



ISSN: 2525-815X

Journal of Environmental Analysis and Progress

Journal homepage: www.ufrpe.br/jeap
<http://dx.doi.org/10.24221/jeap.2.1.2017.1034.50-60>



Performance indexes for the fulfillment of conservation units' management

Rodrigo Ferraz Jardim Marques^a, Alexsandro Bezerra Correia Bilar^{b*}, Rejane Magalhães de Mendonça Pimentel^c, Eberson Pessoa Ribeiro^d

^a Agência Estadual de Meio Ambiente de Pernambuco-CPRH-PE. Rua Santana, n. 367, Casa Forte, Recife-PE, Brasil. CEP 52060-460. E-mail: rodrigojfjm@gmail.com.

^b Universidade Federal Rural de Pernambuco-UFRPE, Unidade Acadêmica de Serra Talhada-UAST. Av. Gregório Ferraz Nogueira, s/n, José Tomé de Souza Ramos, Serra Talhada-PE, Brasil. CEP: 56909-535. *E-mail for correspondence: alexsandrobilar@yahoo.com.br.

^c UFRPE, Departamento Biologia/Botânica. Rua Manoel de Medeiros, s/n, Dois Irmãos, Recife-PE. Brasil. CEP: 52171-900. E-mail: rejanemmpimentel@gmail.com.

^d Instituto Federal de Educação, Ciência e Tecnologia de Pernambuco, Campus Vitória de Santo Antão. Propriedade Terra Preta, s/n, Zona Rural, Vitória de Santo Antão-PE, Brasil. CEP: 55602-970. E-mail: eberson_pessoa@yahoo.com.br.

ARTICLE INFO

Received 01 Nov 2016
Accepted 15 Dec 2016
Published 31 Jan 2017

ABSTRACT

In consequence of the significant human-induced environmental disturbance, conservation units have become essential to the biodiversity protection. However, these territories must be managed democratically and efficiently to meet the preservation purposes and to promote better life quality to the society. The study aimed to propose a set of performance indices for the monitoring and continuous improvement of the management of a state Park under semiarid conditions. Information was obtained through questionnaires with members of the Management Board to determine a prioritization for actions indicated on its management plan, as well as to propose and validate indices capable of evaluating the execution effectiveness of the actions. A relevant product was indicators that permit to verify the results from the studies applied by the conservation unit, which can be used as a parameter for legally protected environmental territories.

Keywords: Environmental management, public policies, nature preservation.

Introduction

Alterations in the perception of environmental issues perception and the manner that the natural resources have been exploited indicated the need of creating specially protected spaces, which aim environmental management, biodiversity conservation, genetic heritage maintenance and natural ecosystems protection or, at least, some parts of them (Hassler, 2005).

Caatinga is a rich biome in biodiversity which covers an approximate area of 844,453 km², corresponding to 10% of the national territory (IBGE, 2014). According to data from the Ministry of the Environment, deforestation of this biome reaches 46% of its area (Brasil, 2014).

In Pernambuco, the area covered by the Caatinga represent 81,388.42 km², which amounts to 83% of the State territory and,

currently, less than 2% accounts for the percentage of this area which in protected, as conservation units (Cavalcanti, 2015).

Environmental policies' elaboration and execution of Pernambuco State is the responsibility of the Secretariat of the Environment and Sustainability (SEMAS) and its executive staff, the State Agency of the Environment (CPRH). The CPRH is an autarchy associated to the Secretariat of the Environment and Sustainability (SEMAS), which aims to promote and guarantee the improvement of environmental quality, contributing to public policies and environmental management projects elaboration, and is responsible for the environment state policies' execution (CPRH, 2013).

The main environmental public policies

made and implemented in the scope of Pernambuco State are the State Policy of Coastal Management, State Policy to Combat Desertification and Mitigation of Drought Effects, State Policy of Solid Waste, State Policy for Tackling Climate Change of Pernambuco, State Policy of Water Resources and Forest Policy of Pernambuco State.

In particular, about the attributions of responsible bodies for the management of the Conservation Unit State System (SEUC) created by the State Law nº 13.787/2009, SEMAS, as a central council, coordinates the consolidation of such system and supports the conservation unit management in the State and Municipal scopes. The CPRH, as a Manager-Council of SEUC, through the Forest Resources and Biodiversity Board (DRFB), is responsible for the implementation of SEUC, promoting and coordinating the execution of planning, creation, deployment, administration, and the control actions for the conservation units (Pernambuco, 2008; 2009).

The Conservation Units (UC) from the Conservation Unit State System (SEUC), according to their specific characteristics, are divided into two groups: full protection and sustainable use units. The basic protection units are those that aims to preserve nature, allowing just the direct use of natural resources. As for the sustainable use units, they aim to make nature conservation compatible with the sustainable exploitation of a part of the natural resources (Pernambuco, 2009).

