIO

CAPÍTULO 10

THE BRAZILIAN FOREST CODE: IS IT AN ACT OF GREEDINESS OR A NEED FOR REALITY ADEQUACY?

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ABSTRACT: Is the forest code really necessary to maintain the competitiveness of the Brazilian agribusiness? This work explores the pros and cons of this Forest Code in order to evaluate the influence of environmental changes on water resources, and diversity of fauna and flora species, as well as commenting about lawmakers. Therefore, a literature review was used for a critical analysis and base of conflicting points of the aspects related to the theme. Nature responses came right after the promulgation of the Forest Code because for decades there has been no precautionary principle regarding environmental preservation, which generated an unprecedented water crisis. The consequences of the Forest Code go unnoticed by the society that, faced with so many emergencies, does not realize that the ecological balance is its ally and the only guarantee for a less arid future.
KEYWORDS: Ecology. Environmental politics. Forest Code 2012.

RESUMO: Seria o novo código florestal realmente necessário para manter a competitividade do agronegócio brasileiro? Este trabalho explora os prós e contras deste novo Código Florestal com o objetivo de avaliar a influência das alterações ambientais sobre os recursos hídricos, diversidade de espécies da fauna e flora, bem como apresentar alguns comentários sobre os autores da lei. Para tanto, se usou referências bibliográficas para

uma análise crítica e embasamento de pontos conflitantes dos aspectos relacionados à temática. Logo após a promulgação do novo código florestal veio a resposta da natureza, pois a décadas não há princípio de precaução quanto à preservação ambiental que gerou uma crise hídrica sem precedentes. As consequências do código florestal passam despercebidas pela sociedade que diante de tantas urgências não percebe que o equilíbrio ecológico é seu aliado e única garantia para um futuro menos árido.
PALAVRAS-CHAVE: Ecologia. Política ambiental. Código Florestal de 2012.

INTRODUCTION

The current national environmental scenario highlights an important sustainability issue. The water crisis, and consequently the energy crisis, came immediately after the approval of the Brazilian Forest Code (Brasil, 2012). A code that made environmental preservation less onerous, pardoned the environmental liabilities of farmers, and made the delicate situation of Brazil's forest remnants and their inherent diversity even more fragile. However, would such a change bring the law into line with the irremediable condition of national ecological and economic zoning or would it be a "ruralist" coup to exploit every square inch of arable areas?

Brazil is one of the most biodiverse countries on the planet. In addition to the Amazon Hileia, the largest tropical forest in the world, Brazil has two morphoclimatic domains: the Cerrado and the Atlantic Forest, which is considered by Myers et al. (2000) as "Hotspots" that are represented by areas of high amount of endemism but extremely endangered. According to Fonseca (1985) and the NGO SOS Mata Atlântica (1993), the Atlantic domain was (and still is) threatened with disappearance when it was estimated that only approximately 7% of its original coverage remained. More recently, satellite data have shown that approximately 11.7% of the Brazilian Atlantic Forest remains (Ribeiro et al., 2009). This data did not modify the Atlantic Forest landscape since the advent of this more precise methodology demonstrated that 83.4% of the total is formed by fragments smaller than 50 hectares, which brings concern from an ecological and conservationist point of view. This concern refers not only to the loss of biodiversity itself (Butchart et al. 2010), but also to the performance of the fauna and flora such as the inability of persistent habitat species (Pardini et al., 2010), problems in the displacement through the matrix (Püttker et al., 2011) propagules dispersion problems (Tabarelli et al., 2012), among other factors.

For Myers et al. (2000), the Cerrado domain is also considerate a conservation hotspot because the percentage of remnants of primary forests was at 20%. Klink and Machado (2005) reported that 30,000 km² per year were modified as a result of the opening of agricultural fronts that occupies 53% of the total Cerrado area.

In addition, the Caatinga, represented by an exclusively Brazilian domain, is equally threatened and ignored by researchers and by the Brazilian population. It is

estimated that between 30.4 and 51.7% of its total area has already been modified by some anthropic activity. This information places the Caatinga as the third most threatened Brazilian domain to disappear. Furthermore, if this last estimate is confirmed the Caatinga can pass the Cerrado regarding its threat status (Leal et al., 2005). In a scenario of such diversity and environmental disasters, would the adoption of a forest code be a measure that takes into account the precautionary principle?

One of the altered points in the Brazilian Forest Code refers to Areas of Permanent Preservation (APPs) such as riverbanks and springs. Both what should be preserved and what must be reconstituted/reclaimed by farmers has been changed, making existing riparian forests even less protected and far less areas to be replanted, depending on the size of the rural property. Such changes were proposed and modified to favor those farmers who no longer had APPs on their properties with the justification of not making their business economically unviable. However, actions that unprotect rivers, lakes, ponds and springs might allow their silting and reduce the volume, or even deplete the water that today has become the most valued commodity in the country.

