

## Supplementary Online Material

### Categorization of sustainable use protected areas for context-specific conservation initiatives in the Amazon

Letícia Lopes Dias\*<sup>1</sup>, Angela Pellin<sup>1</sup>, Neluce Soares<sup>1</sup>, Pedro Pedro<sup>1</sup>, Letícia Umbelina <sup>1</sup> and Fabiana Prado<sup>1</sup>.

\* Corresponding author: leticia.lopes@ipe.org.br

<sup>1</sup>IPÊ – Instituto de Pesquisas Ecológicas, Rod. D. Pedro I, km 47, CEP 12960-000, PO Box 47, Nazaré Paulista, SP, Brazil

#### Text S1

The criteria used by the Federal Court of Accounts for the *Implementation and Management Index Tool* (Indimapa) are reproduced below (TCU, 2021). The original version and further methodological details are available in the audit appendices.

Table S1. Indicator scoring criteria for Indimapa, modified from TCU (2021). PA = Protected Area.

Criteria	Value	Response
<b>Management plan</b>		
PA has a management plan?	1	Yes.
	0	No, but it is in the process of being drafted.
	0	No, and it's not being elaborated.
Does the management plan incorporate the specific objectives contained in the PA creation standard?	1	Yes.
	0	No.
	0	*If the PA does not have a management plan, this component should be evaluated as zero
What is the degree of implementation of actions foreseen in the plan?	1	Total = superior to 90%
	1	High = between 60% and 90%
	1	Medium = between 30% and 60%
	0	Low = between 0 and 30%
	0	Null = 0
	0	*If the PA does not have a management plan, this component should be evaluated as zero
<b>Human resources</b>		
Does PA have at least one person responsible for its management?	1	There is at least one person responsible for the management of the PA.
	0	There is no one responsible for the management of the PA.
Is the number of available personnel compatible with the needs of the unit?	1	It is fully compatible with the needs.
	1	It is partially compatible with the needs.
	0	Not compatible with needs.
Have PA's essential activities been carried out considering available staff?	1	Essential activities have been carried out satisfactorily thanks to the number of staff available.
	1	Essential activities have been carried out despite staff shortages.
	0	Essential activities have not been carried out because of staff shortages.
	1	Essential activities have not been carried out for other reasons, even though PA is sufficiently staffed.
<b>Financial resources</b>		
Are the financial resources (both from budgetary sources and external resources) compatible with the needs of the PA?	1	They are fully compatible with the needs.
	1	Are partially compatible with the needs.
	0	Not compatible with the needs.

Criteria	Value	Response
Have PA's core activities been carried out considering the available financial resources (from budgetary and external sources)?	1	Essential activities have been carried out satisfactorily thanks to the financial resources available.
	1	Essential activities have been carried out despite a lack of financial resources.
	0	Essential activities have not been carried out because of lack of financial resources.
	1	Essential activities have not been carried out for other reasons, even though PA has sufficient financial resources.
Have external resources financed essential activities for the management of the PA?	0	*If the previous answer is "essential activities have not been carried out because of lack of financial resources", this component should be evaluated as zero.
	1	It does not depend on these since external resources only finance activities that are ancillary to the management.
	1	It does not depend on these, because PA doesn't receive external resources.
	0	It depends on these, because without external resources, it would not be possible to carry out essential activities or part of them.
<b>Administrative structure</b>		
Does the PA have an administrative headquarters (even if hosted by another institution or shared)?	1	Yes, PA has an administrative headquarters.
	0	No, PA does not have an administrative headquarters.
Does the PA have furnishings and equipment that meet management needs?	1	The equipment and furnishings of PA administrative structure meet the needs of management.
	0	The equipment and furnishings of the PA administrative structure do not meet the management needs.
	0	PA does not have equipment or furnishings.
Does PA have services such as drinking water, electricity, telephone, internet, etc.?	1	Administrative infrastructure services meet the management needs.
	0	Administrative infrastructure services do not meet the management needs.
<b>Territorial consolidation</b>		
Applicability of the indicator	NA	If the PA is in the Environmental Protection Area or Area of Relevant Ecological Interest categories, this indicator does not apply.
At what stage is the PA's land regularization process?	1	The process has been completed.
	1	The process has not been completed, but with minimal negative impact on PA.
	0	The process has not been completed, with a significant negative impact on PA.
	1	Not applicable.
At what stage are the processes of demarcation (establishment of boundaries) and signalling (visual communication of boundaries) of the PA?	1	The PA is demarcated and signalled.
	0	PA is only demarcated.
	0	PA is only signalled.
	0	There is no demarcation or signalling of the PA.
	1	Does not apply, as it is not possible to carry out signalling and demarcation in the PA.
Do the limits defined by law for PA contribute to the achieving its objectives?	1	Yes.
	1	Yes, but the area could benefit from a redrawing of its boundaries.
	0	No, the current delimitation prevents the achieving the objectives.
<b>Protection</b>		
Does the PA have planning instruments to carry out actions to monitor and combat environmental emergencies?	1	Yes.
	0	No, but there are instruments for inspection planning and/or combating environmental emergencies in preparation.
	0	No.

