

Annual Review of Environment and Resources
**The Future of Tourism in the
Anthropocene**

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Annu. Rev. Environ. Resour. 2022. 47:423–47

First published as a Review in Advance on
August 26, 2022

The *Annual Review of Environment and Resources* is
online at environ.annualreviews.org

<https://doi.org/10.1146/annurev-environ-120920-092529>

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Keywords

Anthropocene, climate change, nature-positive tourism, equity, ethics, overtourism

Abstract

This article undertakes a comprehensive review of tourism's impacts on social-ecological systems and the use of the local to global commons. It examines a wide range of issues from climate change and air travel to biodiversity loss, pollution, and overtourism. It reinforces that tourism in modernity has pursued a dominant growth-driven paradigm of development and market expansion that is unsustainable. The review raises critical questions about how to move forward in the Anthropocene, where climate change is an existential threat to which travel and tourism must adjust. We offer directions for knowledge creation to develop nature-positive tourism that decouples from greenhouse gas emissions and seeks the regeneration of natural capital and communal health and well-being. This direction includes rethinking the purposes and values of tourism by addressing equity and ethical issues. It also calls for inclusivity of diverse worldviews and knowledge systems, including traditional and Indigenous knowledge. Such a pluralistic paradigm replaces the unsustainable modernist tourism paradigm that has dominated its evolution. We conclude with suggestions for research to advance nature-positive tourism.

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INTRODUCTION

The combination of challenges related to climate change and the COVID-19 pandemic during the early twenty-first century is a fitting backdrop for an article on the future of tourism in the Anthropocene. Evidence from planetary ecology is linking habitat destruction to the transmission of zoonotic pathogens and viruses from animals to humans, including COVID-19 (1–5). Thus, the environmental and pandemic crisis can be understood as a symptom of a larger systemic crisis of a rapidly destabilizing relationship between anthropogenic activities and the environment, necessitating a rethinking of our relationship with nature and its critical importance for the creation of a healthy and prosperous society.

As an economic and recreational activity heavily dependent on as well as heavily impacting the environment, this reformulating of the nature-human relationship has direct relevance to the future of tourism in the Anthropocene. Tourism's exponential growth in recent decades, leading to it being recognized as one of 12 key global-scale geophysical forces reshaping the earth for human purposes (6), emphasizes the need for analysis of its relationship to the environment. Similar to increases in all of these key forces shaping the Anthropocene, which include water use, fertilizer consumption, urban population, paper consumption, and motor vehicles, there was a sharp acceleration in the demand for tourism during the second half of the past century. In 1950, there were 25 million international tourist arrivals, rising to approximately 278 million by 1980, then 682 million by 2000, then 1.46 billion by prepandemic 2019 (7, 8). **Figure 1** shows the exponential rise in international tourist arrivals for the period of 1950 to 2019.

Although a significant effect of the COVID-19 pandemic has been on global mobility as a consequence of closed national borders (9, 10)—with international tourist arrivals in 2021 being 72% below those of prepandemic 2019—it is forecast that international arrivals may return to 2019 levels by 2024 with rising rates of vaccination and easing of travel restrictions (11). Conversely, whereas international tourism has been in decline, domestic tourism has had an ascendancy in many countries of the world, with an emphasis on open-air activities, nature-based products, and rural tourism (11).

Given its carbon-centric mobility demands, its exponential growth, a historical expediency of resource usage to secure short-term economic and financial gains, as well as the incremental and

Anthropocene:
climatic and
environmental changes
induced by human
activities that would
have otherwise not
occurred in natural
conditions

