



**ENVIRONMENTAL AND SOCIOECONOMIC UNSUSTAINABILITY OF
EXTRACTIVE RESERVES IN THE AMAZON
INSUSTENTABILIDADE AMBIENTAL E SOCIOECONÔMICA DE RESERVAS
EXTRATIVISTAS NA AMAZÔNIA**

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Abstract

After 32 years of foundation of the first Extractive Reserves (RESEXs), the results show the unsustainability in these areas. In this sense, we evaluate the results of institutional policies, production systems and impacts on natural and environmental resources. This study was developed through the method of association with interference, since more than two variables presented a dependency relationship. Here we conclude that RESEXs are unsustainable because they were created with an emphasis on conservation, and not on the integration of environmental conservation and socioeconomic development.

Keywords: Extractivism; Agriculture; Livestock.

Resumo

Passados 32 anos de fundação das primeiras Reservas Extrativistas (RESEXs), os resultados mostram a insustentabilidade nessas áreas. Nesse sentido, avaliamos os resultados das políticas institucionais, os sistemas produtivos e os impactos os recursos naturais e ambientais. Este estudo foi desenvolvido por meio do método de associação com interferência, uma vez que mais de duas variáveis apresentaram relação de dependência. Aqui concluímos que as RESEXs são insustentáveis porque foram criados com ênfase na conservação, e não na integração da conservação ambiental e desenvolvimento socioeconômico.

Palavras-chave: Extrativismo; Agricultura; Pecuária.

1. Introduction

In the world there was a 10% increase in the number of Conservation Units (CUs), 18% in Brazil and 70% in the Amazon (VIEIRA; PRESSEY; LOYOLA, 2019). In the global scenario, the Amazon plays a role as a carbon sink and fossil fuel reserves, providing ecosystem services, biological and cultural diversity (CODATO et al., 2019).



CUs allow environmental preservation, scientific research, tourist visitation, and in specific cases, the permanence of traditional communities for environmental conservation and socioeconomic development. The CUs have potentials when there is operational planning and ensures the maintenance of social, economic and environmental conditions (TEIXEIRA; VENTICIQUE, 2014). As well as, when it offers ecological infrastructure from the site to the international (DIAS; WEDGE; SILVA, 2016), and effective actions that meet the creation and maintenance goals (VITALI; UHLIG, 2009).

Chico Mendes emphasized the creation of RESEXs, which are areas that allow residents to combine environmental conservation with socioeconomic development. He added that the CUs would benefit traditional communities with varieties of extractive products (RAMALHO, 2016), reduce deforestation and the expansion of pastures (ALLEGRETTI, 1997), as well as recognize rubber tappers with environmental, social, economic and technological policies [...] (CNS, 1985)

The first RESEXs were founded in 1990, based on the movement of rubber tappers in the 1980s, which sought to contain the rampant exploitation of large farmers. THE RESEXs were intended to preserve the native culture and customs of the inhabitants and allow the coexistence of extractivism combined with agriculture and animal husbandry. Later, social movements were dedicated not to allow the expansion of the agricultural frontier because they would damage social culture, survival and well-being of local communities (ALMEIDA; ALLEGRETTI, 2018).

Law No. 7,804/1989 (Art. 9, 18 and 225) instituted RESEXs, supported the creation of areas for environmental conservation, extractive production, agriculture and animal husbandry. He placed the Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA) in charge of the management, supervision and control of RESEXs. The inhabitants were led to believe that the State would pay loving attention to social projects (health, education, retirement programs, etc.) and encourage production (through the provision of credit, technical assistance, transportation and technology), in order to ensure environmental balance and the improvement of living conditions

However, since its foundation, the State has chosen to receive external financial resources, not the policy of taking responsibility for the planning, management and control of RESEXs. For example, the Brazilian Tropical Forest Protection Pilot Program (PPG-7) spent 5 years (1995-1999) in the first RESEXs in the Amazon, and Brazil contributes with less financial investment among PPG-7 countries.

More than three decades after the founding of the first RESEXs, the state has done little to improve the well-being of families and environmental resources in these areas. Families living in RESEXs experience feeding difficulties (MACIEL et al., 2010) and survival (OSTRY; BERG, 2011), given that the main focus of the institutions is on biodiversity (SPEAK; MIZGAJSKI; BORYSIK, 2015).

This study seeks to understand why the creation of RESEXs failed to boost environmental conservation and socioeconomic development. Additionally, the special edition of the magazine "Development and Environment", published in November 2018, as part of the tributes of the 30 years of the murder of Chico Mendes (1944-1988) is emblematic in this sense (ALLEGRETTI; WEDGE; SCHMINK, 2018). The biggest positive balance was the change in attitude of the development model, which still needs to advance considerably.

Our central question is this: why don't Amazon RESEXs guarantee environmental and socioeconomic sustainability? In this sense, the objective of this study was to evaluate the results of institutional policies, production systems and impacts on natural and environmental resources. This study advances because it demonstrates that prioritize the conservation of environmental resources as a strategy for sustainability is not the best way, because it does not guarantee the standing forest and improvement in the living conditions of the inhabitants.

This article is divided into five sections. First, we present the material and method, specifically the areas of study, method, specific procedures and data analysis. Second, we analyze and validate the conclusions of the results and the discussion. Third, we indicate some implications based on the results and discussion. Fourth, we show the novelty of the study in the conclusion. Fifth, we suggest some possibilities aimed at alleviating the problem in the recommendations.

2. Material and Method

2.1 Areas of study

The study included three of the largest RESEXs in the Brazilian Amazon, located in the municipalities of Marechal Thaumaturgo (Acre), Guajará Mirim, Nova Mamoré (Rondônia), Laranjal do Jari, Vitória do Jari and Mazagão (Amapá) (Figure 1). Data collection occurred with residents of the RESEXs and environmental analysts of the Chico Mendes Institute for Biodiversity Conservation (ICMBio), in the period from September 2016, and January to March 2017.

