Federal conservation units in Rondônia, Northern Brazil: history, management and socio-environmental importance

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Abstract. Protected areas are legally established geographic portions to promote the protection of ecosystems. Law No. 9,985/2000, which established the National System of Nature Conservation Units (SNUC), introduced legal instruments and practical requirements for the creation and management of this type of protected area. This work investigated federal conservation units, which has its limits, albeit partially, in the State of Rondônia, Northern Brazil, regarding aspects of management and application of legal instruments. The items investigated include the mosaic management and implementation plan, gathering data to facilitate access to information, both for the academic community and for the population in general. Rondônia has 14 CUs of five categories, seven of the sustainable use group and seven of the integral protection group, managed by the Chico Mendes Institute for Biodiversity Protection (ICMBio). Of the 14 CUs, five have no management plan; on the other hand, despite the proximity of some units, 53.84% do not compose official mosaics or integrated management. The lack of adequate human, financial, and management resources are among the scores that lead to poor effectiveness in these areas.

Keywords: Legal Instruments; Biodiversity; Protected Area.

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Resumo. *Unidades de Conservação Federais em Rondônia, Região Norte do Brasil: histórico, gestão e importância socioambiental*. Áreas protegidas são porções geográficas legalmente instituídas para promover a proteção de ecossistemas. A Lei nº 9.985/2000, que estabelece o Sistema Nacional de Unidades de Conservação da Natureza (SNUC), introduziu instrumentos legais e requisitos práticos para a eficácia de criação e gestão deste tipo de área protegida. Este trabalho buscou investigar as unidades de conservação federais, que tem seus limites, ainda que parcialmente, no Estado de Rondônia, quanto a aspectos de gestão e aplicação dos instrumentos legais. Dentre os itens investigados listam-se o plano de manejo e implementação de mosaicos, reunindo dados que facilitem o acesso à informação, tanto para o meio acadêmico, como para a população em geral. Rondônia possui 14 UCs de cinco categorias, sendo sete do grupo uso sustentável e sete do grupo proteção integral, geridas pelo Instituto Chico Mendes de Proteção da Biodiversidade (ICMBio). Das 14 UCs, cinco não possuem plano de manejo, por outro lado apesar da proximidade de algumas unidades, 53,84% não compõem mosaicos oficiais ou gerenciamento integrado. A falta de recursos

humanos, financeiros e gestão adequados estão entre as pontuações que levam a pouca efetividade dessas áreas.

Palavras-chave: Instrumentos legais; Biodiversidade; Área Protegida.

Introduction

Development policy adopted for the Brazilian Amazon has always been grounded on allowances, tax incentives and other benefits for stakeholders willing to work in the region. This model has generated serious distortions in the economic, social, political and environmental areas, resulting in agricultural, mining and infrastructure enterprises incompatible with the social and environmental characteristics of the region (MMA, 2002).

Space occupation is a subject of controversy throughout the history. According to MMA (2002), a recommendation from the Convention on Biological Diversity, signed during ECO'92, led the countries to adopt an approach that incorporated all possible scales as conservation strategies, including in the allocation of space ecosystems, protected areas, species, genetic resources, biological diversity, among others.

The State of Rondônia is part of the Brazilian Legal Amazon, a concept of administrative nature, established by Decree No. 5,173 of October 27, 1966 (Brasil, 1966) underwent a different occupation process compared to other states in the Amazon Region, which was intense from the Integration and Settlement Projects started in the 1960's.

The rapid development of livestock production, fueled by the construction of the highway BR-364, brought the effect of pressure on forests, including the nature conservation units, and "The areas under consolidated pressure are highly concentrated near roads. Most of them are located in the so-called *arc of deforestation*" (IMAZON, 2005; Ferreira, et al., 2005).

This highway is an important road axis linking Cuiabá (State of Mato Grosso)

to Rio Branco (State of Acre). It was implemented by resources from the Integrated Program for Development of Northwest Brazil (POLONOROESTE), funded by the World Bank in the early 1980s, and completed in 1984. In this year, it was already noticeable the effects of disorderly land occupation stimulated by the work (Pedlowski et al., 1999).

Deforestation and the occurrence of fires in protected areas until 2002 maintained a significant correlation with the distance from the official roads. With the close proximity of roads (< 25 km), deforestation and fires increased significantly in protected areas. Thus, the increase in the transportation infrastructure without a corresponding improvement in the surveillance capacity can increase human pressure on protected areas (IMAZON, 2005).

