



Research article

Strategic planning in Brazilian protected areas: Uses and adjustments

Cristiane Gomes Barreto^{*}, José Augusto L. Drummond

Universidade de Brasília, Centro de Desenvolvimento Sustentável, 70.904-970, Brasília, DF, Brazil

ARTICLE INFO

Article history:

Received 21 October 2016

Received in revised form

6 May 2017

Accepted 21 May 2017

Keywords:

Management planning

Balanced scorecard

Methodological guidelines

RAPPAM

Environmental management

Environmental planning

ABSTRACT

Management plans for protected areas commonly use strategic planning tools in their drafting. It is proposed that the adequate use of the instruments of planning and management of protected areas can improve their strategic competitiveness, providing greater financial and administrative independence, enabling them to be economically sustainable organizations. This study evaluated the application of concepts and strategy formulation, strategy principles and competitiveness, organizational diagnosis, strategic maps, scenarios, and other strategic planning instruments used for conservation management in Brazil. 25 management plans of 25 different protected areas were selected and studied, with special attention to the indicators used in each plan. Results indicate that there is a high suitability for the application of SP tools to the universe of protected areas, although management plans did not take full advantage of these tools. We also found that the broader use of these tools did not guarantee greater managerial effectiveness. We suggest that other governance variables beyond planning strategies must be improved, to ensure a better performance of protected areas.

© 2017 Elsevier Ltd. All rights reserved.

1. Introduction

Protected areas¹ (PAs) are among the main strategies employed for the conservation of biodiversity and maintenance of ecological processes around the planet (Chape et al., 2005). Once established or created, the effectiveness of these PAs depends on their implementation, which includes planning and execution of protective actions, as well as recovery of degraded areas, ecosystem management, research and monitoring, receiving visitors, among others. Concerning the complexity and the lower degree of knowledge about the conservation of tropical biodiversity, PA managers in tropical countries are faced with tough challenges in planning and management (MacKinnon et al., 1986).

Brazil is the largest tropical country and its territory as a whole hosts a world-class megadiversity (Mittermeier et al., 1997). On the other hand, two of its biomes – as Cerrado and Atlantic Forest hotspots – are facing the challenge of protecting their biodiversity and ecosystems against serious threats (Mittermeier et al., 2005). Brazil currently has a network of nearly 2000 PAs (954 federal, 765 state and 230 municipal) (CNUC, 2017). About 240 MPs were set for

Brazilian PAs (ICMBio, 2017). It has been found that the first MPs drafted in Brazil were weakly applied or misapplied, failing in their purpose of guiding PA management, besides being quite expensive. Even with MPs, most PAs face problems such as lack of supervision, deforestation, forest fires, precarious land tenure status, conflicting activities and lack of human and financial resources. So, MPs do not guarantee effectiveness in PA management (Dourojeanni, 2005).

The effectiveness of PAs is evaluated by managers with a method called Rapid Assessment and Priorization of Protected Area Management (RAPPAM),² specifically with the Management Effectiveness Index (Ervin, 2003). In 2010, the latest analysis assessed the effectiveness of 292 Brazilian federal protected areas. Despite the progress recorded by this effort, more than 77% of PAs were found to still have average or low effectiveness (ICMBio, 2011).

To guide their actions, PAs agencies worldwide use management plans (MPs) as main guidelines for the required actions and standards for conservation and use of protected ecosystems (Thomas and Middleton, 2008; Medeiros and Pereira, 2011). Since 1993, Brazilian PA agencies launched several methodological guidelines

² This method consists on a survey-based assessment that evaluates the effects of scope, impact and permanence of management activities, using a variation of the four-point scale ('poor', 'fair', 'good' and 'very good'). It has assessed over 1600 protected areas in 53 countries. Initially proposed in 2003 by WWF, RAPPAM is one of the most commonly used methodologies for effectiveness assessment across the world.

^{*} Corresponding author.

E-mail address: crisgbarreto@gmail.com (C.G. Barreto).

¹ For our purposes, we refer only to protected areas defined by Law 9,985, of July 18, 2000, in which they are called 'conservation units'.

for management planning (Ibama, 1993, 2001a,b; Ibama/GTZ, 1996; Galante et al., 2002; Chagas et al., 2003; Ferreira et al., 2004; Rodrigues et al., 2004; Gonçalves et al., 2009; Fernandes et al., 2011). These guidelines pull together basic techniques used by the federal Brazilian agency in charge of biodiversity conservation - the Instituto Chico Mendes para Conservação da Biodiversidade (ICMBio).

Some studies suggest that a strategic outlook can improve the performance of environmental planning (Joseph et al., 2008; Lockwood, 2010; Scolozzi et al., 2014). To improve management effectiveness in Brazilian PAs, the guidelines included several methodological adaptations taken from the area of business administration. In 1996, one such methodological guideline (Ibama/GTZ, 1996) explicitly adopted the concepts, tools and methods taken from the management tool known as strategic planning (SP) and applied it to the management of the Brazilian federal PAs. Increasingly, new versions of the methodological guidelines consolidate this strategic approach to the drafting of MPs. In 2002, a newly published guideline reinforced this trend (Galante et al., 2002).

Strategic planning is a management tool created in the US business community in the 1950s. It reflected a new business strategy that established the priorities and actions to be followed by an organization. Initially designed for organizations of the first and second sectors (government and private, respectively), SP tools and concepts were adapted to third sector organizations, such as NGOs, nonprofits, community groups etc. (Hudson, 1999; Madruga et al., 2004; Sousa et al., 2005). Although they are nonprofits, third sector organizations found that they needed to improve their competitiveness and ensure their survival in new scenarios in which they suffer growing influence of external factors.

PAs behave economically and administratively as institutions of the third sector, although they are directly linked to the government (Fernandes et al., 2012). They are managed by ICMBio personnel, under the authority of the Ministry of Environment, and are classified as public sector organizations. PAs are divided into national parks, biological reserves, ecological stations, extractive reserves and other categories. However, a number of private initiatives with public purposes predominate in PAs, as happens in the third sector.

In 2006, it was estimated that an investment of US\$ 1.03 billion³ was required to provide the nearly 600 public federal and state PAs with infrastructure, equipment and improvements. They do not generate significant income for the government and are often questioned about their efficiency, due to their high maintenance costs. Shortcomings in the management of PAs are indicated by Dourojeanni (2005) as one of the main causes of low efficiency. Doubts about the effectiveness of PAs and their weak economic sustainability are the main arguments used by policy-makers linked to several productive sectors in their efforts to reduce or extinguish protected areas and even prevent their creation. There is increasing pressure for the conversion of protected areas into full agricultural use, threatening the existence of some PAs (Drummond, 2014).

Admitting intentionality in the use of SP tools in the planning of PAs, in accordance with the different methodological guidelines, we analyzed 25 Brazilian MPs, looking at the intensity and suitability of the use of these tools in the universe of PAs. The purpose of this study was to evaluate the application of the concepts of strategic planning and management, strategy and competitiveness to PA management in Brazil. Based on a checklist of SP tools and on the features of each PA, two aspects were assessed (i) if each tool is

suitable and if it has been applied in the MP of each PA, and (ii) if using more SP tools can improve PA management.

