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The Key to the Sustainability and Conservation of Extractive Reserves in the Amazon

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Abstract: Extractive reserves (RESEXs) are relevant areas that aim to allow the conservation of environmental resources and sustainable production practices of extractivism, agriculture, and livestock. In this study, we evaluated whether this aim is viable in the context of sustainability and conservation. Data were collected in the Alto Juruá, Rio Ouro Preto, and Rio Cajari RESEXs, via 384 questionnaires to investigate environmental, economic, social, and institutional issues in different communities. Here, we conclude that the failure of RESEXs in relation to conservation and development is correlated with a lack of institutional investment in innovations and technologies; low production from extractivism, agriculture, and livestock; lack of technical support; low production; and difficulties in markets for the commercialization of products.

Keywords: extractivism; agriculture; livestock; deforestation

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1. Introduction

The Amazon is a rich essential ecosystem providing high biodiversity, climate regulation, and agricultural products sustaining human existence for more than 10,000 years [1,2]. The wealth endowment of the Amazon is of planetary dimensions; it has the largest tropical forest; the largest river; and abundant flora, fauna, minerals, wood, and carbon in the form of billions of trees [3,4]. It contains the largest biodiversity reserve and genetic bank on Earth, 20% of the planet's freshwater, and sustainable agroextractive potential. This extends to nine countries, with more than half of its 600 million hectares present in Brazil [5–8].

However, colonial governments and modern states have plundered the extraction of natural resources, with commodity production, unequal development, land concentration, environmental contamination, usurpation of indigenous territories, infrastructure projects, and extractive industries [9–11]. For example, deforestation, burning, mining, and business agribusiness have resulted in degradation of the forests that is visible from space, altered climatic conditions, caused biodiversity losses, and hindered sustainable livelihoods in the Amazon [12–17]. This has drawn the attention of national and international communities and led to the adoption of new measures in an attempt to mitigate the damage to natural and environmental resources [18–20].

One such measure is the creation of protected areas (PAs), which have biological, mineral, water, and geological richness [21,22], offering advantages to biological diversity, societies, and climate [23,24], demarcating 15% of the Earth's surface [25]. In the Amazon, there is a set of PAs that covers 52.2% [26], representing 718 PAs (2.2 million km^2), approximately half of which constitute the PAs of sustainable and indigenous lands [27].

PAs cooperate with the conservation of natural and environmental resources [28], climate, water, fauna, flora [29], and carbon stocks [30]; reduce deforestation and burning rates [31–33]; have economic importance [34]; and accommodate local and/or traditional communities [35]. PAs also contribute to global diversity and climate change mitigation goals [36].

PAs contribute to Sustainable Development Goals (SDGs) [37], especially in South America, where there are territories with high ecosystem richness, traditional communities, and people who have cultural relations and subsistence [38]. Therefore, PAs are areas of ecosystem importance [39] that aim to allow human connections with natural resources [40] and collaboration for preservation, conservation, and development [41–43].

In this context, the International Union for Conservation of Nature encourages the establishment and conservation of PAs, as they are vital for the environment, culture, and livelihoods of local communities [44]. Brazilian PAs depend on the National System of Conservation Units (NSCU, Federal Law No. 9985, 2000) and are subject to both conservation and protection because of their natural characteristics as well as investments, oversight, management, elaboration, and approval of management plans [45].

The NSCU divides conservation PAs into full-protection and sustainable-use categories [46]. The first is subdivided into five types: ecological stations, biological reserves, national parks, natural monuments, and wildlife refuges [47]. The second category includes seven types: environmental protection areas, areas of relevant ecological interest, national forests, extractive reserves, fauna reserves, sustainable development reserves, and natural heritage reserves [47].

This study prioritizes the category of RESEXs, which are areas that aim to conserve environmental resources and sustainable productive practices of agriculture, extractivism, and livestock, essentially for the subsistence of traditional communities [48–50]. RESEXs aim to reconcile nature conservation with sustainable productive activities [51], as well as allowing income generation through green economy and bioeconomy [52,53].

However, RESEXs have had unsatisfactory experiences of productive activities of extractivism (rubber, vegetable oils, and Brazil nuts) and livestock farming (cattle, pigs, sheep, and poultry) because there was no integration or combination of productive activities [54,55]. The limitations and lack of institutional pragmatism have led to increased deforestation, worsening the living conditions of local communities and threatening the

environmental and socioeconomic sustainability of RESEXs [56,57]. The means by which protected areas are created, maintained, and commodified may lead to increased environmental degradation through the loss of rights and land [58].

Helping small producers improve production conditions in the short term is necessary for subsistence, avoiding the abandonment of RESEXs and considerably reducing the accumulation of deforestation [59]. It is necessary to create alternatives to enhance extractivism together with swidden (rotational) farming and animal husbandry [60].

Therefore, we surmise that it is strategic to combine environmental conservation with the productive activities of extractivism, agriculture, and livestock in the context of sustainability and conservation.

This proposal is present in the literature. Productive activities of extractivism, agriculture, and livestock can contribute to socio-environmental development [61], given that they are subsistence strategies that generate income and strengthen the local cultural identity [62]. These three activities complement each other to ensure environmental sustainability; social, cultural, political, and ethical respect; and the livelihood of RESEXs communities [63].

