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Papers

Conservation Unit, Road and Territory: an analysis of the relationship between BR 319 and the Igapó-Açú Sustainable Development Reserve, Amazonas, Brazil

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Abstract
This paper is about the potential and menacing relationship between protected areas, highways and tourism in Amazonia. This is a case study in the interfluve of Purus and Madeira River basins, in the southern state of Amazonas, specifically in the Igapó Açu Sustainable Development Reserve, which is crossed by the BR 319 road. Through bibliographical, documental review and fieldwork, an analysis was made regarding the potential, frailties, threats and opportunities of territorial development based on the region's tourism. It has been concluded that the protected area can be an important factor for territorial development based on the improvement of social conditions and on nature preservation, the tourism development is subordinated to the local community.

INTRODUCTION

In Amazonia, human mobility, goods and capital policies have favored the construction of highways crossing the forest, thus causing environmental impacts (FEARNSIDE; LAURANCE, 2002). This article is the result of developed activities within the scope of the Purus Madeira Initiative — IPUMA, in Portuguese, for the preparation of the Management Plan for seven State Protected Areas in the region of influence of the BR 319 highway. This study started in 2010 and was updated with secondary data until 2019.

Secondary and primary information was collected to support the proposal of public use for the master plan of the Sustainable Development Reserve (RDS, in Portuguese) Igapó-Açu, one of the protected areas involved in IPUMA, thus permitting a strategic analysis as a basis for the elaboration of the above-mentioned RDS master plan.

For Matus (*apud* HUERTAS, 1995), the Situational Strategic Planning considers the complexity and uncertainties of social

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processes, recognizing problems in reality and taking into account the points of view of different social subjects.

As suggested by Matus (*apud* HUERTAS, 1995) regarding the identification of problems, a bibliographical and documentary review was made to evaluate the situation of the studied location, as well as the possible inter-scalar connections to define a strategy for recognizing the main subjects related to the public use in the conservation unit.

Thence a script of interviews was created in relation to public visits in the territory. As a tool of analysis, a SWOT matrix (Strengths, Weaknesses, Opportunities and Threats) was produced, already used as an analytical method in several studies on protected areas (BANZATO et al., 2012; REIHANIANA et al., 2012; SCOLOZZIA et al., 2014).

The notion of spatial planning

According to Saquet (2013, p. 8.) "the territory results as content, mediation and process of social relations". In other words, it produces and is produced by social and power relations. In this sense, the territory is as a point of social conflict and as a mediator of production relations.

Complementarily, Raffestin (1993) indicates that nature and culture are constitutive elements of a territory, which should be understood as multidimensional, multiscale and relational: a space where social interaction, exchanges, cooperation and competition take place, as well as domination, control and power. The dominating agents are articulated to maintain a domain, while those who are dominated seek to resist and to invert this logic. Thus, the territory is an occupied, appropriated, controlled and contested space (RAFFESTIN, 1993; SANTOS, 1996; HAESBAERT, 2004; SAQUET, 2009).

When characterizing the spatial features resulting from the historical process of territory production, Santos (1986) indicates two types of space. The "fluid spaces", where there is a techno-informational concentration which allows the fluidity of capital, and the "rough spaces", in which the techno-informational structures are rarefied and there is opposition to the flow of information, capital and population, hindering capitalist expansion over the territory. Similarly, Moura and Magalhães (2011) refer to "territorial impedance" as a resistance from the difficulties represented by environmental norms, such as the conservation units, which have the effect of restraining the urbanization of territories.

Therefore, protected areas can either resist or prevent the pressures of highways over the forest, which "open up the forest for the advancement of logging companies, small and large producers, causing deforestation of up to 50 km on each side of the highway" (BECKER, 2001, p. 152-153).

The national system of protected areas - Sistema Nacional de Unidades de Conservação - SNUC (BRASIL, 2000) - is composed of fully protected areas and sustainable use protected areas. In the sustainable development reserves (RDS), housing is allowed only for traditional communities, and activities are permitted, such

as agriculture, livestock, fishing, including tourism, in addition to extractivism.