About the Legal Amazon, Rylands and Pinto (1998), highlighted that despite having still large pristine areas, the concern with the occupation and sustainable exploitation of this region is huge, given the socio-economic needs of the population and the growth of its importance in the international arena, both economically (e.g. strategic minerals, wood, biotechnology, etc.), environmentally and culturally (e.g. greenhouse effect, high biological diversity, indigenous communities).

For a long time, conservation units have been created without defined criteria of management and in situ conservation and scientific studies grounding their need, a system called ad hoc (Chacpe, 2014), "there are disadvantages in this opportunistic system, including the inefficiency in the use of limited resources in terms of available area considering its biogeographical representativeness" (Rylands and Pinto, 1998). This generates the allocation of resources (financial and territorial) in non-priority areas, hindering the creation of

conservation units in places where the high biological diversity or endemism demanded their presence.

The first attempt to drive the creation of protected areas by predetermined criteria was proposed by Gary Hetterberg, at the time as consultant to the FAO in 1976, which proposed the need to create conservation units in priority areas in the Legal Amazon, leading into account mainly refuge for certain Pleistocene groups (Rylands and Pinto, 1998).

Several workshops sponsored by the Ministry of Environment (MMA) between 1998 and 2000, became more technical the creation of protected areas, listing priority areas for this type of management in the Amazon and in Brazil. Supporting this initiative was the adoption of the Law No. 9,985 of July 18, 2000, which instituted the National System of Nature Conservation Units - SNUC (Brasil, 2000).

Currently prevails the update of the map of priority areas for conservation in the Amazon biome, promoted by the Amazon Region Protected Areas Program (ARPA), whose implementation started in 2003 and now is in its second phase. It can be supported by ARPA: National Parks (NAPAR), Biological Reserves (BIORE) and Ecological Station (ECES), within the integrally protected group; and Extractive Reserve (EXRES) and Sustainable Development Reserve (SDR), in the sustainable use group. Within the program are funded studies that focus on biological representation, local demand for sustainable use conservation units, if there are traditional populations, the situation of intensity of threats and situations on the payment for ecosystem services and the use of biodiversity (ARPA, 2014).

For Rylands and Pinto (1998), the CUs are the most effective means of preserving the values of society and the natural environment (biotic and abiotic environment) collaborating for the development of a more sustainable society, besides ecosystem protection, and the managers of these areas should be aware of this new need. In line with this perspective, the Biodiversity Convention, which took place in Rio de Janeiro in 1992, can be seen as the precursor of the new international mindset for biodiversity conservation.

One of the most effective strategies for the conservation of biological diversity is the establishment of a consistent network of protected areas. For the system to achieve its goals, however, these protected areas must be evenly arranged within the various existing biogeographical units in a particular region so as to preserve significant and representative samples of the diversity of species and landscapes (MMA, 2002).

The Brazilian legal system and the creation of conservation units

Before the SNUC, established by Law No. 9,985/2000 (Brasil, 2000), protected areas were divided into two categories - the direct use and indirect use (Rylands and Pinto, 1998). In the first, sustainable exploitation of natural resources is allowed, but in the latter, these should be fully protected.

The first Brazilian Forest Code (Brasil, 1934) determined the creation of PARNAs, which should be protected in accordance with Article 9 of the above (since repealed) in "regions of the country that by particular circumstances deserve them", however it was only made the regulation of this protected area 45 years later, by Decree No. 84,017/1979 (Brasil, 1979).

The Forest Code from 1965, Law 4,771/1965 (expressly repealed recently) brought the instructions for the creation of REBIO, and land donated by farmers may be part of its constitution (Brasil, 1965), despite the Law 5,197/1967 has directed its definition (Brasil, 1967) only from SNUC that this became clear.

The so-called Brazilian Institute for Forest Development (IBDF) replaced the Ministry of Agriculture in the management of the above units. This body had as legal basis the Decree No. 289 of February 28, 1967 (Brasil, 1967a), and the function of directing forest policy in Brazil.

Also responsible for management of protected areas, the Special Secretariat for the Environment (SEMA), created by

Decree No. 73,030/1973 (Brasil, 1973), this body, linked to the former Ministry of the Interior, was responsible for the creation of several Ecological Stations (ESEC's) in the 80s, among them some in the Amazon, such as the ESEC's Rio Acre and the Niquiá. It was assigned to SEMA, the powers, structure and heritage of IBDF, after the termination of this (Brasil, 1989).