In this context, this study evaluated whether it would be strategic to combine environmental conservation with the productive activities of extractivism, agriculture, and livestock in the context of sustainability and conservation. We aimed to do an in-depth analysis by searching 11 databases (Cambridge Journals Online, Ebsco, Jstor, Nature, Web of Science, World Scientific, Science Direct, Springer, Scopus, Capes, and Scielo), and no studies were found that used this approach. We believe this is a relevant and valid area of research. We aim to extend and contribute to the literature and provide data that is helpful to government institutions and NGOs and to foster general awareness.

The remainder of this paper is organized as follows: Section 2 presents a brief literature review of major international conferences and the commitments of nations. Section 3 describes the materials and methods, specifically the research subjects, delineation, procedures, and data analysis. Section 4 analyzes the results. Section 5 discusses and confirms the results. Finally, Section 6 presents the conclusions of this study.

2. Toward the Development of Global Sustainability and the Challenges of Nations

The World Summit on Sustainable Development (WSSD) in Stockholm 1972 inaugurated the first debate on environmental problems, mainly with international concerns about air, water, and soil pollution, and the new model of economic development [64]. It was a wasted opportunity for progress because time and money were invested to articulate and discuss global sustainability, yet nations did not demonstrate the political will to implement ambitious action plans [65].

The WSSD of Rio 1992 or the Earth Summit took on an agenda that includes the term sustainable development in reference to a possible alliance between environmental conservation and social development [66]. Given the very broad and misdirected agenda, developing countries were hampered by gaps in the implementation of Agenda 21 as well as by the non-implementation of the financial investments that had been defined among the 178 nations [67].

Rio+10 represented the WSSD in Johannesburg (2002), with the aim of reinforcing the multilateral commitment to sustainable development and taking stock of WSSD Rio 1992 [68]. Although there have been attempts to involve civil society on a global scale and broaden the dialogue for stakeholders in international mega-conferences, structural changes are still needed if other forums are to achieve their objectives [69].

The Rio+20 WSSD aimed to reconcile the need to eradicate poverty with the green economy but failed to reconcile firm sustainability goals with economic growth in poor countries and eradicate poverty [70]. At the global level, sustainability challenges have not been met, and the world is in a more perilous situation than it was two decades ago. Current trends show inequalities in health, wealth, and unsustainable patterns of consumption and development [71].

Some studies have confirmed that humans' sustainable relationships with nature reduce impacts on biodiversity and climate change, as well as ensuring the quality of life, social security, morality, and ethics [72]. The United Nations SDGs include 17 interconnected goals with 169 universal targets: ending poverty; reducing impacts on the oceans, forests, and climate change [73]; improving people's socioeconomic conditions [74]; and ensuring the peace and prosperity of societies by 2030 [75,76].

To better address climate change, the Paris Agreement was established at the 21st Conference of the Parties and aimed to set a global climate target to limit the average temperature to 2 °C compared with pre-industrial levels and to keep it below 1.5 °C [77].

In Brazil, the SDGs and the COP showed the following results: 65% are in retrogression; 6.5% went into stagnation; 8.28% are threatened; 14.2% had insufficient progress; and only 0.59% showed satisfactory progress [78]. In turn, the United States established a net-zero commitment based on the Paris Agreement [79], and China assumed responsibility for reducing CO_2 emissions, a goal defined at COP26 [80]. However, both countries have been unable to comply with the agreements defined at the conferences [81].

The European Union (EU) is experiencing the depth and complexity of progress or policy shortcomings in relation to the SDGs, as biodiversity, ecosystems, and human wellbeing remain threats [82]. The EU will achieve its SDG by integrating the environment, economy, and society [83]. To achieve the SDGs, the EU relies on the interconnection between environmental, economic, social, and institutional accountability dimensions to achieve local and global sustainability [84].

Another complex situation is the armed tensions of the Russia–Ukraine and Israel–Hamas war, (ongoing since February 2022), resulting in serious environmental, economic, and social degradation impacting global sustainable development [85]. In addition, nations are experiencing impacts on food, agricultural commodity prices, metal markets, oil, energy [86], global geopolitics [87], and the challenges of achieving the SDGs by 2030 [88].

Globally, the fossil fuel energy paradigm continues to impact the economy, ecology, politics, and society [89]. For example, the European gas and electricity market is experiencing considerable stress given that the 2021 to 2023 energy crisis, caused a global grid effect [90]. The energy crisis and fragile energy supply have brought great dangers to the global production and security of energy supplements [91].

However, various energy options and policies, such as reducing fossil fuel consumption, increasing energy efficiency, and conserving energy, are important for the economic and environmental achievement of the SDGs [92]. The energy crisis can be correlated with green growth and technological progress, as technology is vital for sustainable development in the Amazon and other regions of the world [93].

The application of green extraction technologies and the development of a bioeconomy are promising ways to improve the Amazon scenario because they are environmentally friendly and meet social, economic, and environmental demands [52]. China, the United States, India, Russia, and Japan are the five countries that emit the most greenhouse gases, so they have greater responsibilities for the conservation of natural and environmental resources [94].

3. Materials and Method

3.1. Research Subjects

This study was conducted in the Alto Juruá (Marechal Thaumaturgo, Acre, Brazil), Rio Ouro Preto (Guajará Mirim and Nova Mamoré, Rondônia, Brazil), and Rio Cajari (Laranjal do Jari, Mazagão, and Vitória do Jari, Amapá, Brazil) RESEXs (Figure 1). The criteria of choice and inclusion were based on the length they have existed. Thirty-four years of experience has revealed how conservation can be reconciled with the productive activities of extractivism, agriculture, and livestock. These RESEXs were first created in Brazil and thus have the comprehensive cultural wealth of local communities, the relevant experience of environmental and socioeconomic investments, and a broad potential for biological diversity.

