

From Carbon Footprints to Green Getaways: The Role of Logistics in Sustainable Tourism

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Abstract: Tourism, while boosting global economies, significantly contributes to greenhouse gas emissions, with transport logistics as a major driver. This article examines how rethinking tourism logistics—through green supply chains, local sourcing, circular economy models, and technological innovation—can reduce the sector's carbon footprint. It also addresses the challenges of implementation, especially in developing regions, and emphasizes the need for coordinated efforts to make tourism environmentally sustainable, socially inclusive, and economically resilient. Overcoming barriers like high setup costs, limited infrastructure, and policy gaps is essential. With innovation and collaboration, logistics can transform tourism into a force for climate responsibility.

Key words: sustainable tourism, green logistics, carbon footprint, supply chain management, circular economy, environmental impact, tourism emissions, transportation, climate change, eco-friendly travel.



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Tourism is a double-edged sword: while it fuels economic growth, it also accounts for 8% of global CO₂ emissions, with transport logistics being the largest contributor (UNWTO & ITF, 2019). A 2018 study in *Nature Climate Change* revealed that tourism's carbon footprint is three times worse than prior estimates, driven by air travel, resource-heavy accommodations, and unchecked waste (Lenzen et al., 2018). However, the rise of 'green getaways' signals a shift—87% of travelers now seek sustainable options (Booking.com, 2023), and the logistics behind tourism (from electric airport shuttles to zero-waste supply chains) play a pivotal role in this transition. This article explores how rethinking logistics—from transport networks to circular economy models—can turn high-carbon tourism into a force for environmental stewardship.

The carbon footprint of tourism encompasses both direct emissions, such as those from burning fuel in vehicles, and indirect emissions embedded in the goods and services tourists consume, like food, accommodations, transportation, and shopping. To fully grasp this footprint, it's essential to consider the entire life cycle and supply chain of these tourism-related products and services. The global tourism industry's carbon footprint is shaped primarily by two factors: the demand for tourism-related goods and services and their carbon intensity, or the emissions produced per unit of activity. Between 2009 and 2013, global tourism spending surged by 7% annually, or 30% over

five years, outpacing reductions in carbon intensity (down by 2.7% annually or 12.9% over the period). This imbalance led to a 3.3% annual increase in tourism's global carbon footprint, totaling a 14% rise over the five years (Lenzen et al., 2018).

Wealth plays a significant role in shaping tourism's carbon impact. As affluence increases, so does per capita carbon footprint, since wealthier individuals tend to travel more frequently and consume more resource-intensive services. Technological improvements, such as energy-efficient systems, reduce emissions to some extent, but their impact is relatively weak compared to the influence of rising wealth. Interestingly, time alone doesn't significantly affect the carbon footprint (Lenzen et al., 2018). Tourists from high-income countries typically demand more energy-intensive services, such as air travel, shopping, and upscale hospitality (e.g., hotels and restaurants), which generate substantial emissions from transport and manufacturing. In contrast, tourists from lower-income countries rely more on basic necessities like unprocessed food and road transport, resulting in emissions largely from agriculture (e.g., methane from farms) and ground travel.

Air travel, often seen as a major culprit, accounts for about 20% (0.9 GtCO₂e) of tourism's global carbon footprint. This figure is lower than might be expected because it includes emissions from food, shopping, and upstream supply chains, which are less significant for aviation but make activities like food consumption comparably carbon-intensive due to non-CO₂ greenhouse gases like methane. These facts highlight the complex relationship of consumer behavior, economic factors, and supply chain dynamics to ensure tourism brings positive environmental impact (Lenzen et al., 2018).

However, achieving sustainable tourism depends heavily on adopting eco-friendly practices and innovations. Scholars highlight that a key barrier in advancing sustainable tourism lies in effectively implementing green principles and initiatives into action. The connection between green solutions and sustainable tourism is particularly visible in areas like green logistics (Perkumienė et al., 2020), which involves managing tourist flows especially in popular destinations) decreasing traffic congestion and noise pollution, and addressing other environmental concerns. These aspects are often regulated through legal frameworks.

The ideas of green logistics and green transport have been explored from multiple angles. For instance, Researchers examined how green logistics and transport can be improved for tourist sites, proposing strategies for better development from both governmental and business sides. Other studies have investigated different sustainability measures in tourism, while some stress the importance of green transport in minimizing the ecological footprint of urban households and businesses. Further discussions include adopting green transport methods is essential to fight with air pollution, climate change, and global warming.

Below 3 main strategies are given to optimize logistics in tourism sector (Akhirson et al., 2025).

Point A: Supply chain management. A well-managed supply chain emphasizes sourcing goods locally, cutting down on emissions from long-haul transport while boosting regional economies. Involving nearby producers in tourism supply chains not only promotes local growth but also shrinks the carbon footprint, leading to more sustainable outcomes

Point B: Smarter Transport Solutions. Since transport accounts for a large share of tourism's greenhouse gas emissions, solutions like improving public transit, promoting ride-sharing, and transitioning to electric vehicles are becoming more common. These measures help curb emissions from tourist mobility, reducing the sector's environmental harm

Point C: Proper Waste Management. With modern technologies, governments can improve their waste management system. They can implement enhanced recycling system, restrict the use of single-use plastics and establish more waste pick-up routes to contribute to cleaner destinations.

