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Ecotourism and Co-Management: Strengthening Socio-Ecological Resilience in Local Food Systems

Achilem E. da Silva [1], Kettrin F. B. Maracajá [1,*], André C. S. Batalhão [2,3], Viviane F. Silva [1] and Igo M. S. Borges [1]

[1] Postgraduate Program in Engineering and Natural Resources Management, Federal University of Campina Grande, Campina Grande 58429-900, Brazil; achileme@gmail.com (A.E.d.S.)
[2] Department of Applied Management Sciences, Minas Gerais State University, Passos 37900-106, Brazil; andre.batalhao@uemg.br
[3] Graduate Program in Environmental Sciences, Federal University of Goiás, Goiânia 74605-080, Brazil
* Correspondence: kettrin.farias@uaac.ufcg.edu.br; Tel.: +55-83-999494337

Abstract: The general aim of this paper is to analyse theoretical perspectives on ecotourism, co-production, and co-management, seeking to understand how these approaches interact and promote the sustainability of natural food resources and sustainable management practices. The methodology adopts a qualitative approach with exploratory and descriptive objectives, utilising a Systematic Literature Review (SLR) to identify and examine the key studies related to the subject. The main findings indicate that ecotourism fosters biodiversity conservation, which sustains local food practices and provides significant economic benefits for local communities through co-production and co-management between stakeholders. The community emerges as a principal active resource in planning and management processes by creating opportunities for environmental education; integrating local knowledge and experiences to develop a unique, multidimensional adaptive capacity; and promoting system regulation. Moreover, the analysis of the examined works highlights the importance of environmental education programmes, flexible institutions open to dialogue with the community, and the equitable distribution of benefits. Lastly, a framework is presented that depicts the relationship among ecotourism, co-production, co-management, and socio-ecological resilience, based on five premises. This framework proposes a holistic approach to achieving socio-ecological resilience in food practices and the sustainable management of resources.

Keywords: ecotourism; co-production; co-management; socio-ecological resilience; food sustainability

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Academic Editors: James Kennell and Harry Coccossis

Received: 14 January 2025
Revised: 28 February 2025
Accepted: 4 March 2025
Published: 11 March 2025

Citation: da Silva, A.E.; Maracajá, K.F.B.; Batalhão, A.C.S.; Silva, V.F.; Borges, I.M.S. Ecotourism and Co-Management: Strengthening Socio-Ecological Resilience in Local Food Systems. *Sustainability* **2025**, *17*, 2443. https://doi.org/10.3390/su17062443

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1. Introduction

Socio-ecological systems (SESs), or complex adaptive systems, evaluate the complex interactions between ecological and human elements, considering political, cultural, and historical aspects for resilience in natural resource management, in addition to multiple social systems aimed at addressing an affected ecological system, highlighting the importance of human action for conservation [1,2].

Considering the above, ecosystem services are integrated into the Sustainable Development Goals (SDGs) and contribute to maintaining complex socio-ecological systems. Achieving the SDGs requires policies that balance conservation and lasting cultural changes [3,4]. To reduce environmental problems and enhance human well-being, a collab-

orative policy among different levels of government and social actors, including the reader, is necessary [5].

The interaction between humans and nature is interconnected through ecosystem services that are essential for societal well-being, and disruptions to these services directly impact community sustainability [6]. From this perspective, research on human–nature interactions in local socio-ecological systems has significant global implications. It influences both time and space through complex socio-economic and environmental interactions. This dynamic process shows that local systems are crucial in shaping globally connected systems, generating economic, social, and environmental impacts [7].

Thus, socio-ecological systems (SESs) are assessed based on benefits provided by environmental services to society. This valuation incorporates diverse approaches through the relational restructuring of the society–nature relationship. Over the last century, this relationship has primarily focused on conservation and the sustainable use of resources; however, it now incorporates restoration of the degraded areas. The "green appropriation" refers to emerging ways of utilising land for environmental purposes [8].

Through the assessment of ecosystem goods and services, economic evaluations of environmental resources are conducted to ensure the fair distribution of ecosystem services to society, striving to harmonise resource utilisation with conservation efforts. An example is the wildlife ecotourism sector in South Africa, where the market-driven provision of tourism experiences on wildlife farms and auctions seeks to align economic incentives with environmental sustainability. Additional examples include carbon trading and the appraisal of water resources for sustainable use [9].

The socio-ecological systems framework underscores the complexity of human–nature interactions, especially in the context of tourism [9]. Sustainable tourism relies on the ability to generate economic benefits from tourist activities without degrading local ecological integrity. To achieve sustainability, strategies promoting conservation and use are proposed in a complementary manner, balancing socio-economic growth and biodiversity protection. "People-oriented" strategies allow local community integration into conservation and development initiatives, with adaptive management being crucial for planning interventions that account for both spatial and temporal relationships and dynamics [10].

Ecotourism also facilitates poverty alleviation, especially in underdeveloped regions, by increasing employment opportunities and improving quality of life and social well-being. In rural areas with tourist attractions, these activities need to be carefully planned to ensure local environmental sustainability, mitigating ecological, financial, and temporal losses [11].

To address the complex challenges of natural resource management, co-management and co-production approaches have proven effective. These approaches involve collaboration among various stakeholders, including local communities, governments, and non-governmental organisations, in decision-making and implementing conservation strategies. Co-management and co-production enhance the acceptance and legitimacy of conservation policies while ensuring that local knowledge and experiences are integrated into management practices [12].

In agreement, such approaches, combined with environmental education and community engagement, are fundamental for promoting ecosystem conservation and food sustainability. Environmental education initiatives strengthen knowledge and awareness of the importance of conservation [13], while community engagement bolsters local knowledge and experiences for integration into management practices [12].

The capacity of ecotourism to integrate local communities into conservation and development initiatives is crucial for sustainability. The economic valuation of ecosystem services enables individuals and policymakers to strategically manage resources for con-

servation and sustainable development [14]. An integrated and synergistic governance system between community and tourism is necessary for the endogenous sustainable development of the territory [15]. Co-creation in the evaluation process ensures the acceptance and legitimacy of outcomes, allowing for the planning of flexible, inclusive, and sustainable policies.

The following research problem arises: how do theoretical perspectives on ecotourism, co-production, and co-management interact and contribute to the socio-ecological resilience of ecosystems that sustain local food practices? The general aim of this study is to analyse theoretical perspectives on ecotourism, co-production, and co-management to understand how these approaches interact and promote the sustainability of natural food resources and sustainable management practices.

The hypotheses of this study are as follows: (i) Active participation of local communities in the joint co-management and co-production of ecosystem services is essential to strengthening socio-ecological resilience and ensuring the sustainability of natural resources used in ecotourism and local food systems. (ii) The integration of environmental education strategies and flexible governance promotes a balance between environmental conservation and economic development, facilitating the context-specific adaptation of management policies.

This research adopts a qualitative approach with exploratory and descriptive objectives. To achieve its aims, a Systematic Literature Review (SLR) was conducted, incorporating key theoretical perspectives using the following keywords: ecoturis *, ecosystem services, socio-ecological resilience, co-management, and co-production, combined with Boolean operators and topic-based filters in Web of Science and Scopus.

Considering that sustainable development is a central theme of ecotourism research, this study becomes relevant for future topics addressing risk management, adaptation, resilience, and the reduction in carbon dioxide (CO_2) and greenhouse gas (GHG) emissions [16]. This study also justifies itself by highlighting the need to understand how co-management and co-production within ecotourism assist in the sustainable management of natural resources that directly or indirectly impact the food chain, such as water, soil, and biodiversity.