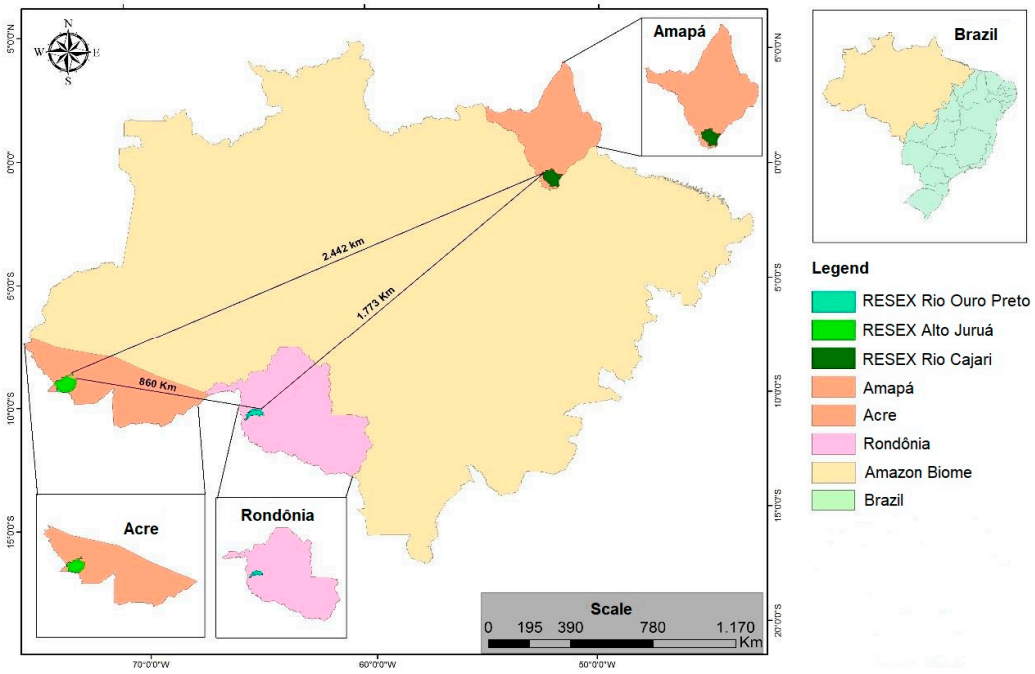

Figure 1. Location and spatial elements of RESEXs Alto Juruá, Rio Ouro Preto, and Cajari River. Source: Prepared by the authors, 2024.

RESEX Alto Juruá was founded through Decree No. 98,863 (23 January 1990) and covers 537,946 hectares. Based on the most recent demographic census, 4170 inhabitants live in 80 communities that are accessible through the Amônia, Breu, and Manteiga rivers [95]. The most economically important production activities include cassava flour, tobacco, sugarcane, beans, rice, corn, cattle, poultry, and pigs. There are no productive chestnut trees; thus, there is no production of Brazil nuts or other extractive activities.

RESEX Rio Ouro Preto was founded through Decree No. 99,166 (13 March 1990) and covers 204,631 ha. According to the last demographic census, 699 inhabitants live in 12 communities that can be accessed through vicinal roads (Ramal dos Macacos, Ramal dos Seringueiros, and Ramal do Pompeu) as well as by Rio Ouro Preto [95]. The main production activities for subsistence are cassava flour, bananas, beans, corn, rice, Brazil nuts, cattle, poultry, and pigs.

RESEX Rio Cajari was founded through Decree No. 99,145 (12 March 1990) and covers 532,397 hectares. According to the latest demographic census, 2293 inhabitants live in 31 communities with the following access routes: BR-156, vicinal roads, the Cajari River, and its tributaries [95]. The subsistence economy consists of the following productive activities: bananas, beans, rice, corn, potatoes, cassava flour, cattle, poultry, pigs, sheep, and Brazil nuts and their derivatives.

This study prioritized a simple random-sample calculation (Figure 2). It included 384 interviewees from 7152 inhabitants in 113 communities of the three RESEXs: Alto Juruá, Rio Ouro Preto, and Rio Cajari (Figure 1). The levels of relevance and the sampling error were 95% and 5.4%, respectively.

$$n = \frac{N \cdot Z^2 \cdot p \cdot (1-p)}{(N-1) \cdot E^2 + Z^2 \cdot p \cdot (1-p)}$$

where

n = sample size (384 interviewees);
N = size of the universe (7152 locals);
p = proportion found (50%);
Z = confidence level (95%);

E = margin of error (5%).