Each group of UCs presents different management categories with distinct objectives. The categories of UC from the group Full Protection Units are Biological Reserve (REBIO), Ecological Station (ESEC), State Park (PE), Natural Monument (MN) and Wildlife Refuge (RVS). The group of Sustainable Use Units is divided into Environmental Protection Area (APA), Area of Relevant Ecological Interest (ARIE), State Forest (FLOE), Fauna State Reserve (REF), Sustainable Development Reserve (RDS), Urban Forest Reserve (FURB), Extractive Reserves (RESEX), Private Reserve of Natural Heritage (RPPN) (Pernambuco, 2009).

Concerning the number of conservation units in Pernambuco, according to the CPRH:

The State of Pernambuco has 81 Conservation Units, 40 of them as Full Protection and 41 as Sustainable Use. Among the Full Protection, Units are 03 Ecological Stations (ESEC), 05 State Parks (PE), 31 Wildlife Refuges (RVS) and 01 Natural Monument (MN). The

Sustainable Use Units include 18 Environmental Protection Areas (APA), 08 Urban Forest Reserves (FURB), 14 Private Reserves of Natural Heritage (RPPN) and 01 Relevant Ecological Interest Area (ARIE) (Della Bella, 2016).

The State Law nº 13.787/2009 created the SEUC of Pernambuco State and state parks, such as Mata da Pimenteira, in Serra Talhada-PE. These conservation units aim to preserve natural ecosystems and to enable the development of environmental education and ecotourism actions. Despite being under special administration regime, Araújo, Marques & Cabral (2009) state that the paradigm of the management model used in major of the conservation units must be changed, and one has to perceive these spaces as organizations that need to produce results for the society. Considering this aspect is necessary to evaluate the management effectiveness in these legally protected areas, from measurable results, using managerial methodologies and tools.

Deserves attention the possibilities of planning and execution of actions from the objectives, goals, and modes compatible with established management structure, management actions deployment degree visualization, to orientate efforts into the implementation and deal with deviations and provide standardization, learning and continuous improvement of management actions.

Checking the Planning execution may occur from the definition and monitoring of indices, which are used in quality and performance controls over the time.

The management of conservation units as organizational spaces show promising ways due to the supply, through the administration of several “theories, approaches, methodologies and tools that enable the management of these spaces in a more efficient and effective manner” (Araújo, Marques & Cabral, 2012, p. 207). These authors state that is necessary to acknowledge that the conservation units are subjected to the basic managerial equation, meaning that it receive input (financial resources, facilities, equipment, information and human resources) which must be transformed into services and products with greater added value, attending the society needs.

Faria (2004) propose the initiation of a continual process of evaluating management effectiveness of conservation units, similarly to that implemented in private organizations. However, even if the most modern methodologies and tools are applied to manage their resources, the efforts and results may only be measured (in

both quantity and quality) from the definition and execution of control mechanisms.

Control is one of the main managerial processes. It seeks to “ensure the accomplishment of goals and to identify the need to modify them” (Maximiano, 2000, p. 27). According to Rezende (2011, p. 130), it is a “process that guides the executed action to a previously determined end”, capable of verifying if the organizational analysis was correct.

The questions “what to control?” and “who are responsible for the control?” must be effectively answered considering the establishment of criteria and means to obtain data and evaluate the results.

A system of indicators is one of the usual means of control that consist of a set of structured indices, supported by practices, methods, and tools aiming to record, describe and represent data towards the creation of performance information (Rezende, 2011). Uchôa (2013, p. 7) conceptualizes an indicator as “a critic variable, which needs to be controlled, maintained in determined levels”. Due to some possible measurements, the selection of an indicator must be characterized by the highest degree of adherence to some properties that characterize a good measure of performance.

Indicators’ properties can be divided into two groups: essential and complementary. The essential properties (usefulness, validity, reliability and availability) must be considered as choice criteria. The properties that may be a target of choice conflict, depending on the individualized evaluation of the situation, are known as complementary properties, which are: simplicity, clarity, comparability, economy, stability and measurability (Rua, 2004; Jannuzzi, 2005; Ferreira, Cassiolato & Gonzalez, 2009 *apud* Brasil, 2012).

Regarding the classification, indicators may be systematized in several ways. According to the National Quality Foundation (2006), indicators are divided in simple and composite, direct and indirect and driving or resultant.

The position of a performance indicator in the value chain is, currently, a quite general classification. Consequently, indicators may be additionally classified as result and effort indicators (Uchôa, 2013).

There is no defined standard to build a system of indicators; there are several applied methodologies (Brasil, 2009).

Uchôa (2013) presents a sequence of steps necessary to build a system of indicators, which starts by selecting goals and critical success factors, following the measurement of desired

results and the respective verification of the chosen indicators’ quality, besides the proposition of an action plan.