With progressively rising global temperatures and an intensified frequency of extreme climatic events such as droughts, storms, and floods, ecosystems providing ecosystem services for human well-being and tourism activities face increasing threats [17]. These events, exacerbated by human activities, have led to severe ecosystem degradation and inflicted considerable damage on local economies. This highlights the urgent need for public policies to protect biodiversity and ecosystem services [18].

The occurrence of extreme changes impacts not only local biodiversity but also the self-renewal capacity and resilience of ecosystems, making it more challenging to implement and manage tourism activities sustainably [18]. Nevertheless, incorporating an understanding of climate dynamics into food and subsistence management plans, along with the co-management of ecosystem services, can foster a more resilient future. It is essential to ensure that public policies and tourism practices are adaptive and contribute to climate change mitigation and adaptation. Such an approach advances long-term sustainable tourism while supporting environmental preservation and restoration [19].

Furthermore, there is a need to understand the interactions between ecotourism, co-production, co-management, and socio-ecological resilience. This investigation will enable a deeper comprehension of the interplay between social, ecological, and economic subsystems for environmental conservation alongside the socio-economic development of local agro-food products, such as coffee or other community-based crops, and ecosystem services. Moreover, this research not only contributes to scientific knowledge but also enriches

the theoretical field by introducing essential management practices for policymakers, environmental managers, and communities involved in ecotourism, particularly regarding the development of effective public policies.

2. Materials and Methods

This study adopts a qualitative approach with exploratory and descriptive objectives [20], and it is characterised as a Systematic Literature Review (SLR). According to [21], an SLR constitutes a method that identifies, evaluates, and interprets all available information from primary studies in a specific thematic field, thereby qualifying as a secondary study. The review process followed the PRISMA [22] (See Supplementary Materials) (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol, ensuring transparency, rigor, and replicability in the identification, selection, and analysis of relevant studies.

The article search was conducted on 15 February 2024, using the following combination of keywords: ecoturis *, ecosystem services, socio-ecological resilience, co-management, and co-production. Boolean operators and topic field labels were employed in Web of Science, enabling searches within the title, abstract, and keywords of articles, as well as in Scopus, as detailed below.

The search terms were set as follows in Web of Science: ECOTS = (ecotouris * AND (ecosystem services OR socio-ecological resilience OR co-management OR co-production)), yielding 503 results. After applying filters, 246 articles remained. In Scopus, the search terms were set similarly: ECOTS = (ecotouris * AND (ecosystem services OR socio-ecological resilience OR co-management OR co-production)), yielding 38 results. After applying filters, 11 articles were selected (Figure 1).

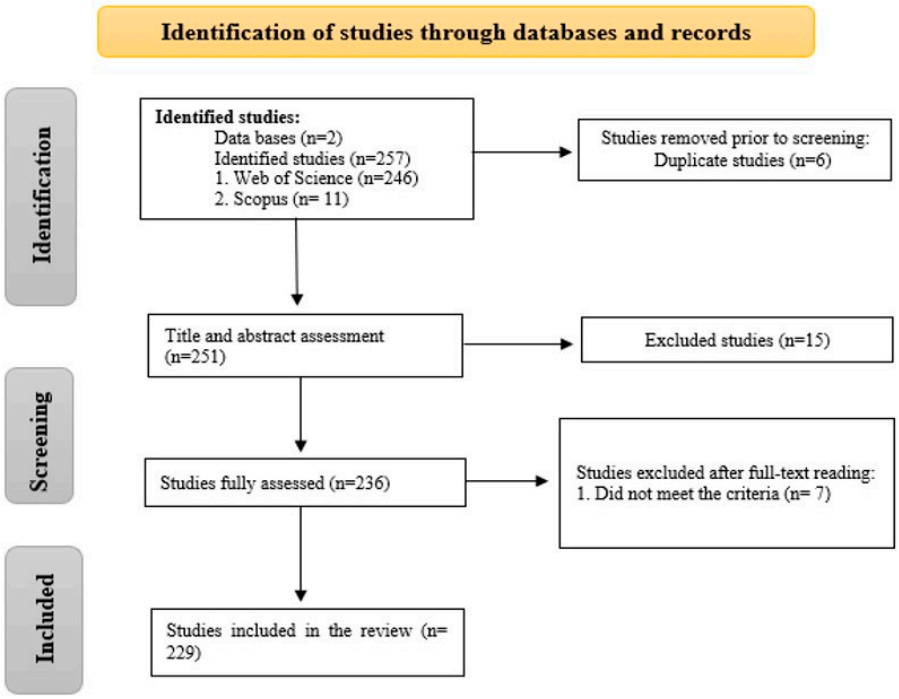


Figure 1. Flowchart of article selection for the 2024 integrative review.

The inclusion filters for both databases consisted of open-access articles, categories related to environmental sciences or similar areas, and refinements by document type, including only articles and reviews, with no restrictions on publication year.

The screening of articles through titles and abstracts was conducted using Rayyan, a free online systematic review tool that facilitates inclusion/exclusion decisions and

resolves duplicates [23]. Articles were excluded based on the following criteria: not being related to the ecotourism sector; lacking connection with ecosystem services, socio-ecological resilience, co-management, or co-production; and not being research articles or review articles.

After generating insights, a full reading of the articles was conducted for the development of the present study. During this process, some articles were found to have no connection with the proposed discussion, while others were retracted or not open-access. This resulted in a total of 229 fully read articles that formed the basis of the theoretical findings presented here. Subsequently, the selected articles were analysed using VosViewer 1.6.20 to organise, examine, and extract information from the data, directing the literature review through visuals generated by the software.

Finally, the methodological limitations of this research are related to (1) the ongoing need for updates, as there was no timeframe specified for the data analysis; and (2) publication bias, as only categories from the field of environmental sciences or similar areas were considered.

3. Results

3.1. Socio-Ecological Resilience and Use of Natural Resources in Ecotourism

From the findings, it is evident that, with the introduction of tourism, complex ecosystems—such as rural areas with their socio-economic, historical, and cultural dimensions—may abandon or blend traditional agricultural methods with the consolidation of tourist destinations in rural regions, thereby promoting sustainable development. However, adapting areas into tourist destinations often leads to the displacement of local communities due to their lack of integration into proposed tourist activities. An integrated governance system and synergy between agriculture and tourism are necessary to achieve endogenous sustainable development of the territory, meaning developing the area itself sustainably at the social, economic, environmental, and cultural levels [15].

Brazil, being the fifth-largest country in the world, possesses the richest biodiversity globally, with six biomes within its territory: the Amazon, Caatinga, Cerrado, Pantanal, Atlantic Forest, and Pampas. However, the country faces inequalities regarding access to and use of ecosystem services, emphasising the need for sustainable development that allows all generations to access and meet their needs. Brazil is significantly influenced by agribusiness with respect to its natural resources, with an estimated 90% of biodiversity degradation due to resource extraction, mostly destined for developed countries [24].

To foster initiatives aimed at strengthening Brazil's biodiversity, the participation of local communities, environmental conservation policies, scientific and technological development, and overcoming agribusiness dominance are crucial. However, conflicts arise between conservation and development in establishing protected areas (PAs), due to negative impacts on local livelihoods, human–wildlife conflicts, and the commercial use of natural resources. Mechanisms like tourism can mitigate negative effects by proposing ecological compensation for preservation, payments for ecosystem services (PES), and jobs associated with PAs [25].

According to [26], understanding the interactions between tourism, biodiversity, and management strategies is essential. Mapping the ecosystem services provided allows for land-use planning and management decisions focused on maintaining and restoring local ecosystems, considering the integration of local areas into regional scales [27]. Additionally, the effects of ecosystem disservices (ESDs) should also be considered in land-use planning to ensure sustainable management [28] and achieve biodiversity conservation through appropriate actions to address negative perceptions of ESDs via environmental education [29].

