Perspective

Tackling Food Waste in the Tourism Sector: Towards a Responsible Consumption Trend

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Abstract: One of the significant problems of planet Earth is related to food production and consumption. This paper evaluates the role of the tourism sector in generating food waste as well as its potential to drive sustainability. Tackling food loss and waste is acknowledged as urgent, both for the people and the planet. Food waste is particularly problematic in industrialised regions, impeding the fulfilment of the Sustainable Development Goals. Although most of the wasted food originates in households, the contribution of the tourism sector is still relevant. A multidisciplinary reflection is thus carried out to assess the impacts of tourism on food production and consumption, linking them with cultural landscapes. By taking the UK as a case study, common problems of the sector are exposed, including dealing with food that remains uneaten, and the need to accurately assess food waste. Data gaps and guidance in measuring food waste are discussed, and suggestions for mitigating this issue include increasing food literacy, reducing food demand, and implementing sustainability business awards. Initiatives such as zero-waste restaurants are paving the way for mainstream changes in reducing food waste, thereby addressing climate change, increasing food availability and helping to alleviate hunger and malnutrition worldwide.

Keywords: responsible consumption; climate change; sustainable tourism; food waste; sustainable gastronomy

1. Introduction

We live in a world where about 828 million people were undernourished in 2021 [1] and 1 billion tons of edible food go to waste every year [2]. Now more than ever, the vast social and economic impacts brought about by the global COVID-19 pandemic have put a spotlight on the interconnected issues of food security and food waste (FW) as well as the need to address both in a global sector, such as tourism [3–5].

Anthropogenic actions have led to climate emergencies, threatening our survival, and causing issues like non-communicable diseases, water scarcity, hunger, and social unrest. Extreme weather, wildfires, rising sea levels, and disinformation exacerbate these problems [6].

This review paper analyses how altering our perception of consumption and production can lead to systemic change and to a healthier world, aligned with all sustainability pillars. So, this study delves into the role of the tourism sector in managing food waste and its potential to champion sustainability. Addressing food loss (generated in the food production stages) and food waste (during the later stages of the value chain) are seen as paramount for both the people and our planet. Food waste, the edible food that remains uneaten, is particularly rife in industrialised regions, hindering the achievement of the Sustainable Development Goals, notably SDG 12 (sustainable production and consumption). While the majority of wasted food originates from households, the tourism sector's

contribution cannot be overlooked. The need to promote sustainability in the sector has been noted by international organizations and different authors, notably in tackling FW and addressing SDG12 [4,5,7–9]. Therefore, the present paper adopts a multidisciplinary approach in assessing the implications of tourism on food production and consumption, and in connecting them with cultural landscapes. The current paper examined the connection between tourism and food consumption and their potential to either contribute to natural degradation or promote sustainable behaviours. With this in mind, the researchers advocated for encouraging simple local actions, such as promoting local ancient food cultures, seasonal foods and zero-waste cooking styles. With the right motivation, such actions may have a multiplier effect in initiating the systemic regenerative transformation needed to adapt to climate change and reverse some trends. The present paper provides a multidisciplinary reflection about the positive and negative impacts of tourism on the way food is produced and consumed, and the linkages to cultural landscapes. Within this framework, we start by providing some historical background and context, and then focus on analysing the complexity of the issue of FW in the tourism sector, from causes to effects. Finally, we provide some practical ways to mitigate these issues and options to explore best practices for adapting to the expected consequences of climate change.

2. Sustainable Development as an Alternative or as a Must

2.1. Historical Context

Since the inception of the industrial revolution in the 19th century, it has been widely accepted that technological advancements (and industrial mass production) generate economic growth, improve the quality of life, and promote social stability. The most developed countries attempted to enhance individual well-being by promoting the consumption of goods and services, which in turn led to an increase in productive activities, fed by extracted natural resources (from coal to agricultural produce). This linear economic model follows the economic doctrines of Keynes [10], which promote an increase in the demand for goods and services, expansion of supply, industrial development, and job creation. However, this development model implies the indiscriminate use of natural resources within productive activities. These are overriding planetary boundaries, generating waste that is deleterious for natural resources required for productive activities, notably food production. These anthropogenic actions are the root cause of global warming, biodiversity depletion and more, threatening the survival of our species [6]. In view of the acknowledged problems, alternative economic models have been proposed, stressing circularity and biodiversity conservation and bringing ecology and economics together, such as in the so-called Dasgupta report [11]. Pioneering political decisions and laws, such as the Paris Agreement [12] and the European Climate Law [13], have been implemented in some parts of the world and mostly ignored in other places where laws do not promote environmental or social protection.

