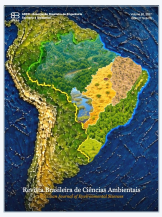
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Gastronomy as a catalyst for the circular economy in tourism: a multi-case analysis of UNESCO Creative Cities in Brazil

A gastronomia como catalisadora da economia circular no turismo: uma análise multicaso das Cidades Criativas da UNESCO no Brasil

Isabel Jurema Grimm[1,2]

Abstract

The circular economy (CE), when applied to food systems, positions gastronomy as a strategic driver. In tourism, this approach promotes local products, reduces waste, and mitigates carbon emissions. In this context, this article aims to analyze how CE principles can be integrated into food systems within gastronomic tourism to promote regenerative tourism by valuing food culture and local products while reducing waste. The study adopted meta-synthesis as its methodological procedure, a qualitative approach focused on the integrated analysis and interpretation of findings from qualitative research on a common topic. In line with contemporary knowledge of CE, food systems, and sustainable tourism, the study also examined Brazil's UNESCO Creative Cities of Gastronomy: Belém, Florianópolis, Belo Horizonte, and Paraty. The results indicate that gastronomy offers a pathway for the transition to circular food systems by strengthening short supply chains, promoting family and agroecological farming, valuing sociobiodiversity, and fostering food-waste prevention and recovery practices. Despite challenges related to governance, infrastructure, and professional training, the cities analyzed demonstrate considerable transformative potential, serving as living laboratories for territorial innovation. The study concludes that consolidating circular food systems in tourism depends on coordinated, integrated public policies; cooperation among producers, chefs, and destination managers; and recognition of gastronomy as a central element of sustainable, low-carbon development.

Keywords gastronomic tourism · circularity · food waste

Resumo

A economia circular (EC), aplicada aos sistemas alimentares, posiciona a gastronomia como um vetor estratégico. No turismo, essa abordagem valoriza produtos locais, reduz desperdícios e mitiga emissões de carbono. Nesse contexto, o artigo tem como objetivo analisar de que forma os princípios da EC podem ser integrados aos sistemas alimentares no contexto do turismo gastronômico, visando à promoção do turismo regenerativo por meio da valorização da cultura alimentar, dos produtos locais e da redução do desperdício. A pesquisa adotou a metassíntese como procedimento metodológico, caracterizada como um estudo qualitativo voltado à análise e à interpretação integradas de achados provenientes de pesquisas qualitativas sobre um tema comum. Alinhada ao conhecimento contemporâneo sobre EC, sistemas alimentares e turismo sustentável, a pesquisa também contemplou a análise das Cidades Criativas da Gastronomia da UNESCO no Brasil: Belém, Florianópolis, Belo Horizonte e Paraty. Os resultados indicam que a gastronomia é um caminho para a transição rumo a sistemas alimentares circulares, ao fortalecer circuitos curtos de comercialização, estimular a agricultura familiar e agroecológica, valorizar a sociobiodiversidade e fomentar práticas de prevenção e reaproveitamento de resíduos alimentares. Apesar dos desafios relacionados à governança, à infraestrutura e à capacitação profissional, as cidades analisadas demonstram elevado potencial transformador, funcionando como laboratórios vivos de inovação territorial. Conclui-se que a consolidação de sistemas alimentares circulares no turismo depende da articulação entre políticas públicas integradas, da cooperação entre produtores, chefs e gestores de destinos e do reconhecimento da gastronomia como elemento central para o desenvolvimento sustentável e de baixo carbono.

Palavras-chave turismo gastronômico · circularidade · desperdício de alimentos

1 Introduction

Global food systems account for approximately one-third of anthropogenic greenhouse gas (GHG) emissions. Furthermore, they are the primary cause of biodiversity loss on the planet. This production model threatens approximately 86% of the species at risk of extinction (UN, 2021; FAO, 2022). At the same time, about one-third of all food produced worldwide is wasted along the supply chain. This waste highlights a serious ethical failure in the face of global food insecurity (HLPE, 2014). It also places unsustainable pressure on land use, water resources, and the climate (Ellen MacArthur Foundation, 2013). This situation demonstrates the unsustainability of the dominant linear food model. This model is characterized by large-scale production, intensive use of chemical inputs, long supply chains, and the growing generation of waste (Lang and Heasman, 2015; Corona et al., 2019). The transition to more resilient, low-carbon systems has become a scientific, political, and social imperative within the framework of the UN 2030 Agenda.

In this context, the circular economy (CE) has emerged as an alternative paradigm to the linear model. The CE prioritizes closing production loops, reusing organic waste, and regenerating natural systems (Ellen MacArthur Foundation, 2013; Corona et al., 2019). When applied to food systems, the CE recovers the nutritional and economic value of discarded products. It transforms co-products into new foods, textiles, or sources of bioenergy. Moreover, it strengthens short supply chains that reduce transport-related emissions (Ellen MacArthur Foundation, 2019, 2021). In the tourism sector, responsible for 8% of global GHG emissions, the CE finds a strategic arena in gastronomy (Ingrao et al., 2023; Strippoli et al., 2024). Gastronomy is the third most common travel motivation worldwide. It plays a central role in highlighting local ingredients, preserving agri-food heritage, and generating regional income (Pérez Gálvez et al., 2017; Grimm and Gomes, 2019; MTur, 2022).

Scientific research on the CE in tourism has advanced substantially since 2020. Recent studies show that circular practices in hospitality and gastronomy reduce the environmental footprint of destinations (Mejjad et al., 2023; Strippoli et al., 2024; Ally et al., 2024). The farm-to-fork approach, agritourism systems, and short supply chains strengthen the territorial symbiosis between rural producers and restaurants (Renfors, 2023). Contributions such as the "3 Cs" framework by Fassio and Chirilli (2023) and the concept of circular gastronomy by Moura et al. (2024) expand the field's theoretical foundation. Regenerative tourism seeks a net-positive impact on ecosystems and local communities (Das and Mishra, 2026). In Brazil, the Ministry of Tourism highlights gastronomy as a fundamental element for socio-productive inclusion and cultural appreciation (MTur, 2021, 2022).