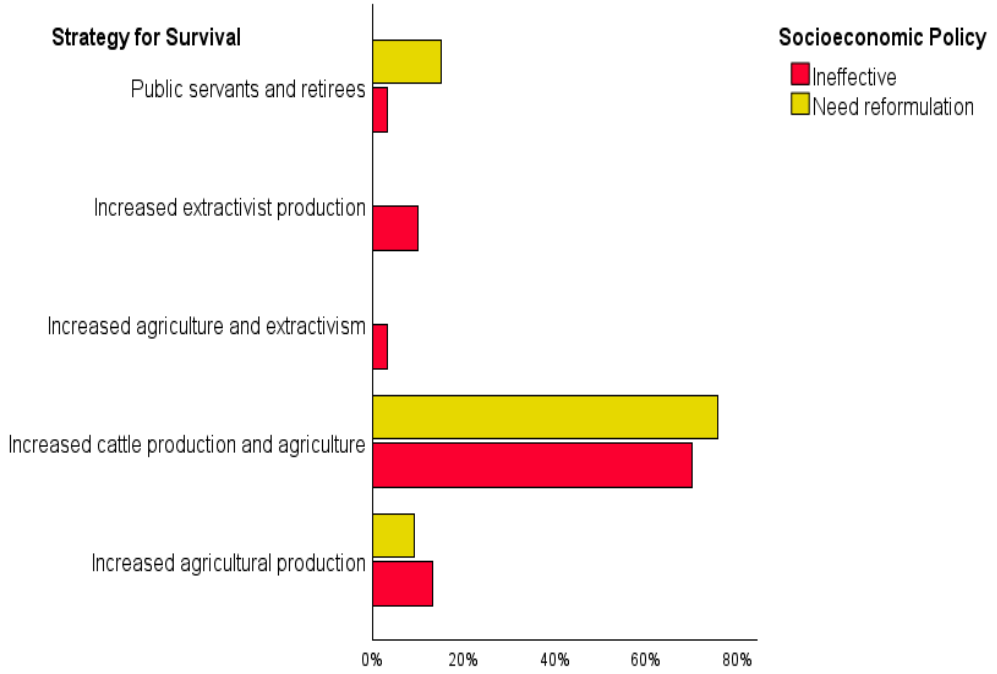

Figure 2. Situation of institutional policies and priority productive activities of local inhabitants. Source: Fieldwork, 2017, 2019. Prepared by the authors, 2022.

The criteria for defining the sample followed traditionally researched values, specifically a significance of 95% and a sampling error of 5%. In the data collection, the challenges of distance, displacement, availability of interviewees, methodological procedures, and goals at each stage of the collection were addressed. Scientific rigor, in line with the local reality of the interviewees, was the key to the success of this research.

3.2. Study Delineation

This study was developed using the method of association with interference, given that more than two variables from the environmental, economic, institutional, and social groups are associated under a dependent relationship [96,97]. For example, the lack of state support for productive policies of extractivism, agriculture, and livestock rearing motivated the commercialization of wood and illegal deforestation in the RESEXs. The inhabitants and traditional communities who opt for these measures need to be aware of environmental rules and economic subsistence needs.

Our priorities in this study were to analyze the phenomena and evidence in the field and specifically to observe real situations, listen to the interviewees, and live with the local inhabitants on a daily basis. This allowed us to understand the mechanisms of institutional control; the cause of the accumulation of annual deforestation; the income from extractivism activities, agriculture, and cattle; the inefficiency of socioeconomic policies; and the challenges that need to be addressed for the sustainability of RESEXs.

Additionally, this path provides innovative changes to environmental and socioeconomic policies. The institutional management model aims to increase the chances of reducing exploitation of forest resources, hunger, social inequality, and poverty to a considerable extent; promote the supply of physical structure, professionals, and medicines through the Unified Health System; and strengthen the social capital of local communities.

3.3. Procedures

Before data collection, the project was submitted to the Biodiversity Authorization and Information System and received approval for collecting data. The next step involved

conversations through email and phone with the heads of the RESEXs with the aim of scheduling the team's trips and preparing them for receptivity. Once the dates were set, the team planned the acquisition of tickets, budgeted expenses for permanent materials and consumption, and calculated the financial costs.

The trips were made by air, land, and river owing to the large distances between the research subjects. Large commercial aircraft contributed to embarkation and disembarkation in larger cities and small ones in smaller cities, close to the research subjects. In addition, 4 × 4 pickup trucks were used because vicinal roads were difficult to access. The data were collected during the Amazonian winter. Most communities were located in riverside areas, and rapid river transport, known as speedboats, conveyed the research team to the RESEX communities for data collection.

The survey was conducted with 234 interviewees from January to March 2017 and 150 interviewees from January to March 2019, resulting in 384 respondents. Only one person responsible for each family home was interviewed because of their experience and knowledge of the policies implemented in the RESEXs. The questionnaire included questions related to the productive activities of extractivism, agriculture, and cattle; public policies; credit availability; household income; deforestation; and environmental impacts.

Each interviewee, regardless of gender, was informed about the procedures, rights, and guarantees before each interview by reading the Free and Informed Consent Form (FICF) out loud. The interviews were conducted in the residence of each interviewee, and all the participants were receptive, kind, and willing to participate. In addition, the interviewees were comfortable with their answers; there was no interference or manipulation, and the results were presented rigorously based on the evidence and phenomena identified in the field.

Audio recorders and a semi-open questionnaire were used for the interviews. The interviews were recorded considering that the information provided may extend beyond the limits of the forms and help enrich this study. After collection, the data were processed, systematized, and made available to the institutions concerned.

In addition, although this was not a systematic review, the search for articles in the databases was conducted in English, Portuguese, and Spanish. Protected areas, extractive reserves, conservation, development, and Amazon were the main keywords as well as Boolean operators. The identification criterion was title. The team worked together to analyze the texts and relied on the Mendeley citation and reference manager to identify study duplications.

3.4. Data Analysis

This study adopted a qualitative approach, as the interviews recorded audio, observations, informal conversations, application of forms, and literature that validated the conclusions. The phenomenon of local communities and inhabitants was observed, analyzed, and interpreted. The systematization of the interviewees' ideas was presented in situ to ensure credibility, reliable results, careful explanation, and relevance [98]. The interviews recorded in audio, conversations with the interviewees, and application of questionnaires are presented in text and figure formats to produce results that can be used to guide public policies and environmental and socioeconomic practices [99–101].

