

Biodiversidade, Espécies Ameaçadas e Sustentabilidade

**Avaliação da efetividade de implementação
e manejo de Unidades de Conservação localizadas
nas regiões oeste e noroeste do Paraná (Brasil)**

**Effectiveness and management of
Conservation Units in the west and northwest
regions of Paraná (Brazil)**

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Protected areas have been created around the world as a response to the gradual decrease of biodiversity, and to the high pressures on natural resources (PIMM *ET AL.*, 2014; CHIARAVALLOTTI *ET AL.*, 2014). Delineation of areas for legal protection is an essential strategy to the maintenance of species and their habitats (GELDMANN *ET AL.*, 2013), since these sites allow in situ conservation of their biological diversity (GODOY & LEUZINGER, 2015).

Conservation units were enacted in Brazil by the Federal Law 9,985 of July 2000, which created the National System of Conservation Units (SNUC) and defined two major groups for classification of part of the protected areas in the country: Conservation Units of Integral Protection, and Conservation Units of Sustainable Use. These two groups were defined considering the society's point of view: the preservationist, which advocates for the untouchability of natural resources, and the socio-environmentalist, which considers the social participation in management mechanisms (BRASIL, 2000).

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The SNUC was created to unify and standardize the administration and management of Brazilian conservation units, which are key for conservation of species and ecosystems (BERNARD *ET AL.*, 2014). Brazil stands out with the largest system of protected areas in the world, with 1,930 conservation units that cover 1,513,366 km² (MINISTÉRIO DO MEIO AMBIENTE, 2016).

Despite its relevance as a conservation strategy, only 22% of the protected areas in the world are properly managed, and only half of the tropical reserves are effective (LEVERINGTON *ET AL.*, 2010; LAURANCE *ET AL.*, 2012). These areas represent a mechanism for conserving biological diversity, however, they face several difficulties in meeting this objective. Therefore, evaluation and discussion about their management effectiveness is essential, since this analysis can be used as an indicator that assists in facing the current management challenges (CHIARAVALLOTTI *ET AL.*, 2014).

In this context, the objective of this study was to evaluate the effectiveness and management of conservation units in the west and northwest regions of Paraná, Brazil, since targeting these areas for scientific researches is essential for the improvement of management strategies.

MATERIAL & METHODS

This study was conducted in nine conservation units in the west and northwest regions of the state of Paraná, Brazil, from the October 2014 to July 2015. The evaluated units and their respective municipalities and areas are presented in Table 1.

Table 1. List of conservation units located in the western and northwest regions of Paraná included in this study

City	Unit name	Area (ha)
Amaporã	Parque Estadual de Amaporã	198.00
Cianorte	Reserva Biológica das Perobas	8,716.00
Diamante do Norte	Estação Ecológica do Caiuá	1,449.48
Foz do Iguaçu	Parque Nacional do Iguaçu	185,262.50
Guaíra	Parque Nacional de Ilha Grande	78,875.00
Palotina	Parque Estadual São Camilo	385.34
São Pedro do Iguaçu	Parque Estadual da Cabeça do Cachorro	126.47
Três Barras do Paraná	Parque Estadual Rio Guarani	2,235.00
Umuarama	APA das Ilhas e Várzeas do Rio Paraná	1,005,180.71

The effectiveness and management of these conservation units was evaluated using questionnaires and interviews applied to employees of the Chico Mendes Institute for Biodiversity Conservation (ICMBio), regarding the federal units, and of the Environmental Institute of Paraná (IAP), regarding the state units. The questionnaire and interview encompassed general questions about the management of the protected areas, and questions based on previous studies on the unit management plans—when it was available in the official website of the institutes.

The questionnaire was applied to each manager together with the interview. The questionnaire addressed issues related to the management of these areas, and objective answers were possible. The interviews focused on collecting information about the units and the main problems faced by each one of them, allowing the interviewees to share experiences, advancements and potentialities of the study areas.

