

Slaughter and Processing Infrastructure in Context of Wildlife Harvesting in the State of Amazonas, Brazil

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Abstract: In Brazil, legal extensive wildlife management systems can only be developed by traditional communities in Protected Areas (PAs). Licensed slaughterhouses are mandatory for extensive management products to reach the formal market and this can be a problem if there are few processing options. Thus, this work aimed to evaluate the infrastructure for slaughter and processing of animal products in the state of Amazonas and its potential for use in extensive animal management in PAs. A documentary analysis of environmental laws for harvesting of wildlife in PAs, licensing of slaughterhouses and processing facilities and inspection of animal products were carried out, as well as a survey of existing establishments and PAs in the state of Amazonas. Currently, there are norms only for extensive management of arapaimas and caimans in PAs in the state of Amazonas, and specific sanitary requirements only for fishing products (fish, mollusks, frogs, caimans and freshwater turtles). There are 94 slaughtering and processing facilities of animal products in Amazonas, and 32% of the state municipalities have some facility. There are 50 state and federal PAs for the categories that permit extensive wildlife management in Amazonas, and 58% of the state municipalities have at least one PAs in their areas. Of the total municipalities in Amazonas, 22.5% have PAs and establishments. However, a great number of establishments are located in the state capital, making unfeasible their use for slaughter in extensive animal management, requiring support places for storage and later processing of animal products.

Keywords: Protected areas, slaughterhouse, processing.

INTRODUCTION

Legal wildlife management occurs in various countries and found to be in different intensities of exploitation, from extensive systems (harvesting) to captive rearing (farming), passing through various forms of semi-intensive systems (ranching) with intermediate characteristics between the extremes [1-3]. In Brazil, wildlife harvesting has only been possible in the 2000s with enactment of the law that created the National System of Conservation Units (in Portuguese, *Sistema Nacional de Unidades de Conservação – SNUC*) (Law nº 9.985/2000). This management system, which is based on the sustainable harvest of defined quantities of part of the natural population of the managed species, can only be legally developed by traditional communities living in Protected Areas (PAs) of the categories National Forest (*Floresta Nacional - FLONA*), Sustainable Development Reserve (*Reserva de Desenvolvimento Sustentável - RDS*) and Extractive Reserve (*Reserva Extrativista - RESEX*) [4, 5].

Community wildlife management is structured on the principle that the objectives of local development and environmental preservation can be achieved simultaneously [6, 7]. To this end, community management must be based on studies of common use of resources, traditional knowledge, ecology and policies to promote the interdisciplinary understanding

of the socioenvironmental context and territorial development [6, 8].

Furthermore, to the products from community extensive management reach the formal market, licensed slaughterhouses are mandatory to ensure the best sanitary conditions of the products [5, 9].

Technical norms for slaughter and processing are key aspects for harvesting wildlife, especially in the Amazon region, because industrialization performs the legal communication between the producer and the consumer and drastically differentiates the traditional hunting process from the sustainable community systems process [5, 10, 11]. Nonetheless, industrialization can be a problem if there are few options for product processing and/or the market requires very specific quality attributes [9, 12].

Thus, the aim of this study is to analyze slaughter and processing infrastructure in the state of Amazonas and its potential for use in community wildlife management systems in Protected Areas.

MATERIALS AND METHOD

A documentary analysis of environmental laws relating to the use of wildlife in Protected Areas was carried out, including licensing of slaughterhouses and processing units, and inspection of animal products both at national and state levels. The legal framework applicable to the state of Amazonas was considered for

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characterizing the species and the management systems allowed.

The slaughterhouses and processing facilities of animal products and PAs existing in the state of Amazonas were characterized, comprising the total number of establishments in the state, categories and location of the establishment or regions covered. The state and federal establishments and PAs were considered.

Data were obtained on the websites of state and federal regulatory and licensing entities, namely: Ministry of Environment (MMA), Ministry of Agriculture, Livestock and Supply (MAPA), Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA), Chico Mendes Biodiversity Institute (ICMBio), Amazonas Agency of Livestock and Forest Defense (ADAF), Amazonas State Environment Department (SEMA) and Environmental Protection Institute of Amazonas (IPAAM).

RESULTS AND DISCUSSION

Legislation for Harvesting, and Sanitary Inspection of Wildlife

Wildlife harvesting is subject to environmental regulations of the present norms like, relating to minimum sizes, places where capture is allowed and harvest rates (percentage of animals that can be captured from a given local population). There are norms for harvest of wildlife in PAs in the state of Amazonas, specifically for arapaimas (*Arapaima gigas*) (IBAMA Instruction n° 34/2004; Decree n° 36.083/2015), black caiman (*Melanosuchus niger*), and spectacled caiman (*Caiman crocodilus*) (CEMAAM Resolution n°008/2011; ICMBio Instruction n°28/2012).