Criteria	Value	Response
PA has the necessary material resources (bases, equipment, vehicles, fuel, etc.) for enforcement actions and combating environmental emergencies?	1	They are made available and meet the needs of PA.
	1	They are made available and partially meet the needs of PA.
	0	They are made available, but do not meet the needs of PA.
	0	Are not available.
	1	Does not apply, as the PA is not under pressures that justify an intense activity for inspection and combating environmental emergencies.
To what extent have the actions to monitor and combat environmental emergencies been effective?	1	The actions to monitor and/or combat environmental emergencies have been very effective.
	1	Only the enforcement actions have been effective.
	1	Only actions to combat environmental emergencies have been effective.
	0	Despite the efforts, the actions have not been effective.
	1	Does not apply, as the PA is not under pressures that justify an intense activity for inspection and combating environmental emergencies.
<b>Research</b>		
PA has research support infrastructure?	1	Yes, and it's satisfactory.
	1	Yes, but it is not satisfactory.
	0	Does not have.
PA has identified its research needs and/or priorities?	1	Yes.
	0	No.
To what extent are research results considered in PA activities?	1	Results, when applicable, are considered in the planning of PA activities.
	0	Results are not considered in the planning of PA activities.
	0	Not applicable, as PA does not have research-based information.
<b>Biodiversity monitoring</b>		
Are biodiversity monitoring activities carried out in PA?	1	Yes, biodiversity monitoring activities have been carried out on a regular basis, with a pre-established frequency.
	1	Yes, but biodiversity monitoring activities have been carried out sporadically, without a pre-established frequency.
	0	No biodiversity monitoring activities are carried out in PA.
How often have biodiversity monitoring activities been carried out in PA?	1	Biodiversity monitoring activities have been carried out on a regular basis, with a pre-established frequency.
	0	Biodiversity monitoring activities have been carried out sporadically, without a pre-established frequency.
	0	No biodiversity monitoring activities are carried out in PA.
Is the biodiversity monitoring carried out in PA sufficient to generate information on the conservation results achieved?	0	*If the previous answer is "no biodiversity monitoring activities are carried out in PA", this component should be evaluated as zero.
	1	Yes, it's sufficient.
	0	Not sufficient.
<b>Participatory management (management council)</b>		
Does PA have a Management Council (or other participatory management mechanism defined by law), formalized or not?	1	Yes.
	1	Yes, but it is not formalized by regulations.
	0	No.
Does the PA management board have a representative composition of the stakeholders interested in the management of the PA?	1	Yes.
	0	No.