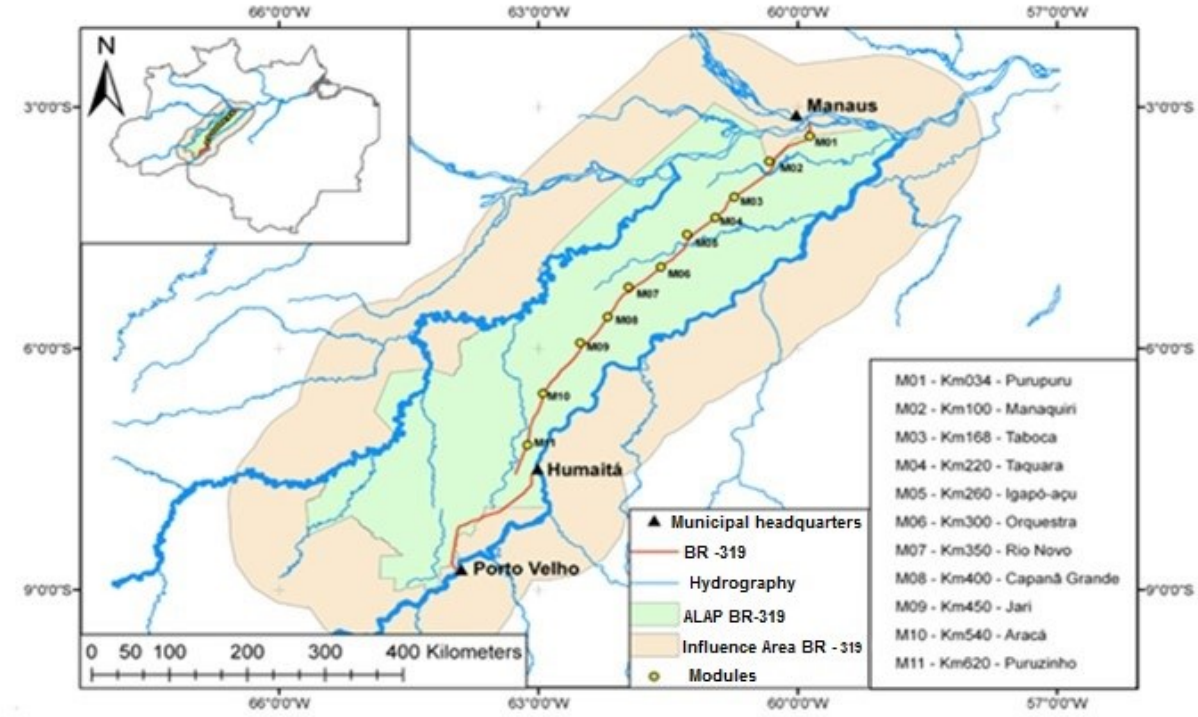
The so-called "fishbone effect", caused by the occupation model of the agricultural frontier in Amazon, has the highways as vectors of deforestation (ESCADA; ALVES, 2001; SAITO et al., 2011). To avoid this, the National Environment Policy (BRASIL, 1981) makes use of environmental licensing processes.

The presence of protected areas in the influence areas of the highways determines a series of procedures for environmental licensing. By way of compensation, financial resources can be allocated to either existing or new protected areas, allowing the creation of other protected areas, such as indigenous lands close to highways. One relevant case is the BR 163 highway, which connects the cities of Cuiabá and Santarém. Furtado and Monteiro (2006) point to positive results in the creation of conservation units along the highway, demonstrating that deforestation has been reduced where there are protected areas.

The case of BR 319 highway: to broaden the debate

The BR 319 highway has been designed to link the cities of Porto Velho and Manaus (Map 1) during the Brazilian military dictatorship (between 1964 and 1985) to integrate and occupy the Amazon region as a geopolitical strategy (FEARNSIDE; GRAÇA, 2009a). Between 1968 and 1973, the BR 319 was constructed over the interfluve of the rivers Madeira and Purus, and inaugurated in 1976 (FEARNSIDE; GRAÇA, 2009b). Due to the lack of maintenance, the highway became impassable and was deactivated in 1988.

