

Special Issue

Changing a Brazilian Protected Areas Paradigm: Why Public Use is Not Just Optional

Ernesto Bastos Viveiros de Castro

Executive Summary

Over the last few decades, Brazilian National Parks followed a paradigm suggesting that public use is only a superfluous activity that can be developed after the full implementation of a Protected Area, which we refer to as the “cherry on the cake paradigm.” This case study aims at discussing whether the increase of public use activities is related to the development of other management activities. This is done by using selected indicators from Serra dos Órgãos National Park (SONP) and investigating aspects of the history of this protected area. The results indicate that if it is not possible to conclude that public use causes improvement in other management activities, there is a strong relationship between the number of visitors and other management indicators. In contrast to what happens in Brazil, our results suggest that public use should be taken into account by protected area managers from the moment of its creation. By doing this, public use contributes significantly to protected areas’ image improvement and to the gain of allies for conservation.

Keywords

Brazilian national parks, national park management, public use, tourism

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Introduction

The natural beauty and potential for recreation and contemplation influenced strongly the creation of the first national parks in the world (Davenport & Rao, 2002; Eagles & McCool, 2002). The first conservationists who advocated for Parks emphasized the importance of an increasingly urban population to have direct contact with nature in order to understand the importance of conservation (Muir, 1901). It has long been accepted that tourism can be a useful and effective tool for conservation and management of protected areas and that well-managed tourism can provide financial and political support to protected areas (Ferraro & Hanauer, 2014; Wilson & Tisdell, 2003). Tourism may also lead to a greater understanding of conservation values, which in turn can lead to more areas being protected (Priskin & McCool, 2006).

In Brazil, the first national parks were also created in areas with exceptional beauty that were visited even before their designations (Lucena, 2006). Despite their origin associated to public use, only 38 of 72 Brazilian National Parks record visitor numbers and few parks offer adequate infrastructure for public use (Souza et al., 2018). Even parks located in important ecotourism destinations are considered officially closed to visitors despite the intense uncontrolled use.

During debates to establish new national parks, one of the main arguments often presented to gather support of local communities is the potential to generate new sources of financial income from tourism, to improve the local economy (ARPA, 2010). However, what commonly happens in Brazil is the prohibition of any public use activity immediately after the creation of a park. For instance, sites traditionally used for outdoor sports or recreation, like trails, waterfalls, or climbing walls, can be closed after receiving a national park designation. The argument for these closures are that a protected area has no management plan and adequate structure to manage public use. Nonetheless, the elaboration of a management plan can take several years or even decades to be made, postponing the regulation of public use activities indefinitely.

In Brazil, public use has been historically seen as a less important and superfluous activity when compared to other protected area management actions. It is considered a “finishing touch” in protected area implementation (i.e., good but unnecessary, which we refer to as the “cherry on the cake paradigm”). This view is constantly reaffirmed and even appears in governmental planning and international cooperation programs, like the ARPA (Amazon Region Protected Areas Program). The ARPA is the largest program that supports the implementation and the management of protected areas in Brazil (ARPA, 2011). The ARPA is sponsored by the Global Environment Fund and several other international partners, which supports 64 protected areas covering a total area of 32 million hectares (Bueno et al., 2011). Yet, the ARPA program does not provide support for the implementation of public use in protected areas. During the first implementation phase of a protected area, actions taken by the ARPA include the development of a management plan, the establishment of an advisory board, the acquisition of private lands, and the development of a protection plan. During the second stage of the protected area implementation (named consolidation), activities likely to be supported by ARPA are research and monitoring, without any references to public use (ARPA, 2011).

This seems to be a Brazilian idiosyncrasy and no similar cases were found in the literature. This scenario was presented during an international debate on protected

areas. Many non-Brazilian protected area specialists reported that the situation in their countries is different, having difficulty to understand the Brazilian issue. Even in less developed countries, such as Cameroon (Josiane Gakou, pers. comm., 2012), DR Congo (Dominique Bikaba pers. comm., 2012) and Malaysia (Rashida Maqbool, pers. comm., 2012), public use is usually integrated from the beginning of a protected area's implementation process.

This case study aims at discussing the relationship between public use and other management activities, using data from Serra dos Órgãos National Park. The hypothesis presented here is that the growth of public use activities is related to the development of other management activities (i.e., research and protection), strengthening the management of a protected area. Ultimately, this is hypothesized that public use growth results in better conditions to protect and conserve biodiversity.

