

# Environmental Crimes in the Environmental Preservation Area (EPA) Adolpho Ducke in the city of Manaus- AM

Bruna Stefany Motta Costa<sup>1</sup>, Andréia Vieira Lima<sup>2</sup>, Naísa Lima de Souza Neta<sup>3</sup>, Fabiana Rocha Pinto<sup>4</sup>

<sup>1</sup>Academic department, University Center FAMETRO, Manaus -AM, Brazil

<sup>2</sup>Environmental Engineer, Academic department, Federal University of Santa Maria, Rio Grande do Sul, Brazil

<sup>3</sup>Environmental Engineer, Undergraduate in Licensing, Audit and Environmental Expertise, Undergraduate in Safety Officer Engineer

<sup>4</sup>Academic department, University Center FAMETRO, Manaus -AM, Brazil

**Abstract** — The Adolpho Ducke Forest Reserve (RFAD) is an Environmental Protection Area (EPA) located in Manaus-AM covering neighborhoods in the northern area belonging to the peripheral region of the city. This research seeks to show through quantitative data the infractions that occurred in the years 2016 to 2019. Data from the notices of infringements made available by the transparency portal on the IPAAM website were used, describing the crimes that occurred in maps acquired by the IBGE website. Among the years evaluated, 2016 was highlighted with the highest occurrence of environmental crime. It was verified the fragility in the preservation compliance of this area of protection, evidencing the need for a more rigid inspection and control by environmental agencies.

**Keywords** — *Infractions, Forest Reserve, Environmental Violation.*

## I. INTRODUCTION

The studies in recent years have devoted themselves to the problems caused by the population, both economic and environmental, knowing that they live according to the social conditions of the environment, in a direct link between food production and infrastructure [16]. This search for appropriate social conditions has caused great consequences. The unbridled uses of non-renewable environmental resources lead to biodiversity reduction and increase carbon dioxide levels[25].

Since the 1960s, the Amazon has been in transition from phases, by different uses of land – hunting, deforestation, harvesting and planting –characterized by rural exodus[27]. These authors also claim that the Amazon rainforest is the most biodiverse and extensive rainforest in the world, besides containing most of the planet's freshwater, about 1/6.

Due to the major discussions on environmental protection, the Federal Constitution of 1988, in article 225, ensures that everyone has the right to a balanced environment, commonly used, and it is up to the government to preserve it and defend it for the generations present and future. In addition, in § 1 paragraph III informs that to ensure the effectiveness of this right, the government must "define, in all units of the

Federation, territorial spaces and their components to be specially protected..."[4].

The National Environment Policy in Law 6,938/81 in Article 2 aims to promote the preservation, improvement and recovery of environmental quality, aiming at socioeconomic development and protection of the dignity of human life. Thus, thinking about the protection of fauna and flora, the federal government created the Conservation Units (UC) where they were divided into two groups of Integral Protection and Sustainable Use, where the protection of up to 10% area for each Brazilian biome [3] is established.

In order to achieve the protection objective effectively, the National System of Conservation of Nature (SNUC), promulgated by Law No. 9.985 of July 18, 2000, was created through the three spheres of government (federal, state and municipal), and in its Article 4 item iii communicates the importance of the creation of UC aiming at the contribution of the preservation and restoration of ecosystem diversity in a balanced way[7].

In Manaus, the National Institute of Amazonian Research (INPA) oversees and supports the maintenance of seven forest reserve units in the capital, with an average area of 32,000 ha, and some of these areas have a

physical structure for research development [21]. One of the research areas used by INPA is the Environmental Protection Area Reserve Adolpho Ducke created through municipal decree 1502, of March 27, 2012[24].

Forest fragments are environmental resources essential to the quality of urban life, although these spaces suffer constant threats by environmental degradation and urban growth[23].

Starting from this prerogative, the present study aims to analyze the records of environmental crimes carried out by IPAAM in the period from 2016 to 2019 around the Adolpho Ducke Forest Reserve in Manaus - AM, in order to verify the main causes of crimes and compare the advance on the preservation area.

## II. MATERIALS AND METHODS

### 2.1. Type of study

The approaches adopted in the research were the descriptive and exploratory methods. Studies identify that descriptive research is an exposition of facts and phenomena of reality and relate exploratory research with knowledge of the problem exposed, in order to make it more explicit[14]. This work is classified as qualitative and quantitative, because it uses the understanding and interpretation of data with attention to its meaning [28].