Areas of Permanent Preservation have the function of protecting water bodies borders. Those riparian areas prevent the soil to be carried by rains into the bed of rivers and springs, causing their silting. It also prevents leachate materials (such as pesticides, fertilizers and various effluents) from directly reaching the source, altering its physico-chemical qualities. Faced with the knowledge about the fragility of the ecological balance, the proposition of such a code seems incoherent (see Ferreira et al., 2014; Azevedo et al., 2017) and the most probable hypothesis is that it becomes an advent that contributes to the rural owners in an ephemeral way, without being valued the services of long term rendered by a balanced and healthy environment that is necessary to agricultural production.

This paper explores the pros and cons of the 2012 Brazilian Forest Code, listing the (immediate and/or long-lasting) gains, as well as losses of the ecological balance, biodiversity and quality of life of present and future generations as provided by Article 225 of the Federal Constitution (Jusbrasil, 2015).

A literature review and critical analysis of scientific articles and websites that are specialized on environmental themes of sustainability and conservation were conducted. The Forest Code will be discussed under the current water crisis and its threat on the diversity of species - from invertebrates to mammals.

Main changes

The changes in this forest code are mainly due to five aspects: Legal Reservation (LR), Permanent Protection Area (PPA), Riparian forests (pertinent to PPAs), consolidated rural area and amnesty. Regarding LR, there have been changes in the LR calculation since areas of up to four fiscal modules does not need to be recomposed; the end of the endorsement and the permission of economic exploitation. The PPA

had its area defined from the regular water level of the water body; Floodplain areas, mangrove swamps, hillside forests, hilltops and areas with an altitude above 1800 meters can be used for economic activities.

The protection area of the riparian forest has been modified to: a) thirty meters for water courses of less than ten meters wide; b) fifty meters for water courses that are from ten to fifty meters wide; c) one hundred meters for water courses that are from fifty to two hundred meters wide; d) two hundred meters for water courses that are from two hundred to six hundred meters wide; and e) five hundred meters for water courses that are more than six hundred meters wide.

Furthermore, in the areas surrounding lakes and natural lagoons the minimum width is: (a) one hundred meters in rural areas, except for a body of water of up to twenty hectares, with a marginal margin of fifty (50) meters; and b) 30 (thirty) meters in urban areas. In addition, there was the establishment of the concept that consolidated rural areas up to four tax modules do not need to rebuild the native vegetation. Finally, the exemption of rural property owners from fines and penalties in force for irregular use of protected areas until July 22, 2008.

The Forest Code and the current water shortage

Vegetation integrity is fundamental to maintain the climatic stability in relation to the hydrological cycle, since approximately 38% of the rainwater of a given locality comes from the evapotranspiration of native vegetation or, more commonly, allochthonous vegetation. The water regulation promoted by the natural vegetation cycle in addition to improving the water quality, is also able to maintain the water volume of the rivers practically constant during the seasonal (see Tundisi & Tundisi, 2010).

Such hydro geomorphological factors must be considered in addition to the economic value, since the natural vegetation is necessary to maintain water quality, to recharge aquifers and atmospheric replacement by evapotranspiration in the control of the sedimentation, avoiding the silting (which preserves the volume of water), to the supply of organic matter fundamental to aquatic life, as well as being fundamental to terrestrial life as a refuge, shelter, foraging and reproduction site. Therefore, the suppression of these forests has an extreme impact on water quality and ecosystem services (Machado & Dupas, 2013). The deterioration of native vegetation decreases water quality and increases the costs of treatment for public water supply, while fountains located in protected and preserved areas require little treatment subsidy (Tundisi & Tundisi, 2010).

In addition to rivers and lakes, flooded areas are of ecological importance and also the least valued. They are fundamental as a buffer system, in the dissipation of erosive forces, in the control of floods, in the maintenance of water quality, in the recharge of aquifers, in the conservation and protection of terrestrial and aquatic biodiversity. The suppression of such flooded areas for any economic and/or social purposes would have

a much more negative than positive result (see Vilaça, 2015) for the local and regional socioeconomic system itself, causing water shortages and rising costs of treatment (Tundisi & Tundisi, 2010).

The arguments of Tundisi and Tundisi (2010) are taxactive to the real need for preservation. While in 2010 the water crisis was not yet announced, at least not so immediately, the statements of these authors show that knowledge about the consequences already existed and was eminent. However, knowledge can not overlap with the interests of public power. In this way the policies are focused on emergency actions that soften the public opinion, in addition to being more profitable, while long term policies do not exist and give place to the speculative policy of immediate results like the current forest code that would be more correctly if it were denominated “Ruralist Code”.