Despite these advances, substantial gaps persist in the scientific literature. The first gap concerns the still-limited conceptual development at the intersection of CE and tourism (De Angelis et al., 2025). The second gap concerns the concentration of evidence in European and Asian contexts, with few studies covering megadiverse countries in the Global South (Macêdo et al., 2025; Almansouri et al., 2026). The third gap involves the scarcity of research on how UNESCO Creative Cities of Gastronomy leverage their heritage to foster circular food systems.

Against this backdrop, this article analyzes how CE principles can be integrated into food systems within gastronomic tourism to promote regenerative tourism. Methodologically, the study combines a meta-synthesis of recent qualitative research (2023–2026) with an analysis of official documents from the four UNESCO Creative Cities of Gastronomy in Brazil: Florianópolis (2014), Belém (2015), Paraty (2017), and Belo Horizonte (2019).

The article's novel contribution lies in the integrated analysis of four central axes. The first axis addresses the valorization of food culture and the preservation of biocultural heritage. The second axis examines the promotion of local products and the strengthening of short supply chains. The third axis analyzes the strategic reduction of food waste through the application of the "Rs" hierarchy. Finally, the fourth axis addresses sustainable and regenerative tourism as an outcome, and the article also systematizes the structural challenges and barriers shaping the circular transition in high-volume tourism destinations.

2 Sustainable food production and distribution systems

Food systems, understood as the set of activities involving the production, processing, distribution, and consumption of food, have garnered increasing attention in light of global challenges in food security, public health, and environmental sustainability (HLPE, 2014; Mello-Thèry, 2018; Corona et al., 2019; Ellen MacArthur Foundation, 2021; Burigo and Porto, 2021). The conventional food system, characterized by large-scale production, monocultures, and the intensive use of chemical inputs, has been criticized for its negative impacts on the environment, human health, and social equity; it is the greatest threat to biodiversity, threatening 86% of the species at risk of extinction (UN, 2021). The dichotomy between conventional and alternative food systems reflects differing approaches to, and values regarding, food production and consumption (Lang and Heasman, 2015).

Alternative food systems seek to promote more sustainable production and consumption models by regenerating natural systems and transforming waste into inputs for new cycles. Organic resources can be repurposed as fertilizers, while co-products are transformed into new food products, textiles, or sources of bioenergy (Ellen MacArthur Foundation, 2019). These systems value agrobiodiversity, local production, and the strengthening of family farming. According to Gliessman (2016), agroecology has emerged as a central paradigm in this context, integrating ecological, social, and economic principles.

Local production reduces dependence on long supply chains, minimizes GHG emissions associated with transport, and drives local economic development. Short supply chains also contribute to waste reduction, as short distances allow for orders that are better aligned with actual demand, thereby decreasing excess inventory and favoring fresh, seasonal products. Gonzalez and Quaresma (2022, p. 17) highlight that the "circular and local economy cannot resolve every

issue within such a vast and complex system, but it is certainly a powerful ally in reconnecting the city with the countryside." Agritourism and family farming play a strategic role by enabling food production and supply through a farm-to-fork approach, representing an environmentally beneficial alternative aligned with CE principles. By adopting regenerative agricultural practices, family farming fosters resilience and food security, improves food quality, and encourages healthier diets, while also helping to mitigate environmental problems such as land degradation.

3 Circular tourism and gastronomy: minimizing food waste

Circular tourism incorporates principles such as reducing, reusing, recycling, and recovering materials and resource flows, thereby mitigating the environmental impacts of the linear model and promoting more sustainable forms of development (Ingrao et al., 2023; Renfors, 2023; Strippoli et al., 2024). Despite its importance, conceptual development at this intersection remains limited (De Angelis et al., 2025). In contemporary tourism, gastronomy has established itself as a key attraction, influencing travelers' choice of destinations and their pursuit of authentic culinary experiences (Pérez Gálvez et al., 2017; Matos et al., 2024; Macêdo et al., 2025). Gastronomic tourism plays a strategic role in promoting circular food systems, contributing to waste reduction and the mitigation of environmental impacts (Pérez Gálvez et al., 2017; Al-Obadi et al., 2022). Local gastronomy adds value to community economies and cultures, preserves culinary traditions, and strengthens regional identities (Gimenes-Minasse, 2023); however, its full development depends on sustainable management practices and the active participation of all local stakeholders (MTur, 2022).

In the Brazilian context, Indigenous influence is evident in the use of cassava, corn, and native fruits; African heritage introduced *dendê* (palm oil), okra, and frying methods; and the Portuguese contributed wheat, sugar, and preservation techniques. This interaction resulted in a unique cuisine based on valuing local ingredients and respecting traditional knowledge. In this context, unconventional food plants (PANCs) expand the range of traditional food offerings and enrich the tourism experience (MTur, 2021), standing out as a competitive advantage capable of boosting the local economy and catering to vegan and vegetarian consumers (Fantinel and Ceretta, 2025).

From a sustainability perspective, food waste is a major contributor to the tourism sector's carbon footprint. When sent to landfills, food waste releases methane (CH_4), a gas with a global warming potential substantially higher than that of CO_2 (FAO, 2022; Ingrao et al., 2023; Krause et al., 2023). Prioritizing local ingredients reduces reliance on long supply chains and encourages ecosystem conservation (Grimm and Gomes, 2019). Innovative agricultural practices and sociobiodiversity ingredients (such as *açaí*, *baru* nuts, stingless bee honey, *jambu*, and mushrooms)[1] expand the biodiversity incorporated into regional cuisine and serve as competitive differentiators (Nascimento, 2022).

International experience indicates progress in the adoption of circular practices within the tourism sector. In Setúbal (Portugal), businesses have incorporated strategies to reduce plastic consumption and use reusable materials, although challenges in raising awareness persist (Carvalho, 2023). Alves et al. (2025) highlight that integrating sustainable rural tourism with the CE offers considerable potential when supported by public policies, collaborative governance, and community participation. Medeiros et al. (2018) emphasize that traditional food practices integrated into tourism strengthen cultural identity and the regional economy, a potential exemplified by the UNESCO Creative Cities of Gastronomy in Brazil. However, De Angelis et al. (2025) point out that, due to its unique nature, tourism presents specific challenges in the transition to a CE.