### 2.2. Area of study

The Adolpho Ducke Forest Reserve (RFAD) was established from Decree No. 1502 of March 27, 2012 aimed at safeguarding biological diversity, protecting existing ecosystems, ensuring the sustainable use of natural resources and quality of the lives of the population.

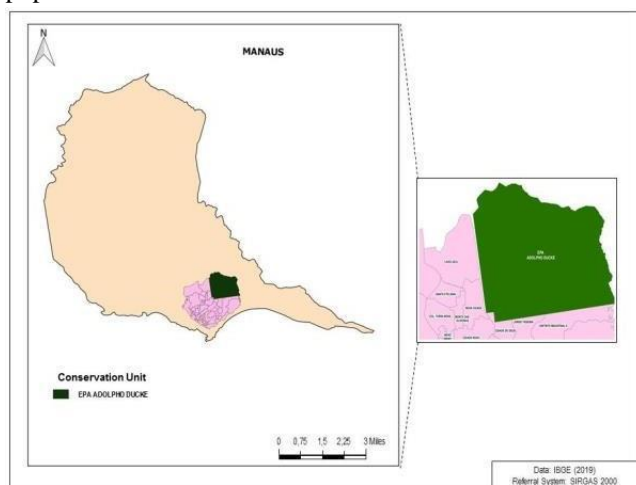


Fig.1: Location map of the Adolpho Ducke Forest Reserve.

According to the National Institute of Amazonian Research, the reserve is located in the Cidade de Deus

neighborhood, north of the capital, in which it is considered one of the peripheral regions of Manaus (Fig.1).

RFAD has about 18,204.8 ha and covers 10,000 ha of humid rainforest, playing the role of bringing the community closer to its surroundings with environmental issues so that they act as collaborators for the protection of biodiversity, promoting the socio-environmental sustainability [2].

DATA from INPA report that the reserve covers areas of the neighborhoods Lagoa Azul, Nova Cidade, Cidade de Deus, Jorge Teixeira, Distrito Industrial II and a part of AM 010 Manaus – Itacoatiara[22]. The unofficial neighborhoods closest to the Ducke reservation are: Communities aliança com Deus, Raio de sol (invasion since 2000); Cidade nova (created in 1996) e Residencial viver melhor 1 (2010)[20]. SNUC classifies THE APAs as spaces for planning and environmental management in large areas and that have ecosystems of great importance, coordinating one or more environmental attributes. It is necessary to guide the sustainable use of natural resources, elaborated through participatory processes of society, which result in a better quality of life of local communities.

### 2.3. Dataprocessing

The data in shapefile format, for the development of the location map, were acquired through the IBGE website. As for the files related to the notices of infringements, they were obtained through the Transparency Portal that is on the IPAAM website, such information was arranged in a spreadsheet and organized by municipalities. For data processing, ArcMap 10.5 and Microsoft Excel 2010 software were used.

The geographic coordinate system used for the production of maps was the Universal Transversa de Mercator – UTM and as a reference system the Datum SIRGAS 2000. For the demonstration of the location map of the reserve (Fig.1) in relation to the municipality of Manaus it was necessary to insert different coloring for the main highlighted layers. As for the creation of the points, in order to demonstrate the places of occurrence of the infringements, the New Shapefile tool was used, later the data was entered through the Add Data tool and edited through the editor tool, respectively applying the use of the create featureraster tool.

Microsoft Excel was used to filter the years and recurring locations of environmental crimes that were in the vicinity of RFAD.

### III. RESULTS AND DISCUSSION

Environmental impacts are classified as the increased human need to gain more space in the environment, devastating in the short, medium and long term. When industrial growth and human activities fail to come to terms with economic progress and the preservation of the environment, they cause environmental violations [11].

A total of 8 environmentally harmful violations around RFAD were filed with IPAAM between 2016 and 2019. Fig.2 shows the types of environmental violations that occurred in neighborhoods that are in the vicinity of the APA.