Map 1. BR 319 Location.



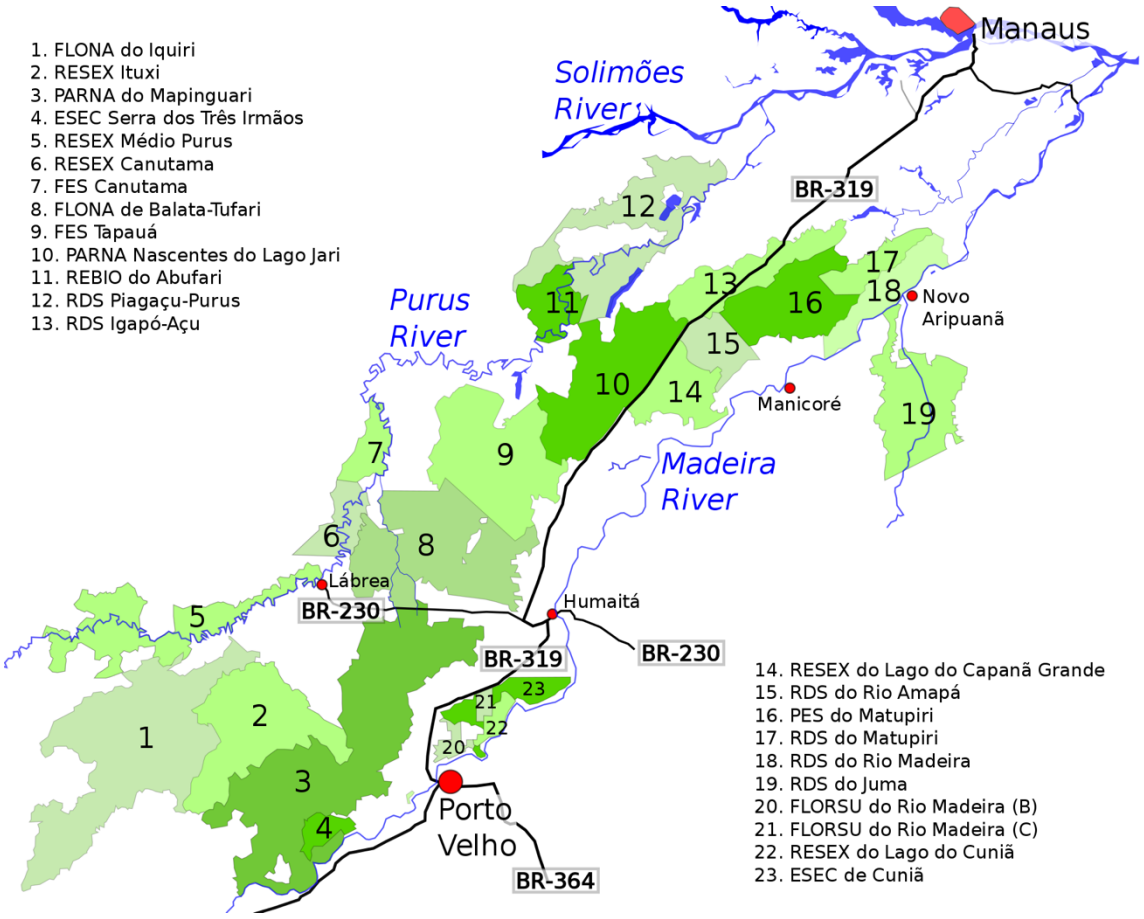
Source: INPA, 2014.

Since then, the highway's rehabilitation has been the subject of speculation at various times and administrations. It was included in the "Brasil em Ação" plan, executed by the President Fernando Henrique Cardoso, in the "Avança Brasil" Plan and foreseen in the "Plurianual" Plan between 2004 and 2007. According to Lima (2007), the Ministry of Transports initiated the rehabilitation works in 2005. However, the Ministry of Environment demanded environmental licensing, thereby blocking the continuity of the works.