2. Materials and methods

The present survey was based on 25 MPs, drafted between 1998 and 2015 by ICMBio and its partners, valid for 25 different federal protected areas. Of the 954 Brazilian federal PAs extant in 2016, only 24.5% (n = 234) have a MP. This proportion is greater if we exclude the 634 private reserves of natural heritage (RPPNs). Half (n = 160) of the 320 federal public PAs have MPs. The 25 PAs selected as the object of our study form a sample of 15.6% of these 320 units. What follows is a list of those PAs and of their respective MPs:

- 1) Brasília National Park (Ibama, 1998);
- 2) Jaú National Park (Miller et al., 1998);
- 3) Iguazu National Park (Beserra et al., 1999);
- 4) Ibirapuitã Environmental Protection Area (Lontra et al., 1999);
- 5) Rio Preto National Forest (Souza et al., 1999);
- 6) Bocaina National Park (Ibama, 2001a,b);
- 7) Lençóis Maranhenses National Park (Castro et al., 2002);
- 8) Cairuçu Environmental Protection Area (Mattoso et al., 2004);
- 9) Rio Trombetas Ecological Station (Siqueira et al., 2004);
- 10) Tinguá Biological Reserve (Silveira et al., 2006);
- 11) Crepori National Forest (Bastos et al., 2010);
- 12) Petrópolis Environmental Protection Area (Barreto et al., 2007);
- 13) Chapada Diamantina National Park (Beserra et al., 2007);
- 14) Tijuca National Park (Figueira et al., 2008);
- 15) Chapada dos Guimarães National Park (Pires et al., 2009);
- 16) Nascentes da Serra do Cachimbo Biological Reserve (Irgang et al., 2009);
- 17) Piaçabuçu Environmental Protection Area (Lontra et al., 2010);
- 18) Rio Acre Ecological Station (Antonelli Filho et al., 2010);
- 19) Jericoacoara National Park (Barreto et al., 2011);
- 20) Campos Amazônicos National Park (D'Amico et al., 2010);
- 21) Guanabara Ecological Station (Barreto et al., 2012);
- 22) Itatiaia National Park (Barreto et al., 2013);
- 23) Serra da Bodoquena National Park (Salzo et al., 2013);
- 24) Serra Geral do Tocantins Ecological Station (Barreto et al., 2014); and
- 25) Caparaó National Park (Ferreira et al., 2015).

Of these 25 MPs, 13 are for national parks, four for environmental protection areas, three for ecological stations, three for biological reserves and two for national forests. These PAs are fairly well distributed over Brazil's various regions and biomes (Fig. 1). Each MP comprises the major planning and management instruments of each respective PA. The 25 MPs were drafted between 1998 and 2015.

For the evaluation of the selected MPs, a structured script was drafted, containing questions about the existence and use of SP tools. This script took into account key elements of SP, based on the Hunger and Wheelen (2002) model: mission, objectives, strategic environmental analysis, scenario analysis, Porter's forces, balanced scorecard and strategy map, among others. Considering the conceptual basis of the SP (Hunger and Wheelen, 2002; Kaplan and Norton, 2005), the following 20 questions of the script were asked of each MP:

- 1) Is there a mission defined for the PA?;

³ Updated values.

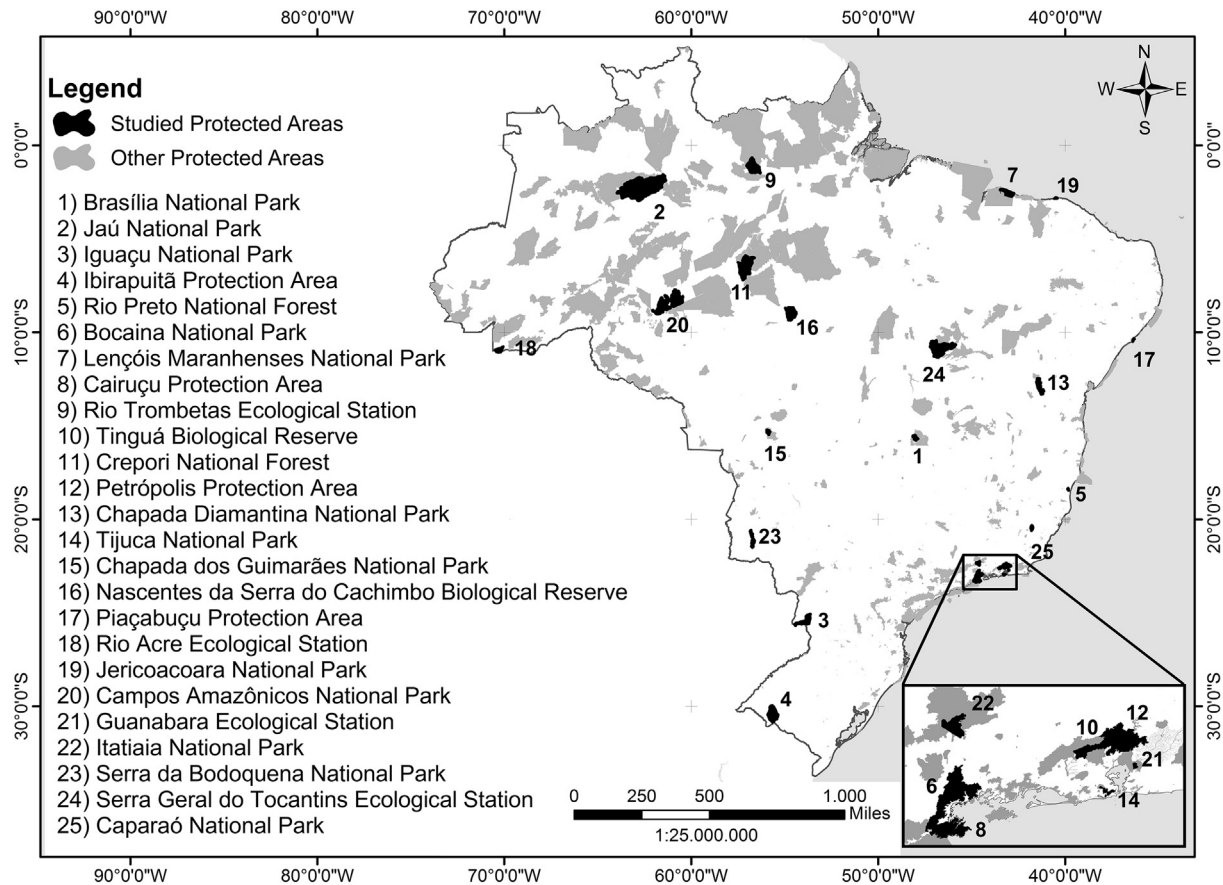


Fig. 1. Location of 25 Brazilian federal protected areas whose management plans were studied.