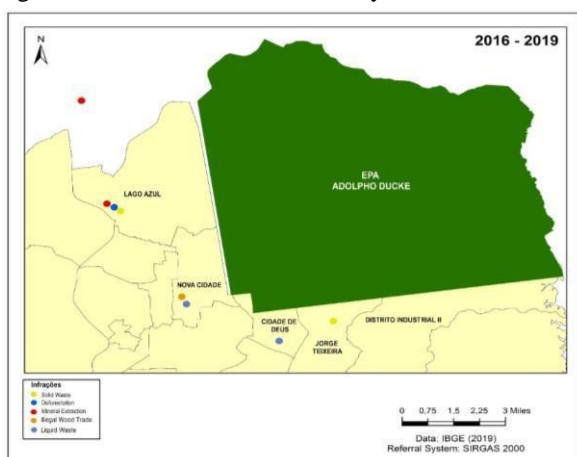


Fig.2: Map of the location of infringements between 2016 and 2019.

Through the spatialization maps of environmental violations, it was observed that 5 different crimes against the environment were recorded, including deforestation, inadequate disposal of liquid waste, inadequate disposal of solid waste, illegal timber marketing and illegal mineral extraction.

It is observed that in the years 2016 and 2018 the crime of illegal mineral extraction was recurrent in the vicinity of the Lagoa Azul Community and on the AM-10 Highway, which connects Manaus to the municipality of Itacoatiara. The extraction of ore in the city of Manaus is due to the technical and socioeconomic feasibility of this resource being applied in activities such as civil construction[12].

It is noteworthy that in the information provided by the agency contained that the users did not have an environmental license, however it is included in the Environmental Licensing Manual of the year 2010[18] of IPAAM that for the performance of this activity it is indispensable that there be the Environmental License, as determined in Law No. 6.938 of 31/08/81[6], State Law No. 3.219/07[1] and CONAMA Resolution 237/97[5].

Also in 2016 there were records of deforestation and dumping of solid waste in place without the authorization of the supervisory body in the Lagoa Azul Community. One of the environmental problems faced by entities is the fight against the crime of plant suppression without proper environmental licensing, since the removal of vegetation directly influences the loss of the local ecosystem, reduces fauna and flora and with the undue management of the soil, contributes to its erosion [15].

Fig.3 exemplifies the percentage of each environmental crime committed in 2016 to 2019 with the aim of showing the most relevant infractions

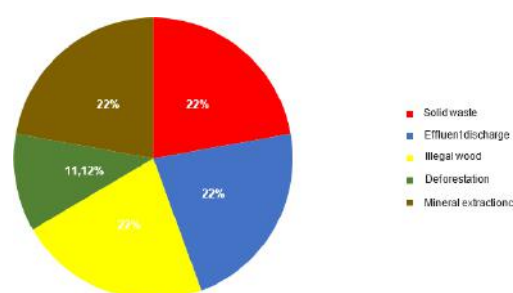


Fig.3: Separate offences by type 2016 to 2019.

According to data obtained, illegal timber offences, effluent dumping, mineral extraction and solid waste have the same amount in the years evaluated, about 22%. Regarding deforestation, it presented the lowest result, being only 11.12%.

It is common knowledge that one of the urban problems is the dumping of solid waste in inappropriate places. Urban Solid Waste (RSU), they are all materials discarded by human activities. Before the acceleration of urbanization, much of the garbage produced was organic matter, being buried in the backyard of the residences[17]. Due to generational change and technology advancement, some materials have become more complex in their decomposition in nature, with the need to raise awareness of their destination.

The sense of 2008 realized by the Brazilian Institute of Geography and Statistics presented data stating that 99.96% of Brazilian municipalities have solid waste management services, on the other hand, their final disposition is 50.75% in leakers, 22.54% in controlled landfills; 27.68% in landfills[3].

In a study conducted in the neighborhood Jorge Teixeira it was possible to identify that this site has garbage accumulation points in some of its main access routes and points out that the residents of the region have a certain knowledge about the aggravating

factors from improper disposal[26]. The authors reinforce that it is necessary to strengthen environmental education practices for these problems to reduce. In view of these data, it is evidenced that inadequate disposal of solid waste is considered a serious problem for the health of the population and brings harm to the environment.

As for deforestation crime, the Legal Amazon in the last 12 months has had about 2,000 km<sup>2</sup> deforested, these data come from the System for detecting Deforestation in the Legal Amazon in Real Time - DETER, a tool used by INPE[8]. In Manaus the gradual urban expansion is one of the main factors in the decrease in vegetation cover in the North and East zones of the capital. It should be epigraphed that the APA is located along the extensions of the two regions[10].