Criteria	Value	Response
	0	*If the PA does not have a management board, this component should be assessed as zero
Is the Management Council (or other mechanism defined by law) active (i.e., does it meet as often as necessary and engage in the management of the PA)?	1	The Council is very active.
	0	The Council is not very active.
	0	The Council is not active.
	0	*If the PA does not have a management council, this component should be evaluated as zero.
Management by traditional and/or local communities		
Applicability of the indicator: Do traditional and/or local communities depend on PA resources or use these resources for their livelihoods?	Applies	Yes.
	NA	No.
	NA	It does not apply as there are no communities living in or around PA.
	NA	It does not apply, since the direct use of natural resources from the PA is not allowed.
Does PA have instruments that regulate access to and sustainable use of natural resources by traditional and/or local communities?	1	Yes.
	0	No.
What is the degree of implementation of the instruments that allow access to and sustainable use of natural resources by traditional and/or local communities?	0	*If the previous answer is "no", this component should be evaluated as zero.
	1	Total = superior to 90%
	1	High = between 60% and 90%
	1	Medium = between 30% and 60%
	0	Low = between 0 and 30%
	0	Null = 0
Does PA have means to monitor the economic and socio-environmental results of the sustainable use of natural resources by traditional and/or local communities?	1	Yes.
	0	No.
Public Use		
Applicability of the indicator: Does PA have potential for public use (visitation, recreation, and environmental education)?	Applies	Yes.
	NA	No.
The potential for public use (visitation, recreation, and environmental education) of PA is effectively harnessed?	1	Yes.
	1	Partially.
	0	No
Does PA have a satisfactory physical structure for visitors?	1	The structure for visitors is satisfactory.
	0	The structure for visitors is not satisfactory.
Is the number of staff available for public use at PA sufficient?	1	The number of staff available is sufficient.
	0	The number of staff available is not sufficient.
Articulation in PA		
Is there participation of traditional and/or local communities in decision-making for the improvement of PA management and for the sustainable use of natural resources?	1	There is high participation in decision-making.
	0	There is low participation in decision-making.
	0	There is no participation in decision-making.
Is there institutional cooperation with other government agencies and entities, whether federal, state, municipal, etc., to improve the management of PA and for the sustainable use of natural resources?	1	There is high cooperation.
	0	There is low cooperation.
Is there cooperation between PA and non-governmental actors (NGOs, private sector, academia, etc.) to improve PA management and the sustainable use of natural resources?	0	There is no cooperation.
	1	There is high cooperation.
	0	There is low cooperation.
0	0	There is no cooperation.
	0	There is no cooperation.
Concessions		
Applicability of the indicator	Applies	If the PA has been identified by the managing body as having the potential for concessions, this indicator is applicable.
	NA	If the PA has not been identified by the managing body as having the potential for concessions, this indicator does not apply.
Is there a forecast of PA zones for concession?	1	Yes.
	0	No.
Are there evaluations to enable the sustainable management and/or exploitation of natural	1	Yes.
	0	No.

Criteria	Value	Response
resources by the private sector, such as economic and financial feasibility studies, in addition to other subsidies considered necessary to ensure the technical, operational, and environmental feasibility of the activities and services included in the object of the concession?		
Are there concessions for the sustainable management and/or exploitation of natural resources by the private sector established in the PA?	1	Yes.
	0	No.