In Brazil, Decree n° 10.468/2020 provides, the Regulation of Industrial and Sanitary Inspection of Animal Products (RIISPOA), describing the technical-sanitary criteria for slaughterhouses, processing and storage of animal products. The inspected establishments were categorized at least in two classes and defined for each species or group of species. Processing units can receive, store, process and trade products of defined species. Slaughterhouses can slaughter and also can perform all other functions of the processing unit. The animals must be alive while arriving at the slaughterhouses, and the sale of animals that are delivered dead is not permitted for human consumption. At present as in the first versions of

RIISPOA, information about wild animals are presented in a superficial way, described as a group of species included in “butcher’s animals”, together with domestic species. Wild species can be slaughtered and processed at inspected establishments, according to their respective categories, but specific sanitary requirements are described for wild species in the fishing category (fishes, mollusks, frogs, caimans, and freshwater turtles). At the state level, Federal RIISPOA is fully followed by the Amazonas Agency of Livestock and Forest Defense in Amazonas (ADAF). The only wildlife species that have their own sanitary regulation in the state of Amazonas are caimans (Alligatoridae), which is provided for by the Normative Instruction SEPROR/CODESAV n° 001/2011. The establishments for slaughtering and processing of wild animals, in addition to sanitary inspection, must have an environmental operating license for the slaughter of wildlife species.

The environmental legislation has developed to permit consumption of wildlife species, but few animals have well-defined criteria for this purpose. The legislation for animal products provides few options of establishments per category of animal, which makes it difficult to adapt them to the diverse production contexts at present in Brazil [5]. Legal support is crucial for the development of wildlife management systems, and criteria with low local applicability and lacking details per species can make the activity unfeasible [9, 13, 14]. There is a legal framework with more specific technical criteria for use of wildlife species in the state of Amazonas, and this can make the state to be the center of development of wildlife management systems in Brazil [5].

Slaughter and Processing Establishments in the State of Amazonas

There are 94 establishments for slaughter and processing of animal products in Amazonas, out of which 90% (85/94) are subject to state government inspection, 10% (9/94) to federal government inspection. Nearly 32% of the state municipalities (20/62) have some kind of establishment for slaughter or processing. Out of these 20 municipalities, 55% (11/20) have only one establishment, while the capital, Manaus, concentrates 50% (47 establishments) of the total number of establishments in the state (Figure 1). The only slaughterhouse legally able to slaughter caimans in the state is located within the RDS Mamirauá, in the municipality area of Uarini.

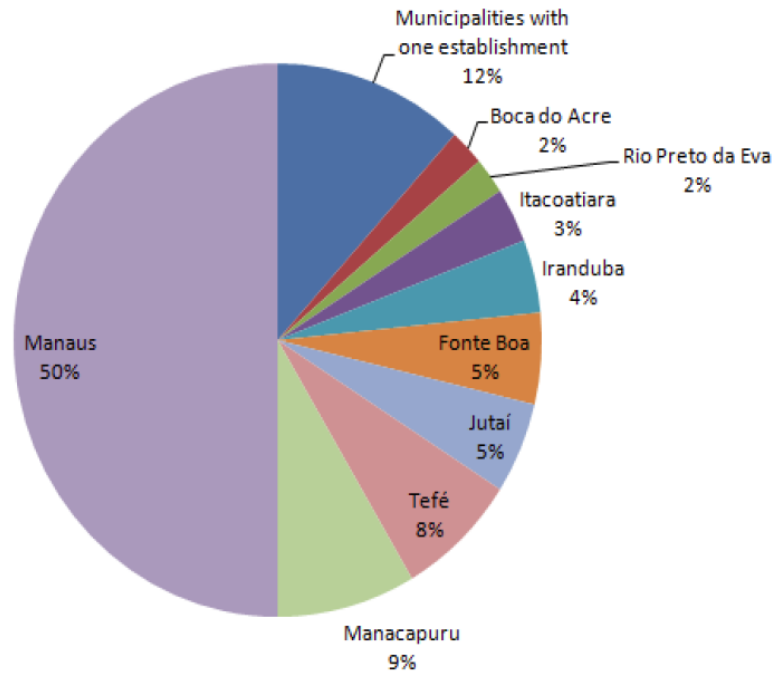


Figure 1: Percentage of establishments by municipality of Amazonas State.