The effectiveness and management of these areas was evaluated based on the analysis of number of employees, existence and updating of management plans, level of understanding of this document by employees, planning of activities carried out in the unit, and application of results obtained by studies developed in the management of the area. Each of these issues was graded as 1 (insufficient condition), 3 (intermediate condition) or 5 (satisfactory condition) and the sum of the grades generated groups of units in optimal (24 to 30), satisfactory (16 to 23) and unsatisfactory (8 to 15) management.

RESULTS

The results obtained showed that all evaluated conservation units had insufficient number of employees to meet their demand. The managers stated that the current number of employees does not compromise the basic activities necessary for the proper maintenance of the areas, however, it limits the development of new programs.

The managers emphasized the scenic beauty of the areas as the main attraction for visitors who search contact with nature for recreation and leisure, even though they may not understand the main goal of the conservation area. All interviewees point out the environmental value as the main feature of the area, i.e., considered its importance for conservation of the ecosystem and the species in it.

Public visitation is allowed in eight of the nine units studied, therefore, the measures adopted to guide visitors of the area were questioned. Information on environmental education, and the use of guides or volunteers in the trails during visitation were the main strategies reported, both of them found in 33% of the questionnaires.

Eight units had management plans (89%), however, this document was outdated in five of them (56%). In addition, the understanding of the employees about the management plan, and the frequency that they consult it for planning the activities in the conservation unit were assessed. These results are shown in Table 2.

Table 2. Existence and update of the management plans, understanding that the employees have of this document and frequency with which it is consulted to plan the activities in the area.

	Exist	Updated	Understanding	Use in management
PE São Camilo	Yes	No	Median	When is necessary
PE Cabeça do Cachorro	Yes	No	Median	When is necessary
PE Rio Guarani	Yes	No	Median	When is necessary
PE Amaporã	Yes	No	Low	When it will be updated
PARNA Iguaçu	Yes	Partly	Media	Regularly
PARNA Ilha Grande	Yes	No	High	Regularly
REBIO das Perobas	Yes	Yes	High	Regularly
EE Caiuá	Yes	Yes	High	Regularly
APA Rio Paraná	No	-	-	-

Assistance for development of scientific researches is another important feature of these conservation units. Conduction of scientific researches is allowed and encouraged in all evaluated units, and seven (78%) of the nine units evaluated are frequently used for scientific researches. According to most of the interviewees, these studies are extremely important, however, in many cases the results obtained by the researchers are not easily available.

According to the managers, inspections are routinely performed, since the simple fact of being daily in the unit is a mechanism that, although indirect, is efficient for the monitoring of the area. In addition, they emphasized actions involving the management bodies (89%), and the support of the Environmental Police (67%) and Federal Police (44%) in previously scheduled operations. The main sources of financial resources for the management of the areas include compensatory measures, received by 89% of the units. Projects for fundraising and the Brazilian ecological tax (ICMS Ecológico) were also reported as financial resources in 33% on the areas.

The environmental impacts reported as strong or very strong in each of the units are shown in Table 3; public visits (67%) and hunting (56%) were considered the main cause of these impacts.

These environmental impacts had different levels in the units evaluated. The interviewees point out inspection (100%), monitoring (100%) and environmental education (67%) as important mechanisms for raising awareness and reducing environmental impacts.

Table 3. Impacts listed as strong (S) or very strong (VS) in the evaluated conservation units.

	Hunt	Fishery	Agric.*	Grazing*	Occupation*	Dams	Roads	Pub.
PE São Camilo	S							VS
PE Cabeça do Cachorro	S							VS
PE Rio Guarani	S							VS
PE Amaporã			S	S				S
PARNA Iguaçu	S		S			S	S	
PARNA Ilha Grande		VS			S	S	S	S
REBIO das Perobas	S							
EE Caiuá		S	S			S		
APA Rio Paraná	VS	S	S			VS		S

*Impacts observed around the conservation unit

According to these results, and following the scoring criteria used to evaluate the effectiveness and management of the units, six (67%) of them had satisfactory, two had optimal (22%), and one had unsatisfactory (11%) management conditions.