4 Material and methods

The study adopts a qualitative approach that is exploratory and analytical in nature. The data collection process followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol (Figure 1), involving searches in the Scopus and Google Scholar databases (2023–2026), which were selected for their breadth and relevance in indexing peer-reviewed scientific journals. English descriptors combined with Boolean operators were used: "Tourism," "Circular Economy," and "Food System"; the search was restricted to the title, abstract, and keywords. The inclusion criteria adopted were as follows: peer-reviewed scientific articles; studies using a qualitative or mixed-methods approach; works simultaneously addressing the CE, tourism, and food systems or gastronomy; and full-text articles published in English. Initially, 22 open-access articles were identified, indicating a field with limited literature. After title and abstract screening, 17 studies were found to align with the study's objective. A subsequent review led to the exclusion of five articles based on the following criteria: purely theoretical studies with no application to tourism; duplicates across databases; and articles with low thematic relevance upon abstract review. A re-examination of the articles allowed for an assessment of methodological consistency, relevance, and alignment with the research objective. At this stage, 12 articles were selected for the meta-synthesis (Figure 1).

The multi-case analysis focused on the four Brazilian cities recognized by UNESCO as Creative Cities of Gastronomy: Florianópolis (designated in 2014), Belém (2015), Paraty (2017), and Belo Horizonte (2019). Established in 2004, the UNESCO Creative Cities Network promotes cooperation among cities that adopt creativity and

[1] *Açaí* is the purple fruit of an Amazonian palm tree. *Cupuaçu* is an Amazonian fruit with white pulp, a distinctive aroma, and a sweet-and-sour flavor, used in sweets, juices, and chocolates. Both are officially recognized national fruits, a status that strengthens their supply chains and helps protect Brazilian biodiversity, genetic heritage, and traditional knowledge against biopiracy.

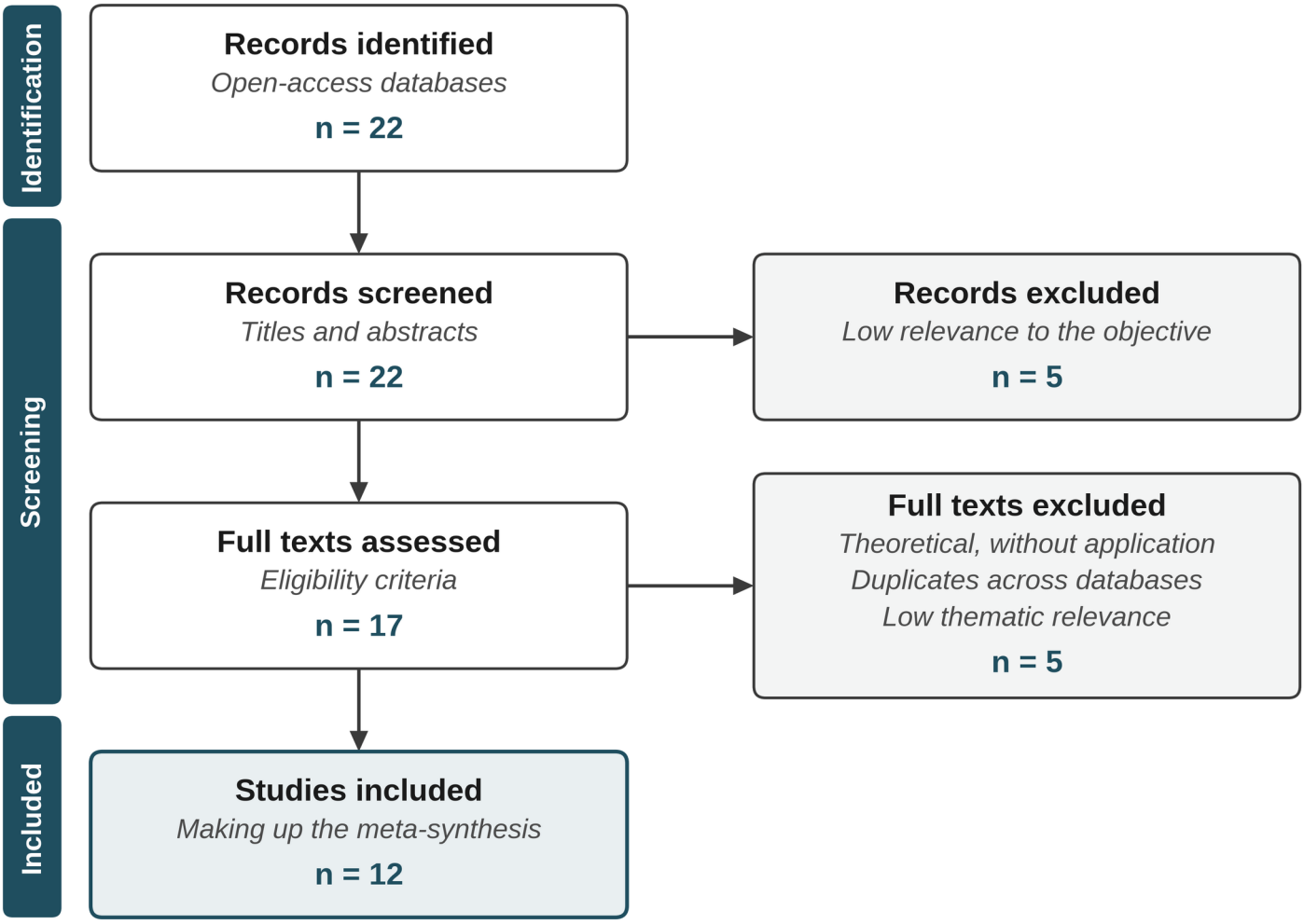


Figure 1. Flow diagram of the selection of studies included in the meta-synthesis

culture as strategies for sustainable development. Membership entails sharing best practices and incorporating areas such as gastronomy, design, crafts, music, film, and literature into urban planning. The designation is renewed every four years and requires reports aligned with the UN 2030 Agenda, which are evaluated by members of the international network (UNESCO, 2015).

The selection of these four units from the pool of Brazilian cities was based on their national tourism relevance, as all are classified solely in Group 1 (A) of the Brazilian Tourism Map (MTur, 2026), which indicates the highest performance in tourist flow, infrastructure, and job creation in the sector. Group 1 (A) comprises 51 municipalities, including the 27 state capitals and other destinations of major national prominence (such as Foz do Iguaçu, Gramado, Porto Seguro, and Búzios). The case analysis relied on official data from the selected municipalities' websites, UNESCO's institutional pages, and public tourism-related databases, supplemented to a lesser extent by scientific articles and bibliographic studies. The choice of official sources was driven by the need to gather up-to-date, institutionally recognized information directly linked to municipal policies, programs, actions, and strategies concerning gastronomy, tourism, sustainability, and the CE. These documents made it possible to identify how each city presents its journey as a Creative City of Gastronomy, which initiatives are formally recognized by public authorities, and what evidence exists regarding governance, the valorization of local products, short supply chains, waste reduction, and the promotion of sustainable development.