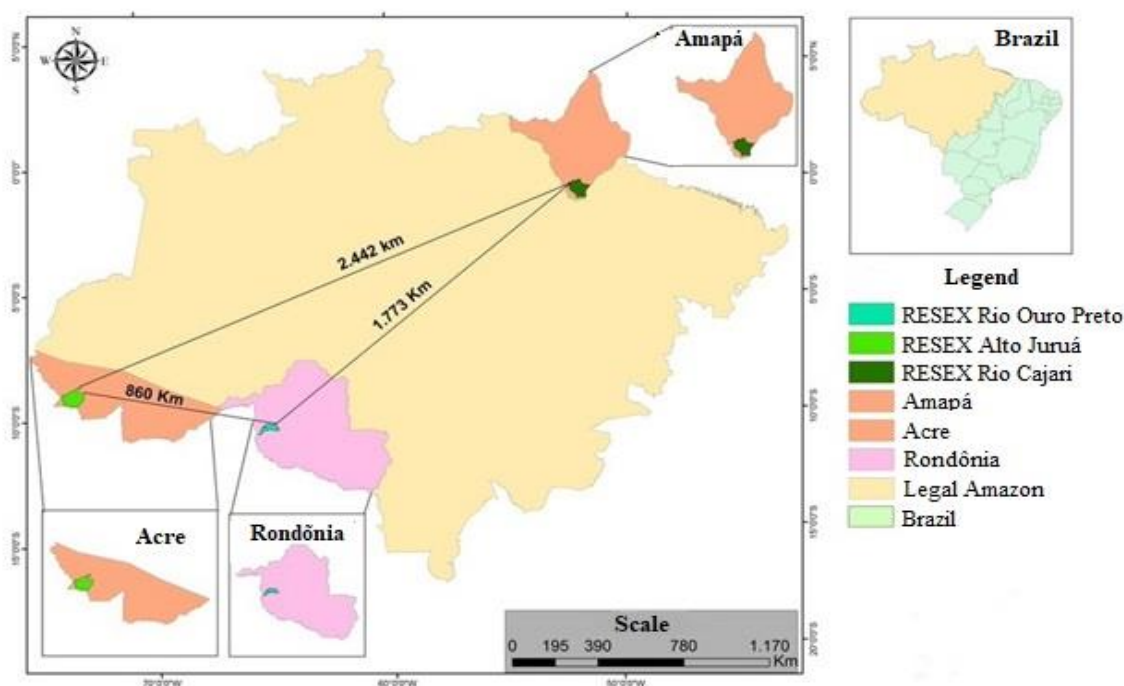


Figure 1 - Location of RESEXs Alto Juruá, Rio Ouro Preto and Cajari River, and their spatial elements

Source: The authors



By involving three states forming a scalene triangle in which shows the distances of the states of Acre, Amapá and Rondônia, whose logistics of field research and financial strategy for the implementation of 232 questionnaires to survey and its analysis were highly expensive. This field research allowed us to talk to residents and get a closer look at their difficulties, ways of life, culture, and habits, as well as their labor activities, including collecting chestnuts, producing vegetable oils, handicrafts, hunting, fishing, agriculture, and animal breeding.

We observed several social challenges, including education (lack of schools, teachers, snacks and migration of children and adolescents to urban centers) and health (sporadic preventive care, lack of nurses and doctors). In this sense, this study was developed as follows: review of published papers on CUs, RESEXs, and economic theory.

Demographically, RESEX Alto Juruá has 4,170 inhabitants, Rio Ouro Preto 699 inhabitants, and Rio Cajari 2,293 inhabitants (IBGE, 2010). The study includes data on three production systems: agriculture (cassava flour, rice, corn, beans, etc.), livestock (cattle and buffalo) and extractivism (brazil nut, açaí and vegetable oils).

The three RESEXs present peculiar characteristics related to the origin of the inhabitants, age, level of education, productive activities, products, as well as the percentage of households interviewed that depend on agriculture, extractivism and creation of cattle (Table 1).

Table 1- Profile of the respondents on the basis of the origin, age, schooling and productivity

RESEXs	Habitants	Age	Scholarity	Productive Activities and Products	% Family
Alto Juruá	Acreanos e Nordestinos.	41 a 60 years	-Illiterate: 36,5% -Literate and/or with formation of fundamental to superior: 63,5%.	-Agriculture: cassava flour, corn, rice, bean and tobacco. -Extractivism: vegetable oils. -Cattle breeding.	-Agriculture: 77,8 -Extractivism: 1,6 -Cattle breeding: 50,8
Rio Ouro Preto	Rondonienses e Nordestinos.	51 a 70 years	-Illiterate: 46,2% -Literate and/or with formation of fundamental to superior: 53,8%.	-Agriculture: cassava flour, corn, rice, bean and coffee. -Extractivism: Brazil nuts, vegetable oils and açaí. -Cattle breeding.	-Agriculture: 77,6 -Extractivism: 58,2 -Cattle breeding: 1,5
Rio Cajari	Quilombolas, Amapaenses e Paraenses.	41 a 70 years	-Illiterate: 36,2% -Literate and/or with formation of fundamental to superior: 63,8%.	-Agriculture: cassava flour, corn, rice and bean. -Extractivism: Brazil nuts and vegetable oils. -Cattle breeding.	-Agriculture: 62,7 -Extractivism: 62,7 -Cattle breeding: 2

Source: The authors

This information represents the profile of the interviewees and their relationships with the primary and secondary forests. First Nature (primary areas) corresponds to the extratritic activities of collecting brazil nuts, vegetable oils and açaí. The Second Nature (deforested areas) equivalent to the realization of agricultural activities (cassava flour, corn, rice, beans, tobacco and coffee) and cattle ranching (HOMMA, 2010).

2.2 Method, Specific Procedures and Data Analysis



The study was developed by the association method, because more than two variables interfere dwelled on, in order to cause a dependency relationship (VOLPATO, 2015). For example, residents rely on state permission to implement swiddens, remove wood, raise animals, hunt, fish, etc. Although this work is rudimentary and does not involve technology to deforest and burn in primary or secondary areas, residents follow the management or use plan.

In addition to, we developed research (BABBIE, 2003) using a semi-open questionnaire distributed to all heads of family (male and female) who lived in the RESEXs for at least 10 years. This criterion was established to ensure the experience and capacity of the interviewees on the theme. Data were collected from 232 residents in the three RESEX, being 102 in the Cajari River, 67 in Rio Ouro Preto and 63 in Alto Juruá. Structured interviews were also conducted with 12 Environmental Analysts of ICMBio. The managers interviewed were gathered at the ICMBio offices in Brasília-DF, Belém-PA, Macapá-AP, Porto Velho-RO, Guajará-Mirim-RO and Cruzeiro do Sul-AC. The objective was to understand the view of each interviewee about the RESEXs based on their institutional experiences and analyze based on the information of the interviewees of the RESEXs.

The questionnaires covered environmental, demographic, economic, social and institutional issues. To sufficiently connect our questions to the daily realities of the interviewees, we conducted a test survey in a quilombola community (in the municipality of Inhangapi-PA), which allowed us to adjust and correct some identified errors.

Once our research instrument was validated, we began the interviews. Interviewees, both residents and community representatives, were not identified by name but by their professional position. The field visits took place in two stages. In the first (September 2016), we identified subjects and held several conversations with institutional managers and community leaders to obtain information about access, distances, displacements, time for each activity and dissemination of results. In the second (January to March 2017), structured interviews were conducted using a script composed of 38 questions for residents and 29 for managers. We recorded these interviews because we understand that only in the field are we able to break the limits of the questions elaborated in the laboratory.

From the quantitative point of view, statistical tests of mean, median fashion and correlation were performed. We also used references, semi-open questionnaires and audio interviews based on environmental, economic, institutional and social groups to ensure a qualitative approach.

3. Results and Discussion

3.1 Production systems

The ineffectiveness of the RESEXs is demonstrated by the income of the families involved in the three productive systems (extractivism, agriculture and livestock). The income from extractive production is lower due to low production, market difficulties, low attention and low human and financial investments. The lack of government subsidy and productive activities are the causes of low production and difficulties in accessing markets (SIVIERO et al., 2016).

Fearnside (1989) draw attention to the need to prioritize RESEXs as soon as possible in order to improve residents' living conditions. However, his position is not generally held, since data reveals that extractivism is an insufficient source for families' social reproduction and forest maintenance. One survey respondent confirms this:



For us, it is toilsome to talk about and work on RESEXs, because they are areas of high complexity (insufficient financial resources), and every day social and productive demands increase (Environmental Analyst/ICMBio, Belém-PA, March, 2017). The creation of RESEXs should represent autonomy in the management of the territory, however, the current format configures granting of territory by the State to State (DUMITH, 2018).