- II) Is there a vision defined for the PA?;
- III) Were principles and values established?;
- IV) Are there, in general, clear and precise goals?;
- V) Was a strategy evaluation matrix used?;
- VI) Was there a matrix analysis, with adjustment between the external situation and the internal capacity?;
- VII) Was the analysis of Porter's five forces conducted in order to define the strategy?;
- VIII) Was the actual or potential ability to take advantage of market needs (market analysis) taken into account?;
- IX) Was there an analysis of trends or scenarios?;
- X) Were the balanced scorecard, strategy map or other instrument with indicators used?;
- XI) Were the strategies adjusted to the available resources?;
- XII) Were there strategies which sought to provide competitive advantages?;
- XIII) Is network organization or organizational architecture considered in the formulation of strategy?;
- XIV) Are the policies that guide or limit actions considered?;
- XV) Were the main action sequences (programs) structured?;
- XVI) Are stakeholders defined and considered in the formulation of strategies?;
- XVII) Was there a definition of the critical success factors?;
- XVIII) Are there risk estimates concerning actions or proposed alternatives?;
- XIX) Do planned actions have indicators or other means of monitoring and verification?; and
- XX) Are there targets for the actions?

This survey sought to record the occurrence of these 20 SP tools

in each of the 25 selected MPs. First it assessed whether the use of such tools is adequate for the planning of each PA, given that it could vary according to the characteristics of the different PAs. Some categories of PA, such as national parks, for example, encourage public visitation, which creates the user's perspective and allows the generation of income. Thus, for national parks planning needs to consider their performance in the market and their competitiveness. For this evaluation, which addressed the issue of tool suitability, we considered appropriate only those SP tools that could be applied in the MP and thus contribute to the planning of each PA.

Second, we searched MPs for the presence SP tools considered adequate to the management of PAs (as explained in the previous step), whether they were being used or not. Thus, the possible responses to the script are: NP (not pertinent) – when using the tool in the specific context of PA is not pertinent; Y (yes) – the tool was used; and N (no) – the tool was not used.

Based on the findings, an assessment was made regarding the suitability and use of SP tools in all MPs. Thus, we evaluated both the framework of the proposal to use SP in PA management and if, indeed, these so-called SP instruments are the same used in business management.

Finally, using the Pearson correlation test, we sought to measure existence of correlation ($p < 0.05$) between the percentage of use of SP tools in MPs (just among the total number of tools assessed as suitable) and management effectiveness represented by RAPPAM index. Only 16 MPs of the sample were analyzed for the correlation test, all of which were published by the year 2009 and therefore had at least one year of preparation until the RAPPAM evaluation date in 2010.

3. Results

The results of the research script show a relatively high alignment of SP instruments and concepts in the universe of PAs (see [supplementary materials](#)). 93% of the tools for the preparation of SP can be adequately covered in their MPs, without adjustments. For those 93% in which SP tools are suitable, 33% used the tools in their MPs and 67% did not use them, despite their potential ([Fig. 2](#)).

Brazilian PAs are divided into two categories: (i) full protection and (ii) sustainable use. Analyses were not focused separately on these two categories. They were focused on the planning tools, regardless of the typology or goals of each PA. We did not find any pattern associated with the grouping of PAs in these two categories. Furthermore, no correlation was found between the ages of studied PAs and the incidence of basic management problems ([Rocha et al., 2010](#)). [Rocha et al. \(2010\)](#) found that older and younger Brazilian PAs (specifically national parks) shared many of the same management problems, such as precarious land tenure security, a basic issue that affects many other management tools and procedures in PAs.

In SP, the mission corresponds to the central goal of an organization and represents the purpose of their existence. It is the starting point for the development of the overall strategic objectives and guides the planning of the organization. In the case of PAs, the mission should be based on the purpose of its creation. However, this purpose can be expressed only in decrees or laws that created PAs or, in many cases, it can remain unknown or not be included in MPs. Even if the mission is not previously defined, nothing prevents it from being defined throughout the planning process. Yet, only 36% of the analyzed MPs contained statements on missions.

Another SP component analyzed was the organization's vision, which projects a future scenario, the situation that the organization aspires to achieve by means of its planning. The vision precedes the establishment of the mission and influences the definition of the organization's goals. Nevertheless, the vision appears in only 16% of MPs, a frequency even lower than that of the mission.

The principles and values of the organization, along with its mission and vision, are part of the initial stage of any SP. Usually they appear linked to the mission as cultural aspects and moral principles that govern the actions of those involved in the organization. In the context of PAs, this tool should express how stakeholders value the social, environmental and intrinsic aspects of biodiversity, for example. However, principles and values were expressed only in a single MP, a mere 8% of the studied PAs.

Critical success factors (CSFs) are key points that define the development or failure of an organization. CSFs vary in each organization, depending on the influence it receives from the internal and external environment, the type of market that bit operates in and the type of business, among others. CSFs are usually counter-

intuitive and, therefore, a study based on the mission and values of the organization supports the formulation of a strategy that converges with the particularities of the organization. In the universe of PAs, not a single MP defined CSFs, although this tool is applicable to MPs.

The objectives of PAs appear in almost all MPs (92%), often in a clear and detailed way, sometimes unfolding into specific goals.

SP matrices help assess the organization's skills and its environment. They help also to address their capabilities for a more efficient management strategy. The most widespread and used matrix is the SWOT, an acronym derived from strengths, weaknesses, opportunities and threats. This and other matrices for strategic assessment may be applied in the planning of PAs. They were used in 60% of the examined MPs.

After preparing the strategic assessment matrix, it should be analyzed to confront strengths and weaknesses of the organization's internal and external environments. This allows one to adjust internal organizational capabilities to the external situation and thus direct efforts towards priority issues. In MPs, this analysis is done by identifying premises relative to defense, recovery, attack, and advance. However, not all MPs containing a strategic evaluation matrix made this adjustment, essential to the interpretation of the matrix. Only 44% of MPs relied on the adjustment of external and internal variables.

Porter's five forces correspond to aspects that shape the strategy of the organization and are related to competition between companies. Analysis of the five forces results in a more efficient strategy that improves the relationship with the customer or user and maximizes the profits of the organization. The adaptation of this tool to the context of the PAs is possible in the case of those that deal with a benefited public, as in the case of visitors to national parks and residents in the communities of national forests and extractive reserves. This is valid also for some areas of environmental protection that have public visitation as a regulated activity. Thus, the deployment of this tool was evaluated only in those PAs that could use it. Still, no MPs used this tool as a means to evaluate the market and improve strategies.

Analysis of the actual or potential ability to take advantage of market needs is also part of the formulation of the organizational strategy applicable in the context of PAs that have beneficiaries (visitors and communities). This tool evaluates the relationship between market opportunity and the ability to provide service within an acceptable risk level; it is also called economic strategy ([Mintzberg et al., 2005](#)). Even MPs of PAs with high rates of visitation, such as the national parks of Brasília and Iguazu, lack this type of analysis. This tool was not used in any MP analyzed in this study and probably not in any other, despite its potential to aid in the formulation of organizational strategies.