In addition to the qualitative approach, the quantitative approach provided tests for mean, median, fashion, variance, correlation, and elaboration of tables and self-explanatory figures. Statistical correlation tests or comparisons of the central tendency measures were quantified based on interviews and forms [102]. A quantitative approach was applied to understand the different causes and effects of phenomena prevalent in environmental, economic, social, and institutional variables [103]. A combination of qualitative and quantitative approaches strengthened this study and enabled sensitivity, reasoning, determination, and environmental and socioeconomic novelty.

4. Results

RESEXs face difficulties in ensuring the survival of their inhabitants; thus, efforts are required to make productive activities sustainable. The state is responsible for the management and implementation of public policies. However, flaws do not allow RESEXs to meet the socioeconomic needs of local communities (Figure 2).

The results show that the socioeconomic policies of institutions are ineffective and require reformulation and investment, especially in productive activities. The lack of inclusion of local communities in the planning, elaboration, and participation stages and the lack of human and financial support compels the inhabitants to indulge in two culturally known activities: cattle rearing and agriculture.

Although these activities have a greater impact on natural resources, the inhabitants are driven by high knowledge of the swidden market and the need for survival. In addition to cattle rearing and agriculture, the extraction of Brazil nuts comprises the third activity. This is less impactful from the point of view of economic importance; however, it does not damage environmental resources (Figure 3).

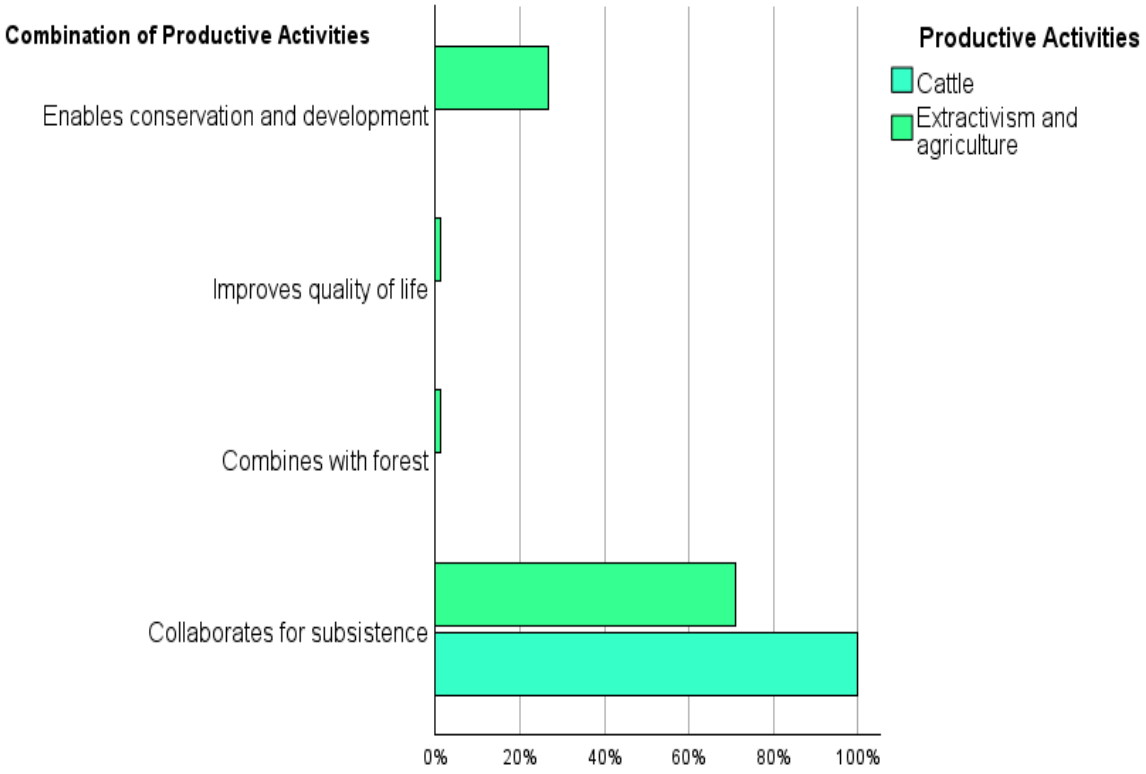

Figure 3. Extractivism, cattle, and agriculture combined collaborate with subsistence. Source: Fieldwork, 2017, 2019. Prepared by the authors, 2022.

Based on the results of the forms, the harvest of Brazil nuts occurred from December to April, with trees having high production in one year and falling in the following year. However, the following difficulties must be overcome to expand production: distance from the family home to the chestnut collection area, short production periods, and annual price oscillations. Cassava flour, beans, corn, rice, bananas, and tobacco are the main agricultural products. Their advantage over extractivism lies in their continuous production and a year-round market. Additionally, cattle rearing is a productive activity commanding greater preference as it requires less effort, yields milk and meat, and fetches high prices in the market.

The local communities still work with traditional agricultural systems and stump swiddens are used for agriculture and cattle rearing. Here, agriculture, chestnut extraction,

and cattle rearing occur in an integrated manner, with the objective of making the best use of productive seasonal periods and increasing the subsistence condition of families. Figure 4 presents the productive structure, possible impacts on natural resources, and type of credit that aims to subsidize agricultural and livestock products.