It is not enough to create areas with a sustainable purpose, to abandon families to repressive legal regimes without effecting the politics necessary for social and productive changes, this does not solve the root cause of environmental degradation. Our interviewees explain:

They wanted to exclude the RESEXs, because whoever collects is park, although the biological reserves are not expensive. At the time of PPG-7, THE RESEXs worked well until the time of the scarcity of financial resources (Environmental Analyst/ICMBio, Brasília-DF, February 2017). The creation of RESEXs, even if it guarantees land ownership, did not represent a major change in terms of quality of life (CAVALCANTE; BATISTA, BAPTIST, SOUZA, 2018).

Today, I get demands for creating RESEXs, but the state does not have the resources to create UCs policies. The state has never had an interest in maintaining islands of excellence, only in possessing external resources (Environmental Analyst/ICMBio, Brasília-DF, February 2017). THE RESEXs would bring hope to the extractive category, because they were supported by ecological prudence, social justice and economic efficiency (MACIEL; ALMEIDA; MENEZES, 2018).

A RESEX reconhece os direitos territoriais, mas os criamos e os deixamos resolver seus problemas. Quando antecipamos recursos relacionados ao bolsa verde e ao bolsa família, que é um recurso e não significa muito para mim, mas para eles representa muito (Analista Ambiental/ICMBio, Brasília-DF, fevereiro de 2017). A criação de RESEXs, mesmo que todas as formalidades legais sejam cumpridas, pode se tornar ficção, causar conflitos e impactar negativamente a qualidade dos ecossistemas e o modo de vida dos habitantes locais (COSTA, 2018).

Arruda (1999) argues that CUs are subject to an external protection regime. The Brazilian State, although a legal entity, must respect the decisions of the PPG-7. The decisions of the state seem to have been made to demarcate the largest number of areas for preservation without considering the necessary conditions for sustainability, which is to maintain survival conditions compatible with the maintenance of forests.

This demonstrates the fragility of government institutions and their inability to establish their mission, that is, to develop policies and strategies for RESEXs (FANTINI; CHRYSOSTOM, 2009). There is a need for adequate responses to social demands, since the majority of inhabitants do not have access to socioeconomic policies and support necessary to overcome the challenges of subsistence (LAVOIE; BRANNSTROM, 2019; BROWDER, 1992).

3.2 Agricultural production

Our results show that in economic terms only cattle exceeds (small margin) small-scale agriculture. Figure 2 classifies these results in terms of minimum wage and number of respondents. With the exception of RESEX Alto Juruá, where small producers specialize in the production of cassava flour for export to other Brazilian regions.

The highest income ranges from 0.5 to 1 minimum wage (40.6%). Part of the interviewees (30.3%) earn incomes below 0.5 minimum wage. These salaries are insufficient to allow home survival, especially in homes that live more than one family. Therefore, the families of the RESEXs are facing many socioeconomic difficulties.

Residents' need to survive explains why they are putting pressure on environmental resources. The precarious living conditions lead to productive activities that cause environmental degradation (RIEMANN; SANTESÁLVAREZ; POMBO, 2011). The interviewees responses reflect their difficulties and discontent with RESEXs:

The structure of the ICMBio is low, both in terms of human and financial resources, which makes it difficult to reach environmental goals and improve the lives of RESEXs families (Analista ambiental/ICMBio, Macapá-AP, março 2017). The RESEXs are compromised by problems of personnel, finance [28], mismanagement, illegal exploitation of timber and burned (COLLINS; MITCHARD, 2017).

RESEXs should be viewed in a more pragmatic way and should have timely agendas to trigger larger agendas, i.e. not exclude populations from living positively (Environmental Analyst/ICMBio, Brasília, February 2017). So that the problems associated with the struggle for land governance, logging, livestock and soil degradation in these areas do not grow (MACIEL et al., 2018).

In addition, the state has never been interested in investing in conservation units, in the Lula government (2003-2011), the narrative is that we do not need international resources, we have the ability to collect to maintain (Environmental Analyst/ICMBio, Brasília-DF, February 2017). This measure inefficient motivated farming growth, and consequently caused fall of extractive activities (FREITAS et al., 2018).

In general terms, reducing the destruction of natural resources in the Amazon depends more on the development of sustainable agricultural activities in deforested areas than on the collection of forest products and the sale of environmental services (HOMMA, 2010). However, the state continues to adopt an authoritarian stance that is biased toward preservation and does not encourage the participation of local populations in management (VIVACQUA; VIEIRA, 2005). It is not enough to prevent residents from participating in agriculture, however, the state must realize viable alternatives for development.

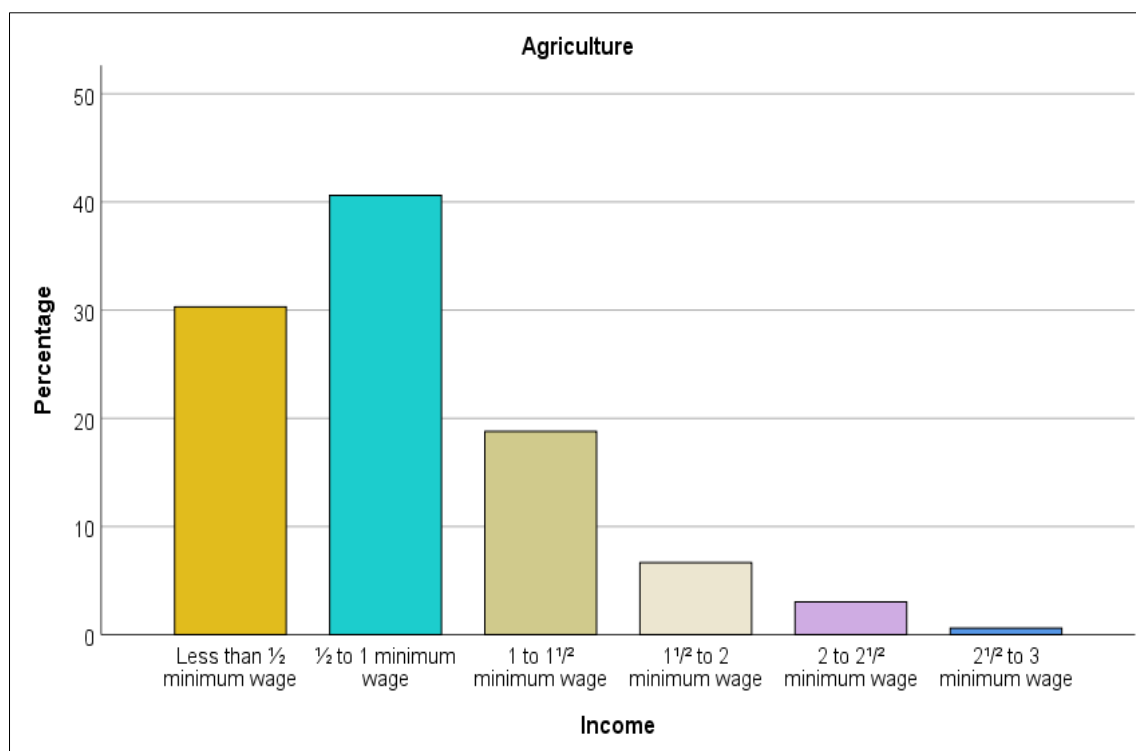


Figure 2 - Monthly family income from agriculture of RESEXs residents

Source: The authors

To increase the legitimacy of interventions at RESEXs, the State should encourage socioeconomic policies to the inhabitants, in order to maintain cultural identity, food security and environmental conservation (CARMENTA; COUDEL; STEWARD, 2018).