Influence of the forest code on biodiversity

The Convention on Biological Diversity (CBD/UN) of 2002 stated that biological diversity is being lost due to human activities. The causes are hunting (see Machado et al., 2013a), habitat loss, overexploitation, pollution, invasion of exotic species and climate change (Ribeiro & Freitas, 2010). According to Imperatriz-Fonseca and Nunes-Silva (2010), the Earth’s ecosystems have already lost 35% of mangroves, 40% of forests and 50% of flooded areas; In addition to overfishing that reduced fishing stocks by 80%. All this leads to a loss of 100 to 1000 times greater biodiversity than data from past centuries. Although Brazil is a signatory to the CBD, changing environmental legislation further increases biodiversity losses. Although a revision of the legislation is salutary to adapt it to the knowledge, the change of the SC did not fit in that context (Ribeiro & Freitas, 2010).

Among the ecosystem services essential to life and consequently the productive process of large and small rural producers is the pollination provided by insects of the *Apidae* family (bees). According to the FAO (Food and Agricultural Organization) 33% of the food produced by mankind depends on pollination by bees (Klein et al., 2007). In South America the pollination service was valued at 11.6 billion euros per year. The most effective way to maintain pollinators is to preserve their nesting sites and this will only be possible by conserving and improving the conditions of the remaining forest fragments (Imperatriz-Fonseca & Nunes-Silva, 2010).

Some groups are useful as environmental quality bioindicators. Freitas (2010) reports the implications of the forest code on the diversity of butterflies, which are important bioindicators, and points out the reduction of riparian forests (important points of connectivity) and the lower protection of areas of altitude and hill tops as the greatest disservices rendered by the Forest Code.

The reduction of areas destined to the maintenance of riparian forests, legal reserve and areas of altitude superior to 1800 meters proposed by the code will affect

the maintenance of the diversity of the ichthyofauna, causing species loss, faunistic homogenization and diminution of fish biomass due to the reduction of the role played by such ecosystems, such as: transfer of solar energy to the aquatic environment, interception of nutrients and sediments that would enter the water bodies and exchange of organic material between the terrestrial and aquatic environments. Most species of fish in Brazil are habitants of streams and this increases this relation with the riparian forests. These species are predators regulating populations of aquatic insects and algae, are important in the processing of organic matter, serving as major fish preys that are important to fishing activities (Casatti, 2010).

Amphibians are declining across the planet and certainly the loss of habitat caused by anthropic activities is the main factor (Toledo et al., 2010). Brazil is home to 17% of the global diversity of amphibians and the largest number of endemic species in the world with species being described each year. In this way, native vegetation and its associated fauna ought to be preserved (Toledo et al., 2010).

The Forest Code will also cause amphibian decline while encouraging deforestation and non-recovery of already deforested areas, as well as generating a cascade effect where states and municipalities will also review their Legislation based on the code. Suppression of vegetation causes consequences such as inbreeding depression due to habitat fragmentation, loss of microhabitats needed by specialized species (e.g., bromeliad species, that is, they depend on bromeliads for their reproduction) (Pederassi et al., 2012), increase in direct sunlight and consequent increase in UV-B radiation, higher volatilization of temporary water bodies causing greater loss of eggs and larvae (tadpoles), which contribute greatly to global warming, affecting the entire planet (Toledo et al., 2010).

In addition to these predictable general effects, there is the specificity of the Amphibia group that depends on the areas of riparian forest due to its ecological and evolutionary characteristics. The reduction of streams is one of the most worrisome factors since it reaches areas of great specificity and endemism. The diversity of amphibian species that inhabit streams is inversely proportional to the width of the water body, precisely where the protection area will be reduced (Toledo et al., 2010).

Among the approximately nine thousand species of reptiles in the world, 760 occur in Brazil (SBH, 2014). There are estimates that approximately 20% of species are at risk of extinction, with habitat loss being the most impacting anthropic factor (Marques et al., 2010). Reptiles have more localized distribution patterns and, as a consequence, are poorly represented in unique areas of preservation. Therefore, conservation at reduced scales in natural units such as microcatchments is better suited to cover as many species as possible. The end of the microbasins as a planning unit favors the concentration of Legal Reserves in single blocks, which do not represent the real diversity of local microhabitats (Marques et al., 2010).