Ecological stations thus provide tools for the purpose of the National Environmental Policy (PNMA), established by Law No. 6,938 of August 31, 1981, which states in the second item of the fourth article as one of its objectives "to the definition of priority areas for government action concerning the quality and the ecological balance, meeting the interests of the Union, the States, the Federal District, the territories and the municipalities". Finally, the own PNMA became SEMA, the main body of SISNAMA (Brasil, 1981), replaced in this role by the Department of Environment of the Presidency (Brasil, 1990). Still, important contributions of PNMA include the creation of the categories Relevant Ecological Interest Area, Environmental Protection Area and Ecological Reserve.

The extinction of IBDF and SEMA and the emergence of the Brazilian Institute of Environment and Renewable Natural Resources - IBAMA (Brasil, 1989) is another important milestone in the history of creation of conservation units. Decree No. 97,946 of July 11, 1989 authorized this body to create and manage of such protected area for the Union (Brasil, 1989a).

The SNUC consists of three hundred and thirteen CUs managed by ICMBio, and confirms and creates clearer devices which enables to follow the provisions of its own Magna Carta 88, which entered the need to establish protected areas, described in item II, first paragraph of Article 225: "Everyone has the right to an ecologically balanced environment, common goods of the people and essential to a healthy quality of life."

The SNUC defined two groups, the strictly protected areas and the sustainable use units, which corresponds to the former categories, indirect and direct use, in function, and twelve categories, five belonging to that group, namely ECES, BIORE, NAPAR, natural monuments (NAMO), Wildlife Refuge (WIRE). And seven of direct use, as follows: Environmental Protection Area (EPA), Area of Relevant Ecological Interest (AREI), National Forest (NAFO), Extractive Reserve (EXRE), Fauna Reserve (FAURE), SDR and Private Natural Heritage Reserve (PNHR).

This study investigated the history of federal CUs and their respective acts of creation in the State of Rondônia, Northern Brazil, drawing a profile of the current situation in terms of their social and environmental importance for biodiversity protection and the compliance with legal requirements, gathering data to facilitate access to information.

Material and methods

This study aimed to compile the available data on Conservation Units in the literature and law, making the history from the Forest Code of 1934, Decree No. 23,793 of January 23, 1934. For the consultation of the legal system, we used the Planalto website, which includes laws and decrees, duly updated, which commits the Union.

For the beginning of the work, a request for authorization for scientific activities was made with the Biodiversity Authorization and Information System (SISBio), resulting in Authorization no. 44735-1. The study was carried out between June 2014 and May 2015.

Another aspect referred to were the federal agencies managers of information unit system and those bringing together, for some reason, information on the subject. It has been made a search of the virtual pages and documents produced by the Chico Mendes Institute for Biodiversity

Conservation (ICMBio), Ministry of Environment (MMA), Brazilian Forest Service (SBF), and Brazilian Institute of Environment and Renewable Natural Resources (IBAMA).

Secondarily, we also considered theoretical framework of scientific publications, books and articles, which contained the subject: "conservation units", "protected areas", "management of conservation units", focusing on publications that cited these areas in the State of Rondônia.

Furthermore, a questionnaire was applied to managers (or servers) of all 14 Federal CUs of the State of Rondônia seeking to analyze management, administrative capacity and enforcement of environmental regulations, the National System of Nature Conservation Units (SNUC).

This is a qualitative and quantitative study, as besides the descriptive textual approach it also sought to translate into numbers some aspects related to conservation units. For Moresi (2003), while the qualitative research seeks to interpret inseparable interfaces which cannot be translated into numbers, the quantitative approach uses the statistical practice, using, for example, percentage and mean.

The research focused efforts on organizing an updated theoretical framework on conservation units in the State of Rondônia, and related its environmental importance to sustainability.

As for the management, the study investigated management plan, number of servers, areas of CUs, participative management and formation of mosaics.

Results and discussion

The State of Rondônia contains fourteen nature conservation units created by the Union. Among these, seven belong to the permanent preservation group, arranged in three categories of those described in the SNUC, National Parks (Pacaás Novos, Campos Amazônicos, Mapinguari, and Serra da Cutia), and

Biological Reserves (Jaru, Guaporé, and Cuniã Ecological Station).

Belonging to the group of sustainable use, there are seven arranged in two categories, National Forests and Extractive Reserves, respectively Bom Futuro, Jacundá, Jamari, and Barreiro das Antas, Cautário River, Ouro Preto River, and Cuniã Lake.