It is acknowledged, however, that the available documents and data vary considerably across municipalities in format, level of detail, frequency, indicators used, and thematic emphasis. While some cities provide dossiers, reports, plans, institutional news, and systematized information on gastronomic and tourism programs, others present data that are more scattered, descriptive, or focused on tourism promotion. This heterogeneity hindered full standardization of the comparative analysis and necessitated an interpretive reading guided by common categories derived from the literature and the meta-synthesis. Thus, the analysis did not aim to establish statistical equivalence among the cases but rather to understand, within each municipal context, whether a relationship exists between gastronomy, tourism, and the creative economy.

Epistemologically, the study was grounded in hermeneutic phenomenology (Van Manen, 1990) to enable in-depth interpretation and integration of the meanings attributed by the various authors of the selected studies, as well as to relate these to the chosen cases. To this end, specific procedures were adopted (Figure 2).

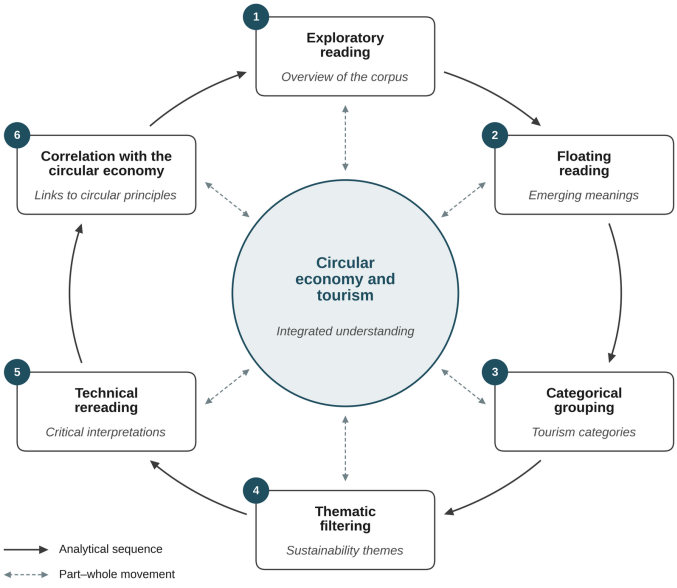


Figure 2. Hermeneutic-phenomenological circle applied to the study

To standardize the analysis through categories, the technique of concept translation and reciprocal synthesis was employed. This technique enabled the translation of concepts from the 12 selected articles (Table 1) and the construction of four central analytical categories: (a) valuing biocultural heritage, (b) promoting short supply chains, (c) reducing food waste, and (d) regenerative tourism, which are addressed in the Results section.

Based on the cycle (Figure 2), each stage was re-evaluated: an exploratory reading of the 12 articles constituting the corpus on sustainable tourism; grouping to organize tourism-sector categories present in the articles (accommodation, supply chain, waste, mobility, gastronomy); thematic filtering to sift the material through the lens of sustainability; and the final stage, which closes the loop by bringing empirical data into direct dialogue with circular principles (reduce, reuse, regenerate) as applied to tourism practices in the cities studied. The cycle repeats, yet each pass brings the interpretation closer to the central theme guiding the entire meta-synthesis.

5 Results

5.1 Integration: circular economy in food systems and tourism

After the exclusion process, 12 articles were selected for analysis. Figure 3 shows the publication year of each article, organized by author, ranging from 2023 to 2026. Most articles (10 of 12) were published between 2023 and 2025, and only two in the most recent year (2026), which indicates a very recent field of study.

Reading the selected articles made it possible to identify the authors' contributions to the analysis of gastronomic systems and how these systems can support strategies for reducing food waste and promoting local value (Table 1).

Table 1 presents a synthesis of the studies underpinning the theoretical integration. The articles defining the pillars of the analytical framework are detailed below to ensure clarity regarding the concepts applied. This integration enabled the identification of four central, shared, and converging themes across the works analyzed: (i) valuing food culture and biocultural heritage; (ii) promoting local products and short supply chains; (iii) strategic reduction of food waste; and (iv) sustainable and regenerative tourism as an outcome.

Regarding the valuing of food culture and biocultural heritage, the integration of the CE begins with the preservation of what the authors term "Cultural Capital and Biocultural Heritage," in which gastronomy is not merely food but a cultural expression connecting the visitor to local history. The use of traditional culinary techniques and native ingredients is identified as a powerful tool for preserving the identity of tourist destinations. The emphasis on meal design incorporates the concept of "circular gastronomy," proposing knowledge and skills focused on re-creation and redesign to foster a sustainable future (Fassio and Chirilli, 2023; Moura et al., 2024; Macêdo et al., 2025).