Methods

Study Area

Serra dos Órgãos National Park, created in 1939, is the third oldest national park in Brazil. Located in Rio de Janeiro State (Figure 1), it protects 20,030 hectares of Atlantic Forest. The Atlantic Forest is one of the five most threatened biodiversity hotspots in the planet (Myers et al., 2000; Mittermeier et al., 2005) and is recognized as a Biosphere Reserve by UNESCO. The park is located in one of the largest Atlantic Forest remnants and is connected to other protected areas.

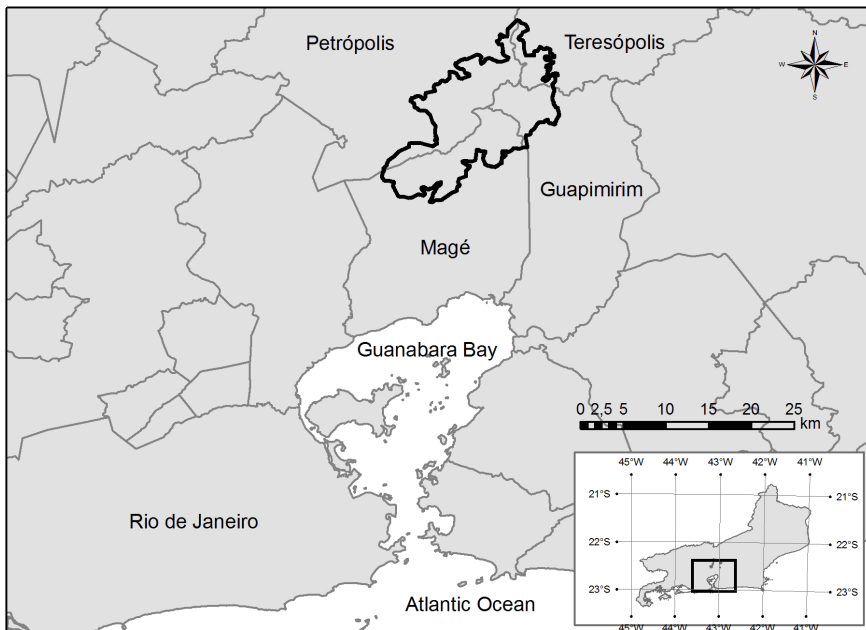


Figure 1. Map of Serra dos Órgãos National Park, Brazil.

SONP has a unique mountainous topology and is the highest section of Serra do Mar mountain chain. Altitude in the park varies from 80 to 2,275 meters above sea level. This wide altitudinal gradient has generated high richness of habitat and species. Despite gaps of knowledge for some taxa and the fact that most biodiversity studies are concentrated in few areas, more than 2,800 species of plants were recorded. There are records of 462 bird species, 105 mammal species, 104 amphibians species, 82 reptile species, totaling 753 species of vertebrates at SONP, which represents about 20% of the known vertebrate species in Brazil in an area of 0.00235% of the Brazilian territory (Cronemberger & Viveiros de Castro, 2009).



Figure 2. Lookout and the view of Dedo de Deus Mountain, in Serra dos Órgãos NP, Brazil.

Besides the importance of its biodiversity, SONP protects the Dedo de Deus (meaning God's Finger, Figure 2), a geologic monument nominated as a Brazilian Natural Heritage by the National Institute of Historic and Artistic Heritage (IPHAN). Its exceptional landscape value attracts tourists and represents an important asset for local development. The park receives more than 200,000 visitors each year, being one of the most visited and having the largest trail system in Brazil. with the trail system ranges from a canopy trail with accessibility to people with disabilities, to an overnight trail that crosses the Park's mountains. Outdoor activities were practiced in this area before the Park's creation and are closely related to SONP's history. The first climbing route to Dedo de Deus, in 1912, is considered a landmark of Brazilian Climbing. Despite its importance for biodiversity conservation and outdoor recreation activities, SONP faces several threats: urban growth, pollution from Rio de Janeiro's industrial zone, poaching, and criminal fires caused by pasture burning.

History and Data Analysis

The relationship between public use and other important protected area management activities was evaluated using available data for the period of 2001–2010. The indicators used are related to activities such as scientific research and law enforcement capacity; as well as management conditions such as staff size and budget for general maintenance. Data were collected from the Park Management Plan (Viveiros de Castro, 2008) and administrative reports. The indicator for intensity of public use corresponded to the number of visitors per year. Research effort was represented by the number of authorized research projects. The SONP's annual budget was used as an indicator of park maintenance conditions. The staff size, including permanent and temporary workers, was used as an indicator of work capacity. To test if the eventual staff increase was only related to the needs of the increasing number of visitors, the number of employees working in other activities (not related to public use) was also included in the analysis as a separate indicator. To represent law enforcement efforts and protection effectiveness, the number of environmental fines issued during the park's monitoring routine was used. This indicator has limitations, since it is expected that effective monitoring will lead to a reduction in the number of fines over time. However, this metric was used considering that law enforcement efforts are still insufficient to inhibit all environmental crimes in the region and is based on the premise that the increase in number of fines is directly related to the increase in protection levels (Hargrave & Kis-Katos, 2013). The relationship between the intensity of public use and the described indicators was tested using Pearson's correlation index with a 95% confidence interval (Zar, 1999).