According to Araújo, Marques & Cabral (2009, p. 29), considering the aggregate experience over recent years on the establishment and use of performance indicators in Brazil, such indicators may be divided into two groups to be applied to conservation units. The first, although small, has the property of applicability to different categories of conservation units; the second has the particularities of the conservation unit management, as its main characteristic, with greater quantities of variables, and a higher degree of complexity.

Considering the specific demand of the management plan of a conservation unit permit an improvement of the quality of public services to the society, to the environmental sustainability, and will be a reference to the national scope. The definition of control mechanisms will improve any evaluation action and, consequently, will provide a qualified management of a conservation unit.

One of the actions of the Program of Monitoring and Evaluation of the Management Plan of PEMP that still has not been executed is the definition of result indicators for management plan monitoring, by qualifying and quantifying variables that enable comparative measurements between current and desired scenarios. Thus, allowing the control of environmental changes and its reactions in the conservation units, indicate (when necessary) the use of correction tools from the managerial actions (Pernambuco, 2013).

It is clearly necessary to establish performance indicators capable of the monitoring and continuous improvement of a conservation unit. This study aims to purpose develop performance indicators considering the manager’s participation.

Material and Methods

Study site

The Parque Estadual Mata da Pimenteira (PEMP) is a full protection conservation unit, with 887.24 ha, located in Serra Talhada, in Pernambuco’s Sertão region (Pajeú microregion), created by the State Decree nº 37.823, of 30 of January of 2012.

The Figure 1 shows the map of the PEMP produced using the ArcGIS 9.3 software with a license from the Department of Geographical Sciences at the Federal University of Pernambuco (DCG/UFPE) being the orbital images projected in the Geocentric Reference System for the Americas (SIRGAS, 2000) and clipped to the

study area.