Ecosystem services can serve as a foundation for managers to define conservation efforts in communities dependent on natural resources. Direct dependence on natural resources fosters strong connections that enhance individuals' well-being, particularly through cultural ecosystem services. Although these services do not directly contribute to subsistence, they encourage ecosystem conservation through scenic beauty, offering psychological benefits to local populations [30].

However, ecosystem services in fragile areas, such as coastal zones, often exhibit low biodiversity levels, resulting in environmental challenges that hinder sustainable tourism development, subsistence, and ecosystem regulation. Therefore, strategic management of landscape restoration is urgently needed to make these areas ecologically functional and prevent natural disasters [31].

The lack of knowledge regarding individuals' direct use of ecosystem services can lead to profound changes in socio-ecological systems, compromising service provision. For instance, Ethiopia's Abaya and Chamo lakes in the Rift Valley experienced increased nutrient enrichment due to the Sasakawa Global 2000 agricultural system, population growth, intensive fertiliser use, and deforestation for agricultural activities. This affected the community's subsistence in terms of water supply and economic activities, such as fishing and ecotourism [32].

In addition to understanding individual preferences, the value of ecosystem services in natural areas should be considered, incorporating spatial elements, substitutes, and complements available to the community. These factors can guide future land-use programmes that residents support, as well as promoting sustainable conservation of agriculture and wetlands connected to ecotourism development [33].

At length, sustainability comprises the interconnection of economic, social, and ecological aspects. However, the conservation of socio-ecological systems is threatened by human actions, such as intensive agricultural systems and traditional livestock farming. To mitigate dysfunctions in these systems, efficiency per unit produced is sought, particularly in mountainous and marginal areas, alongside synergy with rural or sustainable tourism. Moreover, it is vital to raise awareness among farmers about the value of public goods and the environmental costs involved [34].

3.2. Traditional Activities, Land-Use Strategies, and Socio-Ecological Resilience in Ecotourism

Traditional activities that allow for multiple land-use strategies enable the management of different land units through various productive activities based on the ecosystem services (ESs) offered to local residents. However, according to [35], proposing diverse productive and management strategies that enhance resilience to disturbances focuses on diversifying residents' livelihoods and reducing monetary impacts by including activities connected to sustainable tourism [1].

Thus, mixed strategies involving the synergy between sustainable tourism and agricultural methods provide significant economic benefits and enhance the resilience of socio-ecological systems (SESs) to natural and anthropogenic disturbances. This contrasts with the abandonment of traditional activities and exclusive reliance on sustainable tourism [4,36–39], which reduce the resilience of socio-ecological systems, leading to the loss of traditional agricultural practices and knowledge. Consequently, they fail to buffer against disturbances caused by sustainable tourism activities [35], limiting conservation and the resilience of socio-cultural and natural environments [40].

Mixed land use for conservation is exemplified in nature tourism, which can be characterised as a product converging on forest regeneration, potentially incentivised by national policies, such as those in Monteverde, Costa Rica. However, while contributing

positively to conservation, nature tourism can lead to water contamination due to urban infrastructure failing to keep pace with the tourism industry's growth [41].

Landscape-scale planning emerges as a significant strategy for addressing complex socio-ecological systems, fostering sustainability and long-term resilience that supports landscapes. This is evident in small islands like the Galápagos, where internal and external interactions are managed to balance socio-economic tourism and fishing activities through the political integration of stakeholders. However, this approach entails changes to the socio-cultural and political structures of the system [5].

Another complex socio-ecological system where landscape planning optimises ES conservation is wetland areas. These zones are constantly affected by alterations in freshwater supply, impacting not only ecosystem resilience but also societal livelihoods. Landscape approaches function as adaptive and continuous stakeholder engagement in strategic landscape management [42].

Landscape planning is a precursor to conservation initiatives, particularly in mixed-use landscapes for subsistence and conservation. However, despite economic incentives implemented through policies, these fail to deliver efficient results due to individual variations in landowner decisions. This calls for alternative compensation mechanisms to maintain mixed-use landscapes [41].

SESs can be conceptualised as agroecosystems employing intensive agricultural management. In this context, plant species are reintroduced into fragmented agroecosystems to conserve the ecosystem, promote species conservation, and enhance ecosystem services such as sustainable tourism and aesthetic value. However, conflicts with other land uses and modifications to agricultural practices may generate resistance to reintroductions unless stakeholders are involved from the outset, with training for species management and financial compensation incentivising the introduction of biodiversity on their lands [43].

Additionally, socio-cultural pressures from surrounding communities provoke resilience responses within SESs, such as the emergence of community-based tourism in indigenous communities. Policies such as land restitution practiced by local governments influence this, leading to support for community governance and the development of self-regulated governance systems that reduce vulnerabilities within Protected Natural Areas (PNAs) [40].

This analysis adopts the perspective that anthropogenic changes, such as the conversion of natural areas into agricultural or urban zones, interfere with landscapes' resilience and the ecosystem services that they provide to society. While SESs offer substantial services to society, anthropogenic actions exploiting these services can lead to their reduction and degradation at both the local and global levels [44,45].

3.3. Impact of Co-Production and Co-Management on Food Ecosystem Services

Ecosystem services provided by Protected Natural Areas offer economic value to the local population, which, when inaccessible, deprives them of fundamental well-being. Consequently, the management of these areas is difficult due to conflicts between society and nature, such as wildlife hunting, land invasions for resource extraction, excessive grazing, and pressures exerted by tourists [46].

When considered in isolation, co-management facilitates shared decision-making among stakeholders engaged in problem-solving. However, when examined through the perspective of adaptive co-management, it not only enables the integration of core principles and lessons from adaptive management but also lays the foundation for a collaborative local management approach. This approach, which accounts for the distinct situation and characteristics of a given region, advocates for tailored governance solutions. The strength of adaptive co-management lies in its capacity to become a form of collaborative governance

model that harmonises with the local socio-economic context, offering a strategic pathway for environmental management and conservation [47].

When complemented in fragile ecosystems, such as World Heritage Sites and protected landscapes like buffer zones, adaptive collaborative co-management not only facilitates the sustainable use of resources but also strengthens socio-ecological resilience. The foundation of this resilience lies in the engagement of the local community, whose communication networks and cooperative dynamics play an important role in comprehending the socio-ecological system. This community's active involvement in the trial-and-error processes empowers and positions them as an integral component of the resilience-building framework [4].

Supporting the engagement of local residents in adaptive management practices is a key factor in strengthening resilience and adaptation within communities [39]. The LIFE Nature project, developed in the northern part of the Kiskunság region (Hungary), is a notable example, evidencing social conditions and anticipated economic and ecological services through participatory processes even before its full implementation [47].

The authors of [48] highlighted that the effective management of socio-ecological systems depends on understanding stakeholders and continuously monitoring their interests, values, and behaviours. Given the complexity of these systems and the variability among actors, ensuring inclusive participation in co-production is essential for the development of regulatory plans. To be effectively implemented, this process must engage multiple local stakeholders, fostering dialogue and collective decision-making. This approach bridges knowledge gaps and enhances understanding of social and economic disparities within communities, promoting fair working conditions and improving the overall quality of life for all actors involved [49].