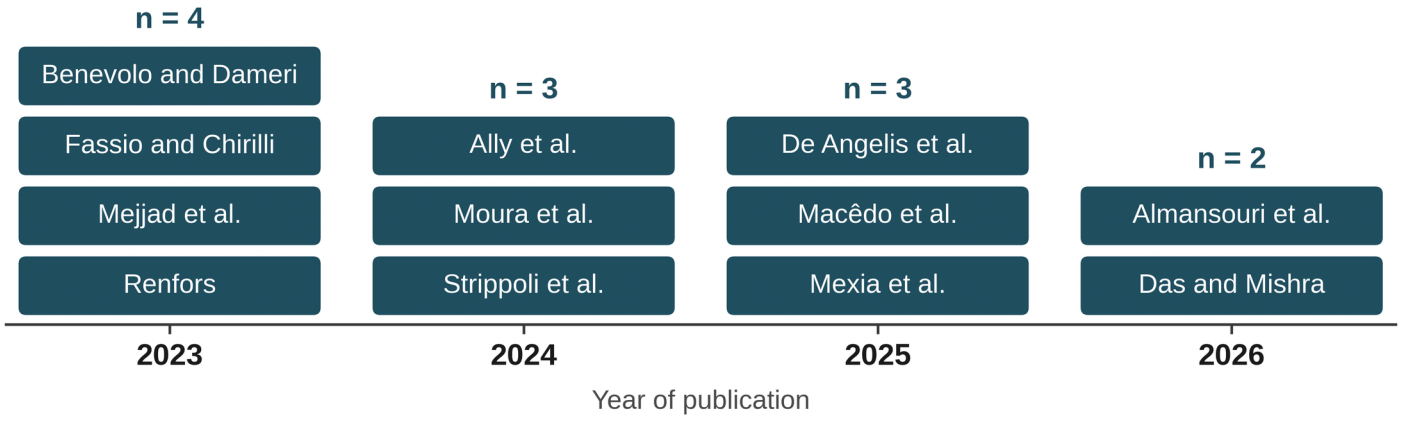


Figure 3. Articles selected for analysis, 2023 to 2026

Table 1. Contributions of the literature to the analysis of food systems in gastronomic tourism

Study	Key concept/framework	Contribution to gastronomy and food systems	Strategies for reducing waste and valuing local resources
Benevolo and Dameri (2023)	Tourism in circular cities	Identifies "food and beverages" as one of the core urban pillars, highlighting its high impact on land and energy consumption.	Encouragement of "zero-kilometer" products, creation of sustainable menus, and implementation of surplus-food recycling practices in the hospitality sector.
Fassio and Chirilli (2023)	"3 Cs" framework	Proposes that the system be based on Capital (natural/cultural), Cyclicality, and Co-evolution.	Preservation of cultural capital (traditional knowledge) to generate fair and well-distributed income.
Mejjad et al. (2023)	SWOT analysis and circular bioeconomy (6Rs)	Analyzes the impacts of tourism peaks on waste generation, food security, and food preservation.	Donation of surplus food, reuse of leftovers as animal feed, recycling of waste into energy and inputs, as well as waste separation and purchasing control in hotels and restaurants.
Renfors (2023)	System-level approach (micro, meso and macro)	Highlights the multiplier effect of tourism on agriculture and on food and beverage manufacturing through circular supply chains.	Focus on the Reduce, Reuse, and Recycle (3Rs) principles and on digital technologies (booking systems) to forecast demand and avoid resource waste.
Ally et al. (2024)	Hotel operations management	Maps the waste flow from the arrival of raw materials to final collection.	Engagement of nearby local suppliers to reduce spoilage of perishable products.
Moura et al. (2024)	Circular gastronomy	Defines circular gastronomy as meal design focused on re-creation and redesign for a sustainable future.	Skill development and design to foster sustainable gastronomy in tourism.
Strippoli et al. (2024)	"R" frameworks (6R and 10R) in the CE	Applies the waste hierarchy (Refuse, Reduce, Reuse, Recycle, Recover, etc.) to the hospitality sector.	Donation of safe surplus food, on-site composting, and conversion of waste into biogas or animal feed.
De Angelis et al. (2025)	Circular tourism ecosystem	Proposes the co-creation of experiences between tourists and local actors, recognizing the vital role of food suppliers in creating social and environmental value.	Use of reusable packaging, surplus donation, portion-size adjustment at buffets, and support for initiatives such as community gardens.
Macêdo et al. (2025)	Sustainability and gastronomy in tourist spaces (markets, fairs, and restaurants)	Treats local gastronomy as a link between tradition, cultural identity, and regional memory, capable of boosting the regional economy by supporting small producers and strengthening the production chain, social inclusion, and community engagement.	Promotion and consumption of local, seasonal ingredients to reduce the carbon footprint; waste reduction through whole-ingredient use and surplus donation; composting and use of organic inputs.
Mexia et al. (2025)	Innovation audit (CTIA)	Focuses on territorial coherence, ensuring that tourism respects local capacities.	Support for cooperatives and closed-loop food systems that promote food sovereignty and social justice.
Almansouri et al. (2026)	Biocultural heritage and identity	Values native ingredients and traditional techniques as a bridge between past and present.	Promotion of local products (such as olive oil and truffles) to avoid standardization and strengthen food security.
Das and Mishra (2026)	Regenerative tourism	Integrates circular resource flows (food, water, and energy) at the destination scale.	Circular resource systems, ecological footprints, and community resilience must interact in feedback loops.

Note: CTIA – Circular Tourism Innovation Audit.

An analysis of the cases reveals how these territories leverage their assets. In Florianópolis (designated in 2014), circularity is evident in mariculture and the small-scale production of oysters (IBAMA, 2004). The "Responsible Consumer Cells" project (Miranda et al., 2021) connects local producers directly to restaurants, thereby reducing logistical losses.

Regarding the promotion of local products and short supply chains, the CE within tourism-related food systems relies on proximity between producers and consumers to close biological cycles. "Zero-kilometer" food initiatives prioritize local suppliers and short transport distances, minimizing the spoilage of perishable goods and the risk of overstocking, while ensuring the availability of fresh, seasonal produce. The "farm-to-fork" approach in agritourism stands out as an effective model in which establishments produce and supply their own food, thereby supporting the local economy and reducing their ecological footprint. The literature highlights the concept of "Territorial Symbiosis," wherein the integration of local farmers into the tourism supply chain creates a mutually beneficial system that fosters inclusive growth and sustainable livelihoods (Ingrao et al., 2023; Renfors, 2023; Ally et al., 2024; Strippoli et al., 2024).

Belém uses its biodiversity as a differentiator. The inclusion of *açaí* and *pirarucu* in short supply chains is supported by the creation

of the Food Museum and the Herb House (*Casa de Ervas*), initiatives that combat food standardization (Vasconcellos and Nunes, 2024). In Belo Horizonte, the focus is on intersectoral governance via the Steering Committee, which analyzes the climate resilience of the Minas cheese chain. In Paraty, the Sustainable Gastronomy Seal seeks to integrate artisanal fishing and *juçara* heart-of-palm production with tourism, aiming to close the biological cycle via composting, although it still faces informality in production (Tomé et al., 2023).