These indicators have several limitations due to the scarcity of available data. There are difficulties in the management of Brazilian protected areas, such as the lack of resources and personnel. This results in limited data available for historical analysis and decision making. The only available data about economic conditions for that period is the annual budget. While it would be interesting to analyze the evolution of the park's regional economic impacts, there are no such historical data. Collection of this type of data has only become available recently (Medeiros & Young, 2011; Souza, 2016). Finally, historical documents were consulted, and interviews with experienced mountaineers and old employees were conducted. Specifically, we were looking for historical events that could exemplify the relationship between public use and other management activities. The historical events were used only for the discussion of the results. Data from other protected areas or from the protected area systems were also used for comparison.

Results

All indicators show an upward tendency during the period analyzed (2001–2010), as shown in the graph (Figure 3).

The number of visitors showed a high and significant correlation with all indicators tested (Table 1). The highest correlation values were encountered for the number of employees who do not work directly with public use ($r = 0.962$, $p < 0.001$), followed by the number of authorized research projects ($r = 0.942$, $p < 0.001$), employees in general ($r = 0.936$, $p < 0.001$) and fines issued ($r = 0.793$, $p = 0.006$). The lowest correlation was with the budget for maintenance ($r = 0.769$, $p = 0.009$).

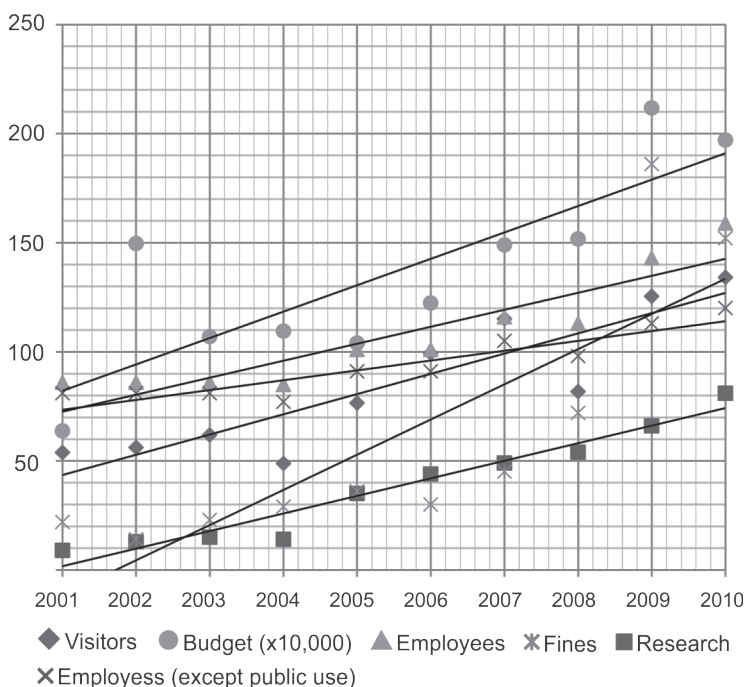


Figure 3. Tendency of Management Indicators in Serra dos Órgãos NP, Brazil between 2001 and 2010.

Table 1

Correlation (Pearson's Correlation Index 'r') between the Number of Visitors and Management Indicators at Serra dos Órgãos NP, Brazil.

		Research projects	Number of employees	Number of employees (except public use)	Number of fines	Budget
Visitors	r	0.9418	0.9361	0.9617	0.7926	0.7690
	p	< 0.0001	< 0.0001	< 0.0001	0.0062	0.0093

Discussion

Results show that there is a significant correlation between the number of visitors and other indicators, which leads to the conclusion that there is a relationship among these different areas. Growth of public use is related to improvements in indicators of research, law enforcement, and structure of the park. Likewise, when the number of visitors is nearly stagnant, other indicators show lower rates of growth as well. This relationship can be a result of increase in protected area visibility when there is public use, which generates greater social control and positive public pressure for its implementation, as well as garner the sympathy of users for conservation efforts. This assumption is well founded in many events throughout the history of Serra dos Órgãos NP and other Brazilian parks, but it has not yet been studied and documented.