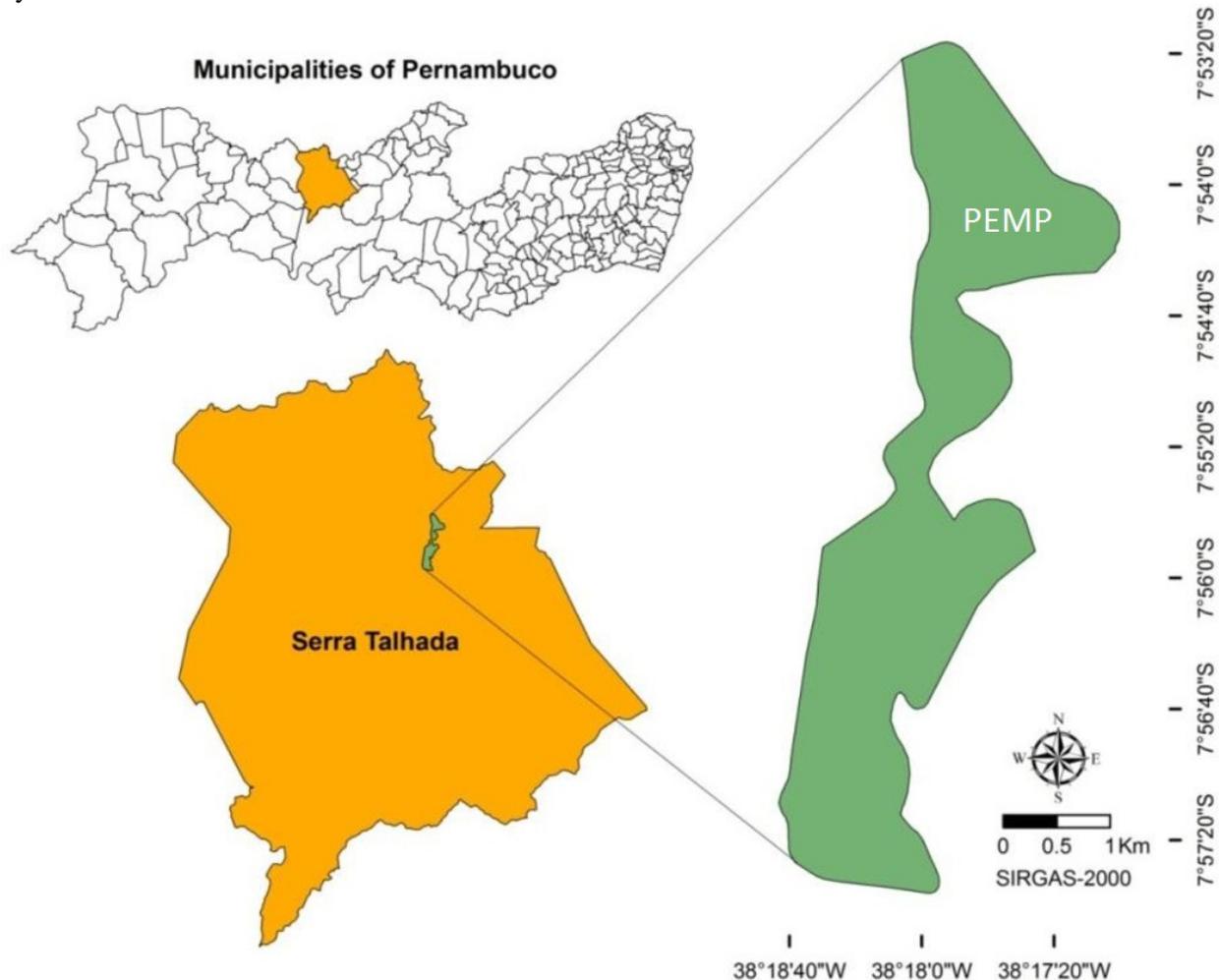


Figure 1. Localization of the Parque Estadual Mata da Pimenteira (PEMP) in the Serra Talhada municipality, in the Pernambuco State, Brazil. Fonte: Bilar (2016).

It is the first conservation unit of Caatinga in the State of Pernambuco (Santos et al., 2013), recognized as a mark of the State's interest in the conservation and preservation of this biome in its territory. The specific objectives of this conservation unit, as it is in the management plan, are:

[...] I – to contribute towards the preservation and restoration of Caatinga ecological diversity, expanding the representativeness of state ecosystems protected as conservation units; II – to encourage the deployment of recovery-promoting actions of degraded areas; III – to protect endemic and rare species of extinction currently occurring in the area and forest remnants of the region; IV – to provide means and incentives to activities of scientific research, studies and environmental monitoring; V – to promote the education, environmental interpretation and recreation in contact

with nature; and VI – to support sustainable development, respecting Caatinga's environmental support capacity, optimizing natural, cultural, artistic and ecotourism vocations throughout the region.[...] (Pernambuco, 2012).

According to this plan, PEMP is in an area classified by the Ministry of the Environment as a priority for the biodiversity conservation in the Caatinga.

Procedures for data collection and analysis

At first, a bibliographical survey was performed by using: books, scientific studies, and legislation to understand the central subject and to formulate the problem-question of the research. Secondly, two types of questionnaires were used, the first using importance scale (semantic differential) and the second using Thurstone scale (agreement) (Appolinário, 2006; Gil, 2007; Mowen & Minor, 2003; Samartini, 2006).

Although a quantitative approach was used when analyzing the first questionnaire, the information was analyzed by a qualitative approach, that is, of the population's concern with an empirical world and with the issue of the context (Gil, 2007).

In compliance with the establishment of the Conservation Unit State System (SEUC), that all research executed in the conservation unit scope in the State of Pernambuco must be submitted to the Manager-Council (CPRH), a formal request was forwarded to the entity above to receive authorization for the research. The Forest Resources and Biodiversity Board from CPRH granted such permission request, under

CA/DRFB N°101/2014, and the research was considered relevant to the conservation unit management.

The first questionnaire was applied, in June 2014, through e-mail, to the members of the advisory and joint management council of PEMP, following established by the Decree CPRH N° 062/2012, with a period of seven days to forward the answers.

A non-comparative scale, "scale of semantic differential", was used to analyze the 50 management actions proposed in the management plan of the PEMP, according to their central theme and respective action programs (Chart 1).

Chart 1. Central themes and respective action programs considered in a management plan.

Central theme	Action program
Management, Unit Monitoring, and Economic Resources	Institutional Articulation Program Physical Infrastructure Maintenance and Recovery Program Institutional Strengthening Program Management Plan Monitoring and Evaluation Program Resource Mobilization for Management Support Program
Environmental Control (Monitoring and Inspection)	Environmental Monitoring and Inspection Program Fire Prevention and Control Program
Environmental Recovery	Degraded Areas Recovery Program Exotic Species Control Program
Scientific Studies and Research	Scientific Research Program
Environmental Education and Community Inclusion	Environmental Education Program Community Communication and Inclusion Program

Source: Adapted from Pernambuco (2013).

The antonym adjective characterizes upper and lower limits of this scale, and the respondent should tick the scale point which best indicates the analyzed object's description. The applied adjective to the elaboration of the scale was the word "important", using four possible points to describe the studied object, such as 1 – no importance; 2 – little important; 3 – important;

and 4 – very important (Samartini, 2006).

During the analysis of the answers, for a better understanding of the results, the scale was transformed in percentage (from 0 to 100%), as seen in Chart 2.

Average, variance, standard deviation and coefficient of variation (CV) of the answers were also calculated.

Chart 2. The scale of importance used to evaluate the central themes, considering the respective action programs, of a management plan.

Importance scale	Original scale	Transformed scale (%)
No importance	1	0.00
Little important	2	33.33
Important	3	66.67
Very important	4	100.00

Source: Samartini (2006).