Also as a part of strategy development, scenario and trend analysis allows the formulation of strategies for alternative future

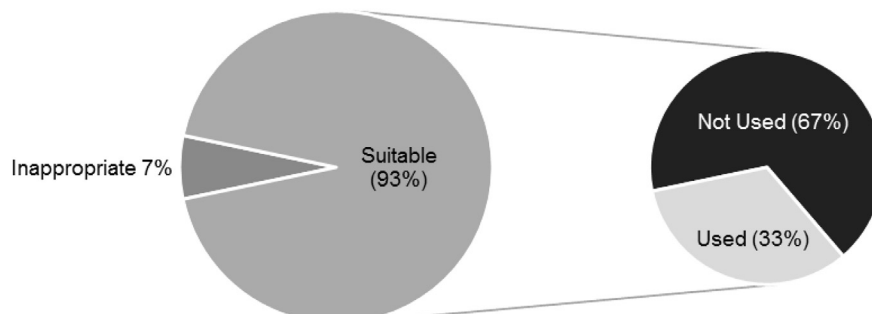


Fig. 2. Percentages of suitability and use of Strategic Planning instruments and concepts in 25 Brazilian Federal Protected Areas.

situations, ranging from optimistic to pessimistic and from short- to long-term (Lobato et al., 2009). This would help provide, for all PA categories, new options for environmental protection and solutions concerning anthropic pressures arising from urban expansion, among others. Despite the flexibility and security provided by scenario analysis, the MP of the Petropolis Area of Environmental Protection was the only one to use this tool. In this MP, trends were raised, evaluated for feasibility and then related to assumptions resulting from the strategic assessment matrix. This resulted in two scenarios, a desirable one and a non-desirable one, for each programmatic theme.

The Balanced Scorecard (BSC) - a balanced measurement system - is a tool that assists in monitoring the performance of employed strategies. BSC, together with the diagram of the strategic map, helps understand strategies in four dimensions: (i) financial, (ii) external customers, (iii) internal processes and (iv) learning and growth (Kaplan and Norton, 2005). For this reason, unless it is adapted, the BSC is applicable only to those PAs that have beneficiaries. The MP of the Campos Amazônicos National Park is the only one that used this tool. In this MP, two strategic maps were developed, one for a short-term period (up to three years) and one for a long-term period (over three years), recording five perspectives: (i) environment, (ii) users, (iii) processes (iv) learning and innovation and (v) and financial support. From the strategic map, a national park tactical planning was drawn. The use of BSC and the strategy map in this MP proved to be possible and useful. In addition, there are ICMBio technical directives that recommend the use of these tools PA planning (Carrillo et al., 2013). Kaplan and Norton (2005) highlight the potential for improvement provided by BSC to governmental and third sector organizations (although the tool is designed for for-profit organizations), by adopting an economic and financial perspective.

Assessment of available resources demonstrates the ability of an organization to deal with current and planned activities. It is part of the evaluation of the internal environment. It helps evaluate the support that can be given to planned actions. Examining the feasibility of planning involves the issue of compatibility between strategies and available resources. While many MPs present inventories of resources and patrimony, strategy construction did not take these data into account. On the contrary, often MPs are designed for an optimal or ideal setting, which demands a high level of resources for implementation. The MP of Tinguá Biological Reserve, for example, estimated that its first year of implementation required an investment of more than US\$ 1.54 million, which corresponds to more than 4% of the annual ICMBio discretionary budget in 2008 (US\$ 35 million) for the management of hundreds of protected areas, monitoring projects, research and species protection, among other agency activities. More than US\$ 6.78 million would be required for a five-year period. Instead of adjusting the PA's needs to the existing institutional capacity, planning directed its actions to seek a huge amount of resources, even if those resources were evidently not available. This kind of strategic decision frustrates the entire planning effort.

Another aspect analyzed was the existence of competitive strategies, used to support the organization in the face of competition. These strategies imply the search for ways to increase the attractiveness of the organization in the market. In this sense, national parks and other PAs that have tourism and visitation as common and relevant activities could adopt strategies to distinguish themselves and to attract visitors and move them away from competing markets, such as ecoresorts, natural attractions in private areas, adventure resorts or even other PAs. National forests, which sell forest products, also can have competitive strategies. Even if this tool does is not pertinent to all categories of PAs, only the Campos Amazônicos National Park included competitive

strategies in its planning.

Net organization brings together work, people, technology and information to optimize actions and generate high organizational performance. In the case of PAs, it is compatible with regional planning methods, which allow joint management of networks of PAs or ecological corridors. The advantages of this strategy are related to resource sharing and optimization of actions. Only three PAs used this tool in their MPs.

Various laws, rules, regulations or policies may influence organizational planning, guiding or limiting strategies and actions. Therefore, MPs should take into account all policies related to PAs before defining strategies. MPs can have their planned actions revoked by master plans, environmental laws and private property rights, among other variables. This affects all categories of PAs and was used in almost all (92%) MPs analyzed.

Programs are sequences of actions that revolve around common goals. They organize thematic lines or strategic sectors, in order to enable their implementation. Almost all MPs analyzed (96%) used this tool to organize planned actions.

The importance of considering stakeholders in the formulation of strategies comes from the belief that jointly developed decisions are less controversial and more integrated than those prepared only by a managing agency. Stakeholder engagement allows more realistic adaptation strategies to external environments. In the case of PAs, stakeholders are identified in community meetings and consulted during planning workshops. In workshops, their contributions to the formulation of strategies are gathered. All MPs went through this process that, in addition to meeting the principle of participation defined in Brazilian environmental policy planning, is determined by methodological scripts.

Risk management functions as a support to the SP tool that aims to minimize the uncertainty of achieving strategic objectives. Like planned actions, risk must have specific indicators must be monitored. For PAs, there are numerous risks to be managed, such as cutbacks in financial transfers, changes in environmental policies, a new polluting business located in its surroundings, among others. Risk management allows adequate reactions to threats and corrects planned actions in order to ensure the organization's performance. Still, no MP dealt with risk planning or any alternative actions.

Indicators are means for monitoring planned actions. Only through indicators is it possible to know whether a plan is being implemented, to identify shortcomings and bottlenecks, to detect interference and define what can be fixed. For MPs of PAs, this tool is required in the technical guidelines of the methodological script (Fernandes et al., 2011). However, indicators should be defined according to a set of criteria so that they are indeed measurable, accessible and accurate. Although the use of indicators was observed in 32% of MPs, their efficiency was not evaluated. Many plans fail when they do not allow monitoring, due to lack of measurable indicators.