The strategic reduction of food waste is approached by the authors through the "Rs" (Reduce, Reuse, Recycle, Recover), transforming waste into resources. The first step is to avoid over-preparing and, when there are safe surpluses, redistribute them to employees or donate them to underserved communities and food banks. Unavoidable organic waste (husks, scraps) must be recovered and reintegrated into the system through composting to fertilize local soils or through anaerobic digestion to produce biogas and clean energy. There is an emerging opportunity to encourage the acceptance of "upcycled" foods (products made from by-products that would otherwise be discarded) to increase the water and nutritional efficiency of the system (Mejjad et al., 2023; Ally et al., 2024; Strippoli et al., 2024).

Regarding the outcomes of sustainable and regenerative tourism, applying these principles can transform a tourist destination into a circular ecosystem. Shifts in tourist attitudes and engagement with circular practices during tourism experiences, such as opting for seasonal menus and practicing responsible consumption, have the potential to reshape visitors' values, which they then carry over into their daily routines. Unlike traditional sustainable tourism, which focuses on "causing less harm," the regenerative model integrated with the CE seeks the co-evolution of tourism, ecosystems, and communities, resulting in a "net-positive" impact. Technologies such as artificial intelligence (AI) and the Internet of Things (IoT) facilitate real-time waste monitoring, the traceability of local ingredients, and the efficient management of resources such as water and energy (Renfors, 2023; Fassio and Chirilli, 2023; Mexia et al., 2025; De Angelis et al., 2025; Almansouri et al., 2026; Das and Mishra, 2026).

In summary, the authors indicate that integrating the CE into tourism food systems can foster territorial resilience by aligning operational efficiency (manifested in reduced costs and waste) with competitive differentiation based on cultural authenticity and the valorization of local products. This alignment ensures that tourism actually contributes to the regeneration of destinations' natural and social capital. Thus, the analysis provides a theoretical and practical foundation for integrating CE principles into food systems within the context of gastronomic tourism, as evidenced by the UNESCO Creative Cities of Gastronomy in Brazil.

5.2 Gastronomic tourism: the UNESCO Creative Cities Network in Brazil

The Network aims to foster cooperation among cities that recognize creativity as a strategy for economic, social, cultural, and environmental development. Its members commit to promoting culture across eight creative fields: architecture, gastronomy, design, crafts and folk arts, music, film, media arts, and literature (UNESCO, 2015).

Florianópolis stands out as the first Brazilian city to be recognized by UNESCO, in 2014, as a Creative City of Gastronomy. This title is attributed to its diverse cuisine, which integrates local natural resources and traditional practices with contemporary fine dining, serving as a pillar of territorial development and the consolidation of circular food systems (Prefeitura Municipal de Florianópolis, 2026).

Its coastal location favors artisanal fishing and mariculture within the state. Santa Catarina is Brazil's leading producer of mollusks and seaweed, accounting for approximately 97% of national oyster production, with the Ribeirão da Ilha area in Florianópolis being a key hub (Brasil, 2024). This sector acts as a driver of socioeconomic development, generating income and boosting local tourism and commerce.

Artisanal fishing has been included in National School Feeding Program (PNAE) purchases, under legislation requiring that at least 30% of products be sourced from family farming; since 2026, this minimum has been 45% (Brasil, 2025). According to the FAO (2014), promoting short supply chains strengthens the local economy and enhances food security.

Leveraging short supply chains can help decentralize and democratize food production and supply. This strategy can strengthen family farming, reduce food miles, and support sociobiodiversity, seasonality, and local agricultural strengths, while also lowering natural resource consumption and environmental footprints, among other benefits (Parrado-Barbosa et al., 2022). In Florianópolis specifically, agroecological fairs and local markets directly connect producers and consumers (Gelbcke et al., 2018). Agroecology supports sustainable production that preserves biodiversity and reduces the use of pesticides. Local gastronomy emphasizes traditional recipes and ingredients, thereby boosting tourism (Matos et al., 2024).

In Florianópolis, gastronomy drives a complex network involving everyone from fishermen and universities to hotels and public authorities (Gelbcke et al., 2018; Matos et al., 2024). The coexistence of conventional and alternative agri-food systems (Sonnino and Marsden, 2006; Mior, 2010) reflects the importance of local food to the city's tourism identity. Itineraries featuring visits to marine farms and markets cater to tourists' desire for authenticity and traceability, thereby enhancing the visitor experience and fostering prosperity within local communities (Floripa, 2026). Integrating diverse products into the tourism value chain contributes to the sustainability of food systems and creates a compelling territorial narrative, connecting visitors to the land and sea that sustain the local cuisine (Nascimento, 2022).

Belém, the gateway to the Amazon, stands out for its gastronomy, deeply rooted in biodiversity and the traditions of Pará. The use of native ingredients and culinary heritage (encompassing fruits, herbs, fish, and regional dishes) creates a space where local food culture can be truly experienced. Products such as *açaí*, cacao, peach palm (*pupunha*), and Amazonian fish – shaped largely by Indigenous and European influences – lend a unique character to the cuisine and re-

inforce its gastronomic and cultural significance (Cardoso et al., 2026). The city is developing initiatives to promote local cuisine, including the establishment of cultural facilities and projects that strengthen connections between producers, chefs, and consumers. Belém has also gained international recognition as a top global gastronomic destination, highlighting gastronomy as a strategic pillar of local development (Vasconcellos and Nunes, 2024).

Located in the heart of the Amazon, Belém transforms native ingredients into authentic gastronomic experiences found at fairs, markets, and restaurants (Vasconcellos and Nunes, 2024). The Ver-o-Peso Market, one of Latin America's largest open-air markets, epitomizes this dynamic, bringing together regional products and traditional dishes such as *maniçoba* and *pato no tucupi*[2], which preserve Amazonian culinary knowledge and practices (Cities Alliance, 2024).

Belo Horizonte, the capital of Minas Gerais, boasts a rich culinary tradition, with the service sector accounting for over 80% of the city's GDP (Prefeitura Municipal de Belo Horizonte, 2025). Events such as the *Fartura Festival, Viradão Gastronômico*, and the Belo Horizonte Gastronomy Biennial help promote traditional cuisine and position the city as a gastronomic destination (Prefeitura Municipal de Belo Horizonte, 2025).