3.3 Bovine and/or buffalo production

The income of cattle (beef and buffalo) surpasses agriculture and extractivism. The average income of livestock among residents of RESEXs was between 0.5 and 1 minimum wage (38.2%) (Figure 3). While 198 of the 232 interviewees (85.3%) do not participate in this type of production, the overall income of livestock is still higher than that of extractive production.

The interviewees described livestock as savings for hours of needs (70.6%), a market that seeks good prices, easy to sell, less laborious and presents lower risk (29.4%). However, state institutions have lost control over this activity, being incompatible to raise cattle without a specific policy with technological.

Respondents also comments on the low production and income of bovine and buffalo breeders due to the necessity of having 20 animals to participate in ICMBio management plan and/or their reprimanding measures. However, even though the valid numbers are low (34 respondents), the livestock market continues to rise. The ICMBio analysts confirm this.

Today, RESEX Rio Ouro Preto has more than 10.000 cattle (data of the vaccine Idaron) and the tendency is to increase (Environmental Analyst/ICMBio, Guajará-Mirim-RO, January 2017). The livestock gain considerable spaces as best economical option for small production (CAVALCANTE; BATISTA; SOUZA, 2018).



Despite this, the absence of the government has provoked the construction of pastures and cattle breeding that grows every year, unfortunately this situation is unbelievable (Environmental Analyst/ICMBio, RESEX Alto Juruá, Cruzeiro do Sul-AC, February 2017). The low offer of environmental policies, economic and social is associated with the growth of bovine livestock in Resexs (SOUZA; OLIVEIRA, 2018).

The tendency of livestock is increase through breeding, but we try to control it due to judicial and territorial limits (Environmental Analyst/ICMBio, Brasília-DF, February 2017). The advancement of livestock is established by the devaluation of the extractive activity (MASCARENHAS; BROWN; SILVA, 2018).

We need massive investments, RESEXs policies are very overdue and cabinet speech does not solve the problem (Environmental Analyst/ICMBio, Cruzeiro do Sul-AC, March 2017). The reality of the inhabitants of the Amazon RESEXs is characterized by scenarios of injustice, social exclusion and low human development (BERNARDES; COSTA; BERNARDES, 2018).

The extensive cattle farming in RESEXs indicates the need for additional research and policies to preserve the dynamism and heterogeneity of land use. Small-scale livestock farming has become an income-generating alternative that meets local needs and desires (SALYSBURY; SCHMINK, 2007). In addition, livestock are easy to sell and provide guarantees of security. This is not the case with extractivism, which fetches very low prices in the market (GOMES; VADJUNEC; PERZ, 2012). Therefore, many families in the RESEXs sell cattle as they are a less risky return (VADJUNEC; ROCHELAU, 2009).

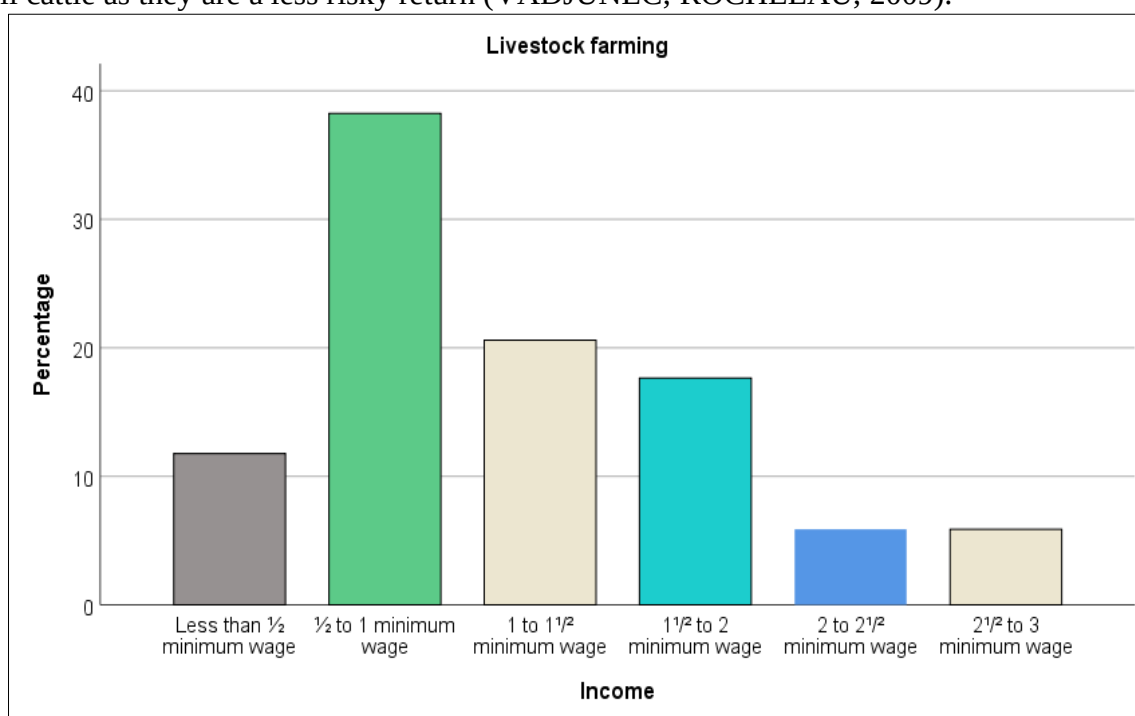


Figure 3 - Monthly family income from cattle ranching of RESEXs residents

Source: The authors

The inhabitants living in the RESEXs are influenced to invest in cattle because they understand that the return is faster (KRÖGER, 2019). We emphasize that this activity is developed without technologies, leading to the degradation of pastures and the expansion of new areas.

3.4 Extractive production

Extractivism was a strong argument for the creation of RESEXs, however, its economy did not remain competitive over time. Low land and labor productivity, low product price and the possibilities of obtaining government transfers put these activities on a secondary level (HOMMA, 2018). The data show that extractivism has become a complementary income to agriculture and livestock. What should be a dominant activity has become secondary. The income of most residents (70%) from extractivism (brazil nut, açai and vegetable oils) is less than 0.5 minimum wage. In addition, (55.2%) 128 of the 232 interviewees answered that they did not work with this activity (Figure 4).