DISCUSSION

Many of the difficulties for the effective management of the conservation units are due the number of conservation areas created in recent years, which had not followed by a complete management structuring, even in the management bodies (ALVES *ET AL.*, 2011). This caused managerial challenges, such as the insufficient number of employees in the conservation units evaluated. Although the managers recognize that the number of employees directly acting in the management is low, they do not have means for hiring new personnel.

Regarding the recreational potential of the area — the main attraction of the unit for visitors — SILVA & MAIA (2011) affirm that the increased discussions about the environment in the last decades and the valorization of the contact with the nature resulted in an increase in the number of visitors to protected areas. Although the conservation units present several problems, they have the structure and attributes required for the development of touristic activities, which can be stimulated to be an ally in the conservation of the areas (LOPES & SANTOS, 2014). Public use generates benefits; however, it can have physical, biological and social negative impacts when poorly planned, compromising the environmental conservation, life quality of the local community, and the public use of the

units itself (NASCIMENTO *ET AL.*, 2016). Therefore, plan the development of these activities is fundamental to ensure the least negative impacts on natural resources.

A management plan consists of a document in which the diagnosis of the conservation unit is described, addressing social, environmental and historical aspects. It aims to detect threats, pressures, opportunities and potentialities of the protected areas. Moreover, it includes the zoning that regulates the territorial occupation and the use of resources, and establishes the rules for management of areas in their surroundings (BRASIL, 2000; SANTOS, 2011). During the interviews the managers point out that the management plan is updated every 5 years, since it contemplates a survey of data that does not change significantly in a short time. They also emphasized that its elaboration requires a multidisciplinary team and high investments that are usually lacking.

According to URBAN (2002), the management plan has to be understood as more than a document or a bureaucratic step, since it is necessary to fulfill the objective of conservation unit, and defines the best way to conserve the biological diversity and ecosystem, guiding the activities to be carried out in the conservation unit. This document is mandatory, however, its elaboration and implementation are usually not well consolidated. MEDEIROS & PEREIRA (2011) estimated that only 15% of the conservation units in Brazil has a management plan duly approved and updated. These facts denote a worrisome problem of management planning in the areas, and a challenge to be faced, since carrying out the management activities established in the plan is fundamental to ensure the maintenance of the area and the conservation of the ecosystem.

The development of environmental, economic and social scientific researches in the units are very important for the short, medium and long term management. However, although the conservation units present a great number of requests for the development of researches, few of them are related to the management and preservation of the ecosystem (LUZ & ELIAS, 2014). Universities, colleges and research institutes could contribute to the effectiveness of management strategies (MEDEIROS & ARAÚJO, 2011). Therefore, researchers of these areas should formally, or even informally, present their results to the managers of these conservation units; and these managers should, whenever possible, monitor the development and results of these researches and apply them when appropriate.

Regarding the inspection of conservation units, VERÍSSIMO *ET AL.* (2011) stated that actions involving it depend on a management strategy that considers a minimum budget. According to these authors, the planning of

local inspection and remote monitoring with the participation of federal and state environmental agencies and the Public Ministry is important to ensure the integrity of conservation units. The interviewees reported that inspection and monitoring are constant activities in the conservation units, however, the number of employees is low. Moreover, some areas are very large and have difficult access; and economic barriers may compromise their effectiveness.

The main sources of resources of the conservation areas are the Brazilian ecological tax (ICMS Ecológico) and compensatory measures, which are environmental valuation mechanisms. According to NASCIMENTO *ET AL.* (2011), these mechanisms have been increasingly debated in the states of Brazil; Paraná created the Brazilian ecological tax (ICMS Ecológico) as an instrument of nature conservation, destining up to 25% of the municipality's ICMS tax collection for this purpose, according to local environmental and social indicators. According to DIAS (2011) compensatory measures are an instrument of the government to determine the inclusion of the environmental protection issue in the economic planning; and these measures have consolidated the National System of Conservation Units (SNUC). Environmental valuation measures allow the creation of new conservation units and contribute to the structuring of management bodies, and the accomplishment of activities established in their management plan.