Recognized by UNESCO as a Creative City of Gastronomy since 2019, Belo Horizonte has made a long-term commitment to policies that promote local cuisine. Following this recognition, the "Belo Horizonte Creative City of Gastronomy" Steering Committee was established; comprising public agencies and the private sector, it is responsible for planning, coordinating, and monitoring initiatives aimed at the sustainable development of the gastronomic sector, directly impacting bars, restaurants, and similar establishments (Prefeitura Municipal de Belo Horizonte, 2024). Key initiatives include the Digital Reputation Program, in partnership with the Brazilian Micro and Small Business Support Service in Minas Gerais (Sebrae Minas); *Inova Gastronomia*, focused on modernizing business models; the 2023 Gastronomy Biennial, which emphasized food security and UNESCO commitments; and the *Ajunta Gastronomia* project, aimed at strengthening the city's culinary identity (Prefeitura Municipal de Belo Horizonte, 2025).

The cuisine of Belo Horizonte reflects the cultural diversity of Minas Gerais, featuring Indigenous, African, and Portuguese influences expressed in traditional dishes such as *pão de queijo* (cheese bread), *feijão tropeiro* (drover-style beans), chicken with okra, and *angu* (cornmeal mush). The use of regional ingredients, such as corn, cassava, beans, okra, *taioba* (taro leaves), and *ora-pro-nóbis*, combined with an emphasis on local meats and meat products, reinforces a culinary identity passed down through generations (Portal Belo Horizonte, 2026). Beyond preserving tradition, Belo Horizonte stands out for its gastronomic innovation, creating contemporary dishes based on seasonality and local production (Prefeitura Municipal de Belo Horizonte, 2024; Portal Belo Horizonte, 2026). Based on the literature analyzed, it can be inferred that this dynamic strengthens circular food systems (characterized by close ties between producers and consumers, a focus on short supply chains, and reduced food waste), thereby shifting the goal from merely generating profit through product sales to creating value based on the circulation of materials and products over time.

Paraty is recognized as a Creative City of Gastronomy for having developed a gastronomic observatory that maps the entire production chain (from agricultural production to the dishes served), consolidating a clear, integrated picture of the local culinary landscape. In recent years, traditional recipes relying on local ingredients and artisanal production methods have been revitalized by chefs and restaurants, boosting cultural and gastronomic tourism. Initiatives such as *Folia Gastronômica* (a gastronomic festival), *Escola de Comer* (a program aimed at improving school meals), and the recognition of Paraty *cachaça* with a Designation of Origin reinforce the territorial identity and economic value of local gastronomy (UNESCO, 2015; Prefeitura Municipal de Paraty, 2025).

Tourism is a key economic activity for the municipality; a notable example is the Paraty Gastronomic Festival, which promotes regional cuisine, highlights ancestral knowledge, and encourages the use of local ingredients, such as fish, seafood, bananas, heart of palm, artisanal cassava flour, and *juçara* pulp. The event fosters community participation and collaborative governance among public authorities, civil society, and the private sector, reflecting a commitment to preserving the Atlantic Forest and Caiçara[3] culture (UNESCO, 2015; Prefeitura Municipal de Paraty, 2025). The gastronomic sector has been strengthened by the creation of the Gastronomic Hub (*Polo Gastronômico*), which brings together local restaurants and encourages direct food sourcing, ingredient traceability, and support for producers. Concurrently, initiatives such as strengthening the seafood supply chain and establishing the Center for Training and the Creative Economy (CEFEC) contribute to professional development, social inclusion, and the adoption of practices aligned with CE principles, such as efficient resource use and waste reduction (Prefeitura Municipal de Paraty, 2025).

Situated in a territory of high biodiversity, Paraty faces structural challenges related to limited arable land, waste management, sanitation, and vulnerability to climate change (Tomé et al., 2023). In this context, the adoption of circular, agroecological, and regenerative agricultural systems emerges as a strategic move to strengthen the local economy, preserve food and environmental heritage, and ensure the resilience of the municipality's tourism and gastronomy sector. Municipal certifications and programs focused on sustainable gas-

[2] *Tucupi*, *jambu*, and *pirarucu* are classic ingredients of the cuisine of Brazil's Northern Region (the Amazon). *Tucupi* is a yellow broth extracted from bitter cassava; *jambu* is an herb that causes numbness in the mouth; and *pirarucu* is one of the largest freshwater fish in the world.

[3] *Caiçara* is the traditional way of life of the populations living along the coast of the states of Rio de Janeiro, São Paulo, and Paraná, formed by the blending of Indigenous, Portuguese, and African peoples.

tronomy demonstrate how the integration of culture, sustainability, and the CE can drive Paraty's territorial development.

5.3 Challenges and barriers to circular gastronomy in Creative Cities

The Brazilian cities designated by UNESCO demonstrate that implementing circular food systems in areas with high tourist traffic (Table 2) can be a compelling strategy. However, for tourism to actually contribute to circular food systems, it must align with the CE and establish value-retention hierarchies, as well as narrow, slow, and close loops, as proposed by Bocken et al. (2016).

An analysis of the four cities revealed certain challenges and structural barriers hindering the full advancement of "Creative Cities of Gastronomy" in Brazil. In Paraty, for instance, territorial constraints create a unique scenario where geography and environmental regulations act as forced catalysts for innovation. With approximately 78% of its territory under environmental protection, the city faces a structural land shortage, making agroforestry systems the only viable path to local food security (Tomé et al., 2023). In this context, adopting circular agricultural systems, which optimize land and natural resource use while promoting regenerative practices and waste reduction, is essential. Furthermore, in Paraty, the use of short supply chains and the proximity between agroforestry systems and the city's Gastronomic Hub could allow organic waste from the hospitality sector to be returned to the land as compost, thereby efficiently closing the biological loop, as proposed by Bocken et al. (2016).

In Florianópolis, the literature identifies different challenges. In this municipality, inadequate training has economic impacts, hindering business participation in the UNESCO program. Compounding this issue is the fact that the program provides neither a budget nor funding for member cities; this acts as an additional obstacle alongside the lack of capacity for project development and the municipality's limited competitiveness (Matos et al., 2024).

The analysis showed that gaps persist across the four cities in stakeholder integration and coordination, along with a lack of dedicated budgets and a shortage of skilled labor, since circularity relies on qualified personnel at every stage, from sustainable agricultural management to table service. Another limiting factor involves inadequate sanitation infrastructure and inefficient municipal solid waste management in these tourist destinations, which can hinder circularity certification (Tomé et al., 2023; Matos et al., 2024; Vasconcellos and Nunes, 2024; Prefeitura Municipal de Belo Horizonte, 2024; Prefeitura Municipal de Paraty, 2025).