Studies shows these policies not only preserve the environment but also improve tourist satisfaction by offering the natural touristic areas.

These strategies can be implemented to face major challenges in tourism logistics to acquire sustainable tourism practices. On the other hand, tourism logistics includes the complex coordination of people, goods, and services, presenting numerous sustainability challenges. Key issues include environmental degradation, excessive resource use, inefficient waste management, seasonal demand fluctuations, overcrowding, and unsustainable transportation systems, all of which hinder the sector's ability to operate responsibly. Here are most well-known challenges (Aksu, 2025) in the sector, that are being faced by many countries.

1. Carbon Footprint and Transportation Emissions

Tourism industry contributes to global carbon emission with its high-capacity transport activities. Particularly, air travel, cruise trips and road transport hold substantial shares of tourism industry's carbon footprint. In accommodation facilities, high energy consumption is further causing environmental harm. It is recommended to change into alternatives modes that will produce less carbon than traditional ways such renewable energy, more efficient transport system and electric vehicles. They are essential to align tourism logistics with climate goals.

Aviation which is heavily reliant on fossil fuels still remains a critical challenge. Solutions like sustainable aviation fuels, carbon offset programs, and optimized flight routes can help reduce emissions. Additionally, expanding rail networks and promoting electric mobility are vital for sustainable tourism logistics.

2. Resource Overconsumption

Tourism puts strains on natural resources like water, energy and often, often exceeding its suggested limits. Hotel and resort industry use huge amount of water and energy for service. It worsens the water scarcity problems which is already hard to deal with. Additionally, their dependence on fossil fuel use also increases the emissions. Implementing water-saving technologies, renewable energy systems, and local sourcing can mitigate these impacts. Innovations like smart energy grids, greywater recycling, and solar-powered infrastructure can enhance efficiency while reducing environmental harm.

3. Waste Management and Pollution

Tourist destinations struggle with excessive waste, particularly single-use plastics and food waste from hotels, restaurants, and attractions. Poor waste handling pollutes ecosystems and makes sustainability efforts go for nothing. Adopting circular economy principles such as zero-waste policies, biodegradable packaging, and advanced recycling systems can minimize landfill dependence. Encouraging businesses to reduce waste at the source is equally critical for long-term sustainability.

4. Seasonal Demand Imbalances

In most countries, tourism work in seasonal timeline. In one season, mass tourism and overcrowding can happen while underutilized infrastructure can be seen in off-seasons. Obviously, it poses logical inefficiencies. Over-tourism often leads to traffic congestion, overconsumption of resources and unpleasant tourist experience and low season activities can negatively impact economic situation of local businesses. For government, it is suggested to diverse their tourism offerings like year-round events, cultural tourism and regional promotions. By this way, they can stabilize supply and demand and reduce external pressure on destinations.

5. Overcrowding and Carrying Capacity Limits

Many popular destinations exceed their carrying capacity, causing environmental damage, overcrowded infrastructure, and threats to cultural heritage. UNESCO sites, in particular, face erosion and pollution due to unchecked visitor numbers. Implementing dynamic pricing, timed entry systems, and visitor quotas can help manage tourist flows. Strengthening public transport and investing in sustainable infrastructure are also key to preserving destinations.

6. Lack of Sustainable Transport Options

Inadequate public transportation forces tourists to rely on private vehicles, increasing emissions and congestion. Improving and increasing eco-friendly alternatives such as electric buses, bike-sharing programs, and efficient rail networks is crucial. Governments and businesses must collaborate to develop integrated, low-carbon transport systems that support sustainable tourism growth.

Addressing these challenges requires coordinated efforts across policy, technology, and consumer behavior. By prioritizing low-emission transport, efficient resource use, waste reduction, and balanced tourism management, the industry can move toward a more sustainable future.

Despite these challenges, some countries still managed to implement sustainable tourism practices aligned with logistics sector. Some case studies and favorable results include Amsterdam's electric mobility revolution (Perkumienė et al., 2020). Amsterdam has transformed its tourism logistics through a comprehensive electric vehicle strategy. The city government implemented a phased transition to electric transport, targeting key tourism-related services. All taxis operating in the city center must now be zero-emission vehicles, with strict enforcement since 2025. Additionally, Costa Rica also showed great progress in regenerative tourism model (Perkumienė et al., 2020). Costa Rica has developed a unique community-integrated approach to tourism logistics that prioritizes both environmental and social sustainability. In the Nicoya Peninsula, a cooperative of 28 family-owned farms collectively supplies 90% of the produce for nearby eco-resorts through a just-in-time delivery system. This hyper-local supply chain reduces food miles by 85% compared to traditional tourism models. The country's pioneering Certification for Sustainable Tourism (CST) program mandates that hotels source at least 30% of goods and services from within 50 kilometers.

In conclusion, tourism impact for the environment is admissible and only tourism logistics itself holds much part of this impact. Above strategies and policies are given to make sure tourism can move in harmony with environment. One is sure: tourism should not cost Earth. Instead, it should promote sustainable practices, ensuring future generation can also afford basic things to survive, clean water, air, land and planet.

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