Decentralised governance, which incorporates multiple stakeholders in planning and decision-making processes, is well illustrated in the Indian Himalayas, where Gram Sabhas (village councils) and Van Panchayats (forest councils) operate. The active involvement of local communities in governance serves as a cornerstone for the sustainable management of resources and ecosystem services, playing a fundamental role in ecosystem conservation and environmental protection. However, governance inefficiencies often emerge in the distribution of responsibilities and the allocation of power, particularly in relation to water rights for infrastructure development and local livelihoods. This indicates the pressing need to clearly define village jurisdictions, ensuring that decision-making processes do not rely exclusively on a top–down management approach that excludes community participation [50].

While a bottom–up management approach is crucial for decision-making in natural governance, the lack of participation, organisation, training, and public awareness can limit policy formulation and weaken shared responsibility in resource use among stakeholders. This highlights the importance of education and awareness programmes. These programmes, which aim to educate and engage awareness about ecotourism practices among local populations, are not just necessary but also highly beneficial. They play a key role in ensuring effective co-management and supporting ecosystem services, such as ecotourism [51].

The authors of [52], in their research, demonstrated that ecotourism practiced in protected areas plays a crucial role in reducing poverty in Costa Rica through programmes. It is necessary to understand the mechanisms of environmental policies on the social and environmental dimensions of other countries to extend this evidence. Thus, the authors clearly state that the mere establishment of a Protected Natural Area (PNA) has neither alleviated nor exacerbated local poverty. In other words, it is necessary to understand and

analyse how the conservation of biodiversity in natural ecosystems and the ecosystem services provided can contribute to poverty reduction.

Conservation incentivised by tourism affects stakeholders in multiple ways, due to individual parcels having distinct land-use conventions between forest cover protection and nature tourism and profitability from agriculture. It is essential to consider unforeseen cross-impacts that both individual uses have on other stakeholders and the socio-ecological sustainability of ecosystem services [41]. An example of this is the Brazilian territory, which provides suitable conditions for the occurrence of tropical ecologies and scenarios that favour ecotourism and, adjacent to this, local landscape resilience. However, ecotourism still maintains conflicts with traditional land uses in Brazil [44].

Ecotourism is a hopeful resource for natural resource use aligned with conservation, due to the local socio-economic development that equips the community with an optional source of income. An example of this is community-based tourism, which can open doors to solve excessive grazing and landscape degradation in dry pasture management in China. Thus, ecotourism as an alternative source of income ensures conservation when, by profiting from tourism, individuals exploit ecological systems less, allowing the ecosystem to regenerate. Otherwise, it infringes on the pillars of ecotourism. Furthermore, the local community offering tourism services and products must provide environmental education to tourists, in addition to satisfaction with artificial tourism elements [38].

The potential of ecotourism areas strategically redefines the sustainable use of territories, strengthening the environmental resilience of the landscape, and allowing local managers a viable alternative for transitioning land-use activities linked to agribusiness into ecotourism activities, which balance economic development, the conservation of socio-ecological systems, and consequently, the inclusion of local communities in the process [44,53]. Communities such as those in the mangrove areas of Malaysia perceive ecotourism as an alternative for achieving a greater source of income compared to other activities practiced, such as fishing, charcoal production, and wood production [49].

Furthermore, a study applied to understanding the perceptions of forest villagers residing in the Black Sea region of western Turkey concluded that, although ecotourism is a satisfactory alternative income source, and these individuals are fundamental to sustainable development and should actively participate in the process, they do not adequately understand the elements and activities of ecotourism due to a lack of education [53].

Therefore, ecotourism activities in forest ecosystems, as an option, lead to the region's economic development and reduce pressures from traditional means of subsistence as stakeholders and the local community participate in the processes of planning, implementation, and monitoring. Furthermore, the satisfaction of tourists, influenced by the well-being of the local population, ensures that, when satisfied, they strive to provide tourism services that enable environmental sustainability and economically and socially sustainable development [53].

Understanding residents' perceptions of the use of the area they occupy allows for minimising the indiscriminate use of the ecosystem services provided, which would negatively affect local preservation and the sustainable development of tourism [37]. Thus, effective participatory cooperation starts from the premise of considering the expectations, needs, local socio-cultural knowledge, emotional perceptions, values, and customs of individuals and the whole [54].

It is important to highlight that the mental well-being of local community individuals with regard to ecosystem services allows managers to identify management strategies that support sustainable regional development. An example of this is when regions in Malaysia face inconsistencies in mangrove management programmes: excessive tourism linked to

risky fishing decreases mental well-being, a mitigating factor of the subsistence economic opportunities that tourism provides to communities through fishing [55].

Despite this, legal approaches alongside economic ones are crucial for the conservation and restoration of legal reserves (LRs) and permanent preservation areas (PPAs), as exemplified by the Atlantic Forest trail. Through its stepping stones and corridors, it conserves ecological diversity, supports ecosystem service conservation, and highlights the area's tourism potential for the local community. Additionally, tourism development diversifies income for private landowners by balancing ecosystem service conservation and biodiversity preservation with compliance at a lower cost [56].

Urban and tourism development policies affect the use of ecosystem services, requiring structured simulations of land-use planning to define measures that maximise and protect their provision. Combining land-use functions allows ecosystem protection and the rational planning of policies that promote local socio-economic and environmental development. An example is the Beibu Gulf area in China, which suffered significant ecosystem service damage due to policies encouraging the conversion of agricultural lands into urbanised tourism infrastructure and aquaculture zones, compromising mangrove and wetland ecosystem functions, and contributing to water pollution [57].

The Pieniny Mountains pastures in Poland, as semi-natural areas rich in wild plants, provide cultural ecosystem services (CESs) for tourism development and local community provision, making the landscape multifunctional and sustainable by balancing ecosystem services. This positively influences the local socio-ecological system. Furthermore, conservation grazing associated with tourism creates opportunities for cultural festivals with dairy products for tourists. However, conflicts may arise among stakeholders over ecosystem service use [58].

For conservation land-use policies (such as tourism) based on economic incentives to be sustainable in the long term, multifaceted actions must be strengthened to establish sustainable landscapes that do not reduce environmental improvements to a mere exchange value [59]. It is important to highlight that a wide range of ecosystem services provided by an area increases tourist numbers, as seen in ecotourism activities at Lake Tisza in Hungary, which benefits from the good ecological conditions of water resources, which are positively valued by tourists and increase the recreational value of the site [60].

When degradation occurs, rewilding or species reintroduction becomes a significant alternative for forest or urban renaturalisation, assisting in restoring ecosystem service provision [61]. While renaturalisation mitigates anthropogenic impacts on ecosystems, conflicts between society and wildlife may arise during the process. These include economic damage to forestry, agriculture, and horticulture, as well as health risks from diseases and traffic incidents, raising ethical and legal considerations regarding species relocation or re-establishment in natural areas [62,63].

Service-based ecotourism is a sustainable option for land use in areas with extensive animal breeding [64]. Additionally, awareness of natural capital and local knowledge in tropical regions of developed and developing countries can drive resilient sustainable tourism projects through, for example, policy decisions and new PAC-adapted initiatives. However, the Small Island Developing States (SIDS) are excessively dependent on tourism, perceiving its potential as a strategy for socio-economic development, local culture, and biodiversity conservation [65].

Land-use planning management, particularly that related to agricultural activities, is crucial for maintaining and expanding ecotourism as a driver of local socio-economic development and environmental protection [66]. Sustainable management through ecotourism can promote ecosystem-based land use, conserving remnants of dry tropical forests by diverting land use around water reservoirs and ensuring future sustainable provision [67].

It also raises local community awareness for the sustainable management of multiple ecosystem services and enhances socio-economic well-being [67,68].