Part of the area of these CUs is in the State of Amazonas (AM) and Mato Grosso (MT), not limited to the borders of the State of Rondônia. In this situation are Cuniã ECES, which has one of its boundaries to the city of Canutama (AM), with 72,628 ha (Brasil, 2010), Mapinguari NAPAR with 1,399,992 ha, distributed in Canutama and Lábrea, both cities in the State of Amazonas, and Campos Amazônicos PARNA with 83% of its territory in the AM and 2% in MT.

The acts of creation also distinguished two historical moments when the federal CUs of Rondônia were created; the first still based on phytogeographic and priority areas described respectively by Ducke and Black in 1953 and Wetterberg et al. in 1976 (Rylands and Pinto, 1998), and the creation took place in the late 70s and during the 80s resulting in 3 full protection units and two sustainable use units (Tables 1 and 2), in a political moment of attention to the United Nations Conference for Human Environment, 1972 in Stockholm, followed by the enactment of the law establishing the National Environmental Policy (Brasil, 1982).

A second round of creation, motivated by the duration of international agreements to which Brazil is a party, in particular the Convention on Biological Diversity (MMA, 2002) and the identification of new priority areas for the Brazilian Amazon (MMA, 2001) and also by the Amazon Protected Areas Program, gave rise to the other CUs. This latter was largely responsible for the creation of many units in the initial decade of this century and still funder of others created in the first period (ISA, 2011).

The ARPA Program supports 56 protected areas across the country and the

State of Rondônia houses 8.93% of these. Importantly, this State has an area of approximately 3,384,708 ha in federal CUs, including 28.79% of sustainable use and 71.21% of full protection. Comparing the total area of these units, just over 60% is within the State boundaries, with the remainder distributed among the States of Amazonas and Mato Grosso (ARPA, 2014).

Table 1. Federal Full Protection Conservation Units of Rondônia, decrees of creation, total areas and areas on the limits of RO.

Conservation Unit	Creation	Total area (ha)	Areas on the limits of RO	Servers number
Cuniã Ecological Station	Decree of September 27, 2001.	189,661.23 20	117,033.2320	18
Pacaás Novos National Park	Decree 84,019 of September 21, 1979.	764,801	764,801	24
Campos Amazônicos National Park	Decree of June 21, 2006.	961,320	144,198	4
Mapinguari National Park	Decree of June 5, 2008.	1,572,422	172,430	26
Serra da Cutia National Park	Decree of August 1, 2001.	283,611.70 00	283,611.7000	1
Guaporé Biological Reserve	Decree 83,716 of July 11, 1979.	600,000	600,000	19
Jaru Biological Reserve	Decree 83,716 of July 11, 1979.	328,150	328,150	35

The servers number contemplates servers permanent, temporary, trainees and outsourced.

Table 2. Federal Sustainable Use Conservation Units of Rondônia, decrees of creation, total areas and areas on the limits of RO.

Conservation Unit	Group	Creation	Total area* (ha)	Servers number**
Bom Futuro National Forest	Sustainable Use	Decree 96,188 of June 21, 1988.	97,357	14
Jacundá National Forest	Sustainable Use	Decree of December 1, 2004.	220,644.5225	3
Jamari National Forest	Sustainable Use	Decree 90,224 of September 25, 1984.	215,000	5
Barreiro das Antas Extractive Reserve	Sustainable Use	Decree of August 7, 2001.	107,234.2574	2
Cautário River Extractive Reserve	Sustainable Use	Decree of August 7, 2001.	73,817.4975	3
Ouro Preto River Extractive Reserve	Sustainable Use	Decree 99,166 of March 13, 1990.	204,583	***
Cuniã Lake Extractive Reserve	Sustainable Use	Decree 3,449 of May 9, 2000.	55,850	5

*The total area of all Sustainable Use Conservation Units is on the limits of RO.
**The servers number contemplates servers permanent, temporary, trainees and outsourced.
***Not informed

The average number of server is one effective employee for an approximate area of 156,665 ha, consigning all strictly protected areas, and the best situation is found in the Jaru Biological Reserve, with an employee for about 27,000 ha. In the sustainable use group, the situation is not different, with approximately 74,960 ha for one effective servant. There are other workforces, such as firefighters, however, they are temporary and exercise a specific function in relation to fighting fires. Of the UCs evaluated, 69.23% have no partnership with other agencies or entities to provide better conditions for fulfilling the role to which they are intended.