Lima (2007) pointed the agriculture, livestock, fish farming, transport and tourism as promising sectors of economic development in the region along BR 319. The author indicates the potential annual increase in tourism and the development of hotel enterprise in the region, especially for the forestry hotels, given that 470,992 guests stayed in the urban area of Amazonas and 227,554 in forest hotels.

Protected areas can be considered as concept of roughness as defined Santos (2006), a natural geographic forms inherited in the landscape context, since they are content objects of which value (given by society to the forest and its environmental attributes) is expressed by the exceptional institutionality (BRASIL, 2000), removing protected territories from the legal land market. Potentially, they become territories of resistance to deforestation, given the pessimistic deforestation scenarios studied by Fearnside and Graça (2009a). 21 protected areas were created around the highway BR 319, 10 federal and 11 state (Map 2).

Map 2. Protected areas around BR 319



Source: https://pt.wikipedia.org/wiki/BR-319. Accessed in August 2019.

The municipality of Careiro Castanho is the only strategic support point for those who cross the BR 319 highway from Manaus. The highway is not paved and has no infrastructure to support the traveler.

BR 319: PROTECTED AREAS AND TOURISM

Tourism in the state of Amazonas increased by 14.7% between the years of 2003 and 2008. Between 2010 and 2014, the number of tourists rose from 675,713 to 1,168,612 (AMAZONAS 2015). The indicators used to evaluate tourism were based on the occupation of urban accommodations, jungle hotels, as well as sport fishing and cruise ship segments.

There was an approximate increase of 2790% in sportfishing activities in Amazonas between 1992 and 2000 (BEGROW, 2002). In 2010, 6,630 tourists were registered, and the number increased to 9,875 tourists in 2014 (AMAZONAS, 2015). These numbers raised an expectation of 4 million dollars of financial transactions, as 95% of North American tourists showed interest in fishing sports. In recent news (G1, 2018), representatives of the Ministry of Tourism stated that sportfishing mobilizes R$50 million per year, bringing 10,000 tourists early to the state.

These data are significant, because the Madeira-Purus interfluvial region is still

unfamiliar to the sportfishing tourism market, although the practice already exists in some locations.

The Igapó Açu RDS is at the junction between the BR 319 and the Igapó-Açu River. The main feature of the region is the igapó vegetation with predominance of macacarecuia (*Couroupita guianensis*). The river has several species of fish, especially the tucunaré-açu (*Cichla temensis*), attractive to amateur fishermen.

IPUMA was created out of the necessity to implement seven new protected areas in the state of Amazonas, besides the former ones around BR 319, in the interflow of Purus and Madeira rivers. In 2010, the Amazonas State Secretariat for the Environment and Sustainable Development — Secretaria de Estado do Meio Ambiente e Desenvolvimento Sustentável do Amazonas (SDS/AM) — hired the Amazon Foundation for the Defense of the Biosphere — Fundação Amazônica de Defesa da Biosfera — to start the project by assuming budgetary execution and assembling the IPUMA team.