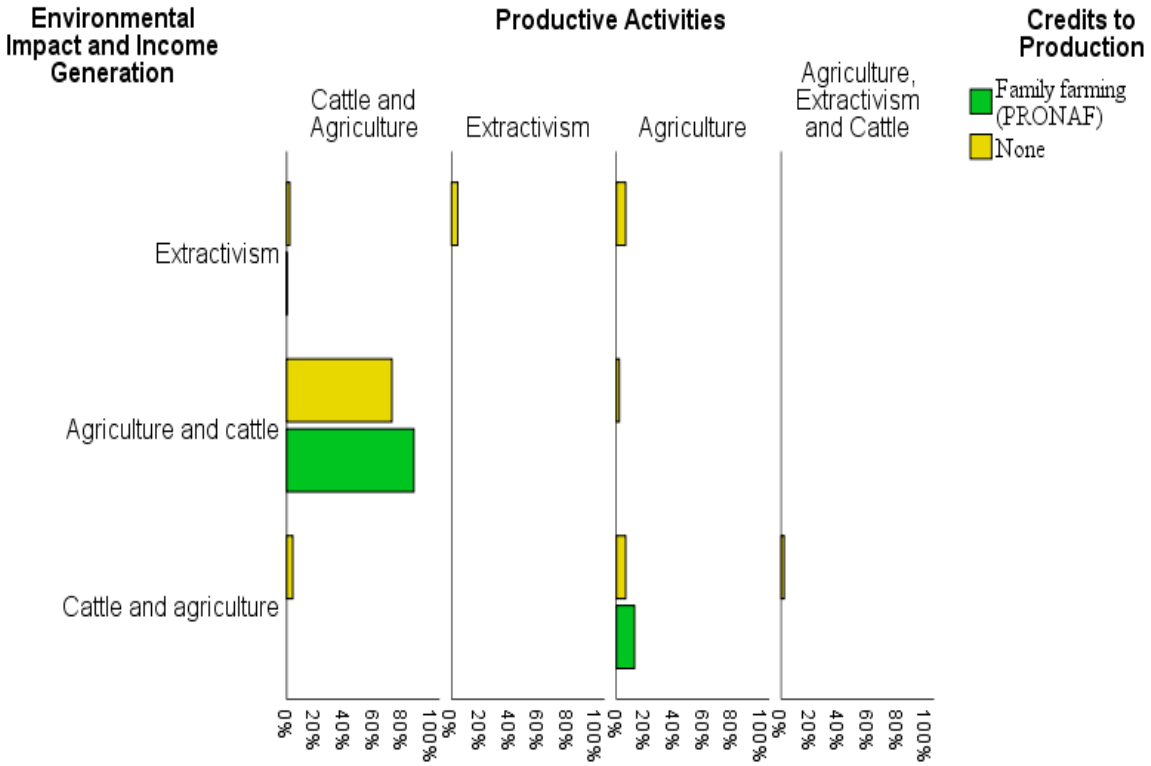

Figure 4. Costing credit applied to agriculture and livestock due to the economic highlight. Source: Fieldwork, 2017, 2019. Prepared by the authors, 2022.

According to the information in the forms, the credit cost of up to BRL 5000 (equivalent to USD 975) per family was incurred by the National Program for Strengthening Agriculture (Pronaf), whose investments were directed to agriculture and cattle rearing. Cattle rearing is considered a productive activity with the greatest impact on environmental resources. However, breeders understand that it meets subsistence needs and that buying and selling is easy. In turn, agriculture enables subsistence because of the productive diversity and commercialization of some products.

Agriculture and extractivism are millenary activities (developed more than three millennia ago by the pre-Columbian people), while cattle have existed in Brazil for approximately 1/2 millennium. In this sense, the choice of productive activities by local communities, such as productive cultural knowledge, food contributions, labor conditions, production costs, and product prices, is logical. Figure 5 shows the monthly household income from agriculture, extractivism, and cattle.