Processing units represent 85% (80/94) of all establishments in the state, while slaughterhouses represent 15% (14/94) of total. The establishments operating in slaughter and/or processing of fishing category represent 53% (50/94) of total, and mammals and birds 47% of total (44/94) (Table 1).

All species that are currently in functional management systems or under specific legislation for extensive use in the state of Amazonas are included in the fishing category [3, 5, 9]. The use of these species have been studied at least for two decades, but infrastructure continues to be one of the key bottlenecks for the development of community extensive management systems [5, 14]. Wild mammal species, especially rodents and artiodactyls, are of importance and mostly hunted and traded in the state [10, 11, 15]. Although there are no legal systems for

the harvest of these species yet, they are included into the categories of small- to large-size mammals in RIISPOA, which represent the second most significant categories of establishments in the state. However, the location of these facilities is decisive for determining their feasibility in community animal management, considering that animals of all species, except fishes, must arrive alive at the slaughterhouses, and the location of most of PAs are remote [16], which makes logistics difficult and increases production costs [17, 18].

Sustainable use Protected Areas in the State of Amazonas

There are 50 state and federal PAs of the categories that allow wildlife harvesting (FLONA, RDS and RESEX) in the state of Amazonas, of this total,

Table 1: Categories, Amount (N) of Slaughterhouses and Processing Establishments in the State of Amazonas and Species Included in each Category

Category	N	Species included
Slaughterhouse for poultry and lagomorphs	01	Birds, small-size mammals
Slaughterhouse for fishing	01	Fish, reptiles, amphibians, invertebrates
Slaughterhouse for cattle	10	Large-size mammals
Slaughterhouse for pigs	02	Medium-size mammals
Meat and meat products processing units	31	Small-, medium- and large-size mammals and birds
Fish and fishing products processing unit	49	Fish, reptiles, amphibians, invertebrates

54% (27/50) are included in the area of only one municipality, while 46% (23/50) cover territorial areas of two to five Amazonas municipalities. From the municipalities of the state, 58% (36/62) have at least one protected area, of which 33% (12/36) have only one PA in their territory (Table 1). Of the municipalities with PAs, 39% (14/36) have appropriate slaughter and processing establishments. In the five municipalities with the greatest number of PAs, there are only two establishments, one in Lábrea and other in Manicoré. The municipality that concentrates great part of the slaughter and processing units, Manaus, has only two PAs in its territory. Of the total municipalities in Amazonas, only 22.5% (14/62) have PAs and establishments in their areas.

The Amazon is the biome with the greatest number of PAs in Brazil [19], and despite the large number of establishments and their location in municipalities with preservation units, the logistics for accessing these places is costly and difficult, as most of the slaughterhouses and processing units are located in large urban centers, while PAs are found in more remote areas [9, 17]. In addition, licensing requirements for these structures are complex and demand resources that the traditional communities cannot afford, making it difficult to structure these establishments in the vicinity of PAs [5].

Extensive wildlife management in Brazil, due to its limitation by protected areas [4, 5], allows a positive market reversal to traditional communities, and at the same time generates financial and social returns from the sustainable use of resources already exploited [1, 6, 13]. Thus, the existence of PAs is justified for those actors exclusively inserted in the economic segment and with no knowledge or interest in positive externalities generated by these areas, like maintaining essential environmental services [18]. However, the development of such production systems requires specific infrastructure, in addition to obvious technical and scientific and managerial capabilities [5]. Lack of electric power and treated water supply in the PAs [9, 17] are the major structural hindrances to the implementation of slaughterhouses in these areas.

CONCLUSION

Numerically, there is sufficient regulated infrastructure to meet possible community extensive management of wildlife in the state of Amazonas, especially of species included in the fishing category.

But the establishments are concentrated in the state capital and in other few socioeconomic centers, wherein there are intensive livestock production systems, which makes the full use of these structures for wildlife harvesting unfeasible. Existing facilities should be considered support places for storage and further processing, while the feasibility of community wildlife management systems is dependent on the implementation of slaughterhouses inside the protected areas.

