

Temporal performance of the management effectiveness of a protected area in the Brazilian Atlantic Forest, São Paulo, Brazil.

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ABSTRACT

This work presents the monitoring of the effectiveness of the management of the Morro do Diabo State Park, Sao Paulo, Brazil, during fourteen years (2002-2016), divided into six-time cuts for which management effectiveness indices were obtained. This protected area (PA) of category II of the World Conservation Union is responsible for the conservation of important species of Brazilian biodiversity, especially the *leonthopitecus chrysopygus*, which until the 1980s was considered the most endangered primate of the planet and which this park has its largest free population in nature. The methodological procedure used was an adaptation of the one proposed by Cifuentes, Izurieta, and Faria (2000), commonly denominated *EMAP*, an acronym of the initials in Spanish. The results indicate that at the beginning of the analyzed period the AP had reasonable conditions for its management, although it presented difficulties related to planning and administration, problems solved from a joint organizational and local effort, prioritizing actions for results. The management quality standard gradually increased, with a greater perception of the scope of the area's management objectives, since in addition to the ecosystem services resulting from its existence, the PA started to offer real benefits to the community by improving and increasing public use and environmental education, for example. However, the effectiveness of management has decreased to previous levels, having as main factors endogenous aspects of the management system linked to indicators limited to management, with repercussions on other management components.

KEYWORDS - Protected areas, measurement, management effectiveness.

INTRODUCTION

Protected areas (APs) are established to protect samples of nature whose main criterion is to conserve biodiversity and ecosystem services that come from them as much as possible (NAUGHTON-TREVES, 2005; CARDINALE et al. 2012; CARRANZA et. al, 2014; GELDMANN et al., 2015), given the enormous pressure on all categories of protected areas in Brazil, although the environmental management instruments of these areas have also improved in recent years (MELLO-THERRY, 2011).

In 2018, 244 countries had more than 238,000 protected areas, covering more than 46 million km², which corresponds to almost 25% of the planet's land surface (UNEP-WCMC, 2018). In 2021, 22.5 million km² of land and inland water areas (16.64% of the world total) and 28.1 million km² of marine and coastal areas (7.74%) are in documented protected areas, an increase of more than 21 million km² since 2010 (IUCN, 2021).

Data obtained from the National Registry of Protected Areas indicate that in Brazil, today, there are 2,468 APs, which cover 2,553,444.62 km² in the continental territory. In turn, the state of São Paulo has 254 state APs, covering an area of 53,372.18 km², that is, 2.09% of the Brazilian protected area (MMA, 2020).

Although the existence of private actors in the process of construction of public policies is considered and, therefore, that they are not restricted to state action, this work will favor the privileged view of the State in the structuring of public policies (MASSARDIER, 2003; MELLO-THÉRY, 2011; FONTAINE, 2015). This is due to the low relative importance of private actors in the environmental management of protected areas in Brazil, in addition to the strong relationship between environmental preservation, public policies, and territory advocated by authors such as Milton Santos, Bertha Beker, and Neli Aparecida Mello-Théry.

Because the management of protected areas, denominated in Brazil as nature protected areas (APs) (BRASIL, 2000), is one of the objectives of the National Environment Policy (BRASIL, 1981, art. 4°), an element also provided for in the Federal Constitution (BRASIL, 1988, art. 225), as well as in other public policies for environmental protection and conservation of the country and aligned with international trends, these areas began to have their managements evaluated to find out whether or not they are fulfilling the role for which

they were created and whether, with this, they are offering society the expected results, benefits and related environmental services (LEVERINGTON; HOCKINGS, 2004; HOCKINGS et al., 2006; GELDMANN et al., 2015).

Even in ideal or almost ideal conditions, having the infrastructure, knowledge, and the inputs to perform a high-quality APs' management, it may simply not happen, a phenomenon that is related to various factors, such as the profile of the management organization, characteristics of social participation, the profile of managers among others (FARIA, 2004; WWF; FF; IF, 2004; IBAMA; WWF, 2007; WWF-BRASIL, 2009a, 2009b; TCU, 2013). For example, a recent study covering 218 marine protected areas identified that among the factors that most influence the effectiveness of these areas in conserving biodiversity are related to the capacities of the people in charge of management and the budget sufficiency for this activity; areas in which such factors are addressed presented almost three times more conservation capacity than the other (GILL et al., 2017).