Associated to indicators, actions also require the establishment of goals, so that managers can know whether planned actions are successful. Goals allow one to set a performance range for actions and programs, as well as to direct management efforts towards objective and achievable purposes. Like indicators, targets are also an innovative methodological guideline requirement (Fernandes et al., 2011). Still, they are even less used than indicators in MPs, appearing in only 12% of the analyzed MPs.

After having evaluated each tool in selected MPs, three sets of guidelines were distinguished: i) tools that are not applicable to the context of PAs (7%); ii) tools that are applicable but are not used (62.4%); and iii) tools that are applicable and used (30.6%).

Only 7% of SP tools are unsuitable to the management of some categories of PAs: i) analysis of the five forces of Porter; ii) market analysis; iii) the Balanced Scorecard, strategic or similar map; and

iv) competitive strategies. In these four cases, the use of SP tools lacks any relevance to all types of PAs, although they could be adapted to some categories. The main explanation is the absence of a conventional market or profit perspective in biological reserves and ecological stations, for example. Market analysis, i.e., actual or potential ability to take advantage of market needs or to deal with risk situations can be used in part of the assessed MPs. In this case, this tool would apply to places where public visitation occurs. This is the main source of non-budgetary revenue for ICMBio and might be the target of such an analysis. Thus, PAs that do not allow leisure visitors, but only educational or scientific visits, such as biological reserves and ecological stations, do not require this type of market analysis. Some environmental protection areas adopted this activity, others did not consider it. National parks and one of the environmental protection areas allow visitation and charge entrance fees or predicted this practice.

On the other hand, tools such as objectives, the matrix of strategic analysis, defining stakeholders and program structuring are present in all or almost all examined MPs. Among the tools with widespread suitability, but which were only partially used in MPs, are (i) mission, present in 36% of MPs; (ii) vision (16%); (iii) use of indicators (32%); and (iv) establishment of goals (12%).

We compare the percentage of the use of SP tools ($n = 20$) in MPs drafted up to 2009 ($n = 16$) and management effectiveness represented by the RAPPAM index (computed in 2010) (Fig. 3). These MPs had been published at least one year before the RAPPAM evaluation, in 2010.

It was found that there is no significant correlation ($r = 0.1084$) between the use of SP tools in the MPs and the management effectiveness. We found that variation in the effectiveness of PA management does not depend on the intensity of the use of SP tools in their MPs.

4. Discussion

Protected areas studied in this article are government organizations, managed by a federal agency, under a special administrative regime, with its own rules of use and management. PAs cannot be regarded as business organizations in a strict sense, for profit,

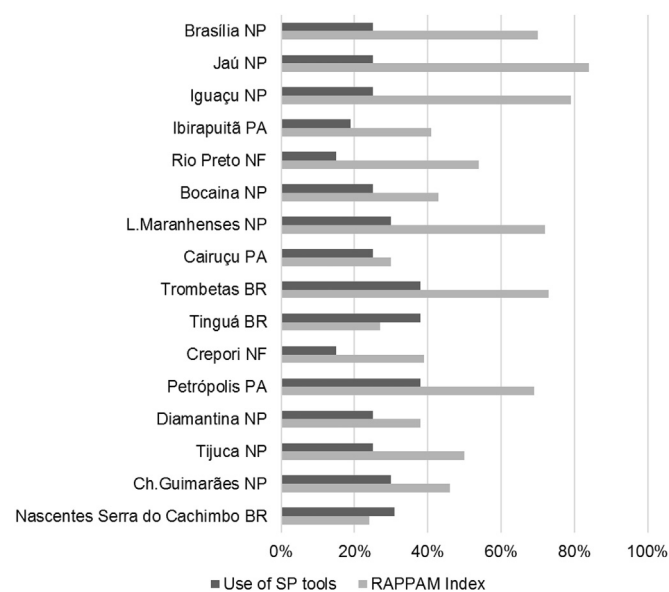


Fig. 3. Percentage comparison of the use of strategic planning tools in management plans and management effectiveness, measured by the RAPPAM index of selected studied protected areas.

subject to market competition and demands, among other elements. Strategic planning was originally conceived in the field of business administration for businesses engaged in the market. Still, PAs assumed, by means of the methodological directives for MPs, a management style inspired by SP, but detached from market mechanisms and profit motives.

The main SP tool used in the researched MPs is the strategic analysis of internal and external environments. Since the publication of the methodological guideline by Galante et al. (2002), this tool has become an essential step in the planning of PAs. It consists of the assessment of strengths and weaknesses and of the opportunities and threats. This is usually made on the basis of information gathered in participatory planning workshops, planned, convened and conducted by ICMBio personnel and partners during the preparation of MPs. On average, workshops promote the interaction between 30 stakeholders from the public and private sectors, involved both directly and indirectly with the PA.

The oldest MPs, drafted before the release of the methodological guideline by Galante et al. (2002), used the method of programs and management subprograms (Miller, 1980). These MPs emphasized environmental assessments and, with regard to strategic planning, were limited to conceptual approaches closely linked to the business approach. This may be the reason why both the literature and common sense stress the difficulty of implementing these MPs (Milano, 2001). Some managers reported that these MPs, due to their complexity, extensiveness and lack of objectivity, were not even consulted by many managers (pers. obs.). These early MPs mobilized a large interdisciplinary team of professionals to develop a dense diagnosis of the aspects of fauna, flora, geology, water resources, history, culture and socioeconomics of PAs. As a consequence, the focus fell upon environmental diagnosis, not on planning.

The most recent methodological guideline (Fernandes et al., 2011) innovated by including more SP components, such as the definition of mission, future vision, strategic objectives, analysis of the strategic evaluation matrix, indicators and goals, among others. In addition, for Fernandes et al. (2011), planning would not only occur by thematic programs (environmental education, protection, research etc.) but also dealing with strategic areas (visitor centers, degraded areas, regulations etc.), in order support decision-making. Indicators became more important, especially with the development and implementation of increasing numbers of MPs. They became necessary for reviews and monitoring, seeking to obtain feedback concerning implementation. Consequently, MPs developed under the influence of the latest guideline draft (Fernandes et al., 2011) contain more SP tools.

The evolution of the planning process of PAs led to adjustments, reducing the breadth and complexity of the evaluation of biophysical features and including more SP tools. It also reduced costs and preparation time of MPs. On the other hand, new planning approaches increased the objectivity of MPs and the feasibility of monitoring and revising planned actions.

Although the use of SP tools has increased in PA management, more tools could be adjusted and used, even if their organizational specificities are considered. Visitors of national parks, for example, may be the PAs' equivalent to customers, since parks provide ecotourism or visitation activities in exchange for entrance fees. Tools such as the definition of critical success factors, adequacy of strategies to available resources, and risk management, for example, could be applied to PA management without any need for adjustments.