The interviewees reported that the main cause of environmental impacts was the public visitation. This activity must be well planned, focusing in maximizing the benefits of tourism in these areas and minimizing negative impacts on the environment. Most of the evaluated units allow public visitation, thus, tourism activities promoted in this areas must be well managed and not compromise the accomplishment of other projects and programs (SIMONETTI AND NASCIMENTO, 2012).

The management of most of the evaluated conservation units was satisfactory. Despite the numerous political, economic and social barriers, the conservation units have been minimally reached their objectives. However, there are still many challenges to be faced to these units to become effective conservation strategies, but important achievements have been observed over time. The great challenges for the units, in general, are the understanding and use of the management plans as more than a legal requirement and a bureaucratic step, using it as an important work tool; and the use of the results obtained by scientific researches, conducted in the conservation units regarding the management of these areas.

SUMÁRIO

As unidades de conservação compreendem uma importante estratégia para conservar a biodiversidade, contudo, encontram vários desafios que precisam ser superados para se consolidarem como um mecanismo eficaz de proteção aos recursos naturais. Diante disso, o objetivo geral deste trabalho foi avaliar a efetividade de implementação e manejo de nove unidades de conservação localizadas nas regiões oeste e noroeste do Paraná utilizando aplicação de questionários e entrevistas com os gestores dessas áreas. Observou-se que em todas as unidades de conservação avaliadas o número de funcionários não é suficiente para atender a demanda de atividades e que apesar de 89% das unidades apresentarem plano de manejo, em 56% delas está desatualizado. A avaliação de efetividade destas áreas de acordo com os critérios de pontuação adotados mostrou que 67% das unidades apresentaram condições de implementação e de manejo satisfatórias, pois apesar das inúmeras barreiras econômicas, políticas e sociais têm cumprido minimamente os seus objetivos de criação.

PALAVRAS-CHAVE: conservação da biodiversidade; áreas protegidas; estratégias de manejo

SUMMARY

The implementation of conservation units is an important strategy to conserve biodiversity, however, their consolidation as an effective mechanism for protecting natural resources faces several challenges. Therefore, the objective of this work was to evaluate the effectiveness and management of nine conservation units in the west and northwest regions of the state of Paraná, Brazil, by application of questionnaires, and interviews with managers in these areas. All evaluated conservation units had insufficient number of employees to meet their demand, and the management plan of 56% of the 89% units that had a management plan were outdated. According to the adopted criteria to evaluate the effectiveness of these conservation units, 67% of them presented satisfactory implementation effectiveness, and management conditions, because they have minimally fulfilled their objectives, despite the several economic, political and social barriers.

KEYWORDS: biodiversity conservation; protected areas; management strategies

RESUMÉ

Les unités de conservation constituent une stratégie importante pour la conservation de la biodiversité, mais elles rencontrent un certain nombre de défis qui doivent être surmontés afin d'être consolidés en tant que mécanisme efficace de protection des ressources naturelles. Par conséquent, l'objectif de ce travail était d'évaluer l'efficacité de la

implémentation et de la gestion de neuf unités de conservation situées dans les régions ouest et nord-ouest du Paraná, en utilisant des questionnaires et des entretiens avec les gestionnaires de ces zones. On a observé que dans toutes les unités de conservation évaluées, le nombre d'employés n'est pas suffisant pour répondre à la demande d'activités et que malgré le fait que 89% des unités ont un plan de gestion, 56% d'entre elles sont dépassés. L'évaluation de l'efficacité de ces zones selon les critères de ponctuation adoptés a montré que 67% des unités avaient des conditions de implémentation et de gestion satisfaisantes, car malgré les nombreuses barrières économiques, politiques et sociales, elles ont minimalement rempli leurs objectifs de création.

MOTS CLÉS: conservation de la biodiversité; places protégées; stratégies de gestion

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