Starting from the perspective of the public policy cycle (JONES, 1984), the stage presented in this article is the evaluation, through the application of a public policy instrument in the management of Morro do Diabo State Park during the years 2002 and 2016. This PA of integral protection was submitted, in the period, to evaluations of the effectiveness of systematic management with the methodology proposed by Cifuentes, Izurieta, Faria (2000), that seeks to identify the bottlenecks and positive points of PA management, making it possible to understand the changes in management and the impacts of its performance as a specially protected space.

The evaluation of the management of PAs is an important part of the cycle of their management, offering the feedback required for constant improvement (HOCKINGS, 2003; HOCKINGS et al., 2006; IUCN, 2016) and other authors. Knowing the situation in which actions and management components are found, more objectivity is assumed in decision-making, since it will start from a clear knowledge of the problems and their causes. This practice allows to improve environmental planning strategies, make actions more efficient and point out where investments are needed (HOCKINGS et al., 2006; ANDRADE, 2012; CURTI, 2021).

This paper presents the progression of the effectiveness of the management of the Morro do Diabo State Park between 2002 and 2016 through the use of a methodological procedure designed for this purpose and that shows the strengths and weaknesses of the management exercised in this specially protected space in the analyzed period.

MATERIAL AND METHODS

The Morro do Diabo State Park (PEMD) is located under the coordinates 22°27' at 22°40' south latitude and 52°10' at 52°22' West longitude; is a protected area in category II of the World Union for Conservation of Nature (IUCN, 1994; BRAZIL, 2000; DUDLEY, 2008) and comprises the largest protected sample of seasonal semideciduous forest of the Hotspot Brazilian Atlantic Forest, with several species of fauna threatened with extinction (IUCN, 2013; SÃO PAULO, 2014). The management objectives of the area indicate the conservation of biodiversity, especially the *Leontopithecus chrysopygus* (black lion tamarin); the development of research and promotion of public use, with an emphasis on ecological tourism (IF, 2006).

The PEMD was administered by the Forest Institute until 2006 and from then on by the Forest Foundation (SÃO PAULO, 2006).

To evaluate the management and obtain its efficacy indexes, the procedure delineated by Cifuentes et al (2000) was used, called *EMAP*. The methodology presupposes the use of a series of indicators and quali-quantitative variables, which are valued according to their scale of five levels, from 0 to 4, in which the highest value reflects the optimal scenario and the lowest, the conditions totally opposed to the achievement of the area's management objectives; intermediate scenarios are associated with other scale values and configure a Lickert scale (1932); each of the indicators has its definition and for each of the five levels of the scale are associated scenarios that prescribe the quality assigned to the indicator (FARIA, 2004, p. 93-117).

The classification of the effectiveness of management occurs through the percentage relationship between the "total achieved" (sum of the scores achieved from the analysis of the current situation of the indicators) and an "optimal total" corresponding to the sum of the highest possible scores to be obtained. The resulting quantity is correlated to the scale that determines the quality standard of management (Chart 1).

Table 1: Scale for the assessment of indicators and Management Effectiveness-EfG (Faria, 2004).

% of optimal total	Quality level of EfG	Level of attention to indicators
≤ 40,99%	Very Inferior or Very Unsatisfactory Pattern	Very strong weakness
41 – 54,99	Lower or Unsatisfactory Pattern	Weakness
55 – 69,99	Median Standard	Attention
70 – 84,99	High or Satisfactory Standard	Positive indicator
≥ 85%	Standard of Excellence or Very Satisfactory	Very positive indicator

Its application required the techniques of data collection of qualitative research such as active and observational participation, formal interviews with employees, monitoring of processes and administrative publications in the Official Gazette of the State, environmental news, institutional sites, current and scientific media (LAKATOS; MARCONI, 2003). As indicated by Richardson (1999, p. 208, 259), participant and non-participant observation allowed different views on the context through the experience of the multiple variables involved in the management of the protected area, as well as about the perceptions of employees, researchers, and visitors through directed, informal, and unsystematic conversations in the work environment. This exploratory search was based on the answers to the indicators considered and questioned in the evaluations (FARIA, 2004).

The reality of management caused the authors to define six-time clippings that were studied in the light of the information and collimated data, the critical analysis of content, according to Mozzato and Grzybovski (2011), of the results of past evaluations (FARIA, 2002, 2004; PIRES; FARIA; MONTEIRO, 2007; PIRES; FARIA, 2009) and original evaluations related to the years 2011, 2014 and 2016.