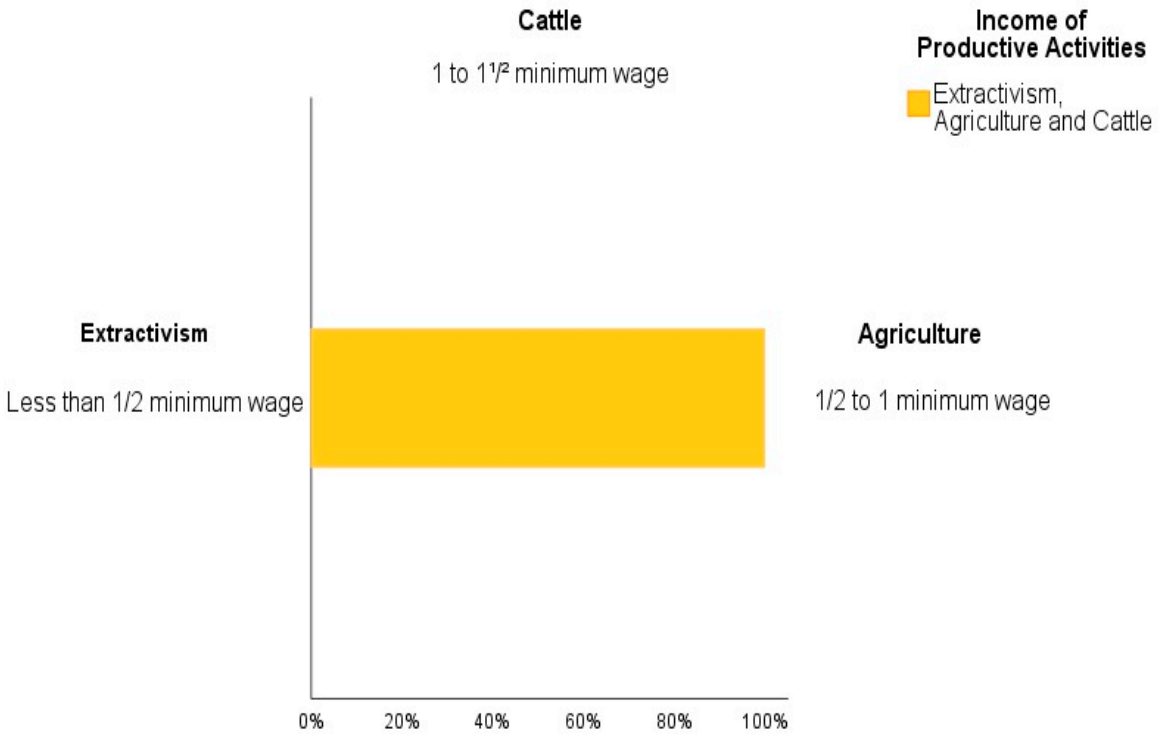

Figure 5. Monthly household income from products from agriculture, extractivism, and cattle. Source: Fieldwork, 2017, 2019. Prepared by the authors, 2022.

The results of the forms indicate that Brazil nut extractivism does not invest in the verticalization of production, and the collection activities carried out only during seasonal periods result in an income that is less than half of the minimum wage. Agriculture results in an income between half or equal to the minimum wage because productive diversity corresponds to a greater supply of products in the market. Cattle rearing results in an income between the minimum wage and one and a half of it. This is attributed to high consumption and a strong regional market and thus complements agriculture and extractivism.

Higher income from cattle means a possible increase in herd size in the short and medium term in RESEXs. This logic mischaracterizes the model of environmental conservation and socioeconomic development, specifically the sustainable use of natural resources. RESEXs are designed to reduce the impact on biological diversity and to meet the livelihood needs of local communities. Table 1 shows the year of RESEX creation, size, and deforestation in hectares, divided into five periods.

According to the results, RESEX Rio Ouro Preto experienced the highest deforestation in the entire historical series. This RESEX has a lower population density (699 inhabitants) and a territorial area that is less than half that of RESEX Alto Juruá. Despite the intervention of the Chico Mendes Institute for Biodiversity Conservation (ICMBio), a group of livestock farmers in the communities of Bom Sossego, Cachoerinha, and Pompeu practice deforestation annually.

RESEX Alto Juruá brought deforestation closer to Rio Ouro Preto; however, both the population density (4170 inhabitants) and territorial area (333 hectares more) were higher. There are cattle farmers (on the banks of the Juruá River) who have lived for more than five decades and continue deforestation because the state has not paid expropriation costs. This situation generates negative results because opening new primary areas for pastures decreases environmental resources.

Table 1. Deforestation in the Alto Juruá, Rio Ouro Preto, and Rio Cajari RESEXs.

RESEX/Year Creation	Total Area and Inhabitants	Period	Deforestation (ha)	%
Alto Juruá (Acre) 1990	537,946 (ha)	Until 1997	6539	1.21
		2000–2005	4969	0.92
		2006–2010	3047	0.57
		2011–2015	1926	0.36
	4170 (population)	2016–2021	3806	0.70
			20,287	**3.76**
Rio Ouro Preto (Rondônia) 1990	204,631 (ha)	Until 1997	7730	3.78
		2000–2005	8966	4.38
		2006–2010	1695	0.83
		2011–2015	1231	0.60
	699 (population)	2016–2021	1236	0.61
			20,858	**10.20**
Rio Cajari (Amapá) 1990	532,397 (ha)	Until 1997	7720	1.45
		2000–2005	1454	0.27
		2006–2010	1940	0.36
		2011–2015	776	0.14
	2293 (population)	2016–2021	966	0.18
			12,856	**2.40**

Source. INPE/PRODES, 2022. Adapted by the authors, 2023.

RESEX Rio Cajari approaches the territorial area of Alto Juruá with a population density (2293 inhabitants) and considerably lower deforestation. The cattle raised in this RESEX on the banks of the Cajari River are buffaloes, as they are suited to extensive flooded areas and swamps. Here, deforestation is lower mainly attributed to the extraction of Brazil nuts, açaí, and vegetable oils. In addition, the margins of br-156 (Água Branca Community) are commercialized for the production of various fresh products derived from Brazil nuts produced by the community.

5. Discussion

Cattle and agriculture are the most extensive productive and commercial activities undertaken by the local communities of the RESEXs; however, the most significant deforestation occurs due to cattle rearing, which requires extensive areas for grazing. In addition, the state's priority is to protect the forest; however, there is little interest in boosting extractive activities combined sustainably with agriculture and livestock management.

The challenge would be to implement extractive activities in first nature (native forest), as well as to transform second nature (deforested areas) into third nature. This can be achieved with the implementation of technologies for proper soil management, planting, and harvesting for productive activities [104]. These activities are necessary because a significant portion of the small-producer population does not produce enough to sustain a minimum standard of living, and these families then rely on government transfers and retirement benefits [105].

These suggestions have the potential and scope to be effective because the means of production are traditional and rudimentary, lacking the technology that could facilitate the collection, beneficiation, processing, and soil management of productive activities in RESEXs.

Thus, it is appropriate to emphasize that productive activities with technologies generate the following benefits: they enable increased production of cassava, oil, banana, and cocoa; facilitate investment credits for the acquisition of machines and equipment; encourage reforestation policies in areas that should not be deforested; and provide cooperation between research institutions, such as the Brazilian Agricultural Research Company, the National Institute of Amazonian Research, and other universities [106].