However, while this represents a promising alternative, the social interests of stakeholders are complex and multifaceted. For instance, coastal initiatives in southern Thailand encountered co-management difficulties with indigenous communities due to land-use legislation restrictions [69]. Instead of limiting livelihoods, authorities could encourage indigenous peoples through co-management practices in sustainable tourism and agriculture [70].

Ecotourism combined with Protected Natural Areas (PNAs) and payments for ecosystem services (PES) programmes contributes to the reduction in tropical deforestation and the conservation of wildlife species, such as primates, in contrast to programmes that do not interact with each other. However, for the success of this intersection of approaches towards conservation and consequent socio-ecological resilience, the participatory action of local communities is required, facilitated by the provision of economic, social, and cultural incentives in the adherence process [71].

3.4. Socio-Ecological Resilience of Local Communities and Food Sustainability

Socio-ecological resilience occurs in adaptive cycles, which can be virtuous (reorganisation after a collapse) or vicious (undesirable reorganisation after a collapse). Thus, resilience in real systems can be challenging to implement and execute, requiring an understanding of different contexts and the resilience executors. For instance, promoting resilience in rural areas may involve local families who, through their experiences, provide traditional knowledge sources alongside scientific and technological knowledge, contributing to their adaptive capacity and the resilience of socio-ecological systems (SESs) [72].

From this perspective, full resilience capacity is functional when supported by public policies directed at the sustainable use of ecosystem services provided by the territory. Territorial resilience thus provides sustainable directions for the recovery of landscapes degraded by anthropogenic action [45], making it a viable action for municipal planning in the Brazilian context [44].

In fragile ecosystems, resilience levels and productivity are low, such as in mountainous ecosystems, consequently reducing the socio-economic well-being of resident groups. Additionally, the community's dependence on forest ecosystem services (ESs) for subsistence means that abandonment of the locality and agricultural activities in mountainous regions leads to devaluation of ecosystem services [50].

However, natural and anthropogenic factors causing land-use changes threaten the resilience capacity of ecosystem services and, consequently, human survival and development. Examples include increasing human settlements, unsuitable agricultural areas, and natural and human-induced forest fires [73,74].

While ecotourism is a sustainable strategy for maintaining protected areas, it should not be the sole revenue source for financing Protected Natural Area (PNA) management. Political, environmental, economic, and social crises, such as the COVID-19 pandemic, pose significant risks, creating the need for alternative funding strategies for protected areas, such as sustainable agricultural programmes or activities and facilities to develop local community capacities for generating new income sources. This approach seeks to maintain financial sustainability, community resilience, and biodiversity conservation [75].

Co-management refines the social resilience of local communities and restores complex socio-ecological systems, since top–down governmental management does not yield effective and sustainable results. Examples include small-scale hilsa fishing in Bangladesh [2] and recreational fishing [48]. Conversely, local tourism organisations (LTOs) mitigate deficiencies or negligence in government management to promote environmental con-

servation. One example is the mist oasis in Lima, Peru, which suffers from ecological degradation. However, LTOs face challenges such as informal obstacles and illegal structures, including informal urbanisation, land trafficking, power struggles, economic barriers, political and community non-adherence, and technical and legal hurdles, which complicate improvements in tourism activity services and infrastructure [76].

Managing ecosystems influenced by economic potential generates conflicts between stakeholders (the government and the local community), impacts natural area conservation, and decreases ecotourism. One example is the conflicts between the government and local communities in mangrove forest management in Karansong, West Java, Indonesia. Thus, community-based PNA management governed by private sector policies reduces community cooperation in the co-management of shared resources. Consequently, local governments must formulate policies involving the local population in natural area management to develop sustainability beyond financial and institutional aspects [77].

PNA management can be classified with distinct objectives: biodiversity conservation, or mixed use (conservation and ecosystem service provision for human well-being) [26]. An example is the mixed-use reserve landscape in central–southern Chile, which employs ecotourism and the use of non-timber products [78]. To help managers balance multiple land uses and ecosystem service income, with an optimal allocation of landscapes between conservation and maximising productive potential, the efficiency frontier framework emerges as a viable strategy [41].

Land-use conservation policies and reintroduction are characterised as management policies for conservation and must consider all ecosystems. One example is the dry tropical forest, which has historically received less emphasis on preservation, management, and use. However, a lack of local community knowledge about the ecosystem services provided by the dry tropical forest results in its poor maintenance. Thus, when regional policies in the form of protection statutes focus on multiple ecosystem services, community awareness and support for sustainable long-term conservation and ecosystem management are enhanced, contributing to landscape resilience [67].

Paid natural resource use associated with management requires property rights for multiple actors, including not only governmental entities but also local communities, the private sector, and tourism-related associations. For example, in paid forest resource use, such as forest tourism and forest carbon sequestration, the socio-economic development of local communities accompanies the growth process through resource use for social services (tourism, research, and heritage conservation) and provision (timber and non-timber product extraction) from natural areas [79].

Similarly, understanding how local actors' perceptions relate to the landscape can also aid in forest landscape restoration. This addresses gaps in local knowledge on conservation and meets socio-economic needs, securing social adherence to sustainable soil management strategies. Imposing sustainable management strategies without stakeholder consultation can foster opposition, leading to the failure of sustainable land use, especially in anthropogenically affected landscapes [80].

The scarcity of information on land-use and land-cover changes, coupled with incorporating science–stakeholder collaboration as a social process for generating new knowledge, fosters social resilience and local community adaptation to creating livelihoods and economies during crises. Conversely, decisions based on erroneous information that ignore natural limitations tend to degrade ecosystem services, subsequently increasing the vulnerability of socio-ecological systems and ecosystem resilience maintenance [81].

Environmental education can serve as a link between local economic development through ecotourism and nature conservation [82]. However, community participation is a key factor in achieving the sustainability and rational use of natural resources, as

demonstrated in eco-governance and environmental education efforts from top–down and bottom–up approaches involving all stakeholders in restoring China's natural coastal wetlands within three years [83].

Nonetheless, environmental education alone may not always ensure the conservation of a natural area. For example, although the educational background of the local community inhabitants of Mahahual (Mexico) positively contributes to the protection and maintenance of coastal ecosystem services, only access to environmental education can enhance the village's sustainable development [84]. Another example applies to the peri-urban forest of Djoumouna, where, despite local residents knowing the value of ecosystem services, a lack of environmental education leads to excessive and uncontrolled resource use, causing losses in ecosystem value and resilience. This highlights the need for strategies aiming at the conservation and sustainable management of Brazzaville's peri-urban forest [85].

3.5. Sustainable Management Practices for Agro-Food Products: Coffee

To promote the use of resources without exceeding ecological limits, it is essential to also understand the factors that underpin the dependence on resource extraction by local communities. For example, the villages adjacent to Sundarbans, located between India and Bangladesh, exhibit socio-economic factors as the primary drivers for dependence on resource extraction. Thus, management must focus on developing activities that diversify community livelihoods, such as ecotourism. The government should implement strategies that avoid institutional and social challenges, such as the loss of livelihoods and job opportunities for the community [86].

Moreover, compensation efforts through financial support from tourists for the local community when they forgo their traditional livelihoods tend to be indispensable for financing conservation, provided that the distribution is equitable between all stakeholders [87]. Consequently, when incentivising the abandonment of traditional deforestation-inducing activities, forest governance should centre local residents in conservation actions so that their awareness culminates in sustainable ecological exploitation [88].

It is important to highlight that management decisions must also consider local particularities, as alternatives like tourism may not be viable as substitutes for traditional activities but can be seen as complementary measures that do not generate sufficient income on their own. An example is the marine protected areas (MPAs) in Nha Trang Bay [89].