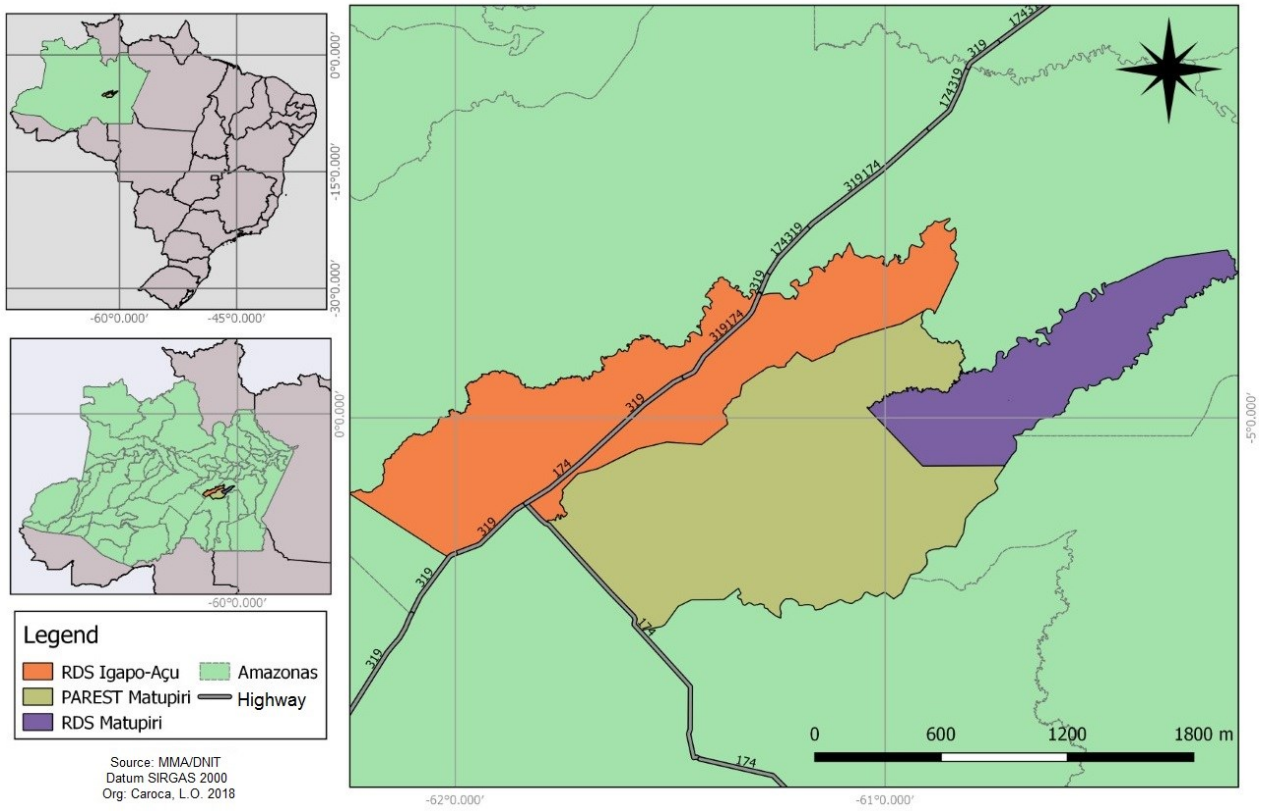
Among the protected areas along BR 319, the Igapó-Açu Matupiri mosaic (Map 3) stands out as the most accessible from Manaus. The mosaic was put forward in 2006, after the Provisional Administrative Limitation Area was decreed in the surroundings of BR 319. Through Decree (AMAZONAS, 2009), the Igapó-Açu Sustainable Development Reserve — Reserva de Desenvolvimento Sustentável Igapó-Açu — was created in 03/27/2009.

The location of the Igapó-Açu community is strategic: the highway benefits access to three protected areas and to an indigenous area. There is a town at the junction of the road with the Igapó Açu river, formed during the 1970s when the place was moved by the flow, trucks stopovers, passenger buses and automobiles. About 30 years ago, houses, bars and a guesthouse were built to support travelers.

From the 1980s on, as the road pavement deteriorated, the flow of vehicles decreased, forcing dwellers emigration. In 2018, the village divided by the river had 200 families (ISA, 2018) and held some houses, five bars and an inn. Although the flow of vehicles is small, they received travelers who seek the rivers of the region as a place for fishing and hunting. During a four-day period, we could observe trucks prepared for family camping, groups of bikers on leisure trips and trucks of amateur fishermen in front of the inn.

The Igapó Açu RDS is inhabited by subsistence farmers, fishermen and extractivists. Although in a precarious state, it is possible to reach the Igapó Açu river by the highway and to arrive at Matupiri RDS through the Igapó-Açu river. If one arrives from Porto Velho, it is only possible to travel on the highway in the driest months of the year.

Map 3: Location of the Matupiri Igapó-Açu Mosaic



Source: BRASIL, 2018, e DNIT, 2018.