On the quantitative results, the scores derived from the evaluations of the indicators, a principal components analysis (PCA) was carried out to find, through this technique, the variables that aggregate as much as possible of the variance present in the multivariate data (HAMMER; HARPER; RYAN, 2001); this expression is considered a good criterion for reducing the set of data and variables to be considered in the analysis; if most of the variance is taken into

account by the first two components, the analysis was successful (DODONOV; OF KINGS, 2012).

RESULTS

The quantitative results presented in Table 1 come from the quali-quantitative analysis of the indicators, whose score from 0 to 4 is associated with alternative scenarios that these indicators can assume in the field. The following is a summary of the behavior of the analyzed indicators, presented in Table 1.

Table 1: Scores of indicators and components used in the evaluation of PEMD management in accordance with Cifuentes et al (2000) and Faria (2004).

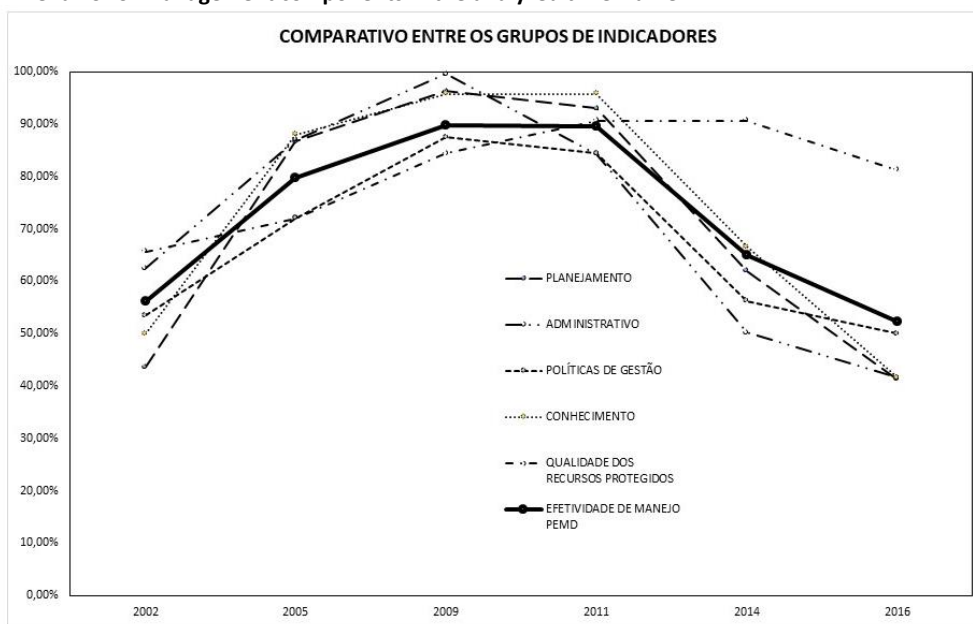
Scopes of indicators	2002	2005	2009	2011	2014	2016	Média
Planning (5)							
Management plan	0,33	3,50	3,66	4	2	1,66	2,5
Zoning	2	4	4	4	3	1	3
Planning level	1	4	4	3	2	1	2,5
Uses x management objectives	3	3	4	4	2	1	2,8
Management Programs	2,4	3,10	3,6	3,6	2,4	1,6	2,8
Total achieved	8,73	17,60	19,26	18,6	11,4	6,26	
Optimum total	20	20	20	20	20	20	
% of optimum	43,66	88	96,3	93	57	31,3	68,21
Management (9)							
Manager	2	4	4	4	1	1	2,66
Staff- RH	2,16	3,16	3,8	3,6	2,16	1,66	2,76
Financing	0,33	2,30	3,33	3	4	4	2,82
Resource generation	2	3	2	2	1	1	1,83
Organization	1,75	3,75	3,75	3,75	1,5	1	2,58
Infrastructure	2	3	4	3	3	2	2,83
Equipment and materials	3	4	3	3	1	1	2,5
Firebreaks	2	3	4	4	3	2	3
Physical demarcation of the PA	4	4	4	4	4	4	4
Total achieved	19,24	30,21	31,88	30,35	20,66	17,66	
Optimum total	36	36	36	36	36	49	
% of optimum	53,44	84%	88,55	84,86	57,39	36	53,51
Management policies (8)							
Legal instrument for creating the area	4	4	4	4	4	4	4
Law enforcement	3	4	4	4	2	1	3
Land tenure	4	4	4	4	4	4	4
Community support and participation	2	4	4	3	0	0	2,16
Support and/or interinstitutional relationship	3	3	3	3	2	1	2,5
Staff support / Career plan	2	2	2	2	2	1	1,83
Training program	0	1	4	4	0	0	1,5
Intra-institutional support or facilitation	2	1	3	3	1	1	1,83
Total achieved	20	23	28	27	15	12	
Optimum total	32	32	32	32	32	32	
% of optimum	62,5	72	87,5	84,44	46,87	37,50	65,14
Knowledge (6)							
Biophysical information	3	4	4	4	3	2	3,33
Cartographic information	3	4	4	4	4	2	3,5
Socioeconomic information	1	4	4	4	4	2	3,17
Legal information	2	3	3	3	2	2	2,5
Research and Projects	2	3	4	4	1	1	2,5
Monitoring and Feedback	1	3	4	4	1	0	2,17
Total achieved	12	21	23	23	15	9	
Optimum total	24	24	24	24	24	24	
% of optimum	50	87,5	95,83	95,83	62,5	37,5	71,53