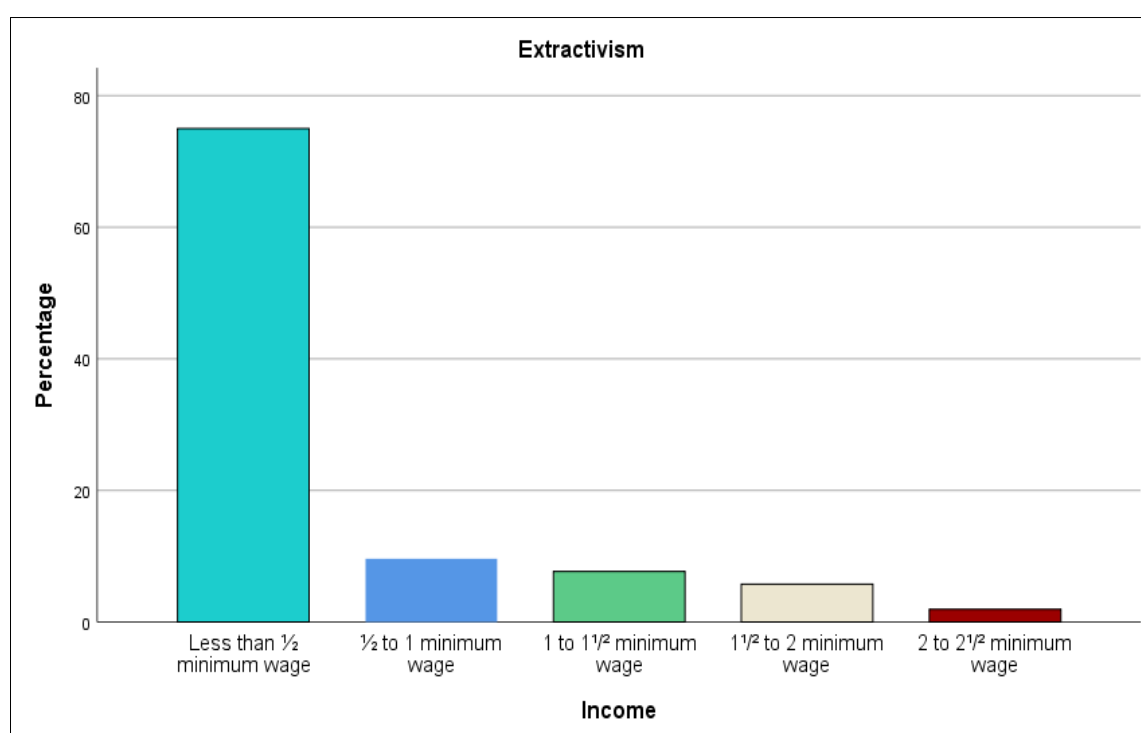


Figure 4 - Monthly family income from the extractivism of RESEXs residents

Source: The authors

The data indicate that the necessary resources for extractivism are running out, and that this industry is collapsing. The efforts by the state, nongovernmental organizations, and environmentalists have had no effect. Therefore, the economic impact of extractivism has continued in the face of growing agriculture and mining (CLEMENT, 2006). ICMBio agree that extractivism may be quickly exhausted.



Production and the extractive market are weak because they do not have the initiative and investments capable of structuring a production chain, such as the collection of oils and pharmaceutical essences (Environmental Analyst/ICMBio, Brasília-DF, February 2017). The low prices of chestnut extraction make it impossible to strengthen the activity and improve the living conditions of those who work with this activity (SILVA; PARAENSE, 2019).

The main factor of deforestation was the decline of extractivism, which motivated and intensified deforestation for cattle breeding, buffalo, and irregular sale of timber (Environmental Analyst/ICMBio, Rio Ouro Preto/ICMBio, Guajará-Mirim-RO, February 2017). Without significant financial support for the activities of rubber, chestnut and açaí, the extractivists prioritize bovine livestock as the main economic activity, even in reserves of sustainable use (LOPESA et al., 2019).

The model can fail, because we are not building a long-term model, there is no policy of valuing people, of extractive labor, credit opening, and societal recognition (Environmental Analyst/ICMBio, Porto Velho-RO, February 2017). The RESEXs are gradually losing the preservation of environmental resources, and the creation of these areas does not warrant the native standing forests (SANTANA; PEDROSO, 2019).

These results contradict the argument that RESEXs were socially successful because it guaranteed livelihoods for current and future generations. Our results suggest that extractivism has not been able to become a primary activity of income generation due to the low productivity of land and work and the fact that it is based on the collection of natural resources (HOMMA, 2011).

Hall (2004) believes that there are serious problems with RESEXs, including limited markets for forest products, vulnerability to price fluctuations and high transaction costs, which makes economic self-sufficiency unrealistic. Extractivism is inefficient and will not survive for long due to the loss of competitiveness in relation to other economic alternatives and urban-rural migration. The low prices of chestnut extractivism make it impossible to improve the living conditions of extractivists, the strengthening and verticalization of the activity (SILVA; PARAENSE, 2019, p. 73).

Agriculture and livestock have become the main generators of income and increasing deforestation rates (INPE, 2019). Our results indicate that the arguments that defend the creation and maintenance of RESEXs in the Amazon are fallible and that these areas are not supported (FEARNSIDE, 1989, p. 40; ALLEGRETTI, 2008). The idea of production chains connected by producers and consumers is suitable for perishable products, but is unfeasible in the context of RESEXs, due to distance and lack of scale (HOMMA, 2018, p. 79; SCHNEIDER; GAZOLLA, 2017).

3.5 Deforestation

Deforestation is a constant problem in RESEXs, especially due to the impact of livestock. The precarious living conditions of the inhabitants lead to the development of productive activities that cause greater environmental degradation (RIEMANN; Mr SANTESÁLVAREZ; PIGEON, 2011, p. 6). Table 2 shows the deforestation of the three RESEXs divided into five periods.

Table 2 - Deforestation in Extractives Reserves Alto Juruá, Rio Ouro Preto and Rio Cajari

RESEXs	Total area (ha)	Time period	Deforested land (ha)	%
Alto Juruá (AC)	537.946	Until 1997	6.539	1,21
		2000-2005	4.969	0,92
		2006-2010	3.047	0,57
		2011-2015	1.926	0,36
		2016-2020	3.470	0,64
			19.951	3,71
Rio Ouro Preto (RO)	204.631	Until 1997	7.730	3,78
		2000-2005	8.966	4,38
		2006-2010	1.695	0,83
		2011-2015	1.231	0,60
		2016-2020	981	0,48
			20.603	10,07
Rio Cajari (AP)	532.397	Until 1997	7.720	1,45
		2000-2005	1.454	0,27
		2006-2010	1.940	0,36
		2011-2015	776	0,14
		2016-2020	869	0,16
			12.757	2,38

The INPE does not inform the beginning of the first period, but was of intense deforestation in the three RESEXs. In the second period there was a reduction, except for RESEX Rio Ouro Preto, which exceeded its first period and the other RESEXs. The third, fourth and fifth periods of RESEX Rio Ouro Preto was in decline. In turn, the RESEXs Alto Juruá and Rio Cajari showed a fall in deforestation in the third and fourth periods, and in the fifth showed increasing.

Peres (2011) presents similar data, finding that 6,3% of the RESEX Chico Mendes 931.537 hectares have been deforested since the reserve was created in 1990 to accommodate 10.000 head of cattle, this is, 11 times the original deforested area. The deforestation of RESEXs affects the maintenance of stocks of carbon and climate benefits (FEARNSIDE; NOGUEIRA; YANAI, 2018), and has received considerable attention in the international arena, because their destruction can intensify the "greenhouse effect" and considerably reduce the reserves of the Earth's biodiversity (CARDOSO, 2018).

Another example is that of RESEX Alto Juruá, which increased marginal per capita permanent deforestation from 0.49 ha to 1.1 ha between 1989 and 2000 (RUIZ-PÉREZ et al., 2005), a change associated with small-scale agriculture. Homma (2016) reinforces these conclusions confirming that much of the deforestation is due to livestock and agriculture. The recent increase in deforestation in conservation areas requires empirical investigation of causes and consequences (KRÖGER, 2019, p. 11).