Another aspect where the tourism sector grows significantly and requires planning, conservation, and management relates to land-use and land-cover changes. An example is the Sacred Kailash Landscape in China, where tourism development has caused land-use changes to accommodate tourism offerings (pilgrimage and infrastructure). Although the impacts have been limited, the region's alpine biodiversity and ecosystem services have become vulnerable to tourist disturbances [64].

Integrating land-use management and conservation is a sufficient condition for developing sustainable use planning without ecosystem degradation. Approaches allow for identifying recreational sites and structuring management decisions based on the area's social and ecological characteristics, resources, and support conditions. This includes delimiting supply and demand through methodologies such as outdoor forest recreation systems, the recreational opportunity spectrum, carrying capacities, and acceptable change limits [90].

One possibility for integrating ecological conservation and sustainable socio-economic development, considering land-use and land-cover changes, is establishing ecological security patterns (ESPs). Decision-makers and managers can use ESPs to identify spatial distribution guidelines for a location's ecological elements through models such as the InVEST and circuit theory models. These tools help maintain balance, resilience, and the

functionality of critical ecosystem services. By predicting changes in land use and land cover, such as forest cover, managers can anticipate transformations and propose mitigation measures as ecological safeguards for achieving sustainable management. Forest cover degradation, for instance, threatens sustainable tourism [91].

Certifications for regulating ecosystem services can be implemented, such as the Forest Stewardship Council (FSC) certification, which promotes the sustainable management of forest ecological services (FESs). By aggregating FESs into packages, it increases forest owners' income, encouraging resource conservation through established management standards [92].

Effective land management impacts biological diversity and ecosystem services. Understanding how incentivised or non-incentivised conservation in protected areas, environmental service payments, and ecotourism influence ecosystem structure variations is crucial. Additionally, it is necessary to address the effects of constant climate changes. Land management is essential for formulating conservation policies, sustainable initiatives, and human livelihood systems. Efforts to mitigate tourist disturbances and excessive ecosystem resource extraction depend on local contexts and the conservation approaches employed, such as a coordinated mixed effort for tropical forests combining protected areas, PES, and ecotourism [93].

In summary, for sustainable management practices for agro-food products to be effective, the discussion of resilience is critical due to the adaptive governance capacity required for productive ecosystems to withstand the impacts of climatic events. Nationally, Brazil is committed to mitigating climate effects through greenhouse gas (GHG) emission reduction targets, degraded pasture restoration, and implementing Integrated Crop–Livestock–Forest (ICLF) systems. Global warming significantly impacts natural areas and agricultural systems, particularly in tropical environments, due to uncertainties in water and agricultural availability and persistently high temperatures. Integrated decisions among stakeholders at the private property and landscape levels are necessary, including investing in public policies employing technologies that adjust productive systems on sustainable bases to address extreme climatic conditions [19].

Climate change consistently impacts agricultural systems in terms of agro-climatic zoning. Discussions on genetic and physiological adaptation conditions for crop varieties are necessary to prevent the displacement of productive areas. For instance, coffee cultivation in southern and southeastern Brazil may face restrictions, limiting *Coffea arabica* L. cultivation to mountainous areas with average annual temperatures below 23 °C, making 95% of the area unviable [94]. Agricultural Climate Risk Zoning (ACRZ) refers to simulating agricultural scenarios based on regions, cultivars, varieties, and sowing, with respect to Brazil's climatic risks, for subsequent strategy definition in research and development to adapt to global climate change [95].

The Intergovernmental Panel on Climate Change (IPCC) estimates a global average temperature increase of up to 5.8 °C by the end of the 21st century. Recent data from the IPCC's 6th Synthesis Report observed that the global surface temperature increased by 1.09 °C between 2011 and 2020 [17]. These findings show that climate change directly affects ecosystem service provision, necessitating an understanding of climatic factor interactions with the socio-ecological environment. An example is the natural barrier function of oceans, where maritime ecosystems sequester carbon [96].

Brazilian coffee production is characterised by monoculture areas cultivated conventionally under full sun, diverging from its Ethiopian origins, where coffee grows in deciduous forests. Coffee cultivation in Brazil spans 2.18 million hectares, of which only 576 hectares (0.02%) is organic. However, organic coffee is on the rise, leading to certifications for 709,000 hectares (6.7%) of organically cultivated coffee globally. This trend has

increased the demand for specialty coffee of superior quality, achievable through coffee tree afforestation—a technique in agroforestry systems (AFSs) [97].

In Brazil, four major certification initiatives regulate coffee production: the Permanent Coffee Purity Control Program, the Coffee Quality Program, the Sustainable Coffee Program of Brazil, and the Capsule Certification Program. These programmes establish rigorous quality and sustainability standards, ensuring consistency in coffee production methods. The role of specialists in the coffee industry is indispensable in adhering to and promoting these standards. Among these initiatives, the Coffee Quality Circle Program focuses on certifying coffee houses, cafés, and coffee points [98], where expertise and engagement are fundamental to maintaining excellence throughout the certification process.

The role of coffee industry professionals, environmental advocates, and even consumers who value sustainability is invaluable in supporting responsible coffee cultivation. These efforts go beyond protecting the environment; they also contribute to biodiversity conservation, forest preservation, and the maintenance of essential ecosystem services. Additionally, they help strengthen the resilience of coffee-growing communities, ensuring that both people and nature walk together. Every choice, no matter how small, has the potential to create a lasting impact.

The value of coffee goes beyond its consumption; it plays a significant role in tourism, built on three pillars: the product itself, the people who produce it, and the production environment where it is cultivated. As a microclimate-dependent product, coffee develops distinct characteristics in each region, influenced not only by climate and geography but also by the traditions and expertise of those who grow it. This diversity and uniqueness make coffee a culture—coffee farming—where production depends on the subjectivity of the coffee grower, the property, and the multiple activities surrounding the beans throughout the production and commercialisation chain. Understanding and appreciating these aspects contributes to the resilience of agricultural landscapes, ensuring long-term economic viability and environmental balance [99].

3.6. Sustainable Cultivation Techniques: Coffee

Sustainable cultivation techniques not only promote the quality and productivity of coffee plantations but also yield environmental benefits from coffee cultivation, such as forest preservation and biodiversity conservation. Considering the demand for high-quality coffee, sustainable socio-environmental conditions are alternative production methods adopted in coffee cultivation to meet economic, environmental, and social demands. An example of this is agroforestry systems (AFSs), which are defined as a cultivation and management method where woody species are integrated into the same area as agricultural or animal production [97].

When applying the AFS method to coffee cultivation using shaded coffee plantations, it becomes an option to minimise ecological imbalances, maximise the productivity and quality of coffee beans, and foster the socio-economic and environmental development of the region, providing a sustainable production system. However, socio-economic, cultural, and political factors have created barriers to adopting agroforestry systems. Additionally, lower productivity compared to full-sun planting is a challenge. Incentives for AFSs, such as payments for ecosystem services (PES), contribute to the adoption and acceptance of this practice [97,100].

The Brazilian coffee market presents factors that position it as a prominent global producer and exporter, including favourable climate and soil, the availability of extensive arable land, public and private research and development institutions, logistical infrastructure, species and crop diversity, an advantageous international business environment, and regional diversity. However, the country also faces environmental and economic

challenges, such as international coffee price fluctuations, constant climate changes, and sustainability-related issues [101].

Moreover, active involvement of local communities in co-management and co-production practices enhances socio-ecological resilience, ensuring resource sustainability for both ecotourism and food practices. This is particularly effective when the local community offers coffee shops, guided tours of coffee plantations, accommodation on coffee farms, and coffee trade. In parallel, competitive strategies in these areas can improve the quality and productivity of coffee plantations, distinguishing the region through specialty beans and certifications. However, the management of coffee enterprises can vary, even within homogeneous areas, impacting the quality and productivity of the coffee-growing region [102].