Although there are few studies that estimate public support for the existence of the National Park (Ladle et al., 2016), there are historical facts that highlight the potential of public use to garner support for SONP's management. In the 1950s there were still no laws to prevent building in areas declared as a park but not yet acquired by federal government. A project to establish a village at the base of the mountain Dedo de Deus was a real threat to the park's integrity. Brazilian mountaineering clubs created a movement to raise funds and to pressure the federal government to provide financial resources, which guaranteed the purchase of this area and its ultimate protection. At this event, an area of 168 hectares was purchased, which included popular hiking and climbing routes. The remaining area of the same property was not acquired at that time and was occupied with 47 buildings (ICMBio, unpublished data). Although still inside the park, this area has not been bought until today. This is a good example of how public use can contribute to the land tenure issue, which is considered a major obstacle to the effectiveness of protected areas in Brazil (Albuquerque et al., 2010).

Another aspect in which the public use contributes to the management of a protected area is the economic growth of activities related to tourism in the surrounding of protected areas, such as hotels, restaurants, travel agencies, and transportation (Moisey, 2002). National parks are often the main attraction that keeps tourism in vast regions (Meyer, 2008; Viveiros de Castro et al., 2015). Considering the economic contribution that may come from tourism, in relation to opportunity costs of other land use options, the cost-benefit analysis can change when establishing a protected area. The perception that the existence of a park has a positive influence on local economies can neutralize any resistance from people who have their traditional activities limited by the park's existence (Moisey, 2002), a problem often faced in Brazilian protected areas. Tourism in Brazilian national parks is still far below its potential, receiving only 8,071,018 visitors in the whole federal protected area system in 2015. Nevertheless, the activity had an impact of USD 1.23 billion in local economies and generated 43,602 jobs that year. SONP generated USD 16.57 million for the local economy and generated 1,535 jobs in 2015 (Souza, 2016).

The economic potential of ecotourism is often used to garner support for the creation of protected areas. However, the difficulty for implementing public use activities, due to the currently dominant paradigm in Brazil, has been hindering the creation of several new protected areas, such as the proposal to create a national park in Altos da Mantiqueira. Due to the closure, for decades, of trails in the neighboring Itatiaia National Park, the local Mountaineering Federation opposed the creation of the new park for fear that traditional trails in that area would also be closed (FEMESP, 2009). On the other hand, the highly developed tourism in Serra dos Órgãos NP helped in gaining public support for the park's enlargement in 2008. Not only did the local community approve the park's proposition of adding 7,674 hectares to its area, but they advocated for more area to be protected in the park, which resulted in the final incorporation of 8,991 hectares to the park's area, including some sites with high public use potential (Viveiros de Castro et al., 2008). The approval of the local community to the park is generally influenced positively by the existence of touristic activity (Eagles & McCool, 2002). The mere presence of citizens, and therefore consumers and voters, in a protected area also represents a social control that helps to ensure a better level of management and influences decision makers (Eagles & McCool, 2002). The

negative repercussion of any administrative weaknesses stimulates allocation of funds for maintenance in protected areas open for visitation rather than in protected areas with no public use and control. In addition, parks that charge entrance fees have a concrete reason to ask government for more resources for maintenance, since a low level of maintenance reflects in fewer visitors and less tax revenue to the system, which may explain the significant correlation between the number of visitors and the available budget (Table 1). The decline in resources for Serra dos Órgãos maintenance between 2009 and 2010 is due in part to the beginning of a concession contract that includes many services for public use support, which reduced operating costs absorbed by the concessionaire such as part of the provision of staff and maintenance of facilities. It does not consist, therefore, in real reduction in resources available for maintenance. Now, instead of resources for maintenance coming uniquely from the Federal treasure, they come from private operator funds as well. If the resources invested by the concessionaire had been considered, the correlation could be even higher.

Another factor that may explain this relationship is the use of physical structures to support public use in other activities of the protected area. One example is the Petrópolis-Teresópolis overnight trail that crosses the park's mountains. Until the 1990s there was no entrance gate or any control at the Petrópolis access, leaving public use uncontrolled and hindering the recovery of lost visitors. With the growth of outdoor activities and ecotourism, a checkpoint was built with the support of the local community and the municipality (WTO, 1998). The park gradually took charge of this structure and presently has a permanent staff that controls access and maintains the trails, it supports law enforcement actions, and has a fire brigade. Recently an old lodge was purchased to create a new structure, including a visitor's center, a campground, and accommodations for researchers and firefighters. Public use demand enabled the creation of this structure that enhances the management effectiveness of the protected area. However, it is important to consider that investments to manage public use must accompany the growth and diversification of public activities, but investments in large infrastructures are not always necessary before opening the park to the public. Several studies show that areas with simple structures can be more interesting for certain visitor profiles (Manning, 2011; McCool et al., 2007).