Globally, public policies should be analyzed more broadly to reduce deforestation and forest fires (BROW; ROSENDO, 2000). This will allow deforested areas in the region to be used more productively (HOMMA, 1996) and contribute to a better understanding of the problems in RESEXs (LEVEY, 2002). It is necessary to question the mistaken opinions about the success of RESEXs (ALLEGRETTI, 2008, p. 46), and inadequate environmental priorities that prevent the improvement of the living conditions of local communities (FEARNSIDE, 1989, p. 42). RESEXs have not met sustainability goals in more than three decades of foundation.

Until more sustainable technological and economic alternatives emerge, the forest transition will take time, denoting high social and environmental cost of lacking greater investments in science, technology and provision of public goods, rather than governmental transfers.

4. Implications for politics of RESEXs

The RESEXs demarcation policy aimed to reduce human pressure in these areas. In addition, it was precipitated when it did not take environmental policy to the extent it left it under external control in the 1990s. The rubber tappers' proposal in the 1980s emphasized a different agrarian reform than that created by the National Institute of Colonization and Agrarian Reform (INCRA).

Among the RESEX proposal's points, the most prominent confirmed the need for harmonious living with nature and the interrelationship between conservation and development. However, in reality families living in RESEXs areas have become politically isolated, have a hard time earning a living, and have little ability to influence land planning and management (SANTOS; BRANNSTROM, 2015, p. 49).

Today, RESEXs areas have shifted their priorities. Producers are trying to green activities due to market impositions, not because of environmental pressure or legal imposition. The demarcation of conservation areas has served the goals of NGOs and environmental movements, as well as generated many scientific and political debates. However, there is still a need to: a) improve the socioeconomic conditions of inhabitants of RESEXs; b) reduce deforestation; c) increase the planning and efficient management of environmental organizations in the Amazon; d) integrate credit policies (Pronaf), supervision and management of ICMBio; e) implement anti-poverty policies, since Siraj-Blatchford, Mogharreban and Park (2016) argue that forests offer the world's poor a way to make a living through illegal practices.

5. Conclusions

Social and productive policies proved ineffective 30 years after their creation. The trend this of demarcation the conservation territories, but this does not result in better living conditions for the thousands of families in these areas. Institutional abandonment of families living in these areas is visible, perhaps the non-allocation of resources occurs to discourage the permanence of local communities. We emphasize that the scarcity of public goods is not the privilege of the RESEXs, but of all small producers in the Amazon region. Many NGOs and social movements prioritize the extractive cause supported by external funds, not always with altruistic intentions.

The growth of agriculture and livestock in terms of the reduction of extractivism activity is due to the lack of effective action of the State. The absence of institutional attention leads to an increase in the annual rate of deforestation, due to human subsistence needs. Here we conclude that RESEXs are unsustainable because they were created with an emphasis on conservation, and not on the integration of environmental conservation and socioeconomic development.



6. Recommendations

The challenge is to transform at least part of "Second Nature", represented by deforested areas, into a "Third Nature" with more sustainable productive activities that generate income and employment. The untouched forest is "First Nature". In addition, there will be a need for strong and democratic trusts, as well as the inclusion of viable economic alternatives combined with ecological balance.

Other research may reveal evidence in other areas and regions of the country and show whether our results are part of a trend or is specific to the Amazon. It is possible to demonstrate that in order to achieve environmental conservation and socioeconomic development it is necessary to reformulate the current public policies, in order to maintain the primary forests and the survival of the inhabitants.

Amazon 4.0 launched in 2016 proposes a new development paradigm that combines in-depth knowledge of Amazonian biodiversity from the economy of the standing, preserved and productive forest (NOBRE; NOBLE, 2019). It is based on the example of açaí in Pará, but which errs by generalization extends to other extractive products or potential, by reduced supply, dispersion of resources, lack of economies of scale, perishability, long distances and lack of domestication technology. The examples of condoms made of native rubber trees and vegetable leather recommend caution with the magnitude of this proposal for the Amazon region.

References

- ALLEGRETTI, M. H. A Construção social de políticas públicas: Chico Mendes e o movimento dos seringueiros. **Desenvolvimento e Meio Ambiente**, v. 18, n. 12, p. 39–59, 2008. <https://doi.org/10.5380/dma.v18i0.13423>
- ALLEGRETTI, M. H. Ambientalismo político y reforma agraria: de Chico Mendes al movimiento de los sin tierra. **Nueva Sociedad**, v. 150, p. 57-68, 1997.
- ALLEGRETTI, M. H.; CUNHA, L. H. O.; SCHMINK, M. Edição Especial 30 Anos do Legado de Chico Mendes. **Desenvolvimento e Meio Ambiente**, v. 48, p. 1-511, 2018. <https://doi.org/10.5380/dma.v48i0.63011>
- ALMEIDA, M. W. B.; ALLEGRETTI, M. H.; POSTIGO, A. O Legado de Chico Mendes: êxitos e entraves das reservas extrativistas. **Desenvolvimento e Meio Ambiente**, v. 28, p. 25-55, 2018. <https://doi.org/10.5380/dma.v48i0.60499>
- ARRUDA, R. S. V. Populações tradicionais e a proteção dos recursos naturais em unidades de conservação. **Ambiente e Sociedade**, v. 2, n. 5, p. 79-92, 1999.
- BABBIE, E. **Método de pesquisa survey**. Belo Horizonte: UFMG, 2003. 519 p.
- BERNARDES, R. S.; COSTA, A. D.; BERNARDES, C. Projeto sanear Amazônia: tecnologias sociais e protagonismo das comunidades mudam qualidade de vida nas reservas extrativistas. **Desenvolvimento e Meio Ambiente**, v. 48, p. 263-280, 2018. <https://doi.org/10.5380/dma.v48i0.58510>
- BROWDER, J. The Limits of extractivism: tropical forest strategies beyond extractive reserves. **BioScience**, v. 42, n. 3, p. 166–174, 1992. <https://doi.org/10.2307/1311822>

BROWN, K.; ROSENDO, S. The institutional architecture of extractive reserves in Rondônia, Brazil. **The Geographical Journal**, v. 166, n. 1, p. 35–48, 2000. <https://doi.org/10.1111/j.1475-4959.2000.tb00005.x>.

CARDOSO, C. A. S. **Extractive reserves in Brazilian Amazonia**: local resource management and the global political economy. 1ª ed. London: Routledge, 2018. 274 p.

CARMENTA, R.; COUDEL, E.; STEWARD, A. M. Forbidden fire: does criminalising fire hinder conservation efforts in swidden landscapes of the Brazilian Amazon? **Geographical Journal**, v. 185, n. 1, p. 23-37, 2018. <https://doi.org/10.1111/geoj.12255>

CAVALCANTE, F. C. S.; BATISTA, G. E. A.; SOUZA, E. F. As Unidades de conservação e a questão do desmatamento no Acre: o papel da RESEX Chico Mendes. In: 56º CONGRESSO BRASILEIRO DE ADMINISTRAÇÃO, ECONOMIA E SOCIOLOGIA RURAL, 29 Jul a 1º de Ago, 2018. Campinas: Unicamp. **Anais Eletrônicos...** Campinas: SOBER, 2018. Disponível em: www.unicamp.br/unicamp/index.php/eventos/2018/03/22/56o-congresso-da-sober-debate-transformacoes-recentes-na-agropecuaria-brasileira. Acesso em: 15 ago. 2018.