The importance of the first questionnaire enabled the prioritization of management actions by its respective programs, revealing possible restrictions for the conservation unit management. It reveals what is truly important to be measured

by the indicators. Two indicators for each management program were proposed, based on the perception of Uchôa (2013), selecting the indicators that are relevant and reducing the quantity for the essential.

The values closer to point 4 (very important) from the importance scale were used to balance the actions (variables) to be measured, by evenly distributing among the programs proposed in the management plan.

In the scenarios where the importance scale used did not identify any priority difference, showing a draw, it was evaluated the management action to the Conservation Unit System, following Araújo, Marques & Cabral (2009). Subsequently, reasonable adherence degree of the indicators to the essential and complementary properties was analyzed.

Thirdly, a second questionnaire with proposed indicators was submitted, through e-mail, to the appraisal of advisory board full members, still during June 2014, with a more seven-day period to forward the answers.

To measure the attitude of each member, that is, the amount of affection or appreciation for or against the proposed indicator, it was used the "Equal-appearing Interval Scale or Thurstone Scale". This scale consists of a set of declarations, where each one has a predefined value in the scale and are presented to the respondents, so that agree or disagree (Mowen & Minor, 2003).

The member's contributions were obtained through the questionnaire, allowing the possibilities of the proposal of new indicators or the addition of comments by the members.

There was no sort of identification of the respondents, on both questionnaire models used in this research, who were given full awareness regarding their academic purposes. The members were made aware that their participation was voluntary and it could terminate at any given time (as they wished), following the instructions for performing research with human beings established by the National Research Ethics Commission (CONEP).

For the first questionnaire, from 12 (twelve) full member of the manager-council, 8 (eight) have answered, representing 66.67%. For the second questionnaire, it was received 7 (seven) replies from the members, representing 58.33%. Thus, it can be considered a representative sampling, bearing in mind that the usual quorum for plenaries in conservation unit consists of an absolute majority of advisory board full members.

Results

In December 2013, the management plan for the Parque Estadual Mata da Pimenteira (PEMP) was validated, by its managerial council,

consisting of a period of four years to execute the established actions and, by the end of this period, its review. Among the steps for the elaboration of this document, it has identified the potentialities and vulnerabilities of this particular conservation unit, from the analysis of the internal and external environment. This analysis enabled the definition of actions aiming the right management performance and the achievement of goals that provide effective results for the PEMP, as well as allowing the definition of environmental zoning and action programs (CPRH, 2012; Pernambuco, 2013). The State Agency of the Environment (CPRH) of Pernambuco is an executive staff of the Policies of the Environment from this State and participates, along with the civil society, in the administration of public conservation units in the state scope (Pernambuco, 2009).

According to the importance scale used in this study, the management actions: "develop actions to combat hunting and deforestation" and "establish limits/boundaries of the conservation unit with physical mark" had the greatest priorities (with more than 90% of importance), according to the respondents of the first questionnaire.

By scoring more than 85% of importance, the following actions also deserve to be highlighted: "provide the infrastructure for the conservation unit functioning and the implementation of the actions in the Management Plan"; "perform lectures in surrounding schools and communities with themes related to the conservation unit"; "establish partnerships with schools, universities and IPA, in order to disseminate the importance of conservation unit preservation"; "elaborate and implement a signaling project for the conservation unit"; "develop actions for the eradication of waste disposal in the conservation unit and surrounding areas".

The answers from the second questionnaire presented a single pattern, with the respondents' concordance to the proposed indicators, with only one-member listing contributions and presenting suggestions.

An overview of the synthesis of the results for the proposal of indicators, as a function of the central theme and respective programs, with management actions' description, is presented in the Chart 3.

Twenty-six indicators of performance were proposed, making up a system intended to monitor the actions recommended in the management plan of the PEMP.

Chart 3. Indicators of performance proposed to the Parque Estadual Mata da Pimenteira (PEMP).