The magnitude of environmental damage, that can be caused by the current socio-economic model, was noticed even in the early times of the industrial revolution. Measures were implemented to tackle the identified specific issues (Table 1). Action seemed to be more rapid and local during the onset of the industrial revolution, when problems were new and caused concern.

More and more environmental disasters, after the initial ones, have been acknowledged but not so clearly assumed to be of anthropogenic origin (Table 1). After the Second World War, environmental issues increased, hand in hand with the technological developments based on the multiplication of fossil fuel uses, from power generation to plastic packaging. As the reader is certainly aware, most often accountability or damage repair do not seem to be considered, as in the countless ocean oil spills.

Table 1. Prominent environmental and public health disasters acknowledged to be caused by industrial pollution.

Date	Place	Short Description of the Damage	Law/Mitigation Measures	Ref.
1850s	UK	Crop destruction, death of animals, and public health issues with casualties; Cause: heavy air and water pollution from the industrial production of NaOH, vital to textile and soap industries	Alkali Act of 1863; the release of poisonous chemicals by such industries begun being monitored.	[14]
1860s	UK	Crop destruction, respiratory diseases; Cause: poor quality air with airborne particles, released by industrial plants	Public Health Act of 1875 dictated that chimneys had to be tall enough to release gases and particles away from the ground.	[15]
1950s	Japan	Human fatalities caused by methylmercury poisoning released by industries into water (Minamata Bay).	In 2013, the UN implemented the Minamata Convention to prevent Hg poisoning and to control discharges to the environment.	[16]

In the 1960s, various civil society organizations questioned the limits of the current development model that was causing economic crises and environmental deterioration. Firstly, it took place in developed countries and later in less developed ones where wages are lower and concerns with environmental damage are recent (e.g., Amazon deforestation). Environmental debates between 1960 and 1980 focused on the growing demand for the use of non-renewable resources of this model based on extracting–transforming–consuming–discarding. There is continuous pressure to extract more and more resources to support the increased demand and the underlying economies of scale. As a result of these debates, the Brundtland Report introduced the concept of sustainable development as a solution to the global crisis. It was defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs [17]. However, the mode of production has remained unchanged.

Quoting Sir David Attenborough, "Today, we ourselves, together with the livestock we rear for food, constitute 96% of the mass of all mammals on the planet. Only 4% is everything else—from elephants to badgers, from moose to monkeys. And 70% of all birds alive at this moment are poultry—mostly chickens for us to eat. We are destroying biodiversity, the very characteristic that until recently enabled the natural world to flourish so abundantly. If we continue this damage, whole ecosystems will collapse. That is now a real risk." [11].

2.2. The Great Problem: Consumption

Consumption is perceived as an intrinsic process of society; it is a "biological function" that has occurred throughout human history. It is noteworthy that in the Agenda 21 program, consumption is considered as the most significant cause of the continued deterioration of the global environment. In the Rio Declaration, the unsustainable patterns of consumption and production were highlighted [18]. Additionally, the concept of "Sustainable Consumption" was born at the Rio de Janeiro UN Conference, in 1992 [18].

Moreover, in 2000, the Millennium Development Goals (MDGs) were conceived [19] and later replaced by the Sustainable Development Goals (SDGs) in 2015 [20]. The 17 SDGs consist of 169 targets to be achieved by 2030, with 232 associated global indicators [21]. Expectations that the SDGs would stimulate action over the next decade were high in areas of critical importance for humanity and the planet. However, with a few exceptions all countries are underperforming in meeting the SDG targets [3,6,11,21].

Sustainable consumption and production, now translated into SDG 12, has been a recurring topic in all environmental summits since the establishment of the MDGs.

This paper specifically addresses SDG 12, titled "Ensure sustainable consumption and production patterns" from the point of view of tourism, when regarding leisure as a "good" and stimulating its consumption [4,5].

As a prelude to what we will state in Section 2.1, we should highlight herein that because of the excess consumption of resources by a growing human population, we have been crossing planetary boundaries and threatening planetary equilibrium, thereby compromising the survival of our species [22]. According to the Intergovernmental Panel on Climate Change (IPCC), climate-resilient development integrates mitigation and adaptation actions. Maintaining the resilience of the ecosystem services, which we depend upon, demands equitable and effective conservation efforts at a global level [6]. Moreover, according to the same report, agriculture is currently one of the major drivers of biodiversity loss, soil degradation, water pollution and more. However, food can be also a cultural asset valued by tourism (e.g., regional gastronomical routes) or destroyed by it (e.g., mimicking global food habits instead of enhancing local seasonal foods).