Quality of protected resources (6)							
Size	3	4	4	4	4	4	3,83
Shape	3	3	3	3	3	3	3
Isolation, insularity, connectivity	1	1	2	3	3	3	2,17
Integrity of the headwaters in the PA	3	3	3	4	4	4	3,5
Exploitation of natural resources within the PA	4	4	4	4	4	4	4
Threats	1	2	3	3	2	1	2
Total achieved	15	17	19	21	20	19	
Optimum total	24	24	24	24	24	24	
% of optimum	62,5	70,83	79,16	87,50	83,33	79,16	77,08
Σ Total achieved	74,97	109,65	122,14	120,95	82,06	63,92	
Σ Optimum total	132	132	132	132	132	132	
Management effectiveness index	56,79	83,06	92,53	91,63	62,16	48,42	72,43

Note. The fractional values come from the evaluation/operation of sub-indicators.

From Table 1, it can be seen that the management effectiveness or effectiveness index (EfG) ranged from lower levels to reach levels of excellence, then falling from 2011. Figure 1 offers a graphical view of management performance in the period, highlighting the moments of rising and fall in the quality of management, with reflection on the achievement of the area's management objectives.

Figure 1: Behavior of management components in the analyzed time frame



*Analogously to what Faria (2006) and Carvalho (2020) proposed, attention is drawn to those indicators that obtained an average of fewer than 2 points (or 50%) in the sampled period, since from there the lowest enters the space of warning of weaknesses in different intensities and magnitudes, with weak and very weak indicators that need to be worked on to ensure the overcoming of obstacles to effective management. This is the main reason to keep an area under the scrutiny of some method that allows managers to see the results of their actions, as well as the set of organizations and people involved in the management process.

Indicators whose scores were above the overall average obtained (2.8 points) have very good qualities that must be maintained and multiplied in the state PA system, such as the

physical demarcation of the area, recognized limits, and resolved land ownership. When it comes to the average of a historical series, it is important to observe the trends of the scores.

In Principal Component Analysis (PCA) the correlation indices range from -1.0 to +1.0, meaning that the variable (indicator) has a negative or positive correlation in the construction of the component or new factor. It was taken into account that for an indicator to be associated with a given component, its correlation coefficient must be greater than the module [0.25], a condition equivalent to that presented by Ângelo (1996). The use of this technique reduces the dimensionality of variables and data, which enables a more pragmatic and synthetic analysis of management, addressing the indicators with greater implications for the EfG indices.

According to Table 2, the first two main components accounted for 86.48% of the total data variation and include nine original indicators, an indication of the importance of these variables in the results obtained by the technique. From the 3rd component onwards, the percentage of explanation of the data variance is too low to be considered, even though it includes important variables evaluated. Comparing the results expressed in Table 1 with the result of the PCA, it is observed that the first two components are followed by variables whose scores fluctuated significantly over the time studied.

Table 2: Principal components (PC), respective variables, and percentage of explained variance of the scores achieved by the indicators.