	PROGRAM	MANAGEMENT ACTION DESCRIPTION	INDICATOR PROPOSAL
Management, Unit Monitoring, and Economical Resources	Institutional Articulation Program	Establish partnerships with schools, universities, and IPA, to disseminate the importance of conservation unit preservation	Amount of partnerships set up for the promotion of the conservation unit per year
		Motivate more effective participation of the Manager-Council	Manager-Council meeting quorum
	Physical Infrastructure Maintenance and Recovery Program	Provide the infrastructure for the conservation unit functioning and the implementation of the actions in the Management Plan	Viable infrastructure per year
	Institutional Strengthening Program	Elaborate a Training Plan and continuous upgrading for the advisory board members	Training hours performed by the advisory board members per year
		Elaborate internal statute	Action of internal statute elaboration status
	Management Plan Monitoring and Evaluation Program	Define result indicators for the Management Plan monitoring	Indicators definition status
		Perform monitoring workshops and evaluation of adjustment to the Plan	Monitoring Workshop execution status
	Resource Mobilization for Management Support Program	Elaborate projects for resources mobilization and partnerships	Number of projects elaborated to mobilize resources per year Mobilized resources (\$) per year
		Identify and implement actions which promote socioenvironmental inclusion for local population	Amount of socioenvironmental inclusion actions with the surrounding areas implemented per year
	Environmental Control (Monitoring and Inspection)	Environmental Monitoring and Inspection Program	Develop actions to combat hunting and deforestation
Elaborate and deploy an environmental inspection plan			Action of elaboration and deployment of an environmental inspection plan status
Fire Prevention and Control Program		Elaborate and deploy a forest fire prevention and control plan	Action of elaboration and deployment of forest fire prevention and monitoring plan status Fire occurrence inside the conservation unit per year Fire occurrence in the Buffer Zone of the conservation unit per year
Environmental Recovery	Degraded Areas Recovery Program	Elaborate, deploy and monitor environmental recovery projects in the Recovery Sectors	% of degraded area recovered per year
	Exotic Species Control Program	Elaborate and deploy exotic species Management Plan	Action of elaboration and deployment of exotic species management plan status
Scientific Studies and Research	Scientific Research Program	Support and fund research for ecological tourism incentive	Amount of research applied to the management plan per year Researchers satisfaction index
Environmental Education and Community Inclusion	Environmental Education Program	Perform lectures in surrounding schools and communities with themes related to the conservation unit	Amount of people made aware in Environmental Education per year
		Develop educational campaigns related to the themes: waste, forest fire, hunting and animal confiscation, for the surrounding community	Amount of educational campaigns performed per year
		Elaborate and deploy monitored track	Action of elaboration and

		project	deployment of monitored track status
	Community Communication and Inclusion Program	Disseminate events and activities of the conservation unit in blogs, websites and other means of communication	Percentage of events and activities disseminated per year
		Elaborate communication plays to inform and sensitize the community and users of the conservation unit	Amount of communication plays elaborated per year

Source: Marques et al. (2016).

For the central theme Management, Unit Monitoring and Economical Resources, the priority actions for the Institutional Articulation Program and its respective proposed indicators were: to establish partnerships with schools, universities, and IPA, in order to disseminate the importance of conservation unit preservation, with 87.5% of relevance, and the proposed indicator was a number of partnerships established for the promotion of the conservation unit per year; and to motivate more effective participation of the Manager-Council, with 79.17%, proposing as indicator the Manager-Council meeting quorum.

The actions “encourage and support the municipality for creating a Municipal conservation unit surrounding the Park”, “motivate more efficient participation of the Manager-Council” and “enable partnerships with private and public sectors and universities for research production” did not differ according to the importance scale. In this case, the action “motivate more effective participation of the Manager-Council” was defined as a priority.

The Physical Infrastructure Maintenance and Recovery Program has obtained contribution in the making of the indicator from one advisory board member.

There was a disagreement on the proposal, on the sense of management action coverage, because, on the advisory board member’s understanding, the action “provide the infrastructure for the conservation unit functioning and the implementation of the actions in the Management Plan” includes the action “establish limits/boundaries of the conservation unit with physical mark”.

Indicators were proposed for both management actions for the Institutional Strengthening Program. Regarding “elaborate internal statute” action, it is proposed an indicator of “action status”, which will show the current situation of such an action during the management process (Example: uninitiated, in progress, and completed). All the indicators proposed as action status follow the same approach.

Management action of “elaborate projects for resources mobilization and partnerships”, from the Resources Mobilization for Management

Support Program, received an advisory board member’s indicator proposal. Thus, the variable “Number of projects elaborated to mobilize resources per year” was added.

Among the indicator proposals for the Physical Infrastructure Maintenance and Recovery Program, Institutional Strengthening Program, Management Plan Monitoring, and Evaluation Program and Resource Mobilization for Management Support Program, can be highlighted: the provision of infrastructure for the conservation unit functioning and for the implementation of the actions in the Management Plan, with 87.5% of importance, and the elaboration of projects for resource mobilization and partnerships and the implementation of actions that promote socioenvironmental inclusion for local population, both presented 83.33% of importance, according to the advisory board members’ answers.

Although the action “develop actions to combat hunting and deforestation” has obtained the greatest priority on the scale when compared to the other actions (95.83%), the proposed indicators for the Environmental Monitoring and Inspection Program, in accordance with an advisory board member suggestion, took into consideration the most comprehensive action “Elaborate and deploy an environmental inspection plan”, which must cover every action in the program.

The Fire Prevention and Control Program is composed of the management action “elaborate and deploys a forest fire prevention and control plan”, and it was considered relevant to the advisory board members (83.33% of importance), and the action status was its monitoring indicator.

Regarding the Environmental Education Program, there was no initial indicator proposal for the action “develop educational campaigns related to the themes: waste, forest fire, deforestation, hunting and animal confiscation for the surrounding community”; it was verified the need of complementing the information on the indicator “amount of people made aware of environmental education per year” from the indicator “amount of educational campaigns performed per year”.