CLEMENT, C. A Lógica do mercado e o futuro da produção extrativista. In: KUBO R, BASSI J, SOUZA G, ALENCAR NPM, MEDEIROS P, ALBUQUERQUE P. **Atualidades em etnobiologia e etnoecologia**. Recife: Nupeea/Sbee; 2006, p. 135-150.

CNS. Conselho Nacional dos Seringueiros. Resoluções do primeiro encontro nacional dos seringueiros. Brasília, DF, 11 a 17 de outubro. 1985. p. 1-66. Disponível em <<https://documentacao.socioambiental.org/documentos/04D00051.pdf>>

CODATO, D.; PAPPALARDO, S. E.; DIANTINI, A.; FERRARESE, F.; GIANOLI, F.; MARCHI, M. Oil Production, biodiversity conservation and indigenous territories: towards geographical criteria for unburnable carbon areas in the Amazon rainforest. **Applied Geography**, v. 102, p. 28–38, 2019. <https://doi.org/10.1016/j.apgeog.2018.12.001>

COLLINS, M. B.; MITCHARD, E. T. A. A small subset of protected areas are a highly significant source of carbon emissions. **Scientific Reports**, v. 7, n. 41902, p. 1-11, 2017. <https://doi.org/10.1038/srep41902>

COSTA, P. C. P. Reservas extrativistas marinhas: reflexões sobre desafios e oportunidades para a cogestão em áreas marinhas protegidas. **Desenvolvimento e Meio Ambiente**, v. 48, p. 417-431, 2018. <https://doi.org/10.5380/dma.v48i0.58793>

DIAS, T. C. A. C.; CUNHA, A. C.; SILVA, J. M. C. Return on investment of the ecological infrastructure in a new forest frontier in Brazilian Amazonia. **Biological Conservation**, v. 194, p. 184-193, 2016. <https://doi.org/10.1016/j.biocon.2015.12.016>

DUMITH, R. C. Dez anos de resistência da Reserva Extrativista de Canavieiras (BA): análise dos conflitos inerentes à reprodução social e política das suas comunidades tradicionais. **Desenvolvimento e Meio Ambiente**, v. 48, p. 367-391, 2018. Doi:10.5380/dma.v48i0.58675

FANTINI, C. A.; CRISÓSTOMO, F. C. Conflitos de interesses em torno da exploração madeireira na Reserva Extrativista Chico Mendes, Acre, Brasil. **Boletim do Museu Paraense Emílio Goeldi**, 2009, v. 4, n. 2, p. 1–17, 2009. Doi: 10.1590/S1981-81222009000200002

FEARNSIDE, P. M. Extractive reserves in Brazilian Amazonia: an opportunity to maintain tropical rain forest under sustainable use. **BioScience**, v. 39, n. 6, p. 39–42, 1989. <https://doi.org/10.2307/1311068>

FEARNSIDE, P. M.; NOGUEIRA, E. M.; YANAI, A. M. Maintaining carbon stocks in extractive Reserves in Brazilian Amazonia. **Desenvolvimento e Meio Ambiente**, v. 48, p. 446–476, 2018. <https://doi.org/10.5380/dma.v48i0.58780>

FREITAS, J. S.; FARIAS FILHO, M. C.; HOMMA, A. K. O.; MATHIS, A. Reservas extrativistas sem extrativismo: uma tendência em curso na Amazônia. **Revista de Gestão Social e Ambiental**, v. 12, n. 1, p. 56–72, 2018. Doi: 10.24857/rgsa.v12i1.1388

GOMES, C. V. A.; VADJUNEC, J. M.; PERZ, S. G. Rubber tapper identities: political-economic dynamics, livelihood shifts, and environmental implications in a changing Amazon. **Geoforum**, v. 43, n. 20, p. 260–271, 2012. <https://doi.org/10.1016/j.geoforum.2011.09.005>

HALL, A. Extractive reserves: building natural assets in the Brazilian Amazon. **Political Economy Research Institute**, v. 74, p. 2–27, 2004.

HOMMA, A. K. O. **A Imigração Japonesa na Amazônia**: sua contribuição ao desenvolvimento agrícola. Brasília: Embrapa, 2ª ed., 2016. 255 p.

HOMMA, A. K. O. Biodiversidade e biopirataria na Amazônia: como reduzir os riscos? **Passages de Paris**, v. 6, p.111–128, 2011.

HOMMA, A. K. O. **Colhendo da natureza**: o extrativismo vegetal na Amazônia. Brasília: Embrapa, 2018. 219 p.

HOMMA, A. K. O. **Extrativismo vegetal na Amazônia**: história, ecologia, economia e domesticação. Brasília: Embrapa. 2014. 468 p.

HOMMA, A. K. O. Modernisation and technological dualism in the extractive economy in Amazonia. In: RUIZ PÉRES M, ARNOLD J. **Current issues in non-timber forest products research**. Indonésia: Center for International Forestry Research, 1996, p. 59–81.

HOMMA, A. K. O. Política agrícola ou política ambiental para resolver os problemas da Amazônia? **Política Agrícola**, v. 9, n. 1, p. 91–102, 2010.

IBGE. Instituto Brasileiro de Geografia e Estatística. Censo demográfico 2010 [on line]. Disponível: <<http://www.censo2010.gov.br/sinopse/index.php?dados=P6&uf=00>>. Acesso em: 5 out. 2019.

INPE. Instituto de Pesquisas Espaciais. Desflorestamento na Amazônia, Inpe/Prodes 2019 [on line]. Disponível em : <<http://www.inpe.dpi/inpe.prodes/html>>. Acesso em: 13 Ago. 2019



KRÖGER, M. Deforestation, cattle capitalism and neodevelopmentalism in the Chico Mendes Extractive Reserve, Brazil. **The Journal of Peasant Studies**, p. 1-19, 2019. <https://doi.org/10.1080/03066150.2019.1604510>

LAVOIE, A.; BRANNSTROM, C. Assembling a marine extractive reserve: the case of the Cassurubá Resex in Brazil. **Journal of Latin American Geography**, v. 18, n. 2, p. 120-151, 2019. <https://doi.org/10.1353/lag.2019.0036>

LEVEY, D. J. Prospects for conserving biodiversity in Amazonian extractive reserves. **Ecology Letters**, v. 5, p. 320–324, 2002. <https://doi.org/10.1046/j.1461-0248.2002.00323.x>.

LOPESA, E.; SOARES-FILHO, B.; SOUZA, F.; RAJÃO, R.; MERRY, F.; RIBEIRO, S. C. Mapping the socio-ecology of non timber forest products (NTFP) extraction in the Brazilian Amazon: the case of açaí (*Euterpe precatoria* Mart) in Acre. **Landscape and Urban Planning**, v. 188, p. 110-117, 2019. <https://doi.org/10.1016/j.landurbplan.2018.08.025>

MACIEL, R. C. G.; ALMEIDA, A. M.; MENEZES, H. C. S. Avaliação econômica da pecuária de gado na Reserva Extrativista Chico Mendes. In: 56º CONGRESSO BRASILEIRO DE ADMINISTRAÇÃO, ECONOMIA E SOCIOLOGIA RURAL, 29 Jul a 1º de Ago, 2018. Campinas: Unicamp. **Anais Eletrônicos...** Campinas: SOBER, 2018. Disponível em: www.unicamp.br/unicamp/index.php/eventos/2018/03/22/56o-congresso-da-sober-debate-transformacoes-recentes-na-agropecuaria-brasileira. Acesso em: 16 ago. 2018.