The tourism sector has undoubtedly a large impact on economic, social and environmental outcomes, and needs to accelerate the shift towards sustainability in meeting SDG 12 targets [4,7–9].

Tourism requires a lot of water, energy and products from agriculture and the food industry and will continue to do so in the future. However, the magnitude of FW in the tourism sector has been acknowledged. A program to tackle it was developed: the Global Roadmap for Food Waste Reduction in the Tourism Sector [4]. The Roadmap sets out how the tourism sector can contribute to the achievement of target 12.3; in other words, halving FW globally by 2030. It also provides an action framework to accelerate FW reduction in tourism, sharing practical insights and guidance for the sector, with a particular focus on accommodation providers and cruise lines to scale up impacts [4,9]. It outlines how to set sustainable business targets, shows examples of methodologies to measure progress, suggests actions that can be incorporated into a business' action plan, and also states how progress should be reported [9].

2.3. What if the Tourism Offer Infinitely Grows?

Ceaser Augustus, a Roman emperor, governing in a wellness period of European History, had the idea of granting a summer leisure period to labour workers. This very idea was revamped in the second half of the 20th century, allowing white and blue-collar workers from industrialized countries to spend vacations abroad [23]. Travelling to warm sandy beaches has been further encouraged by low-cost flights and accommodation, particularly attracting more and more tourists to the Mediterranean region and to some island states, thereby increasing the pressure on natural coastal habitats [24–26]. Tourism business models have been disregarding the fact that territories and cities (and all tourism attraction spots in general) reflect peculiar natural, historical and cultural features that are not compliant with the mainstream model of mass tourism. This also impedes cities' resident mobility, creates problems in accommodating parking nearby touristic sites, and stimulates bad practices by entrepreneurs. Often, local businesses offer low-quality and non-authentic services and products to meet low price expectations by misinformed tourists. Therefore, uncontrolled mass tourism negatively affects local economies in the medium to the long-run by masking the region's unique features, which are ultimately what visitors want to find and enjoy.

In a constantly changing world, the pursuit of sustainable food systems and responsible tourism practices have gained importance in recent decades. On one hand, travelling may enhance awareness about natural and cultural assets and tolerance towards different cultures. On the other hand, unregulated tourism expansion has been noted as a driver of degradation of natural and cultural assets and monuments, gentrification and intolerance. Therefore, tourism businesses are being challenged to become sustainable from social, economic and environmental viewpoints.

2.4. Can Tourism Help to Promote Sustainable Food Habits and Climate Adaptation?

The relationship between "food" and "tourism" is key because both are desirably culture-related activities. Food is much more than a sum of nutrients because food choices have been driven by emotions, beliefs and cultural features, and shared meals are moments of leisure and social interaction. Travelling is culturally enriching and contributes to increased tolerance and promotes dialogue between regions. Inspiring examples of sustainable tourism have been reported and are worth mirroring [27]. Similar to tourism, food-value chains (including the food we waste) are damaging to our health and to the planet, as they significantly contribute to greenhouse gas (GHG) emissions, biodiversity loss and more [28,29]. In this sense, gastronomic tourism routes can be more than just a niche market to explore, as they commonly rely upon showcasing the best of local, seasonal and traditional foods, associated cultural assets and corresponding landscapes. Thus, with a close inspection of ancient food cultures (e.g., Mediterranean, Asian or South American diet), it becomes evident how they have met human needs, while preserving nature, and complying with the EAT-Lancet Commission findings to feed a growing population within planetary boundaries [30].

The cultural dimension of sustainable food habits may be leveraged by tourism, as several ancient food cultures positively impact human health [31–33] and are well integrated with the landscape, as is the case of the Globally Important Agricultural Heritage Systems [34].

Tourism presents an opportunity to promote sustainable food systems, as it can influence the demand for local products, contribute to economic diversification and encourage the conservation of food heritage [27,31,35]. Tourism experiences can be transformative and they can promote societal changes [8] by enhancing wellness and well-being of the local population through the creation of new jobs and more inclusive local value chains, which are linked to the territories. For tourists, it brings about an opportunity to leave a positive footprint and to travel with purpose, and can lead to numerous positive effects when it comes to the transformation of the whole "tourism ecosystem" through behavioural changes [7,8,27,31].