There is no road policing, environmental inspection, mechanical assistance structure, nor health/accident support. The risks of visiting the Igapó Açu RDS are many, from exposure to accidents with venomous animals, such as sleeping snakes (*Sibynomorphus mikania*) , jararaca (*Bothrops jararaca*) and liana snake (*Chironius*), predatory mammals, like Panthera onca as well as exposure to endemics such as malaria, dengue and leishmaniasis.

During an interview with the RDS manager in 2010, it was informed visits were already occurring in the region, although there are no official records of the number of tourists. The activity generated income for cooks, bushmen and pilots, as to all residents of the protected areas. The main activities reported were sport fishing and illegal hunting safaris practiced by high purchasing power tourists. The manager expected that road paving would increase the volume of visitors in the RDS, which could bring improvements to the resident communities.

The sport fishing is a source of disagreement among some fishermen because there is a dispute over the fishing resource. Although there are no records on the number of visitors to confirm that this activity reduces the fishing stock, there is indeed a social conflict.

One of the main local leaders, the owner of the only existing lodging facility, said she had lived and worked in the region for 32 years. The inn is located on the side of the highway and

close to the Igapó-Açu river where there is a ferry for crossing vehicles. She was an employee of the inn and then she became the owner in 1993. She was also president of the Residents' Association. According to her, confirming the information from the RDS manager, visits were paid by researchers, fishermen from Manaus, fishermen brought by sport fishing operators and groups of hunters.

The tourists movement in the inn grows especially between July and August. In January, during the rains, there are no visitors because of traffic impediments. Travelers whose main interest is sport fishing come from São Paulo, Brasília, Pará and other locations. Most are men who come by car from Manaus, rent boats and eat at the inn. The inn owner confirmed there were groups with the intention of hunting, and she did not enjoy that the fishermen took the fish out of the region, since they do not create any benefits. She suggested there should be some kind of charge or financial aid to the community that could be collected from the amateur fishermen, as well as some kind of fishing agreement establishing rules and limits for professional or amateur fishermen.

In her statement, she indicated the desire for an increase in the number of visitors. She stated there should be other ventures besides the one she owned and that there also should exist a sort of community organization in relation to tourism, which latter happened in 2014.

In 2013, Mil Maravilhas Ecotourism Association was founded in RDS, to promote the protagonism of the local population in the organization of tourism activities. As stated by Rezende (2016), meetings were held to prepare the participatory management plan and a Deliberative Management Council — was created in 2014.

A major problem is communication, as there is only one public telephone connected to solar energy, which is very often defective, thereby leaving the locality with no communication with the exterior.

The sport fishing is practiced within the RDS of Igapó Açu, but also advances in the RDS of Matupiri and in the State Park of Matupiri. As reported by local fishermen, some visitors arrive by seaplane and rent local boats. Until 2010 the perception is that the tourist visits, even in a reduced number, is an activity occurring under external command, subjugating the place to an external economic logic.

Analysis of RDS management information

After the bibliographic review and field research in 2010, and the update of data and information until 2019 we prepared the content analysis extracted posteriori through interviews with local subjects. The content synthesis was organized in a SWOT matrix (Table 1) exposing the potentials, limitations and challenges for the development of the public use program for the RDS.

Table1 - SWOT Matrix for the Public Use Program.