Although it was presumed that a planning instrument that adopts SP tools could improve management efficiency, causal connections between them remains scarce in the literature (Geldmann et al., 2013). Based on this premise, since 1996 (or for

the last 20 years) Brazilian managers have tried to add these tools to MPs in order to make PAs more efficient. However, it was found that MPs do not use all the potential of SP tools. Additionally, we found no correlation between the effectiveness of a PA and the use of SP tools in its MP. The degree to which management effectiveness can be enhanced through the strategic approach remains speculative. Effectiveness has not shown to be related to management, but with the size and the degree of threats to PAs (Geldmann et al., 2015). Effectiveness of a PA must be influenced also by other governance variables, such as the ability of managers to secure connections, or external environment traits, or the network of partners, among others.

Even with the latest innovations and the more frequent use of SP tools, MPs still have implementation problems. Tijuca and Serra dos Órgãos National Parks have not had much success in the implementation of actions planned in their MPs. Only 26.7% of the Tijuca MP and 55% of the actions predicted in the Serra dos Órgãos MP were implemented (Medeiros and Pereira, 2011). The present survey also established that the greater use of SP tools did not ensure greater effectiveness in PA management.

Concerning the assumption that a well-designed plan ensures more efficient management, we find three reasons for the persistent failure in the implementation of MPs. The first is the lack of definition of critical success factors (CSFs). This could provide clues to the identification of key points that influence the success or failure of implementation. Thus, over MP's usually long implementation period, it would be possible to correct flaws and redesign actions, without harming strategies or the plan as a whole. However, CSFs have not been used in the assessed MPs.

Secondly, it is clear in all analyzed MPs that strategies are not compatible with available resources. According to managers, this is one of the most recurrent failures in implementing a MP (pers. obs.). Actions are usually planned without taking into account income, equipment and human resources. Many MPs deal with an ideal setting, one in which there are unlimited resources. This inevitably leads to the impossibility of achieving much of the planned actions.

In the third place, even if a MP contains many SP components, they must be properly aligned with each other. For example, setting targets is complementary to defining indicators. Even though indicators are defined, they become perfunctory in the absence of defined goals or of a performance scale. Thus, it is possible to measure implementation of an action, but this does not allow one to judge whether this is satisfactory or not. Something similar is observed in the definition of strategic objectives. They need to be defined by the analysis of the environment, which in its turn depends on the analysis of the strategic assessment matrix. However, even if most MPs rely on an array of strategic assessments, less than half of them are examined. Without this analysis, strategic goals are set without the necessary methodological basis and become mere adornments. Thus, the use of SP tools should be preceded by a better understanding of their operation and connections, so that they can reach their full potential. The absence of some essential SP tools or of the desired alignment between them stems from (i) the lack of mandatory guidelines that determine their use and (ii) the lack of knowledge about SP by plan drafters.

Another important consideration about the ineffectiveness of PA management is the lack of development of tactical-operational planning. It is noteworthy that SP is aligned with MPs because they are hierarchically on the same level as planning. After the establishment of SP, tactical and/or operational plans must be implemented, unfolding strategic actions in everyday actions, in short and medium terms. In the case of PAs, MPs are conceived to last for a period of up to five years. However, operational planning, corresponding to operational plans, are annual. No planning

beyond the strategic level was observed in our sample. In addition to the MP, PAs ideally should have complementary management tools that correspond to the operating plan and action plans.

After this step, there is a feedback phase which, in the universe of Brazilian federal PA planning, occurs with monitoring and evaluation. This system of performance measurement is essential to strategic learning and to the survival of organizations in future scenarios. However, monitoring depends on the establishment of indicators in the early stages of planning. Often, a frustrated performance stems from the absence of links between the formulation and the implementation of strategies.

Although MPs are credited with playing a major role in PA management, the low efficiency of these PAs cannot be related to planning. To ensure a good organizational performance, PAs need to improve their managerial and financial efficiency. MPs can help in this process, indicating the establishment of partnerships, the search for resources, promotion and sponsorship, either voluntarily or with the use of marketing practices to increase the appreciation of park visitation and other benefits generated by PAs.

Nevertheless, even with a well formulated MP, better results depend on the personal and institutional efforts of various stakeholders. Part of the success of an organization comes from its ability to align interests, manage conflicts and engage people, resources and efforts for troubleshooting. Well connected managers trained to manage organizations will have improved abilities to form partnerships, raise funds, manage resources and implement action planning more effectively.

5. Conclusion

Successful PA planning may improve the sustainability of these organizations, ensuring their recovery and expansion. The use of SP tools in the planning of PAs, besides having a wide range of well-studied and tested methods and concepts, promotes greater reliability in the construction of MPs.

This study found that there is great potential for using SP in PA management, although this potential is used ineffectually. Although the systematic use of SP in the planning of PAs is possible, we found that so far few SP tools have been incorporated into MPs. Additionally, we found that there is no correlation between the effectiveness of PAs and the use of SP tools in their MPs. Although PA managers seek to improve MPs by incorporating more SP tools, this is not happening. Explanations for the failure in the implementation of MPs, even after their completion, include the lack of definition of critical success factors, the inadequacy of the strategies in the face of available resources, the misalignment between complementary SP tools, and the lack of tactical-operational planning.

Thus, we conclude that, in addition to incorporating more SP tools in the PA planning, management efficiency depends on the proper use of these tools, the strategic value of stakeholders and complementary planning tools. This suggests that the use of SP tools in MPs needs to be improved. The results of monitoring analysis will further contribute to required adjustments and to acknowledge developments in the management of these organizations.

Acknowledgements

Drummond acknowledges the support of Brazil's CNPq (National Research Council) (Grant no. 308217/2012-8).

Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://>

dx.doi.org/10.1016/j.jenvman.2017.05.064.