MACIEL, R. C. G.; CAVALCANTE FILHO, P. G.; ARAÚJO, W. S. A.; OLIVEIRA, O. F. Pobreza, segurança alimentar e autoconsumo na Reserva Extrativista (RESEX) Chico Mendes. In: 56ª CONGRESSO BRASILEIRO DE ADMINISTRAÇÃO, ECONOMIA E SOCIOLOGIA RURAL, 29 Jul a 1º de Ago. Campinas: Unicamp. **Anais Eletrônicos...** Campinas: SOBER, 2018. Disponível em: www.unicamp.br/unicamp/index.php/eventos/2018/03/22/56o-congresso-da-sober-debate-transformacoes-recentes-na-agropecuaria-brasileira. Acesso em: 17 ago. 2018.

MACIEL, R. C. G.; REYDON, B. P.; COSTA, J. C.; SALES, G. O. Pagando pelos serviços ambientais: uma proposta para a Reserva Extrativista Chico Mendes. **Acta Amazônia**, v. 40, n. 3, p. 489-498, 2010.

MASCARENHAS, F. S.; BROWN, I. F.; SILVA, S. Desmatamento e incêndios florestais transformando a realidade da Reserva Extrativista Chico Mendes. **Desenvolvimento e Meio Ambiente**, v. 48, p. 236-262, 2018. Doi: 10.5380/dma.v48i0.58826. e-ISSN 2176-9109

NOBRE, I.; NOBRE, C. Projeto “Amazônia 4.0”: definindo uma terceira via para Amazônia. In: SORJ, B.; SOUPIZET, J. F.; FAUSTO, S. **Futuribles**, São Paulo: SP, 2019, p.7-20.

OSTRY, J.; BERG, A. Inequality and unsustainable growth: two sides of the same coin? **IMF Economic Review**, p. 11-24, 2011. <https://doi.org/10.5089/9781463926564.006>

PERES, C. A. Conservation in sustainable-use tropical forest reserves. **Conservation Biology**, v. 25, n. 6, p. 1124–1129, 2011. <https://doi.org/10.1111/j.1523-1739.2011.01770.x>

RAFAEL, M. C.; DELELIS, C.; TOFOLI, C.; PADUA, V. C.; RIBEIRO, K.; MENESES, G. A. Federal protected areas management strategies in Brazil: sustainable financing, staffing, and local development. **Natureza & Conservação**, v. 13, n. 30, p. 30-34, 2015. <https://doi.org/10.1016/j.ncon.2015.05.003>

RAMALHO, T. **Chico Mendes**. Chicago: Encyclopædia Britannica, 2016. 123 p.

RIEMANN, H.; SANTESÁLVAREZ, R.; POMBO, A. El papel de las areas naturales protegidas en el desarrollo local: el caso de la península de Baja California. **Gestión y Política Pública**, v. 20, n. 2, p. 1-13, 2011.

RUIZ-PÉREZ, M.; ALMEIDA, M.; DEWI, S.; COSTA, E. M. L.; PANTOJA, M. C.; PUNTODEWO, A.; POSTIGO, A.; ANDRADE, A. G. Conservation and development in Amazonian extractive reserves: the case of Alto Juruá. **BioOne**, v. 34, n. 3, p. 218–223, 2005.

SALISBURY, D. S.; SCHMINK, M. Cows versus rubber: changing livelihoods among Amazonian extractivists. **Geoforum**, v. 38, n. 6, p. 1233–1249, 2007. <https://doi.org/10.1016/j.geoforum.2007.03.005>

SANTANA, R. S.; PEDROSO, S. C. Evaluation of the advancing deforestation in the State Extractive Reserve of Jaci-Paraná - RO, between 1996 and 2016. **Terr@Plural**, v. 13, n. 1, p. 93-105, 2019. <https://doi.org/10.5212/TerraPlural.v.13i1.0006>

SANTOS, N. A.; BRANNSTROM, C. Livelihood strategies in a marine extractive reserve: implications for conservation interventions. **Marine Policy**, v. 59, p. 45–52, 2015. <https://doi.org/10.1016/j.marpol.2015.05.004>

SCHNEIDER, S.; GAZOLLA, M. **Cadeias curtas e redes agroalimentares alternativas: Negócios e Mercados da Agricultura Familiar**. Porto Alegre: RS, 2017. 520 p.

SILVA, A. S. O.; PARAENSE, V. C. Production chain for brazil-nuts (*Bertholletia excelsa* Bonpl.) at Ipaú-Anilzinho Extractive Reserve, Municipality of Baião, Pará, Amazonian Brazil. **Revista Agro@mbiente**, v. 13, p. 68-80, 2019. Doi:10.18227/1982-8470ragro.v13i0.5413

SIRAJ-BLATCHFORD, J.; MOGHARREBAN, C.; PARK, E. **International Research on Education for Sustainable Development in Early Childhood**. Michigan: Springer International Publishing, 2016. p. 1-14. https://doi.org/10.107/978-3-319-42208-4_8

SIVIERO, A.; MING, L. C., SILVEIRA, M.; DALY, D.; WALLACE, R. **Etnobotânica e botânica econômica do Acre**. Rio Branco: Edufac, 2016, 428 p.

SOUZA, D. R. N.; OLIVEIRA, M. L. R. Conflitos e desafios de populações tradicionais na Amazônia Brasileira: o caso da Reserva Extrativista do Extremo Norte do Estado do Tocantins. **Mundo Agrário**, v. 18, n. 38, p. 2-11, 2018. <https://doi.org/10.24215/15155994e062>

SPEAK, A. F.; MIZGAJSKI, A.; BORYSIK, J. Allotment gardens and parks: provision of ecosystem services with emphasis on biodiversity. **Urban Forestry & Urban Greening**, v. 14, n. 4, p. 772-781, 2015. <https://doi.org/10.1016/j.ufug.2015.07.007>

TEIXEIRA, M. G.; VENTICIQUE, E. M. Fortalezas e fragilidades do sistema de Unidades de Conservação Potiguar. **Desenvolvimento e Meio Ambiente**, v. 29, p. 113-126, 2014.

VADJUNEC, J.; ROCHELEAU, D. Beyond forest cover: land use and biodiversity in rubber trail forests of the Chico Mendes extractive reserve. **Ecology and Society**, v. 14, n. 2, p. 1–29, 2009.

VIEIRA, R. S.; PRESSEY, R. L.; LOYOLA, R. The residual nature of protected areas in Brazil. **Biological Conservation**, v. 233, p. 152-161, 2019. Doi.org/10.1016/j.biocon.2019.02.010

VITALI, M.; UHLIG, V. M. Unidades de conservação de Santa Catarina. **Sustentabilidade em Debate**, v. 7, p. 44-61, 2009.

VIVACQUA, M.; VIEIRA, P. F. Conflitos socioambientais em unidades de conservação. **Política e Sociedade**, v. 4, n. 7, p. 139-162, 2005.

VOLPATO, L. G. O Método lógico para redação científica. **Revista Eletrônica de Comunicação Informação & Inovação em Saúde**, v. 9, n. 1, p. 1-14, 2015. <https://doi.org/10.29397/reciis.v9i1.932>