STRENGTHENING	FRAGILITIES	OPPORTUNITIES	THREATS
Ichthyofauna for amateur fishing in the lakes and rivers of the Igapó Açu and Matupiri RDS.	No research and monitoring of ichthyofauna.	Development of the Management Plan with the participation of communities, favoring community organization with a view to supporting and organizing Public Use activities.	Institutional weakness of the State government for mediation of conflicts, and maintenance of symmetry of power between external agents and the community with regard to sport fishing.
Community reaction generated by the already disordered sport fishing.	Incipient state of community organization in the face of current and future pressures from the growth of sportfishing tourism.	ARPA and DENIT resources for implementing a participatory management plan.	Generation of expectations regarding the attractiveness of the region that will not be met.
Igapó forest during the flood season for canoeing, preferably with traditional canoes.	Absence of security protocols for tourism development in the RDS Igapó Açu.	International interest to get to know the Amazon.	Absence of a permanent and clear policy that articulates tourism, nature conservation and social development.
Knowledge of the population about the elements and dynamics of the local nature that can be presented to visitors.	Lack of training of local labor for the development of recreational activities with some degree of risk.	Existence of international organizations interested in supporting sustainable development projects in the Amazon to maintain biodiversity.	Predominance of external knowledge over community knowledge.
Participatory, detailed inventory of resources for the development of Public Use.	Discontinuity in the implementation of the management plan.	Previous knowledge of visitors about the region, with a view to leisure and tourism activities.	Potential increase in disordered visitation, due to the proximity of Manaus, considering the imminent paving of BR 319, a policy for the development of tourism in the Amazon.
Presence of fishing operators	Asymmetric economic relations between fishing operators and the community.	Mastery of public use activities by intermediaries linked to the tourist business.	Hegemony of tourist activities by subjects external to the community.
Diversity of landscape units	Territorial extension of UCs with very low demographic density and lack of inspection structure.	Development of the sense of belonging (environmental education) of the Igapó Açu RDS communities, with the landscape as a source and development of a protection strategy and use of the UCs in an integrated manner.	Disregard of the dynamics of the region's nature when implementing the highway and tourism support structures.
Igarapés for bathing;	Long distance from the urban center (Careiro Castanho) to support tourist activities, hindering inspection and prevention of environmental impacts.	Implementation of a control and inspection and security system in the RDS.	Lack of resources to implement the management plan and the resulting public use program.
Small beaches (in the low season) for camps, picnics and landed fishing;	Process of emigration of the population due to the lack of social structures such as public health equipment, education and means of communication;	Elaboration of projects to qualify resources for Public Use;	Abandonment of the region by the government

Community agroextractivism in the RDS;	Poor reception structure in the Igapó Açu RDS and absent in the Matupiri RDS (accommodation, food);	Valorization of the production of ecological agriculture for the national and international market, making the visitation to the producers an attractive one;	Overvaluation of agroecological merchandise by the foreign market, leaving the domestic market short of supplies.
Use of local production to feed visitors;	Absence of actions aimed at food security	Paving will make it possible to sell local products and import complementary products from other regions.	Substitution of local food for outside food
Unique institutional structure for the three UCs aimed at coordinating Public Use as a strategic management program.	Restoration of the road without the management plan implemented;	Optimization of resources for conservation of a wide area	Insufficient resources to meet the three conservation units that make up the mosaic of local UCs
Existence of living spaces such as a soccer field and bars in the Igapó Açu Reserve, igarapés and the Igapó Açu River itself.	Bodies of water along the highway with easy accessibility without any protection;	Implementation of the management plan as an opportunity to attract resources for basic infrastructure	Absence of forecast resources for the implementation of basic infrastructure in the community
Navigation for nature observation on the Igapó Açu River;	Absence of environmentally compatible technology in the Igapó Açu RDS;	Traditional technologies like canoes; Presence of INPA researchers can provide answers to local needs	Insufficient socio-environmental research in support of land management
Use of traditional knowledge about local nature;	Absence of fauna and flora inventory that for the guidance of visitation	International appreciation for sport fishing	Interest and promotion of illegal sport hunting; Irregular and uncontrolled sport fishing;
Presence of endemic birdlife;	Absence of bird fauna inventory	International interest in bird watching	Absence of infrastructure for bird watchers
Mastofauna important and possible to be sighted. Traditional knowledge about the local fauna, habits and places of sighting;	Absence of infrastructure to support visitation (transport, signaling, accommodation, shelters, communication).	International events in Brazil that promote the Amazon	Attraction of tourists without adequate infrastructure

Source: the author.

The matrix made it possible to interpret that the geographic situation of the RDS Igapó Açu is strategic to support conservation policies such as the Amazon Protected Areas Program — Programa de Áreas Protegidas da Amazônia (ARPA) —, which contains 105 protected areas including the mentioned RDS.