Optimizing supply chains can contribute towards reducing FW, improving product quality and safety, and strengthening the resilience of food systems [3,5,9,36]. In addition, sustainable supply chains can promote the inclusion of small producers and local communities, promoting a more equitable distribution of benefits and risks [37]. Key strategies may include promoting the certification of sustainable products, developing public policies that encourage the production and consumption of local foods, and implementing responsible tourism practices that value food heritage conservation [7,9,35]. In our opinion, it is also essential to strengthen the capacity of small producers and local communities to participate in supply chains through training, technology transfer, and access to financing [37].

Collaboration between the public, private, and civil society sectors is crucial for addressing the challenges and for seizing the opportunities presented by sustainable food systems, tourism, and supply chains [26,38]. The design and implementation of effective public policies and regulations can facilitate the transition to more sustainable and equitable practices, while the private sector can play a key role in sustainable innovation.

3. Tackling Food Waste in Tourism

3.1. How Could the Tourism Sector Contribute in Tackling Food Loss and Waste?

FAO defines food loss as the decrease in the quantity or quality of food due to the decisions taken early in the value chain by producers and intermediary actors, excluding retailers, food service providers and consumers [36]; this is monitored by SDG12.3.1 [39]. Food waste refers to "the decrease in the quantity or quality of food resulting from decisions and actions by retailers, food service providers and consumers", at the end of the value chain [36]. It is targeted by SDG 12.3: "by 2030, halve the per capita global food waste at the retail and consumer level, and reduce food losses along production and supply chains including post-harvest losses".

Food loss and waste together make up about $\frac{1}{4}$ of all food produced for human consumption, exposing the loss of efficiency of the mainstream food system [36].

The total edible food that is wasted is much larger in regions, such as the US and industrialised Asia than in the Global South. It ranges from 42% of the total calories produced in the US and Oceania to 15% in Latin America [3]. According to the same source, more than half of the wastage occurs at the point of consumption in wealthy regions, including Europe, while in the Global South (the origin of many crops that are globally distributed) most of the losses are at the farm and storage level [3].

This waste directly compromises the advancement of SDG 2, and indirectly aggravates climate change, because the uneaten food is often disposed of in landfills, generating GHG emissions, contaminating soils, and facilitating the spread of plagues and diseases.

Taking the UK as a case study, when analysing the patterns of FW, it was found that the highest levels of FW were associated with younger age groups. The most typical example is a young family, eating out frequently, poorly managing their food behaviours, and with low confidence in their cooking skills. Even if more than 70% of FW originates in households, the contribution of the hospitality and food service sector is considerable (13% and 0.8 Mt in a year) [40]. If the whole tourism sector would undertake actual actions, businesses would be profited in terms of cost savings (e.g., disposal costs), as well as in social and economic value creation, with reputational returns and enhanced stakeholder engagement. In addition, its impact could be reflected in other sectors, notably by setting guiding examples for consumers' behaviours.

In the hospitality tourism subsector, FW is classified into two categories: edible parts and associated inedible parts. For example, bones are associated parts of some cuts of meat and constitute inedible food residues. Figure 1 displays the sources of FW in decreasing order of magnitude, taking the UK as an example and sourcing the data from [40].

As can be seen in Figure 1, the food parts categorised as inedible (and unavoidable) accounted for approximately 26% of all food wasted in the hospitality industry, food services, and retail food stores in the UK, in 2013. On one hand, this means that the remaining 75% of FW is avoidable. On the other hand, the tendency to challenge such a categorization without compromising food safety [41], while taking other actions [42] is nowadays more than trendy. This trend is increasing rapidly, as noticed by magazines such as the Financial Times [43].