These strategies are ideal for overcoming the current challenges and legitimizing the sustainability of extractivism, agriculture, and livestock activities, specifically as a fundamental requirement for environmental and socioeconomic success [107]. Productive activities contribute to food security, generate employment and income, and maintain the cultural aspects of traditional communities [108].

However, there is still a lack of planning, organization, investment, and management of the productive activities of extractivism, agriculture, and livestock rearing; therefore, the integration of agroextractivism increases the possibility of improving the living conditions of inhabitants and conserving the natural and environmental resources of the RESEXs.

In addition, these activities should ensure a considerable reduction in deforestation, strengthen cultural and economic practices, diversify production methods, and equitably distribute benefits to local communities [109]. Productive integration provides resilience, ensures economic viability, presents productivity variations [110], builds and maintains fertility over time, increases the chances of preserving biodiversity, and boosts food production [111].

Small-scale agriculture and cattle rearing complement Brazil nut extraction, support the extractive model, generate income, and prevent the migration of traditional communities [112]. The integration of environmental and agricultural policies stimulates development, provides project formulation, and is a key factor for the sustainability of production systems [113,114]. In this sense, institutional changes in state management establish a relationship of trust between local communities and opportunities for successful productive activities [115].

Even when the RESEXs are not in the productive phase, extractivism, agriculture, and cattle ranching are considered adequate ecological and technological solutions to reduce the human pressure on natural resources and poverty in these areas. Nonetheless, the potential of food sovereignty has been co-opted by a state-centered version and neoliberal food security arrangements at the national and supranational levels. This weakens the territorial governance of local communities and severely affects environmental conservation [116]. Thus, it is essential to strengthen productive activities to improve food efficiency and reduce subsistence difficulties through environmentally sustainable strategies [10].

Agriculture is a crucial site of analysis through which one can understand extractivist logic and practices; where these are present, one can speak about extractivism, and agriculture livestock [117]. In the rural world, climate justice can only be pursued within the context of agrarian justice. The fundamental question remains as to why some social classes and groups are particularly vulnerable to climate change whereas others are not [118].

In this context, the effective collaboration of traditional productive practices associated with technology promotes spatial awareness, is capable of promoting the use and management of the forest's natural resources without destroying them, and updates traditional knowledge and ways of thriving in the Amazon with economic autonomy [119]. This productive model tends to enter the daily work of traditional communities because of sociodemographic and productive influences [120].

Thus, agriculture, livestock rearing, and extractivism have become significant because they occur in an integrated manner, contribute to economic security for traditional communities, and boost socioeconomic income without mischaracterizing the ways of life [112]. In addition, these productive activities play an important role in diversifying and increasing incomes [121,122] and reducing poverty and deforestation [123]. Some families carry out these three productive activities in isolation because ICMBio has not yet presented an envi-

ronmental and socioeconomic policy for support and productive advancement to reduce deforestation and enhance family subsistence.

Deforestation occurs in greater intensity in communities located on the banks of adjacent roads, close to markets, and with a medium or high population density [124,125]. The expansion of new areas also occurs for extensive livestock rearing [126,127]. Moreover, deforestation, economic growth projects, and global warming threaten the maintenance of environmental resources [128]. Solutions to reduce deforestation and burning and improve the quality of life of small producers require investment, increased supervision, and the development of technological and economic alternatives [104]. Therefore, the existence of environmental and socioeconomic policies with effective governance will reduce deforestation [18].

Deforestation and the loss of natural resources are common environmental problems. However, the strict environmental objectives of the state undermine the conservation goals and needs of the local communities of RESEXs and other small producers. Families understand the importance of collecting plant products, the role of forests in climate regulation, and the improvement of the quality of human life. However, continue deforestation of primary forests continues because of the necessity of meeting socioeconomic requirements. It is relevant to recognize the social, political, economic, and historical contributions of traditional communities to extractivism in the Amazon and comprehend that it is essential to integrate extractivism with agriculture and livestock rearing.

6. Conclusions

The productive activities of extractivism, or plantation for extractivism, can be sustainably integrated along with agriculture and livestock rearing. This is an alternative means of improving the living conditions of local inhabitants and reducing deforestation and its impact on fauna and flora. The loss of primary forests is most often caused by local communities attempting to meet their subsistence needs.

Food, clothing, medication, child maintenance at school, and transportation expenses contribute the most to socioeconomic deficiencies. Here, we conclude that the failure of RESEXs in relation to conservation and development is correlated with the following: a lack of institutional investment in innovations and technologies; low production from extractivism, agriculture, and livestock; lack of technical support; low production; and difficulties in markets for the commercialization of products.

The integration of productive activities of extractivism, agriculture, and livestock with extractive/domestication technologies is a way to reduce the use of natural and environmental resources, increase family income and subsistence capacity, and ensure the permanence of children in schools. To achieve sustainability of the RESEXs in the Amazon, it is necessary to respect the cultures and vocations of its inhabitants; the relationship of local communities with nature; provide socioeconomic sufficiency; innovate production processes; and reformulate environmental, economic, and social policy aspects.

According to this logic, the Amazon has no magical solution. Extractivists, small producers, indigenous peoples, quilombolas, riparian areas, and traditional populations must all pursue the objective of improving their technological standards. The reduced dependence on government transfers will then be an indicator of an improved standard of living. Therefore, it is important to combine conservation with the productive activities of extractivism, agriculture, and livestock to achieve sustainable development.

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