The ARPA Program cover an important portion of the Amazon, which can be considered as an impedance space, or a spatial roughness (SANTOS, 1996), which may influence the

containment of deforestation in the region. The south of the State of Amazonas and the RDS of Igapó-Açu are included in the so-called arc of deforestation in the Amazon (BARNI et al. 2015). If necessary, preventing measures are not taken, the restoration of the BR 319 highway may trigger the expansion of deforestation.

FINAL CONSIDERATIONS

The volume of tourists in the Amazon is not as significant as in other regions in Brazil. In the case of protected areas, the number of tourists is also lower than in protected areas near cities in the southeastern regions, especially on the Brazilian coast. However, tourism is already significant in the Amazon region. Public policies for tourism and nature conservation indicate that there is an interest in making tourism an option compliant with economic, social development and nature conservation.

The implementation of protected areas seems to us a palliative measure in view of other actions, such as opening roads to facilitate the fluidity of goods and people. It also has a function of resistance to the occupation model that causes the "fishbone effect" or the expansion of deforestation in the Amazon rainforest. This model needs to be rethought, with the forest, rivers and local populations as baseline values for an alternative development that promotes social well-being and nature conservation.

It does not seem evident that a highway of approximately 1000 km in the middle of the Amazon rainforest can be economically viable, because of the constant need for maintenance and dependence on the climatic and hydrological regime. Associated with the use, the heat, the rains and the forest's resilience tendency, even if of low intensity, the use of this road will cause the degradation of the pavement and will demand a support and maintenance infrastructure, as has already happened. These demands are not economically justified today, considering the poles that will be joined. Although cargo may gain in speed of transportation, costs are higher than inland waterway. The influence of the hydroelectric plants of Jirau and Santo Antônio in the Brazilian state of Rondônia may bring instability to the operation and navigation on the Madeira River, which may arouse interest in cargo transportation on the BR 319 highway.

Protected areas play a role in the territory beyond the objective of protecting biodiversity. They avoid a perverse and exclusionary development model and mobilize the political participation of communities, so they can organize themselves and become sovereign over their territories in the face of new challenges which come with the roads and the expansion of capitalist development in the region.

The Igapó-Açu RDS and Matupiri RDS are already used for tourism, with some control and participation of local communities in the process. The restoration of the road may increase the use of rivers and the forest for the purpose of leisure and recreation, consequently creating a potential for economic development and having tourism and other activities as dynamic factors.

Thus, the protected areas along BR 319 contain forests and rivers degradation, serving as territories of resistance. This confrontation arises through the apex of Rondônia, where the beaches of the Purus River are already used in seasonal parties, and through Manaus, where international tourism pressures the ichthyofauna, besides the prohibited practice of sport hunting.

For the development of a public use program in the Igapó-Açú RDS, a community engagement strategy must take place through actions toward environmental education and through the development of a public use system that can be strengthened by the protected areas and profit from it. In this sense, it is possible to create a sense of belonging between these communities and the protected areas they inhabit. Although already a reality, a visit and tourism subprogram is also strategic because tourism tends to be further developed in the Igapó Açu region. In this case, the risk is the emergence of an external protagonism, which can stimulate social exclusion and promote conflicts between residents and the management of the protected area.

The development of the environmental conservation strategy based on the protected areas located along the highways must be accompanied by an improvement in the living conditions of the local population. For public use programs to be developed in the RDS Igapó Açu, basic infrastructure is required, such as basic sanitation, treatment and water supply, as well as an efficient communication system. In addition, it is necessary to encourage and provide the development of support structures for tourism and environmental education, which are scarce in the region.

The effective implementation of protected areas in the southern region of the State of Amazonas has a fundamental geopolitical importance, as it may resist to the development model that disregards the biodiversity of the Amazon and the populations that live there and depend on the forest and rivers. Valuing traditional knowledge and biodiversity is an inspiration for establishing a dialogue with possible visitors who wish to expand their life experiences and who bring their experiences and knowledge to the inhabitants of the region. In conclusion, tourism can generate benefits for the Amazon, based on dialogical relationships.

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