C. P.	Indicadores	% da Variância
1	Manager Financing Community support and participation Training program Monitoring and Feedback	72,155
2	Management plan Equipment and materials Community support and participation Training program 'Isolation, insularity, connectivity'	14,07

It can be deduced that from a universe of 34 indicators, we can more tenaciously explore the indicators 'Manager', 'Funding', 'Support and community participation', 'Training program', 'Monitoring and feedback', 'Management plan', 'Equipment and materials', 'Isolation, insularity, connectivity'. However, this reduction does not mean that management is limited to these factors, on the contrary, as one of the creators of the EMAP methodology (CIFUENTES, 1991) and other authors claim, the management of protected areas is so complex that in each site the multiple variables and their connections are shaped in different and almost unique ways.

The group of indicators with the best performance over the period analyzed was related to the scope 'quality of protected resources', which improved due to ecological connectivity carried out with neighboring fragments, and even the improvement in the conservation status of these same fragments and from the park's vegetation. The environmental quality has only withered in recent years due to threats to the park due to the precariousness of surveillance activities, lack of staff or expertise adequate to the needs of the area, or due to the absence of leadership and monitoring routines and the search for pragmatic solutions to the impacts of human activities on the protected area.

The scope of knowledge underwent an increase in its performance because of the management plan and monitoring systems, to then begin a decline from the last two timelines (2014 and 2016) due to outdated information about the area, added little by little control over the surveys carried out and the complete elimination of systems for the integrated monitoring of the park.

The administrative sphere had its score high at the beginning and decreased in 2014 mainly due to the profile of the manager, whose training, interest, motivation, and form of hiring were relevant. The staff took on another scope because of retirements and not the replacement of staff, a chronic problem in Brazilian PAs (SEMEIA, 2021). Although the UC's funding remains stable and at a reasonable level, apparently at specific times it suffered from planning for investments in improving equipment and in the maintenance of internal paths and fire breaks, essential for protection against forest fires.

The planning and political spheres also had an average performance, which was reflected in the general performance of the administration. The conduction of activities based on the management plan was discontinued as of 2013, causing mismatch, little operability, and the failure of essential actions for the Parks category. The 2004 management plan is out of date, but the document still serves the purpose of conducting activities in the area, requiring only its consideration by the people in the management system. The disregard, for example, of the zoning and the rules applicable to each zone implies in the divergence of 'opinions' regarding the inspection of predatory fishing in the buffer zone, for which section the management plan is specific, objective and, clear (IF, 2006). This situation enhances an inter-institutional conflict, maximized in the face of changes in the staff of environmental military police and in the surveillance of the park, who need to periodically receive guidance on the subject from the area's management.

In the scope of management policies, one of the most important mechanisms was abandoned in 2012, the management board, which was only resumed in 2018 with a representation far below that of the past. With a reduced staff and a manager without a suitable profile for the function, the application and compliance with standards were compromised, as well as the relationships with multiple external organizations and even within the managing organization itself. The 'training program' indicator does not necessarily deal with the existence of a program, but with initiatives and activities that ensure constant learning and updating of employees in the area, an aspect that proactive managers are able to capitalize on among professors, professionals from the institution and other bodies with local/regional operations, researchers, projects and visitors with similar knowledge.

In relation to the six-time frames, in the first clip (2002) the area leaves a condition in which, despite having basic resources for management, it did not have a management plan, management council, management was conducted locally by an employee manager. Without the proper technical qualification, factors that are shared against the full achievement of the management objectives of the parks category, fundamentally about public use and the carrying out and control of research. As a result, the EfG index was at the lower limit of the Medium Standard class and had very specific deficiencies in the administrative and planning areas.

Despite this, in this scenario, an adequate basic infrastructure, a good number of employees with public examinations, a protection system based on a team of equipped and experienced forest guards, with land and water activities that compensated for the pressures and threats of forest fires, hunting, and illegal fishing. The maintenance of internal paths, roads, and trails guaranteed access to workers, researchers and less than 3000 visitors per year. Hunting (CULLEN et al., 2000), the ecological isolation of the park and, changes in the surrounding land use (CULLEN et al., 2005), a highway that segments the PA (FARIA; MORENI, 2000), fishing and forest fires were threats to be dealt with.

Right at the beginning of the 2nd time frame (2005), strategic adjustments were triggered, there was an injection of financial resources through environmental compensation and human resources through public tenders and other forms of hiring, the management council was implemented and participated in the preparation of the plan management (IF, 2006), resulting in a document with strong social belonging (CASTRO et al., 2007). The executive processes and the main actions outlined in the management plan began to take shape, leading management to a level of excellence that ensured the fulfillment of objectives and the possible absorption of untimely demands and requirements, ensuring the conservation of protected natural values and provision of environmental services.