Linking food practices to tourism enables reduced waste and rational resource use. Coffee tourism, for instance, incorporates ecological, educational, and gastronomic aspects while leveraging the economic contributions of coffee to local economic sustainability and its role in regional development [98]. Nevertheless, despite its significant potential, coffee tourism requires planning, organisation, and structured knowledge by local coffee-related institutions to ensure efficient management of the services offered within the tourist geographical space [103–105].

Local sustainability is thus based on factors such as the empowerment of coffee landscapes, redefinition of practices and territories, and strengthening of local identity, creating opportunities for community participation and leadership, as seen in the Caparaó Capixaba region [106]. Although there is a trend towards replacing traditional coffee planting with large-scale production techniques that heavily rely on chemical products, integrating coffee production with tourism aims to preserve traditional knowledge, local identity, cultural heritage, regional community development, and shared experiences and knowledge with tourists. Understanding the historical and cultural aspects associated with coffee cultivation helps reveal how the activity shapes community identity [107].

4. Discussion

Theoretical Contributions

Tourism provides localities with pluriactivity through the development and enhancement of new ecosystem service functions. It offers conditioning factors for socio-ecological resilience by promoting a new service chain that, when linked to coffee, starts from the premise of enjoying traditions, culture, and the potential of the environment. However, tourism dynamics require, as a fundamental link, the engagement of residents in conceptualising regional public policies aimed at preserving the authenticity of the experience through the valorisation of local knowledge [108].

Regarding Brazilian ecotourism, there is inefficiency in territorial planning by designating only particular development areas while neglecting other potential areas. Similarly, there is little literature addressing the integration of tourism and ecosystem services in environmentally and sustainably planning Brazilian territory. Thus, the challenge is to implement a scientific basis that allows for the identification of such areas and encourages municipal policymakers to adopt ecotourism practices at the local level [44].

For the community to contribute to lasting policies for ecotourism based on food sustainability and natural resource management, there is a need for open and flexible political environments, opportunities for education and training at the local scale, dialogues between stakeholders, and adaptive local strategies that promote balance in conservation and long-term cultural changes. Furthermore, community participation, as the key point for achieving food sustainability, only occurs through a sense of identity, acceptance, and distributive justice based on the cost–benefit perception.

Thus, the relationship among ecotourism, co-production, co-management, and socio-ecological resilience is based on the following premises:

1. Ecotourism only aligns with environmental conservation when the local community actively participates and holds decision-making power.
2. Environmental education acts as the link between nature conservation and ecotourism.
3. Community participation serves as the connection for self-organisation within sustainable systems and the rational use of natural resources, provided that there is no vulnerability and distributive justice.
4. Knowledge co-production emerges from community cooperation in the process, functioning as the central point between biodiversity and ecotourism, provided that access to environmental education and training is available.
5. A sense of identity and local knowledge, stemming from co-production and co-management, enable the community's adaptive capacity, local environmental resilience, and, consequently, the sustainable development of tourism.

The dotted line on the arrow represents dependence on occurrence, while the symbol circle at the end of the arrow indicates that the preceding term serves as a link to the following term. The symbol rhombus at the end of the arrow further highlights a causal consequence for the subsequent terms.

In this context, the relationship between the elements in Figure 2 develops through the co-production of knowledge and the co-management of decisions, which form the foundation of this relationship. As shown by the dotted line on the arrow, this process can only take place when the community actively engages, reinforcing their essential role in the system.

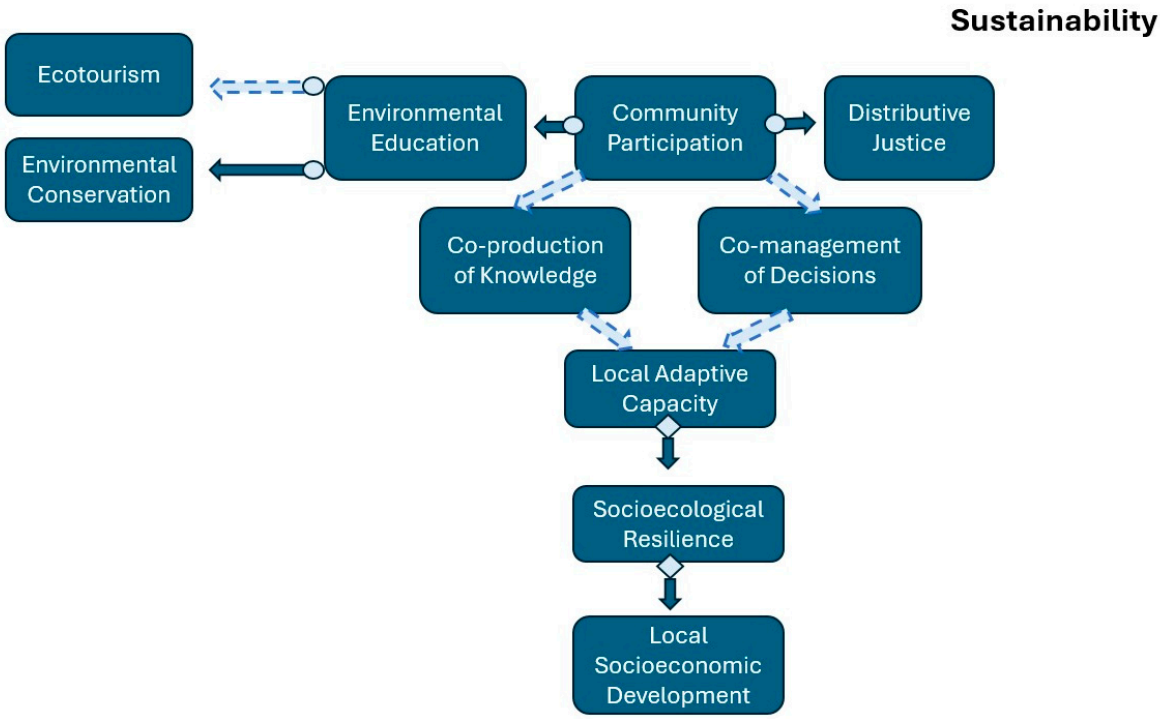


Figure 2. The relationship among ecotourism, co-production, co-management, and socio-ecological resilience in the context of sustainable food management practices.

Similarly, community participation relies on the community awareness of environmental education and the perception of the fair distribution of benefits at the local level. This indicates the fundamental role of environmental education in encouraging community involvement and strengthening a sense of shared responsibility.

Likewise, local adaptive capacity, which is the ability of a community to adapt to changing socio-ecological conditions, hinges on the integration of knowledge co-production and jointly practiced decision co-management. This integration is essential for adopting socio-ecological resilience—the ability of an ecosystem to absorb and recover from disturbances—ultimately contributing to local socio-economic development.

Thus, Figure 2 illustrates how the five premises highlighted above are integrated, representing the connections among these elements in a causally linked and interdependent manner, emphasising that we are all part of a broader, interconnected system.

Integrating these premises creates a holistic approach to achieving socio-ecological resilience through co-management and co-production practices in ecotourism and the environmental sustainability of food practices, as highlighted by [109], who pointed out that granting authority to local communities can lead to a sustainable regenerative socio-ecological cycle for resource use, since adaptive and collaborative co-management strengthens the resilience of socio-ecological systems (SESs). Thus, the analysed studies demonstrate that integrating collaborative and community-inclusive participation through co-management and knowledge co-production is crucial for achieving socio-ecological resilience, which affects food preservation and the sustainable management of resources. Furthermore, the reviewed works underscore the importance of environmental education programmes tied to tourism and flexible institutions open to dialogue with the community.