Fig.4 shows the number of occurrences separated by type of violations committed in the years 2016 to 2019 in neighborhoods adjacent to RFAD.

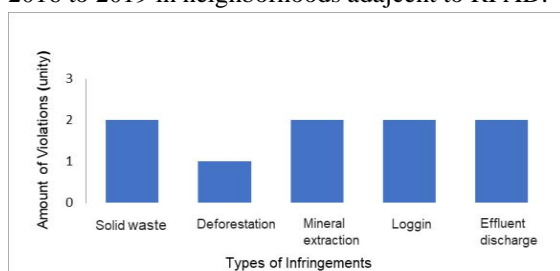


Fig.4: Number of offences identified in the years 2016 to 2019.

Although deforestation violations appear as one of the environmental crimes with low evidence, The recurrent crimes in a UC cated in southern Amazonas deforestation corresponds to 38% of the crimes environmental authorities [13].

It can be observed that Fig. 5 shows a difference in violations detected between the years evaluated. The year 2016 stands out with the highest number of recorded infractions and the years 2018 and 2019 with a smaller number of occurrences.

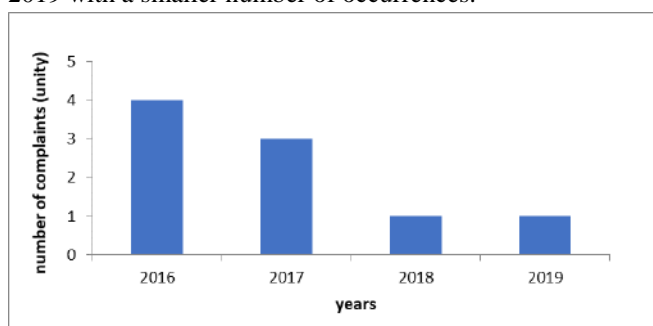


Fig.5: Number of complaints in 4 years.

According to the Specialized Defender's Office in the Environment and Agrarian Issues (one of the departments of dpe – AM), most of the fileds reported not knowing, at that time, the practice of environmental crime. It also clarifies that there is a need to strengthen environmental education[9].

We can observe that, in Figure 2, in 2019 only the crime of eviction of domestic effluent without due treatment was evidenced. However, on the official IPAAM website, it informs that in February of that same year, it had disarticulated an invasion called Itaporanga, located in the vicinity of RFAD[19]. In which a devastation was identified on land with demarcated lots and found the removal of wood and the hunting of wild animals. The agency began the year by complying with a series of monitoring of areas with the aid of drones in an attempt to improve environmental surveillance.

The years in which there was a low incidence did not mean that they were exempt from occurrences since the data collected were only complaints recorded in the department responsible for supervising the site. There are communities emerging near the reserve that have not yet been monitored and have no record of violations due to lack of government inspection.

#### IV. CONCLUSION

The environmental protection areas were created with the objective of total preservation of its location and still occurrences were detected around the RFAD unit. Among the period analyzed, the year 2016 was where the most occurrences recorded by ipaam. Offences such as dumping solid waste and mineral extraction were recurrent in the years studied, showing the difficulty in containing population occupation and fulfilling the function of safeguarding the APA.

The article highlights the lack of supervision and control of environmental agencies responsible for these areas, emphasizing the need for preventive actions focused on the population that lives around the reserve, seeking through awareness and education establish joint care between community andstate.

#### REFERENCES

- [1] AMAZONAS. Law N° 3219, of 28 de dezembro de 2007. Talks about environmental licensing in the State of Amazonas and gives other determinations. Available on: <<https://www.legisweb.com.br/legislacao/?id=244700>> Acesso em: 16 out.2019;
- [2] BARROSO, A.L.F. & MESQUITA, R.C.G. Subsídios para a gestão de jardins botânicos no Brasil – o caso do Jardim Botânico Adolpho Ducke de Manaus. Rodriguésia, v. 65, n. 3, p. 791- 805,2014;