The 3rd and 4th clippings (2009 and 2011) present a high EfG as they are the result of proactive technical management in favor of the Park's management objectives. Resources for environmental compensation provided for in environmental legislation (BRASIL, 2000) were designated, given the institutional budget reduction itself (FARIA, 2004). Through this means, investments were made in protection, maintenance, public use, and administration activities, and the number of monitors was expanded to serve visitors.

The planning capacity increased with the emergence of Annual Operating Plans (POAs) built from the management plan and with the participation of employees and society, enhancing the feelings of belonging and responsibility of those involved (FARIA; PIRES, 2013). A geographic information system was adopted to enter the daily occurrences of the unit, whether natural or anthropogenic, constituting a georeferenced database with the purpose of providing feedback to the management, according to the model presented by Pires et al. (2005).

The body of lookouts decreased, but its members were aware of the norms established for the environmental zones, especially the buffer zone, in which new management guidelines for pesticide spraying and fishing were applied (SÃO PAULO, 2002; IF, 2006).

Civil society organizations, the State, and local companies started a movement in favor of forest restoration (ITESP, 2000; BELTRAME et al., 2006) and ecological connectivity between the Park and forest fragments in its surroundings (CULLEN et al., 2005). Together with stricter environmental legislation and inspection, they have resulted in a reduction in the ecological isolation of the area, in addition to illegal hunting and fishing.

The increase in the quantity and quality of public use was an annual constant between the years 2005 and 2011, reaching more than 25,000 visitors/year, an aspect that required the improvement of the receptive infrastructure, which at first was adapted to the growing visitation, so that complementary equipment can be planned soon (FARIA; PIRES, 2013). The

activities were conducted for and with the community to find paths and enable decisions to minimize the environmental impacts suffered by the Park, such as the running over of wild fauna on the road that segments it (FARIA; PIRES, 2012).

In this short interval, important environmental public policy programs and projects were implemented ('Ecological Child', 'Places to Learn', 'Trails of São Paulo', 'Park Roads') and geological studies were carried out that led to the recognition of the 'Morro do Diabo' elevation as the seventh state geological monument (FERNANDEZ et al., 2014).

In 2009, as required by the State Council for the Environment, the PEMD management presented the results related to the implementation of the Management Plan. Of the five programs that make up the document, the results were satisfactory about the actions and results implemented, in which 72.32% of the planned programmatic actions managed to reach 80% of the expected results in the plan (CONSEMA, 2010).

Management effectiveness decreased slightly in 2011 due to reduced financial resources, changes in organizational operative planning, and changes in administrative assistance offered by the central offices. However, the PEMD celebrated its 70th anniversary as a protected area with the high-quality management standards, in which the set of actions tended to fulfill the area's management objectives. The biggest reasons for the existence of the Park category (DUDLEY, 2008), conservation, public use, and research support were being implemented within a context of good governance and social participation.

In the 5th and 6th clippings (2014 and 2016), management effectiveness declined, taking the area to the lowest level of this historical series. This should trigger the alert that the management indicators were out of balance, with the prevalence of some factors influencing the behavior of other variables.

After a period of relative managerial autonomy, decentralization of actions and decisions based on professional competencies and social participation, on the energy of democratic planning and the synergy of human relations, unfortunately, a delicate momentum came to the managing organization that pushed it to reach political agreements, with the replacement of managers with adequate training and skills by personnel from friendly, political and without technical criteria (ESCOBAR; GIRRARDI, 2013a; IEMBO et al., 2015). In 2012, this 'wave' reached the PEMD, assuming the area's management with a very different professional profile from the previous one, incompatible with the relevance of the area and the functions that this professional needs to develop.

This situation gave rise to a type of deficient administration in the PEMD, less purposeful and proactive and more reactive, with little technical management and fond of political management, as alluded to by Girardi (2017). The operational plans lost quality, with no social participation due to the deactivation of the management council (MMA, 2016). Managers were urged to comply with a booklet (FF, 2012) in which administrative solutions were concentrated in the central offices, a document that, although addressing technical issues in the management of PAs, repeats old models of public management, in addition to not replacing academic training and profile more appropriate to managers, according to Douroujeani (2002).

Communication with the outside world was greatly affected, as the telephone and internet services at the PEMD headquarters ceased to exist due to the lack of maintenance,

which 'justified' the transfer of the administrative office to a house provided in the city, 14 km from where things happened.