The results also show a significant correlation between visitation and the number of fines given (Table 1). Law enforcement duties include operations against irregular constructions in the park's surroundings, capture of wild birds, collection of ornamental plants, and poaching. This indicator is not ideal for law enforcement efforts as an intensification of monitoring is expected to reduce environmental crimes and the number of fines over time. On the other hand, the law enforcement department being currently understaffed, increased field efforts will be expected to increase the number of fines. Hargrave and Kis-Katos (2013) found a significant relationship between the number of environmental fines given and a reduction in deforestation rates in the Brazilian Amazon. This study suggested that the increase in the number of fines at SONP has resulted in more biodiversity protection. In this sense, park employees reported that staff growth in recent years was also related to the number of visitors, increasing the level of monitoring and surveillance activities. Law enforcement data in federal protected areas in Rio de Janeiro and São Paulo States show that Serra dos

Órgãos and Itatiaia National Parks (two protected areas with a strong tradition of public use) are better protected than other protected areas (ICMBio, unpublished data).

The high correlation between the number of visitors and the number of research projects (Table 1) shows that the visibility of national parks attracts not only tourists but also researchers. This relationship between public use and research is demonstrated by data from the whole Federal protected area System. Among the 15 top ranked protected areas regarding the number of research projects in progress, 13 (87%) are categorized as national parks and include four of the five most visited parks in Brazil (ICMBio, unpublished data). Biological reserves and ecological stations are the two categories in the Brazilian system that correspond to the IUCN Category Ia (Dudley, 2008). They exist exclusively for research and preservation. Surprisingly, only one biological reserve is among the top 15 protected areas with the highest number of research projects.

The existence of structures to support public use can also facilitate access and activities of researchers such as a good trail system and experienced guides. Cronemberger (2010) found a high concentration of research activities along the main public trails in the SONP. Another consideration is the feedback between public use and research. The existence of public use attracts researchers from fields that go beyond the study of natural resources, such as economic and social aspects related to tourism, visitor impacts, and health. In addition, information generated by research may attract more visitors due to records of the presence of charismatic species such as the threatened woolly spider monkey (*Brachyteles arachnoides*). Information can also have an indirect influence, such as environmental interpretation programs that attract more visitors. Beyond the positive feedback between public use and scientific research, research activities can contribute greatly to the public management, supporting decisions about eventual restrictions for visitors at sites of occurrence of vulnerable animal or plant populations, or other actions aimed at reducing visitor impacts.

SONP presented a fast growth in visitor numbers in recent years and experienced significant improvements in terms of management effectiveness. Evaluations using the methodology Rapid Assessment and Prioritization of Protected Area Management (RAPPAN) show this progress (Ervin, 2003; Leverington et al., 2008). In 2005, the park evaluation resulted in a 56% effectiveness index, being the 40th most effective protected area among the 246 Federal Protected Areas evaluated. In 2010, a new survey resulted in an 82% effectiveness index, being one of the four more effective protected areas among the 292 Brazilian Federal Protected Areas evaluated (ICMBio, 2011).

Finally, the benefit of public use for society awareness on the importance of biodiversity conservation must be considered as a strategy. Protected areas that do not receive visitors will have more difficulties to communicate their importance to the broad public. People who are acquainted with the natural heritage of a protected area tend to be more supportive of government actions and to engage in campaigns for conservation. Correia et al. (2018) found that National Parks (the only category of protected area that explicitly includes public use among its purposes) have higher levels of visibility, public interest, and support than other protected area categories. In this sense, protected areas with poor visibility are more exposed to successful downgrading and downsizing initiatives (Correia et al., 2018).

Conclusion

Contrary to the dominant paradigm about protected area management in Brazil, results show that public use is strongly related to other indicators of successful protected area management: research, law enforcement, and structure. These results suggest that efforts to implement public use must accompany the development of other protected areas activities in a positive feedback process to strengthen management. Since this case study is limited to only one national park and the methodology used has not been replicated, it is not possible to conclude that public use is a direct cause of improvements in other management activities. Nonetheless, this is the first study that addresses this central issue in the Brazilian system of protected areas. More studies are needed to produce better data, to enable more conclusive analyses, and to guide management strategies for this protected area system. This is important since this system is one of the largest in the world.

Finally, public use can contribute significantly to protected area consolidation, including improved image in the society and support for conservation. In contrast to the paradigm of the “cherry on the cake,” public use can and should be considered since the creation of a protected area.

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