Discussion

Management actions considered as of greater importance as the interpretation of the respondents were those related to the management and monitoring of the park, environmental education and integration with the community, corroborating Maximiano (2000), Faria (2004), Hassler, (2005), Rezende (2011), Araújo, Marques & Cabral (2012), about the relevance of the consideration of a management model for the protected areas based on what has been adopted by organizations, guided by the planning and control of the activities to be carried out, with a focus on quality.

In relation to the proposition of parameters for monitoring management activities, the lack of knowledge of the definition of an indicator of performance, the essential and complementary properties and the steps to its definition, according to Rua (2004), Jannuzzi (2005), Ferreira, Cassiolato & Gonzalez (2007 *apud* Brazil 2009, 2012), can be assigned as factors that influenced the pattern of answers from counselors.

Indicator proposals for the Degraded Areas Recovery Program and Exotic Species Control Program need also be highlighted and are essential to reaching the preservationists purposed of the PEMP.

The proposed indicators for the Scientific Research Program, though the priority have pointed out the management action "support and fund research for ecological tourism incentive", have followed the indicators set common to a conservation units system, according to Araújo, Marques & Cabral (2009), seeking a greater measurement coverage of the other actions proposed for the aforementioned program.

Finally, proposed indicators for the Communication and Inclusion Program with the Community place a high emphasis on the actions performed by the conservation unit in this study, aiming to make local population and general visitor of the park aware of its socioenvironmental importance.

Conclusion

It was evident that the managerial public administration concepts can be applied to conservation units, using tools of effective management, aiming to obtain results, considering the conservation units characteristics and its adequacy needs.

The deployment of performance indicators, as a control process for the administration of a conservation unit, makes the necessary information available for decision-

making and action-guiding.

Based on the management actions priority, established by the Manager-Council, 26 indicators were proposed to monitor the management performance of the PEMP. The indicators were distributed into 12 programs proposed in the management plan of this conservation unit aiming a balance of the variables to be monitored.

Finally, it is recommended, for the improvement of this conservation unit management, the following measures: a) elaboration of strategic planning, with medium- to long-term objectives, aiming to provide better clarity regarding the management. In this case, management actions would be an unfolding of the objectives; b) training the members from the Manager-Council on managerial methodologies, seeking the space management appropriation, creation and implementation of its strategic planning and an indicator system improvement proposed here, as a parameter and incentive for new research.

Acknowledgement

The authors are grateful to the Agência Estadual de Meio Ambiente do Estado de Pernambuco (CPRH), Secretaria de Estado de Meio Ambiente e Sustentabilidade (SEMAS/PE), Fundação de Amparo à Ciência e Tecnologia do Estado de Pernambuco (FACEPE), by granting scholarship (Doctoral level) to the second author, as well as the Conselho Nacional de Desenvolvimento Científico (CNPq) by Productivity Scholarship granted to the third author.

References

AGÊNCIA ESTADUAL DE MEIO AMBIENTE-CPRH. Portaria CPRH nº 062, de 22 de junho de 2012. Cria o Conselho Gestor do Parque Estadual Mata da Pimenteira, e dá outras providências. Diário Oficial do Estado de Pernambuco. Recife-PE, 26 Jun. 2012.

AGÊNCIA ESTADUAL DE MEIO AMBIENTE-CPRH. Relatório de atividades 2013. Available in: http://www.cprh.pe.gov.br/ARQUIVOS_ANEXO/Relat%C3%B3rio%20de%20Atividades%202013.pdf. Access in: 16 May 2014.

APPOLINÁRIO, F. 2006. Metodologia da Ciência: filosofia e prática da pesquisa. São Paulo: Thompson.

ARAÚJO, M. A. R.; MARQUES, C. P.;

CABRAL, R. F. B. 2009. Melhorando a efetividade da gestão de unidades de conservação: a experiência do Programa de Gestão para Resultados-PGR. Programa Áreas Protegidas da Amazônia-ARPA e Cooperação Técnica Alemã-GTZ. Cadernos ARPA, 3. Brasília: MMA.

CABRAL, R. F. B. 2012. Unidades de conservação no Brasil: o caminho da Gestão para Resultados. Núcleo para Excelência de Unidades de Conservação Ambiental-NEXUCS (Org.). São Carlos: RiMa Editora.

BRASIL. 2005. Decreto Federal nº 5.378 de 23 de fevereiro de 2005. Institui o Programa Nacional de Gestão Pública e Desburocratização - GESPÚBLICA e o Comitê Gestor do Programa Nacional de Gestão Pública e Desburocratização, e dá outras providências. Diário Oficial da União, Brasília-DF, 24 Jan. 2005.