Although the financial resources for costing have increased from 2013 to 2016 (SÃO PAULO, 2013; 2015), with the hiring of outsourced surveillance (ESCOBAR, GIRARDI, 2013b), this increase in expenses did not imply a substantial improvement in the protection of the area, in improving 'Administrative' indicators or in management effectiveness. Without its corps of park rangers, a function terminated by a government act (SÃO PAULO, 2008), and without outsourced surveillance during contract renewal periods, the loss of fauna by hunting (CULLEN et al., 2000) and being run over (FARIA; PIRES, 2012) increased and its consequence may be the decrease in wild species stocks, in accordance with the conclusions of Benitez-Lopez et al. (2017).

Regarding governance (GRAHAM et al., 2003), between 2011 and 2018 the park did not have a management council, aggravating decisions in a period when management faced obstacles to being effective and efficient, with a real decrease in human resources and without a clear strategy for integrating the protected area to the local dimension and global issues, as indicated by Medeiros, Irving, and Garay (2006).

In the last analyzed interval, the quality of the protected resources is recognized by the EfG, as the forest has received a lower frequency and magnitude of forest fires in the last two decades; sites defined as recovery zones (IF, 2006) are at an advanced stage of recovery, and the park's ecological connectivity has improved thanks to ecological corridors and springboards that have become functional in the landscape (RODRIGUES et al., 2010; O IMPARCIAL, 2017). On the other hand, the non-compliance with regulatory standards in the buffer zone is also evident, especially those that apply to the use of pesticides, which compromise the environmental quality of the area.

The area returned to a management efficiency with low quality, moving in the last four years to a Medium standard (55–69.99% of the excellent total) and an Inferior or Unsatisfactory standard (41–54.99 of the excellent total), with the failure to meet primary management objectives, such as the protection of resources, and the cooling-off activities such as public use.

However, the management effectiveness of the PEMD was above the minimum levels reported by assessments in Brazilian PAs, as studies of a similar nature show that most federal PAs had rates lower than 60% of EfG (KINOCHI et al., 2012), with a considerable concentration of PAs below 40% effectiveness. In 2016, the average effectiveness index of federal PAs was 47.74%.

FINAL CONSIDERATIONS

The method used allows for a global view of management and statistical routines complement this analysis, as they offer details of the real impact of indicators on management, even though management itself is not restricted or reduced to the variables considered. For this reason, and because management is not a Cartesian science, especially because it is produced by people, local memory is used, otherwise important data and cognitive information that only the human mind can perceive and express are relativized, even with high correlation and convergence of quali-quantitative data.

The conditions and factors that led the protected area to achieve successful management are clear, which primarily involves land title regularization, well-defined boundaries, existence and consideration of a management plan, participation, and social support, an authentic, trained, experienced staff and managers, motivated by regular institutional support. In turn, the elements that caused the greatest imbalance in the management, pushing effectiveness in a negative direction, are associated with the human factor endogenous to the responsible organization, whether due to poor selection and training of managers, disregard for the expertise of former rangers, the little support or inter-institutional relationship and the interruption of citizen participation in the management through the management council.

The shifts in the quality of PEMD management support a statement: the management effectiveness index is strongly related to the organizational characteristics of the managing institution and the technical and administrative properties of field management, especially the manager, factors that were revealed by this temporal evaluation. Methodologically, this indicates that the separation of indicators into distinct groups does not mean the annulment of influences between them, as the temporal evaluations allowed us to infer those changes in the profile of local managers and institutional guidelines resulted in broadly different management standards.

The absence of proactive leadership and conceptual repertoire in conservation and management of PAs signal the lack of ownership and managerial authority that hasten the demotivation of employees in their work; the absence of planning does not allow the local administration to obtain satisfactory resources, leading to the scrapping of movable and immovable property in the area. With few employees and park rangers hired, without the slightest control over compliance with regulations, the conservation of biological diversity is at the mercy of illegal uses, prohibited hunting, and fishing. This leads us to an article in which Miguel Milano (2000) states that the real threats to protected areas are “associated with the people involved with the PAs, political decision-makers and technicians in charge of their effective management”.

Occasionally, these issues suggest the need for the managing organization to establish transparent technical criteria for the selection of directors and managers of APs, as well as for the choice of where to invest resources to improve management, given that the increase in the cost of the unit is not translated into an improvement in its management quality. Management based on professional skills and social participation grants ownership and authority to its members according to the contracts and official responsibilities assumed.