Reducing protection in high altitude areas also negatively influences the preservation of reptiles, as they are typically rich in endemism. In addition, many of the

species that are not yet endangered may be harmed by the reduction of PPAs around water bodies because of their dependence on these riparian environments (Marques et al., 2010). Another factor would be the replacement of legal reserves by areas of silviculture (with exotic planting), since many species do not tolerate areas so altered by anthropic activities. Among the species that can be extinguished are those with molecules with pharmaceutical potential such as snakes. For instance, captopril is an antihypertensive from the venom of the jararaca (*Bothrops jara*raca) that could save countless human lives (Marques et al., 2010).

Brazil has the highest number of endangered birds; from the approximately 1834 bird species, 234 are endemic to that country (Develey & Pongiluppi, 2010). The further reduction of forests will be very detrimental to this zoological group as they are extremely dependent on the foraging, sheltering and breeding forests. Even the smallest forest fragments are important, for example, the trampolines (see Moura et al., 2015), which disperse specimens and prevent inbred reproduction and consequent inbreeding depression (Develey & Pongiluppi, 2010). Birds are important ecological components of the landscape (Moura et al., 2018; Moura et al., 2015). In addition to contributing to the dispersal of native plant species (Moura et al., 2016; Moura et al., 2017a; Moura et al., 2017b) and some to pollination, they are also important predators, capable of controlling pests that are harmful to human cultures, and the elimination of this environmental service would cause serious damage to the agroecossystem (Develey & Pongiluppi, 2010).

Regarding mammals, one-third of the worldwide species are at risk and, once again, among other factors, habitat loss is one of the main problems of preservation. Brazil has the second largest variety of species from the Mammalia class with 701 native species (Paglia et al., 2012), and legal reserves and PPAs are the main habitats that maintain these species. Mammals play key ecological roles in ecosystems (Machado et al., 2017; Machado et al., 2016; Machado et al., 2013b). For example, they can be pollinators, seed dispersers, and insectivores that aid in pest control. The reduction of natural habitat areas would represent, in addition to the risk of extinction of species of this group, an increase in the risk of disease transmission with a consequent deterioration of Brazilian public health (Galleti et al., 2010).

The real interests of the forest code

The main argument for the flexibilization of the Forest Code was the claim that compliance with the old law could reduce the competitiveness or even make the Brazilian agribusiness unfeasible, since external competitors did not face such a restriction. However Brancalion and Rodrigues (2010) evaluated that the current influence of the old Forest Code on production is negligible and largely compensated by considering the environmental services provided by ecologically preserved areas, in addition to enabling environmental certification that would add value to the Brazilian product.

Taking into account the gigantism of a continental country like Brazil and the reality of its macro and mini biomes, any attempt to change the Forest Code would have to be conducted by competent and bioetically sensitive people (Ab'Sáber, 2010). However, it was led by neophytes on sustainability issues subordinated to a parallel army of farmers who have more power than governors and mayors (Ab'Sáber, 2010). In this sense, the code has become another ruralist instrument to open fronts of production at any cost while there is no research to reuse degraded land or the interest of governments in fostering technologies to revitalize silty soils. In addition, the alleged promise of the code to enable small farms or to promote the employment bond of rural workers falls to the ground when the details of the precarious rural conditions prevailing in the interior of Brazil are analyzed (Ab'Sáber, 2010).

The "Forest Code" goes against the planetary counterpart of CO_2 reduction policies since such a liberalizing code will generate a wave of deforestation and uncontrollable emissions of this greenhouse gas. It cannot be conceivable that a project of national interest should be made with a view to favoring only a small part of the present generation (Ab'Sáber, 2010).

Ab'Sáber (2010) exposes the political deviation of the proposal that instead of serving the people, robs the people of their most precious possession, the constitutional right to a balanced and healthy environment necessary for life itself. Although as a disguise the elaboration of this code has been the viability of small properties, the water crisis subsequent to its approval demonstrates its moral fragility and usefulness as an instrument that should serve the sustainable development of the nation.

CONCLUSION

The Forest Code as a preservation tool serves to dissuade society since it will be directly and indirectly affected by the environmental impacts arising from a greater permissiveness of the legislation in relation to agribusiness actions and the lack of clarification on the theme of the National politicians.

It is evidenced that the Forest Code is against sustainability, reducing the chances of a healthy future. There are no favorable factors with its implementation.

The precautionary principle is completely ignored, as well as so many needs of the Brazilian population that in the face of so many urgencies cannot realize that a balanced environment is their ally and the only guarantee of a less arid future.

Reducing or simplifying preservation areas is not economically feasible; on the contrary, it is a suicidal decree practiced by every society that is alien to its own choice and relegated to the background along with its natural heritage, which is much more profitable than any annual monoculture, enriching a few part of the population and causing the marginalization of an entire ignorant society. There will be no profitable agribusiness without a balanced environment that subsidizes it ecologically.

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