- [3] BRAZIL, Ministry of the Environment. **A Problemática "Resíduos Sólidos"**. Government of Brazil.2019;
- [4] BRAZIL. **Federal Constitution of 1988**. Signed on October 5, 1988.  
<[http://www.planalto.gov.br/ccivil\\_03/Constituicao/Constituicao.htm](http://www.planalto.gov.br/ccivil_03/Constituicao/Constituicao.htm)>. Accessed in: 02 october. 2019;
- [5] BRASIL. CONAMA's resolution, Nº 237, of 19 december 1997. Available on:  
<[http://www.icmbio.gov.br/cecav/images/download/CONAMA%20237\\_191297.pdf](http://www.icmbio.gov.br/cecav/images/download/CONAMA%20237_191297.pdf)> Accessed in: 14 october.2019;
- [6] BRAZIL. **National Environmental Policy: Law nº 6.938, of 31 august 1981**. Available on:  
<[http://www.planalto.gov.br/ccivil\\_03/LEIS/L6938compilada.htm](http://www.planalto.gov.br/ccivil_03/LEIS/L6938compilada.htm)>. Accessed in: 7 october 2019;
- [7] BRAZIL. National System of Nature Conservation Units:**Lawn.º9.985**,of18july2000.Availableon:  
<[http://www.planalto.gov.br/ccivil\\_03/LEIS/L9985.htm](http://www.planalto.gov.br/ccivil_03/LEIS/L9985.htm) >. Accessed in: 10 january2019;
- [8] CORDEIRO, F. **Queimadas e desmatamento deixam Manaus e sul do Amazonas em emergência**. Bem Paraná, p. 1-1, 9 august. 2019. Available on:  
<https://www.bemparana.com.br/noticia/queimadas-e-desmatamento-deixam-manaus-e-sul-do-amazonas-em-emergencia-783#.XbdkdJKhdh>. Accessed: 16 october. 2019;
- [9] CRIMES ambientais em área urbana são maioria em processos na DPE-AM. **A Crítica**, Manaus. 02 june 2016;
- [10] DACOSTA,M.S.B;PINTO,V.A.B.;SOARES, C. B. S.DA S. [https://www3.ufpe.br/cgtg/SIMGEOIV/CD/artigos/SReFOTO/073\\_4.pdf](https://www3.ufpe.br/cgtg/SIMGEOIV/CD/artigos/SReFOTO/073_4.pdf). **Análise do Desmatamento nas Zonas Leste, Norte e Oeste da Área Urbana de Manaus/Am**. Recife, PE, year 2012, p. 001-009, 2012. Available on:  
[https://www3.ufpe.br/cgtg/SIMGEOIV/CD/artigos/SReFOTO/073\\_4.pdf](https://www3.ufpe.br/cgtg/SIMGEOIV/CD/artigos/SReFOTO/073_4.pdf). Accessed in: 10 october2019;
- [11] DA SILVA, V.M. **A polícia militar atuando contra crimes ambientais**. Graduate program and Extension of the Command of the Academy of Military Police of Goiás – CAPM. GOIAS. June2018;
- [12] DE SALES, C. **Licenciamento ambiental da atividade de mineração em unidades de conservação no amazonas: incidência, suporte jurídico-administrativo e aperfeiçoamentos**.2018. p. 167. Dissertation (Professional Master's degree in Management of Protected Areas of the Amazon) -Instituto Nacional de Pesquisa da Amazônia – INPA. 2018. Available on:  
[http://w2.files.scire.net.br/atrio/inpa-mpgap\\_upl/THESIS/89/dissertaovfinalclemerson\\_de\\_sales\\_20190128120353105.pdf](http://w2.files.scire.net.br/atrio/inpa-mpgap_upl/THESIS/89/dissertaovfinalclemerson_de_sales_20190128120353105.pdf). Accessed in: 15 october2019;
- [13] DE OLIVEIRA, E. K. B.; NAGY, A. C. G.; BARROS,Q.S.;JÚNIOR,L.S.M.;MARTINS,B.
- [14] C. **Crimes ambientais em unidade de proteção integral no sudoeste da amazônia**. ENCICLOPÉDIA BIOSFERA, Centro Científico Conhecer - Goiânia, v.13 n.23; p. 398.2016;
- [15] FANTINATO, M. **Métodos de pesquisa. Apresentação de aula**, USP2015;
- [16] FILHO, J. M. F.; DE CARVALHO, R. G.; CAMACHO, R. G. V. **Impactos ambientais em unidades de conservação urbanas: o caso da Área de Relevante Interesse Ecológico da Ilha da Coroa em Mossoró no Rio Grande do Norte, Brasil**. Revista Brasileira de Geografia Física, [s. l.], ano 2017, v.10, n. 1, p. 304-31, 27 january 2017. Available on:  
<https://periodicos.ufpe.br/revistas/rbgfe/article/view/234023/27461>. Accessed in: 15 october 2019;
- [17] FONTANA, R. L. M; COSTA, S. S; SILVA, J. A. B; RODRIGUES, A.J. **teorias demográficas e o crescimento populacional no mundo**. Ciências Humanas e Sociais Unit, Aracaju, v. 2 n.3 p. 113- 124, March2015;
- [18] GARCIA, M.B.S. & NETO, J.L. **RESÍDUOS SÓLIDOS: RESPONSABILIDADE COMPARTILHADA**. Rio de janeiro. Centro Universitário Augusto Motta - UNISUAM. 2016. Available on:  
<<http://apl.unisuam.edu.br/revistas/index.php/Semios/article/view/1981996X.2015v9n2p77/683>>Accessed in: 20 out. 2019;
- [19] INSTITUTO DE PROTEÇÃO AMBIENTAL DO AMAZONAS - IPAAM. **Manual de licenciamento ambiental para a atividade de exploração de substâncias minerais de emprego imediato na construção civil no Estado do Amazonas**. IPAAM, 2010. Available on:  
<<http://www.ipaam.am.gov.br/wp-content/uploads/2017/01/MANUAL-DE-LICENCIAMENTO-2010.pdf>> Accessed in 15 october 2019
- [20] INSTITUTO DE PROTEÇÃO AMBIENTAL DO AMAZONAS - IPAAM. **Governo do Amazonas desarticula invasão nas proximidades da reserva Adolpho Ducke**. 2019. Available on:  
<<http://www.ipaam.am.gov.br/governo-do-amazonas-desarticula-invasao-nas-proximidades-da-reserva-adolpho-ducke/>> Accessed in: 30 october 2019
- [21] INSTITUTO MUNICIPAL DE PLANEJAMENTO URBANO - IMPLURB. **Bairros de Manaus**. 2019. Available on:  
<<http://implurb.manaus.am.gov/bairros>> Accessed in: 20 october 2019;
- [22] INSTITUTO NACIONAL DE PESQUISAS DA AMAZÔNIA - INPA. **Reservas Florestais doINPA-DESER**, 2018. Available on:  
<<http://portal.inpa.gov.br/portal/index.php/campus-nucleos-reservas-e-estacoes/diser/reservas-e-estacoes>>. Accessed in: 08 october 2019;
- [23] INSTITUTO NACIONAL DE PESQUISAS DA AMAZÔNIA - INPA. **Programa de Pesquisa em Biodiversidade: Reserva Florestal Adolpho Ducke - CENBAM**, 2012. Available on:

- <ppbio.inpa.gov.br/sitios/ducke>. Accessed in: 08 october. 2019;
- [24] KUDO, S. A; PEREIRA, H. S; SILVA, S. C.P. **A proteção jurídica dos fragmentos florestais urbanos: um estudo da paisagem e da legislação ambiental e urbanística da cidade de Manaus.** Desenvol. Meio Ambiente, v. 38, p. 521-540, august 2016;
- [25] MANAUS. **Law nº 1502, of 27 march 2012.** Create the Adolpho Ducke Environmental Protection Area. Manaus: Manaus Prefecture, [2012]. Available on: <<https://leismunicipais.com.br/a/am/m/manaus/decreto/2012/150/1502/decreto-n-1502-2012-cria-a-area-de-protecao-ambiental-adolpho-ducke-e-da-outras-providencias>> Accessed in: 09 october 2019;
- [26] MARTINE, G.; ALVES, J. E. D. **Economia, sociedade e meio ambiente no século 21: tripé ou trilema da sustentabilidade?** Rev. bras. estud. popul., v.32, n.3, p.433-460, november2015;
- [27] OLIVEIRA, K. C.; SANTOS, R. M. DA S.; VIANA, Á. L. **Geração de resíduos sólidos: a percepção da população em um bairro da Cidade de Manaus, Amazonas.** InterfacEHS Magazine. v. 11, n. 1, p. 42- 52, june2016;
- [28] VIEIRA, I. C. G; TOLETO, P. M; HIGUCHI, H. A **Amazônia no antropoceno.** Cienc. Cult. vol.70 no.1 São Paulo January/March.2018;
- [29] RANGEL, M. **Fundamentos e princípios das opções metodológicas.** UERJ. Rio de Janeiro. June 2018;