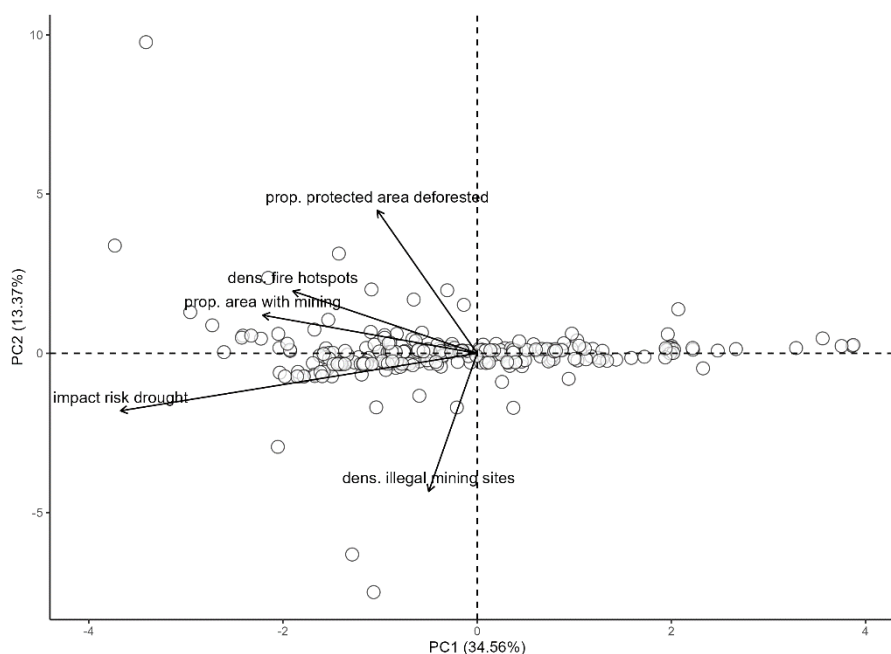


Figure S1. Biplot of the Principal Component Analysis used to aggregate the threat data and generate component 1 (PC1), used as the territorial context indicator.

Table S3. More information on data used in the calculation of the Territorial Context indicator (PC1).

Variable	Source	Date of information	Date of access	Link
Density of fire hotspots	Instituto Nacional de Pesquisas Espaciais (INPE)	01/01/2021 and 31/12/2021	17/05/2022	<a href="http://www.inpe.br/queimadas/bdqueimadas/">http://www.inpe.br/queimadas/bdqueimadas/</a>
Density of illegal mining sites	Rede Amaz3nica de Informa3o Socioambiental Georreferenciada	2020	19/05/2022	<a href="https://www.amazoniasocioambiental.org/es/mapas/#descargas">https://www.amazoniasocioambiental.org/es/mapas/#descargas</a>
Average distance from deforested areas	Projeto MapBiomass	2019	25/05/2022	<a href="https://code.earthengine.google.com/977010360f78f7123c8fa44d8162716d">https://code.earthengine.google.com/977010360f78f7123c8fa44d8162716d</a>

Proportion of protected area that has been deforested	Projeto MapBiomias	2019	25/05/2022	<a href="https://code.earthengine.google.com/977010360f78f7123c8fa44d8162716d">https://code.earthengine.google.com/977010360f78f7123c8fa44d8162716d</a>
Average road distance	Instituto Brasileiro de Geografia e Estatística (IBGE), complementadas com dados do Imazon	2019	03/06/2022	<a href="https://imazongeo.org.br/#/">https://imazongeo.org.br/#/</a> e <a href="https://geoftp.ibge.gov.br/cartas_e_mapas/bases_cartograficas_continuas/bc250/versao2019">https://geoftp.ibge.gov.br/cartas_e_mapas/bases_cartograficas_continuas/bc250/versao2019</a>
Average distance from logging centers	Imazon	2018	26/05/2022	<a href="https://imazongeo.org.br/#/">https://imazongeo.org.br/#/</a>
Impact Risk Index for Drought	Ministério da Ciência, Tecnologia e Inovações	2020	28/07/2022	<a href="https://sistema.adaptabrasil.mcti.gov.br">https://sistema.adaptabrasil.mcti.gov.br</a>
Proportion of area with mining	Agência Nacional de Mineração (ANM)	09/02/2021	19/05/2022	<a href="https://dados.gov.br/dados/conjuntos-dados/sistema-de-informacoes-geograficas-da-mineracao-sigmine">https://dados.gov.br/dados/conjuntos-dados/sistema-de-informacoes-geograficas-da-mineracao-sigmine</a>

## References

TCU, 2021. Relatório de Auditoria Operacional nas Unidades de Conservação (Auditoria (Fiscalização) No. TC-023.646/2018-7). Tribunal de Contas da União.