References

- Antonelli Filho, R., et al., 2010. Plano de Manejo da Estação Ecológica Rio Acre. http://www.icmbio.gov.br/portal/images/stories/imgs-unidades-coservacao/esecc_rio_acre.pdf (Accessed 29 June 2016).
- Barreto, C.G., et al., 2007. Plano de Manejo da Área de Proteção Ambiental da Região Serrana de Petrópolis. http://www.icmbio.gov.br/portal/images/stories/imgs-unidades-coservacao/apa_petropolis.pdf (Accessed 11 April 2016).
- Barreto, C.G., et al., 2011. Plano de Manejo do Parque Nacional de Jericoacoara. <http://www.icmbio.gov.br/portal/biodiversidade/unidades-de-conservacao/biomas-brasileiros/marinho/unidades-de-conservacao-marinho/2261-parna-de-gericoacoara.html> (Accessed 11 April 2016).
- Barreto, C.G., et al., 2012. Plano de Manejo da Estação Ecológica da Guanabara. <http://www.icmbio.gov.br/portal/biodiversidade/unidades-de-conservacao/biomas-brasileiros/marinho/unidades-de-conservacao-marinho/2250-esecc-da-guanabara.html> (Accessed 11 April 2016).
- Barreto, et al., 2013. Plano de Manejo do Parque Nacional do Itatiaia. http://www.icmbio.gov.br/portal/images/stories/docs-planos-de-manejo/pm_parna_itatiaia_enc4.pdf. Accessed 16 July 2016.
- Barreto, C.G., et al., 2014. Plano de Manejo da Estação Ecológica da Serra Geral do Tocantins. http://www.icmbio.gov.br/portal/images/stories/docs-planos-de-manejo/esecc_serra_geral_do_tocantins.pdf. Accessed 16 July 2016.
- Bastos, B.R.M., et al., 2010. Plano de Manejo da Floresta Nacional do Crepori. http://www.icmbio.gov.br/portal/images/stories/imgs-unidades-coservacao/crepori_plano%20de%20manejo.pdf (Accessed 16 July 2016).
- Beserra, M.M.L., et al., 2007. Plano de Manejo do Parque Nacional da Chapada da Diamantina. http://www.icmbio.gov.br/portal/images/stories/imgs-unidades-coservacao/parna_chapada_diamantina.pdf (Accessed 11 April 2016).
- Beserra, M.M.L., et al., 1999. Plano de Manejo do Parque Nacional de Iguaçu. http://www.cataratasdoiguacu.com.br/manejo/siuc/planos_de_manejo/pni/html/index.htm (Accessed 29 June 2016).
- Carrillo, A.C., et al., 2013. Lições aprendidas sobre a etapa de planejamento em planos de manejo de UC. http://www.mma.gov.br/images/arquivo/80255/LICOES_APRENDIDAS_etapa_planejamento.pdf (Accessed 30 June 2016).
- Castro, A.C.L., et al., 2002. Plano de Manejo do Parque Nacional dos Lençóis Maranhenses. <http://www.icmbio.gov.br/parnalencoismaranhenses/planos-de-manejo.html> (Accessed 29 June 2016).
- Chagas, A.L.G.A., et al., 2003. Roteiro Metodológico para Elaboração de Plano de Manejo para Florestas Nacionais. Ibama, Brasília.
- Chape, S., Harrison, J., Spalding, M., Lysenko, I., 2005. Measuring the extent and effectiveness of protected areas as an indicator for meeting global biodiversity targets. *Philos. Trans. R. Soc. B Biol. Sci.* 360 (No.1454), 443–455. ISSN 1471/2970.
- CNUC - Cadastro Nacional de Unidades de Conservação do Ministério do Meio Ambiente. <http://www.mma.gov.br/areas-protetidas/cadastro-nacional-de-ucs/consulta-por-uc> Accessed 21 April 2017.
- D'amico, A.R., et al., 2010. Plano de Manejo do Parque Nacional dos Campos Amazônicos. http://www.icmbio.gov.br/portal/images/stories/docs-planos-de-manejo/parna_campos_amazonicos_pm.pdf (Accessed 16 July 2016).
- Dourojeanni, M., 2005. Plano de manejo 1, 2 de setembro de 2005. http://www.oeco.com.br/marc-dourojeanni/16369-oeco_13689 (Accessed 2 December 2010).
- Drummond, J.A.L., 2014. Proteção e produção: biodiversidade e agricultura no Brasil. Garamond, Rio de Janeiro.
- Ervin, J., 2003. WWF: Rapid Assessment and Prioritization of Protected Area Management (RAPAM) Methodology. WWF, Gland, Switzerland.
- Fernandes, C., et al., 2011. Roteiro Metodológico de Planejamento. http://www.funbio.org.br/wp-content/uploads/2014/02/Roteiro_versao_finalizada_2011_1.pdf (Accessed 23 March 2016).
- Fernandes, V., Malheiros, T.F., Philippi Jr., A., Sampaio, C.A.C., 2012. Metodologia de avaliação estratégica de processo de gestão ambiental municipal. *Saude Soc.* 2012 21 (Suppl. 3), 128–143. ISSN 0104-1290.
- Ferreira, L.M., et al., 2004. Roteiro metodológico para elaboração de planos de manejo para Reservas Particulares do Patrimônio Natural. IBAMA, Brasília.
- Ferreira, L.M., et al., 2015. Plano de Manejo do Parque Nacional de Capará. http://www.icmbio.gov.br/parnacapara/images/stories/PM_PNC-completo_PDF.pdf (Accessed 16 July 2016).
- Figueira, T., et al., 2008. Plano de Manejo do Parque Nacional da Tijuca. Disponível em: http://www.icmbio.gov.br/portal/images/stories/docs-planos-de-manejo/parna_tijuca_pm.pdf (Accessed 11 April 2016).
- Galante, M.L., et al., 2002. Roteiro metodológico de planejamento: Parque Nacional, Reserva Biológica e Estação Ecológica. Ibama, Brasília.
- Geldmann, J., Barnes, M., Coad, L., Craigie, I.D., Hockings, M., Burgess, N.D., 2013. Effectiveness of terrestrial protected areas in reducing habitat loss and population declines. *Biol. Conserv.* 161, 230–238. <http://dx.doi.org/10.1016/j.biocon.2013.02.018>.
- Geldmann, J., Coad, L., Barnes, M., Craigie, I.D., Hockings, M., Knights, K., Leverington, F., Cuadros, I.C., Zamora, C., Woodley, S., Burgess, N.D., 2015. Changes in protected area management effectiveness over time: a global analysis. *Biol. Conserv.* 191, 692–699. <http://dx.doi.org/10.1016/j.biocon.2015.08.029>.
- Gonçalves, M., et al., 2009. Roteiro metodológico para elaboração de planos de manejo para Florestas Nacionais. Ibama, Brasília.
- Hudson, M., 1999. Administrando organizações do terceiro setor. Makron Books, São Paulo.
- Hunger, D., Wheelen, T., 2002. Gestão Estratégica: Princípios e Prática. Reichmann & Affonso, Rio de Janeiro.
- Ibama, 1993. Roteiro Metodológico para a Elaboração de Planos de Ação para Implementação e Gerenciamento de Unidades de Conservação de Uso Indireto. Ibama, Brasília.
- Ibama, 1998. Plano de Manejo do Parque Nacional de Brasília. <http://www.icmbio.gov.br/portal/images/stories/imgs-unidades-coservacao/PARNA%20Brasilia.pdf> (Accessed 11 April 2016).
- Ibama, 2001a. Roteiro metodológico para gestão de Área de Proteção Ambiental. IBAMA, Brasília.
- Ibama, 2001b. Plano de Manejo do Parque Nacional da Serra da Bocaina. <http://www.icmbio.gov.br/parnaserradabocaina/extras/62-plano-de-manejo-e-monitorias.html> (Accessed 11 April 2016).
- Ibama/GTZ, 1996. Roteiro Metodológico para o Planejamento de Unidades de Conservação de Uso Indireto. Ibama, Brasília.
- ICMBio, 2011. Avaliação comparada das aplicações do método RAPPAM nas unidades de conservação federais, nos ciclos 2005–06 e 2010. Instituto Chico Mendes de Conservação da Biodiversidade, WWF-Brasil. ICMBio, Brasília.
- ICMBio, 2017. Plano de Manejo. <http://www.icmbio.gov.br/portal/planosmanejo> (Accessed 21 February 2017).
- Irgang, G.V., et al., 2009. Plano de Manejo da Reserva Biológica Nascentes da Serra do Cachimbo. http://www.icmbio.gov.br/portal/images/stories/imgs-unidades-coservacao/rebio_nascentes_da_serra_do_cachimbo.pdf (Accessed 16 July 2016).
- Joseph, C., Gunton, T.I., Day, J.C., 2008. Implementation of resource management plans: identifying keys to success. *J. Environ. Manag.* 88 (4), 594–606. <http://dx.doi.org/10.1016/j.jenvman.2007.03.028>. ISSN 0301-4797, September 2008.
- Kaplan, R.S., Norton, D.P., 2005. The Office of Strategy Management. Harvard Business Review, pp. 72–80.
- Lobato, D.M., et al., 2009. Estratégia de empresas, 9. ed. Editora FGV, Rio de Janeiro.
- Lockwood, M., 2010. Good governance for terrestrial protected areas: a framework, principles and performance outcomes. *J. Environ. Manag.* 91, 754–766. <http://dx.doi.org/10.1016/j.jenvman.2009.10.005>. ISSN 0301-4797.
- Lontra, C., et al., 2010. Plano de Manejo da Área de Proteção Ambiental de Piaçabuçu. http://www.icmbio.gov.br/portal/images/stories/docs-planos-de-manejo/apa_piacabucu.pdf (Accessed 11 April 2016).
- Lontra, C., et al., 1999. Plano de Manejo da Área de Proteção Ambiental de Ibraiputã. http://www.icmbio.gov.br/portal/images/stories/docs-planos-de-manejo/pm_apa_ibirapuita.pdf (Accessed 29 June 2016).
- MacKinnon, J., MacKinnon, K., Child, G., Thorsell, J., 1986. Managing Protected Areas in the Tropics. Gland, IUCN, 1986.
- Madruça, L.R.R.G., Venturini, J.C., Weiblen, B., Severo, R., 2004. A Vivência do Planejamento Estratégico em uma Organização Terceiro Setor: O Caso da OMEP/SM. VII SEMEAD – Estudo de Caso Terceiro Setor. Disponível em: http://www.ead.fea.usp.br/Semead/7semead/paginas/artigos%20recebidos/Terceiro%20Setor/TS01_a_vivencia_do_planejamento_terceiro_setor.PDF (Accessed 16 December 2010).
- Mattoso, A., et al., 2004. Plano de Manejo da Área de Proteção Ambiental de Cairuçu. http://www.icmbio.gov.br/portal/images/stories/imgs-unidades-coservacao/apa_cairucur.pdf (Accessed 29 June 2016).
- Medeiros, R., Pereira, G., 2011. Evolução e implementação dos planos de manejo em parques nacionais no estado do Rio de Janeiro. *Rev. Árvore* 35 (n.2), 279–288. ISSN 0100-6762.
- Milano, M.S., 2001. Conceitos básicos e Princípios Gerais de Planejamento, Manejo e Administração de Unidades de Conservação. In: FBPN (org.) Planejamento e Manejo de Áreas Naturais Protegidas, pp. 1–50.
- Miller, K., 1980. Planificación de parques nacionales para el ecodesarrollo en Latinoamérica. Fundación para la Ecología y la Protección del Medio Ambiente, Madrid.
- Miller, C., et al., 1998. Plano de Manejo do Parque Nacional do Jaú. http://www.icmbio.gov.br/portal/images/stories/docs-planos-de-manejo/parna_jau_pm.pdf (Accessed 11 April 2016).
- Mintzberg, H., Ahlstrand, B., Lampel, J., 2005. Strategy Safari: A Guided Tour Through The Wilds of Strategic Management. Simon and Schuster, New York.
- Mittermeier, R.A., Robles-Gil, P., Mittermeier, C.G., 1997. Megadiversity. Earth's Biologically Wealthiest Nations. CEMEX/Agrupación Sierra Madre, Mexico City.
- Mittermeier, R.A., Gil, R.P., Hoffman, M., Pilgrim, J., Brooks, T., Mittermeier, C.G., Lamoreux, J., Fonseca, G.A.B., 2005. Hotspots Revisited: Earth's Biologically Richest and Most Endangered Terrestrial Ecoregions, 2. ed. University of Chicago Press, Boston.
- Pires, F.A.O., et al., 2009. Plano de Manejo do Parque Nacional da Chapada dos Guimarães. http://www.icmbio.gov.br/portal/images/stories/imgs-unidades-coservacao/parna_chapada-dos-guimaraes.pdf (Accessed 29 June 2016).
- Rocha, L.G.M., Drummond, J.A., Ganem, R.S., 2010. Parques Nacionais Brasileiros: problemas fundiários e alternativas para sua resolução. *Rev. Sociol. Política, Curitiba* 18 (n. 36), 205–226.
- Rodrigues, E., et al., 2004. Roteiro de Manejo de Uso Múltiplo das Reservas Extrativistas Federais. Ibama, Brasília.
- Salzo, I., et al., 2013. Plano de Manejo do Parque Nacional da Serra da Bodoquena. http://www.icmbio.gov.br/portal/images/stories/docs-planos-de-manejo/Encarte4_2013.pdf (Accessed 11 April 2016).
- Scolozzi, R., Schirpke, U., Morri, E., D'Amato, D., Santolini, R., 2014. Ecosystem services-based SWOT analysis of protected areas for conservation strategies.