The analysis shows that the integration of the CE with food systems in gastronomic tourism first manifests itself in the valuing of biocultural heritage; here, food is treated as a cultural expression that connects visitors to local history and preserves so-called cultural capital. This process is exemplified in Belém, where the use of ingredients from Amazonian sociobiodiversity and traditional dishes (such as *pato no tucupi* and *maniçoba*) counteracts the standardization of food. It is also seen in Belo Horizonte, where PANCs (Fantinel and Ceretta, 2025), such as *ora-pro-nóbis*, can strengthen regional identity and food security.

Short supply chains seek to foster proximity between producers and consumers, operating on "zero-kilometer" and "farm-to-fork" principles to reduce the carbon footprint and the spoilage of perishable goods associated with transportation. In Florianópolis, this territorial symbiosis is realized through the "Responsible Consumer Cells" project, which connects mariculture directly to local restaurants, while in Paraty, the Gastronomic Hub encourages direct purchasing and traceability, ensuring product freshness and seasonality.

Regarding the strategic reduction of waste, applying the "Rs" hierarchy (Reduce, Reuse, Recycle, and Recover) enables the transformation of waste into resources through strategies such as donating safe surplus food and accepting upcycled food products. Cities such as Paraty aim to close the biological loop by composting organic waste from the hospitality sector, reintegrating it into the soil to fertilize local production systems.

Finally, the transition to regenerative tourism requires moving beyond the logic of merely minimizing harm and instead aiming for

Table 2. UNESCO Creative Cities of Gastronomy in Brazil

City	Year of designation	Competitive advantage (ingredients and dishes)	Circularity and governance actions
Florianópolis	2014	Largest oyster producer in Brazil, accounting for approximately 97% of national production. The region also stands out for the production of other mollusks and mullet, as well as for artisanal fishing.	Responsible Consumer Cells project (*Células de Consumidores Responsáveis*); inclusion of artisanal fishing in PNAE purchases, national minimum of 45% from family farming since 2026, under Law No. 15.226/2025 (Brasil, 2025).
Belém	2015	*Açaí*, *pupunha* (peach palm), *tucupi*, *jambu*, and *pirarucu*.	Ranked the world's 7th best gastronomic city (Vasconcellos and Nunes, 2024); creation of the Food Museum (*Museu do Alimento*) and the Herb House (*Casa de Ervas*).
Paraty	2017	Paraty *cachaça* (Designation of Origin), PANCs, banana, and *juçara* palm pulp.	CEFEC (Center for Training and the Creative Economy); Sustainable Gastronomy Seal; 78% of the territory within protected areas (Tomé et al., 2023), which calls for agroecological practices.
Belo Horizonte	2019	Minas cheese, *ora-pro-nóbis*, *taioba*, and *feijão tropeiro*.	Intersectoral Steering Committee; Digital Reputation Program; *Saboreando o Amanhã* project (climate resilience analysis).

Note: PANCs – Unconventional food plants (*plantas alimentícias não convencionais*); PNAE – National School Feeding Program (*Programa Nacional de Alimentação Escolar*).

net-positive impacts and the co-evolution of ecosystems and communities. The experiences analyzed indicate that there is still a long way to go to fully realize the principles of the CE. In this context, closing biological loops (Bocken et al., 2016) within food systems is essential for Creative Cities of Gastronomy to actually contribute to circular food systems.

6 Conclusions

This article aimed to analyze how CE principles can be integrated into food systems within the context of gastronomic tourism, with the goal of promoting regenerative tourism by valuing food culture and local products and reducing waste. The study highlights that gastronomy can serve as a strategic driver for establishing circular food systems in tourist destinations by strengthening local production networks, reducing food waste, and valuing cultural and biological diversity, while focusing on closing the natural biological cycle in accordance with CE principles.

An analysis of the UNESCO Creative Cities of Gastronomy in Brazil demonstrates that local governance and cultural heritage are central elements in driving the transition toward a CE. Although the findings are situated in the Brazilian context, they offer analytical insights applicable to other destinations seeking to integrate sustainability, culture, and economic development.

The four Brazilian Creative Cities of Gastronomy follow distinct paths in incorporating the principles of circular food systems. While Florianópolis and Belo Horizonte stand out for strengthening short supply chains and institutional governance, Belém demonstrates the potential of Amazonian sociobiodiversity to add value to food systems, and Paraty moves toward a regenerative perspective by integrating agroforestry systems, cultural heritage, and the closing of biological cycles. Collectively, these cases reveal that the transition to circular food systems does not rely on a single model, but rather on each territory's ability to coordinate its ecological, cultural, economic, and institutional assets around strategies capable of reducing resource use, retaining value, and regenerating ecological processes.

Establishing circular food systems relies on integrated public policies; collaboration among producers, chefs, and destination managers; and the prioritization of food produced locally using regenerative practices. Preventing waste requires logistical improvements, the alignment of supply and demand, and the redistribution and creative use of surplus food.

Local food production serves as a pillar of regenerative tourism; it boosts the economy by keeping financial resources within the community, reduces the carbon footprint associated with transportation, celebrates cultural identities through authentic cuisine, and strengthens short supply chains. Furthermore, it fosters circular practices (such as organic waste composting), enhances product transparency and traceability, and increases the resilience of food systems in the face of global crises. Gastronomic itineraries that connect visitors with producers, markets, and seasonal restaurants enrich the tourism experience and reinforce narratives rooted in the land and sea.

Brazil's Creative Cities of Gastronomy showcase the potential of cuisine as a tool for social, economic, and environmental transformation. However, structural challenges persist, such as insufficient professional training, a lack of dedicated funding, and weak integration among stakeholders in the tourism and gastronomy value chains. Overcoming these gaps requires investment in skills development across the entire chain and enhanced institutional coordination.

Taken together, these cases demonstrate that tourism's primary contribution lies in its ability to link production, distribution, consumption, and post-consumption within a single territorial food system. Yet they also reveal that proximity and cultural authenticity alone are insufficient to define circularity. Circular food systems require strategies capable of reducing resource use, retaining value, and closing biological cycles through the recovery and reintegration of organic waste and nutrients. This is an area where future tourism research can make substantial strides.

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Grimm, I.J.: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing.

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