The biggest problem of discontinued management in protected areas, with the presentation of fluctuations in the efficiency index, lies in the difficulty of rescuing management to higher quality standards. As time progresses, the scenario tends to deepen, being necessary to dedicate much more resources and efforts to its resumption in favor of its management objectives. The consequences of a poorly managed Park point to a decrease in the local/regional recognition of the protected area as activities with and for society cease to materialize, especially when social participation is excluded or disdained, something that can be transmuted in threat if society 'forgetting' the PA occurs.

Between the closing, submission, and acceptance of this article, there were important facts that confirm the incidence of the human factor in the effectiveness of the management of the area, whether at the level of local management or in the human chain that decides to carry out the management actions:

As expressed in this article, the PEMD was without an advisory board from 2012 to 2018. In December 2018, this instance was reinstated with only five public sector representations, including FF, and five civil society representations (SÃO PAULO, 2018). Its 'renewal' in 2021 (SÃO PAULO, 2021) remained underrepresented, with the same organizations, and kept the exclusion of relevant representations of the regional public sector, such as the SIMA Environmental Research Institute, which has researchers and employees of the field in the park, the UNESP of Presidente Prudente, the Institute of Lands of São Paulo and the Secretary of Education; and the absence of civil society representation, no less important: the associations of two agrarian reform settlements that border the park, the Pontal do Paranapanema river basin committee and the rural labor and employer unions. The operability of the board is unknown, which can lead to the perception of being a merely figurative instance.

During the Covid-19 pandemic, visitation was interrupted in all state parks, but no alternative activities were planned and carried out at the PEMD, as happened in other areas where employees and environmental monitors were mobilized for the intense use of social networks, promoting lives, conservation messages, courses, technical seminars, lectures, among other forms of communication with society, as well as the planning of new activities and educational materials.

Very recently, by order of the local authority, the outsourced security guards were induced to search the Park's public employees at the time of leaving work, whose justification is supported by the disappearance of materials that were impossible to be taken away without detection by third parties, given the employees' use collective vehicle for their transport. An unusual fact in the protected areas of São Paulo, such a constraint does not favor the work climate, and may become a strong obstacle to the effectiveness of management.

On the other hand, a very positive point for the park's management was that FF obtained and allocated significant resources for the revitalization of the park's properties and trails. Starting in 2020, the work is expected to be completed in December 2021, with the complete recovery of the properties, replacement of obsolete elements, coatings, paintings, in addition to the implementation of individual sewage treatment systems for each building, in compliance with parameters required by Cetesb and Conama, and a new energy distribution system (FF, 2021). In this process, and apparently due to a lack of knowledge and dialogue, the oldest and most historic building of the unit was demolished, an old corral from the 1960s built with noble woods that currently do not exist in the timber market ('peroba-rosa', *Aspidosperma Polyneuron*, and purple ipe, *Handroanthus avellanadae*), a place that could have been restored to house recreational and research activities, for example. Testimonies from officials indicate that some of them tried to prevent this from happening but without success.

Regarding knowledge and research, the area was awarded the project for Monitoring Medium and Large Terrestrial Mammals, given its isolation in the landscape and the possibility of connectivity with the Paraná Corridor (FF, 2019), but also due to its presence of at least 3 of

the 4 target species of the pilot project (*Panthera onca*, *Tapirus terrestris*, *Puma concolor*, *Tayassu pecari*). The implementation of this project, conceived and coordinated by Forest Foundation, resulted in the essential recovery of fire breaks and internal paths, strategic accesses for protection against invasions, hunting, and forest fires. Such maintenance should be a constant, as it is a recommendation expressed in the PA management plan. However, such revival of the East face firebreaks, as well as those on the SP-613 highway that segments the park, seem not to have been properly oriented, as long sloping stretches do not contain any device to prevent soil erosion, whose characteristics are stamped on the management plan of the area and easily visible on the ground.

In the year in which the Morro do Diabo State Park completes eighty years of existence as a protected area and due to its importance for the conservation of Brazilian biodiversity, 2021, this work points to the need for the area to benefit from effective and efficient management. It is urgent to seek compliance with national and international guidelines for planning and management of protected areas, seeking to solve the problems and highlight the strengths detected in the analyzed time frame, aspects that the continuous monitoring of management allows to obtain and demonstrate.

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