The following aspects in the SNUC were analyzed: management plan, composition of mosaics, overlap and proximity to other UCs. 38.46% has no Management Plan and yet there are managements plans not reviewed since 1984, hardly applicable to the current reality.

Souza Jr. et al. (2005) consider the creation of mosaics as a means of surveillance of the most critical locations by the government. Of the 14 Conservation Units, only five make up mosaics, such as the Jacundá National Forest, the Cuniã Lake Extractivist Reserve, the Cuniã Ecological Station, the Amazonian National Park and the Jaru Biological Reserve. There are areas in all conservation units which are overlapped, juxtaposed or close to each other. The overlaps occur with indigenous lands. Despite the proximity of some units, 53.84% do not compose official mosaics or has integrated management, and not always the two conditions occur simultaneously.

A study conducted in Federal UCs in Rondônia using the method Rappam (MMA, 2014) concluded that the vulnerability of conservation units is related to ease of access to areas, low hiring and maintaining employees, with the most critical aspects being the inadequate human and financial resources for enforcement; lack of participatory management, management plan and center to receive visitors. It also considered the strictly protected group as the one with more

effective management than the sustainable use group (WWF Brasil, 2011).

As for support resources, all federal conservation units of Rondônia have vehicles (motorcycles, cars or boats). Among the thirteen units, only three have infrastructure to receive visitors, but other factors influence the opening of units to the public, as the legislation itself and cases of overlap with indigenous lands, as in Pacaás Novos NAPAR. It is noteworthy that there are cases where such headquarters are the same used as support for monitoring.

Data organized by the Social Environmental Institute showed that, in 2010, 70% of the management plans of the Legal Amazon Conservation Units had not started or not completed. Participative management is a means of taking the community close to the conservation unit and thus defending and protecting it. In Rondônia, 30% of the units had no participative management. The instruments brought by SNUC (advisory council and deliberative council) are not enough, and in some cases, units that even having council do not have participative management.

Discussing the topic, Abreu and Pinheiro (2012) pointed out that even after ten years of creation of the SNUC, the implementation of councils is time consuming due to the bulky need for resources, even citing the Amazon geography and the lack of appropriate means of communication, as barriers to meetings of the members.

From an ecological perspective and regarding the preservation of biodiversity, there is a great concern with the existence of roads within these protected areas, insofar as factors such as hunting and deforestation are stimulated with the ease of access. This is a worrying situation, since 83.33% of the strictly protected group has roads in the vicinity and even crossing the unit, such as the case of the Mapinguari PARNA, which is crossed by the Transamazon highway (BR-230).

Results of the IMAZON research on human pressure in the Brazilian Amazon rainforest report that areas under consolidated pressure are highly

concentrated near roads and also mention the proximity to the Transamazon Highway (IMAZON, 2005).

Conclusion

Unfortunately, the situation of the Brazilian conservation units and, without distinction, those managed by ICMBio in the State of Rondônia, is chaotic. In a first aspect, the protection of the public *munus* is ineffective, both by the lack of concern of the state to provide adequate inputs - human, material, logistical resources - to the CUs, leading, for example in the case of human resources, to a lack of adequate and properly trained staff, delaying the provision of information to the community.

In a second approach, effective service to provide support for these protected areas to not fall into inertia is imminently required. It is required more research, especially in relation to biodiversity sustained by these areas, the relationship with traditional people and society awareness mechanisms for cooperation and joining forces to the use of these areas, as required by law and as is necessary for preservation or conservation, according to the group to which these areas belong.

Following this reasoning, federal universities, federal institutes for science, education and technology, private centers for teaching, applied research institutions should sign agreements with the ICMBio for the advance in research, teaching and extension within and in the surrounding areas to these conservation units, in order to bring knowledge closer to society, making environmental education an effective instrument to value these areas.

Nature conservation units for preservation of environmental samples are extremely important. Nevertheless, the management effectiveness involves the ability of these areas to achieve the goals to which they are created: biodiversity protection - including endangered animals in unique habitats and peaceful coexistence with traditional communities, in some cases.

In this way, each category plays a key role, so it should become more effective the exploitation of mosaics and also adequate monitoring of indigenous lands that overlap the CUs, to bring the information to reality.

It is not enough the compliance with international agreements to which Brazil is a party, such as the Convention on Biological Diversity, which provided for creating several units to meet the required area. Moreover, it is essential to consider the pressures that directly affect these units, highlighting deforestation, roads in and around the units and poaching in the State of Rondônia.

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