REFERENCES

- [1] Chardonnet P, Clers BD, Fischer J, Gerhold R, Jori F, Lamarque, F. The value of wildlife. *Revue scientifique et technique-Office international des épizooties* 2002; 21(1): 15-52.
<https://doi.org/10.20506/rst.21.1.1323>
- [2] Nogueira SSC, Nogueira-Filho SLG. Wildlife farming: an alternative to unsustainable hunting and deforestation in Neotropical forests? *Biodiversity and Conservation* 2011; 20(7): 1385-1397.
<https://doi.org/10.1007/s10531-011-0047-7>
- [3] Freitas CT, Lope PFM, Campos-Silva, JV, Noble, MM, Dyball R, Peres CA. Co-management of culturally important species: A tool to promote biodiversity conservation and human well-being. *People and Nature* 2019; 2(1): 61-81.
<https://doi.org/10.1002/pan3.10064>
- [4] Ranzi TJD, Fonseca R, Da Silveira R. Uso e Manejo de Fauna Silvestre em Resex, RDS e Flona Federais. *Biodiversidade Brasileira* 2018; 8(1): 35-52.
- [5] Franco DL, Botero-Arias R, Vital TW. Evolução das políticas para o uso sustentável da fauna no Brasil: o caso do manejo comunitário de jacarés no Amazonas. *Brazilian Journal of Development* 2019; 5(9): 16319-16339.
<https://doi.org/10.34117/bjdv5n9-184>
- [6] Berkes F. Rethinking community-based conservation. *Conservation Biology* 2004; 18(3): 621-630.
<https://doi.org/10.1111/j.1523-1739.2004.00077.x>
- [7] Humavindu MN, Stage J. Community-based wildlife management failing to link conservation and financial viability. *Animal Conservation* 2015; 18(1): 4-13.
<https://doi.org/10.1111/acv.12134>
- [8] Turine JAV, Macedo MLR. Direitos Humanos, Comunidades tradicionais e Biodiversidade: Desafios para o desenvolvimento sustentável. *Revista Direito UFMS* 2017; 3(2): 175-194. doi: 10.21671/rdufms.v3i2.5313
- [9] Marioni B, Barão-Nóbrega JAL, Botero-Arias R, Muniz F, Campos Z, Da Silveira R, Villamarín F. Science and conservation of Amazonian crocodylians: a historical review. *Aquatic Conservation: Marine and Freshwater Ecosystems* 2021; 1(1): 1-12.
- [10] Lopes GP, Valsecchi J, Vieira TM, Do Amaral PV, Da Costa EWM. Hunting and hunters in lowland communities in the region of the middle Solimões, Amazonas, Brazil. *UAKARI* 2012; 8(1): 7-18.
<https://doi.org/10.31420/uakari.v8i1.120>
- [11] El Bizri HR, Morcatty TQ, Valsecchi J, *et al.* Urban wild meat consumption and trade in central Amazonia. *Conservation Biology* 2019; 1(1): 1-1.
- [12] Zylbersztajn D. Agribusiness systems analysis: origin, evolution and research perspectives. *Revista de Administração (São Paulo)* 2017; 52(1): 114-117.
<https://doi.org/10.1016/j.rausp.2016.10.004>

- [13] Kellert SR, Mehta JN, Ebbin SA, Lichtenfeld LL. Community natural resource management: promise, rhetoric, and reality. *Society & Natural Resources* 2000; 13(8): 705-715. <https://doi.org/10.1080/089419200750035575>
- [14] Amaral ESR. A comunidade e o mercado: os desafios na comercialização de pirarucu manejado das Reservas Mamirauá e Amanã, Amazonas-Brasil. *UAKARI* 2007; 3(2): 7-17. <https://doi.org/10.31420/uakari.v3i2.27>
- [15] Mesquita GP, Barreto LN. Evaluation of mammals hunting in indigenous and rural localities in Eastern Brazilian Amazon. *Ethnobiology and Conservation* 2015; 4(1): 1-14.
- [16] Joppa LN, Pfaff A. High and far: biases in the location of protected areas. *PloSone* 2009; 4(12): e8273.
- [17] Calegare MGA, Higuchi MIG, Forsberg SS. Desafios metodológicos ao estudo de comunidades ribeirinhas amazônicas. *Psicologia & Sociedade* 2013; 25(3): 571-580. <https://doi.org/10.1590/S0102-71822013000300011>
- [18] Palomo I, Montes C, Martin-Lopez B, González JA, Garcia-Llorente M, Alcorlo P, Mora MRG. Incorporating the social-ecological approach in protected areas in the Anthropocene. *BioScience* 2014; 64(3): 181-191. <https://doi.org/10.1093/biosci/bit033>
- [19] Drummond JA, Franco JLA, Oliveira D. Uma análise sobre a história e a situação das unidades de conservação no Brasil. In: *Conservação da Biodiversidade: Legislação e Políticas Públicas*. Brasília: Editora Câmara 2010; 341-385.

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