BRASIL. 2014. Ministério do Meio Ambiente. Bioma Caatinga. Available in: <http://www.mma.gov.br/biomas/caatinga>. Access in: 08 Oct. 2014.

BRASIL. 2009. Ministério do Planejamento, Orçamento e Gestão. Secretaria de Gestão. Melhoria da gestão pública por meio da definição de um guia referencial para medição do desempenho da gestão, e controle para o gerenciamento dos indicadores de eficiência, eficácia e de resultados do Programa Nacional de Gestão Pública e Desburocratização. Brasília: MP.

BRASIL. 2012. Ministério do Planejamento, Orçamento e Gestão. Secretaria de Orçamento Federal. Secretaria de Planejamento e Investimentos Estratégicos. Indicadores-Orientações Básicas Aplicadas à Gestão Pública / Ministério do Planejamento, Orçamento e Gestão. Coordenação de Documentação e Informação. Brasília: MP.

CAVALCANTI, C. 2015. Os desafios da pauta ambiental na gestão do Governo de Pernambuco. Palestra proferida pelo Secretário Executivo da Secretaria de Meio Ambiente e Sustentabilidade (SEMAS) do Estado de Pernambuco durante o XIX Seminário Integrador da Rede PRODEMA. Recife, 29 set. 2015. 74 slides: color.

DELLA BELLA, S. 2016. Abertura da II Semana das UCs: instrumentos de gestão – plano de manejo e conselho gestor. Palestra proferida pela Gerente da Unidade de Gestão de Unidades de

Conservação da CPRH/PE. Recife, 17 out. 2016. 18 slides: color.

FARIA, H. H. 2004. Eficácia de gestão de unidades de conservação gerenciadas pelo instituto florestal de São Paulo, Brasil. Tese de Doutorado, Universidade do Estado de São Paulo, Rio Claro, São Paulo, Brasil. 401 p.

FUNDAÇÃO NACIONAL DA QUALIDADE-FNQ. 2006. Cadernos de Excelência: resultados Série Cadernos de Excelência, n. 8. São Paulo: Fundação Nacional da Qualidade.

GIL, A. C. 2007. Como elaborar projetos de pesquisa. 4. ed. São Paulo: Atlas.

HASSLER, M. L. 2005. A importância das Unidades de Conservação no Brasil. Revista Sociedade & Natureza, v. 17, n. 33, p. 78-89.

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA-IBGE. 2014. Mapa de Biomas e de Vegetação. Available in: <http://www.ibge.gov.br/home/presidencia/noticias/21052004biomashtml.shtm>. Access in: 02 May 2014.

MAXIMIANO, A. C. A. 2000. Introdução à Administração. 5ª ed. São Paulo: Atlas.

MOWEN, J. C.; MINOR, M. S. 2003. Comportamento do consumidor. São Paulo: Prentice-Hall.

PERNAMBUCO. 2008. Decreto Estadual nº 32.514, de 23 de outubro de 2008. Aprova o Manual de Serviços da Agência Estadual de Meio Ambiente-CPRH, e dá outras providências. Diário Oficial do Estado de Pernambuco. Recife-PE, 24 Oct. 2008.

PERNAMBUCO. 2009. Lei Estadual nº 13.787, de 08 de junho de 2009. Institui o Sistema Estadual de Unidades de Conservação da Natureza – SEUC, no âmbito do Estado de Pernambuco, e dá outras providências. Diário Oficial do Estado de Pernambuco. Recife-PE, 09 Jun. 2009.

PERNAMBUCO. 2012. Decreto Estadual nº 37.823, de 30 de janeiro de 2012. Cria o Parque Estadual Mata da Pimenteira, localizado no Município de Serra Talhada, neste Estado. Diário Oficial do Estado de Pernambuco. Recife-PE, 31 Jan. 2012.

PERNAMBUCO. 2013. Parque Estadual Mata da Pimenteira: plano de manejo. Secretaria de Meio Ambiente e Sustentabilidade, Agência Estadual de Meio Ambiente. Recife, PE.

REZENDE, D. A. 2011. Planejamento estratégico público ou privado: guia para projetos em organizações de governo ou de negócios. São Paulo: Atlas.

SAMARTINI, A. L. S. 2006. Comparação entre métodos de mensuração da importância de Atributos em produtos e serviços. Fundação Getúlio Vargas. Escola de Administração de

Empresas de São Paulo. Relatório de Pesquisa. São Paulo.

SANTOS, E. M.; MELO JÚNIOR, M.; SILVA-CAVALCANTI, J. S.; ALMEIDA, G. V. L. (Org.). 2013. Parque Estadual Mata da Pimenteira: Riqueza Natural e Conservação da Caatinga. Recife: EDUFRPE.

UCHÔA, C. E. P. D. 2013. Elaboração de indicadores de desempenho institucional. Coordenação Geral de Programas de Capacitação/DDG. Brasília: ENAP/DDG.