In this sense, sustainable development of ecotourism can only be achieved by resilient socio-ecological systems that involve the adaptive capacity of communities within the tourism system through knowledge co-production and decision-making co-management processes, as emphasised by [110]. However, these processes are only achieved when the community is aware of environmental education opportunities and perceives distributive justice in tourism's costs and benefits. Consequently, ecotourism becomes a regenerative practice capable of promoting the environmental conservation of food and subsistence systems, as well as local socio-economic development, along with the capacity to restore and adapt tourist destinations.

Moreover, the theoretical findings of this research highlight that community participation, as an essential resource for socio-ecological resilience, only occurs in the absence of vulnerability and with distributive justice. Consequently, knowledge co-production arises from the community's access to environmental education and training. In line with this, [111] emphasises that when ecosystem services are valued by the community, quantifying them is fundamental to attracting policymakers and investors, facilitating the implementation of conservation policies due to the integration of traditional and scientific knowledge, thereby contributing to the adaptive capacity of socio-ecological systems.

Community training and education provide an opportunity to transition from traditional management to adaptive co-management, which ensures long-term maintenance based on collaboration, contributing to the conservation of ecosystems that support local food practices [47]. Therefore, the complex dynamics of SESs require local communities' adaptive capacity to achieve integrated and collaborative policies among government levels and social actors, culminating in lasting cultural changes.

Governance required for the resilience of socio-ecological systems must consider local specificities through socio-ecological assessments that translate political decisions adapted to local capacities and socio-economic contexts. According to [4], the community is a crucial resource for achieving socio-ecological resilience, as a lack of community input in policy planning processes affects its sustainability [77].

Finally, based on the premise that resilience in complex socio-ecological systems leads towards a sustainable regenerative socio-ecological cycle of resource use, the social resilience of communities relies on adaptive capacities developed through three factors:

(1) their participation and empowerment in formulating and implementing conservation strategies, (2) governance mechanisms enhancing the resilience of ecosystem services, and (3) ecotourism as a viable alternative for strengthening the community's adaptive capacity. Thus, resource governance must occur participatively, and the cost–benefit perception of conservation must be understood by all stakeholders, particularly the community.

5. Conclusions

This study aimed to analyse theoretical perspectives on ecotourism, co-production, and co-management to understand how these approaches interact and contribute to the socio-ecological resilience of ecosystems that sustain local food practices. From this, it was found that socio-ecological resilience within the context of ecotourism, when analysing aspects of co-production and co-management of ecosystem services, promotes the sustainability of natural food resources and their sustainable management.

For the resilience of an ecological system, as outlined by, social systems—through local and traditional knowledge, community identity, and a collective sense, alongside institutions and norms regulating these interactions—are crucial for promoting system regulation. Similarly, ecosystem services are valued based on individual subjectivity, highlighting the importance of human action in establishing interactions between conservation and the economy.

The main findings demonstrate that the adaptive capacity of local communities is unique and multidimensional, acting as a link between conservation and the sustainable use of ecosystem services. However, such capacity only manifests when local communities actively participate and are empowered. Moreover, local community participation in the planning and management of ecotourism creates opportunities for environmental education.

Active involvement of local communities in co-management and co-production practices enhances socio-ecological resilience, ensuring the sustainability of resources used for both ecotourism and food practices or agroecosystems. Additionally, socio-ecological resilience is essential for sustainability in ecotourism. Co-management and co-production approaches foster cooperative and legitimate management decisions, thereby promoting social and ecological resilience.

Other crucial findings relate to environmental education, which emerges as a bridge between local economic development and nature conservation, as well as adaptive co-management, which refines the social resilience of local communities and restores complex socio-ecological systems, such as food and agricultural systems. The analysis further highlights the importance of environmental education programmes, flexible institutions open to dialogue with communities, equitable distribution of ecotourism's benefits, and the preservation of natural resources for future generations.

Furthermore, open and flexible political environments provide opportunities for local education and capacity-building, along with dialogue among stakeholders, to develop adaptive strategies that promote a balance between conservation and subsistence systems. For legitimacy and community acceptance, perceptions of distributive justice in cost–benefit sharing are necessary, along with socio-ecological assessments that translate political decisions into measures adapted to local capacities and socio-economic contexts.

Finally, co-production is an essential process for assertive decision-making, due to the involvement of the local community. As ecosystem services are valued by the community, this is fundamental for attracting policymakers and investors, facilitating the implementation of conservation policies. Similarly, the complex dynamics of socio-ecological systems require local communities to have adaptive capacities to achieve integrated and collaborative policies across government levels and social actors, culminating in lasting cultural changes.

Limitations and Agenda for Future Studies

Regarding the limitations of this research, one key constraint is the lack of primary data collection to assess the practical applicability of these findings, as the study is still ongoing. However, this also presents opportunities for future research to explore these areas in greater depth. As a result, there has been no comprehensive evaluation of co-management and co-production approaches in local ecotourism systems, which would enable comparisons with the findings of the selected studies in the literature review. This impacts both the generalisability of the literature's findings and the applicability of the results in developing solutions tailored to specific locations.

Additionally, this limitation makes it more difficult to understand the challenges involved in implementing socio-ecological resilience in sustainable food practices and management. It also limits the ability to assess the direct effects on the socio-economic development of communities and local environmental conservation.

Nevertheless, the findings of this study present an integration of these approaches, emphasising a holistic method to achieve socio-ecological resilience in food practices and management. This approach, based on its premises, balances environmental conservation with the socio-economic development of local communities. Accordingly, the delegation of authority to local communities can lead to a sustainable regenerative socio-ecological cycle for resource use, as adaptive and collaborative co-management strengthens the resilience of socio-ecological systems (SESs).

To advance the understanding of sustainability in ecotourism, future studies should focus on empirical research that evaluates the effectiveness of collaborative and adaptive management practices in different cultural and ecological contexts, based on the social resilience of communities and their adaptive capacities. Moreover, future research should also explore adaptive governance and its implications for resolving conflicts of interest among stakeholders, develop robust methodologies for quantifying cultural ecosystem services, and investigate the role of education and local capacity-building in community resilience and the sustainability of the regenerative socio-ecological cycle of food management practices.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/su17062443/s1, Reference [112] is cited in Supplementary Materials.

Author Contributions: Conceptualisation, A.E.d.S. and K.F.B.M.; methodology, A.E.d.S. and K.F.B.M.; software, A.E.d.S.; validation, A.E.d.S.; formal analysis, A.E.d.S. and K.F.B.M.; investigation, A.E.d.S.; resources, A.E.d.S., K.F.B.M., V.F.S., A.C.S.B. and I.M.S.B.; data curation, A.E.d.S. and K.F.B.M.; writing—original draft preparation, A.E.d.S.; writing—review and editing, A.E.d.S., K.F.B.M. and A.C.S.B.; visualisation, A.E.d.S., K.F.B.M., V.F.S. and I.M.S.B.; supervision, K.F.B.M.; project administration, K.F.B.M.; funding acquisition, K.F.B.M. and V.F.S. All authors have read and agreed to the published version of the manuscript.

Funding: The research leading to these results received funding from FAPESQ—PB Foundation, Edital 04/2021 FAPESQ-PB/CAPES, outorga 341/2024.

Informed Consent Statement: Informed consent was obtained from all subjects involved in this study.

Data Availability Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest: The authors declare no conflicts of interest.

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