In Figure 1, when inspecting the FW categorized as "edible", it is noteworthy that 35% are wasted calories from carbohydrate sources, such as potatoes, bread, pasta, and rice.
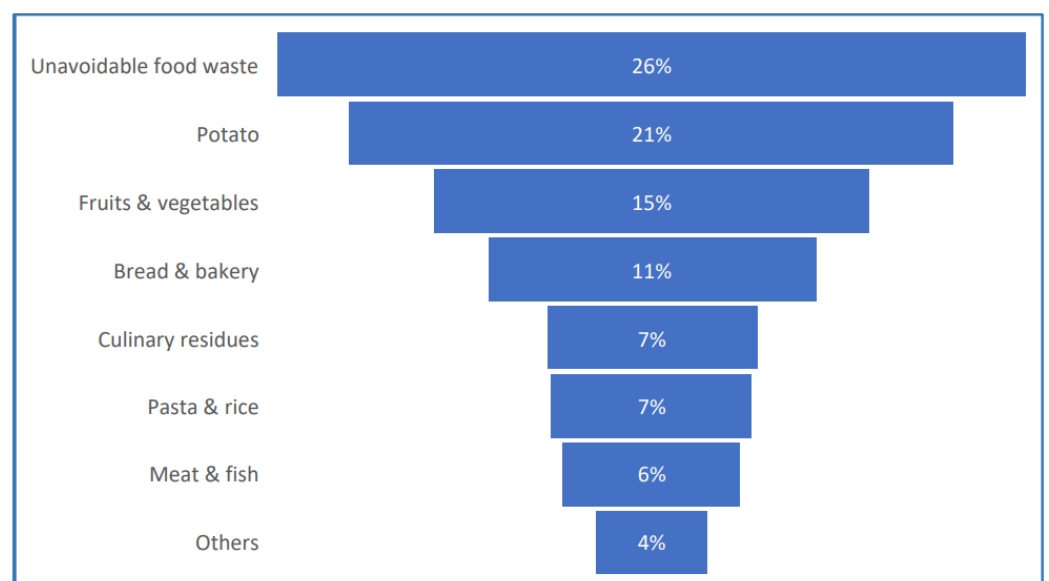

Figure 1. Food waste in the UK hospitality and food service sector by type in 2013 (data source: [40]).

Indeed, even if the majority of food wasted by the hospitality sector in the UK in 2013, was unavoidable (26%), the sum of the FW categorized as carbohydrates, fruits and vegetables, and meat and fish, still amounted to 60%, representing a shocking amount of avoidable uneaten food.

3.2. Problems with the Measurements of Wasted Food

When addressing FW in tourism, we have to talk about the problems with measurements and consequent difficulties in tackling it. Data gaps on how and when FW is generated and its composition result from unclear methodologies for measurement, whose associated level of error and degree of confidence are unknown. It therefore leads to the lack of evidence-based estimates on potential savings, cost of measures, and return period of investments. In addition, it is difficult to set targets due to the lack of information on average waste generated by different types of businesses, despite the recent and constantly improved datasets [5,9,38,39].

Current solutions encompass tackling the growing demand for more and more food, often above reasonable quantities. This results in obesity (and consequent public health problems) and FW (and consequent economic losses and environmental damage). The researchers believe that reducing food wastage (FW) in the hospitality sector, in parallel with the implementation of sustainability business awards, and measures to increase food literacy, for example, showcasing a delicious, balanced and varied daily menu in accordance to the reference range of 1800–2500 Kcal/day) [44], will be highly effective. Significant reduction in FW can be achieved by planning menus in advance, targeting zero-waste meals, standardising FW measurements, dialoguing with food authorities about the "best of" dates in food packages, and finally, stimulating healthy food habits and serving adequate portions.

Therefore, FW reduction could be a key strategy for addressing climate change. In the tourism sector, this can be particularly relevant because those who travel more are from more industrialised regions (Global North) and are likely to reproduce their home behaviours everywhere (recall the figures in Section 3.1). This has significant consequences for food security, as it implies a lower availability of food for the global population, especially in regions where food insecurity is a persistent problem [36–38]. Reducing FW could significantly increase food availability and contribute to alleviating hunger and malnutrition worldwide [3–5,8,9,27].

4. Concluding Remarks

The issue of FW in the global context of hunger cannot be overlooked, especially considering the role of the tourism sector. A link has been identified between tourism and FW, which is particularly prevalent in industrialised regions such as the United Kingdom, and has direct consequences for the achievement of the Sustainable Development Goals. Particularly concerning is the association of higher FW levels with younger demographics, indicating a need for increased education and awareness. While households contribute significantly to FW, the role of the hospitality and food service sectors cannot be underestimated. It is evident that more accurate measurement tools for FW are required, and that a multifaceted approach to address this problem is necessary. This should include strategies such as reducing food demand, increasing food literacy, and implementing sustainability business awards. Overall, reducing FW has been identified as a critical strategy for mitigating climate change, improving food security and helping to alleviate global hunger and malnutrition.

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