- J. Environ. Manag. 146, 543–551. <http://dx.doi.org/10.1016/j.jenvman.2014.05.040>, ISSN 0301-4797, 15 December 2014.
- Silveira, N.E., et al., 2006. Plano de Manejo da Reserva Biológica do Tinguá. http://www.icmbio.gov.br/portal/images/stories/imgs-unidades-coservacao/rebio_tingua.pdf (Accessed 11 April 2016).
- Siqueira, J.D.P., et al., 2004. Plano de Manejo da Reserva Biológica de Trombetas. http://www.icmbio.gov.br/portal/images/stories/imgs-unidades-coservacao/rebio_trombetas.pdf (Accessed 29 June 2016).
- Sousa, E.G., Valadão Jr., V.M., de Sá, R.C.R., 2005. *Formulação Estratégica em Instituições do Terceiro Setor: o Caso de uma ONG*. http://www.abepro.org.br/biblioteca/ENEGEP2005_Enegep0702_0459.pdf (Accessed 20 December 2010).
- Souza, A.L., et al., 1999. Plano de Manejo da Floresta Nacional do Rio Preto. http://www.icmbio.gov.br/portal/images/stories/docs-planos-de-manejo/flona_rio_preto_pm.pdf (Accessed 16 July 2016).
- Thomas, L., Middleton, J., 2008. *Guidelines for Management Planning of Protected Areas*. IUCN World Commission on Protected Areas. University of Cardiff, Department of City and Regional Planning, Gland, Switzerland and Cambridge, UK. ix +79 pp.