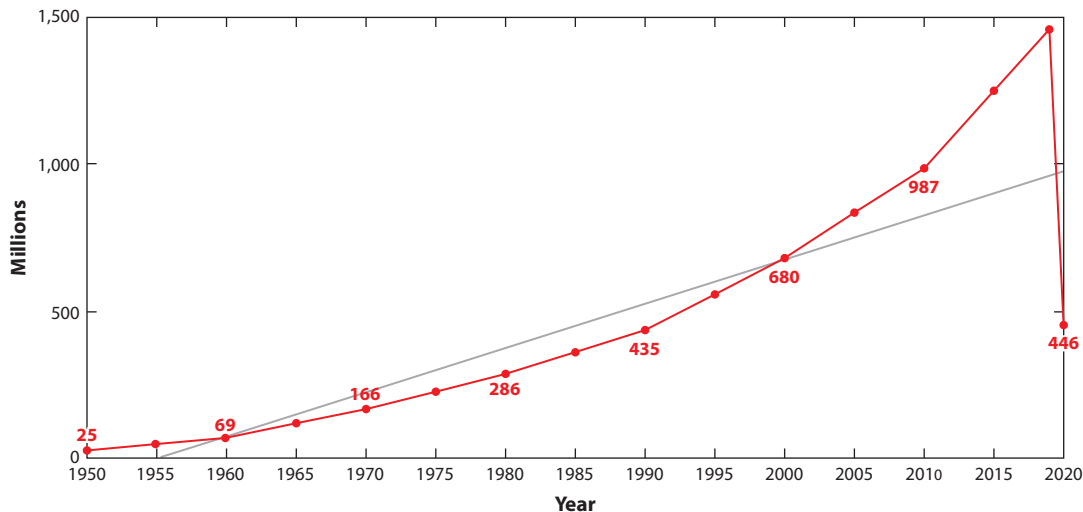


Figure 1

International tourist arrivals between 1950 and 2019. Data from 8.

cumulative character of environmental impacts accompanying its geographical expansion, combined with the nebulous and fragmented structure of the industry that makes its regulation problematic, tourism is a voracious consumer of nature. Subsequently, alongside an urgent need for the tourism sector to decouple itself from greenhouse gas (GHG) emissions, there is also a requirement to respond to its overuse of other natural resources, including water depletion, biodiversity loss, and environmental pollution.

Furthermore, the enjoyment and benefits of tourism mobility is not something equally accessible to all inhabitants of the planet, similar to many of the other anthropogenic forces driving environmental degradation. Excessive resource usage is primarily an outcome of consumerism inherent to developed countries and Western-centric lifestyles. Social inequality remains innate to the Anthropocene just as it did to the Industrial Revolution. As Malm & Hornborg (12) advocate, it was capitalists in a small part of the Western world who founded the fossil economy without consulting the rest of humanity, thus denying them a stake in the earth's destiny. The roots of anthropogenic climate change were thus predicated on inequitable global processes, determined by capitalistic investment decisions rather than democratic deliberation (12), a *modus operandi* that continues today.

The marked inequality of resource usage is reflected in GHG emissions with the wealthiest 10% of humanity producing roughly half of their total, whereas the world's poorest peoples with the least responsibility for climate change produce only 10% of all GHG emissions and are left to face its most immediate and extreme effects—conditions already creating climate refugees (13, 14). This inequality is replicated within tourism with recreational mobility having been primarily Western-centric until the recent growth in outbound tourism from newly industrialized countries, including Japan, South Korea, and China. Thus, although millions enjoy the benefits of tourism, there exists a mobility gap between rich and poor, between the hypermobile or kinetic traveler and those who have rare or no access to tourism (15, 16). Pirie (17) refers to this inequality as an issue of “mobility morality,” necessitating a reconceptualization of tourism mobility in terms of fairness, equity, environmental justice, and human rights.

Conversely to tourism's overuse of nature, it can help enhance our understanding of the plurality of values inherent to it, developing ecological literacy and knowledge of humanity's dependence on the environment. Tourism may also give biodiversity an economic value through visitation, providing a substantive case for the use of tourism as part of sustainable economic policy focused on ecosystem conservation. Subsequently, tourism planned and developed in the right way, i.e., according to sustainable principles, has a role to play in achieving the United Nations 2030 Sustainable Development Goals (SDGs). However, as various critiques have illustrated, neoliberal globalization and related values need to be addressed if the promise of the SDGs is to be effectively accomplished (18, 19).

Tourism may thus be comprehended as a vector of anthropogenic interaction with the environment, resulting in positive or negative environmental outcomes, determined by an amalgam of interrelated factors playing out in social-ecological systems extending from the local to the global. These include ethical frameworks and cultural values, behavioral adjustment, environmental planning and management, technological developments, ecological literacy, stakeholder co-operation, policy decision-making, and a range of economic paradigms. The rest of the article contextualizes and analyses these issues within two main sections. The first provides an analysis of tourism's role in social-ecological systems, with a specific focus on climate change as well as resource and equity issues. The final section identifies key directions for tourism research, reflecting a principal theme of reconsidering the purposes of tourism in the Anthropocene, including its role in the creation of a nature-positive society and a type of sustainable development that captures social and environmental improvement within the limits of ecological carrying capacity.

TOURISM'S ROLE IN SOCIOECOLOGICAL SYSTEMS

Mobility Impacts and Inequalities

Although for many people tourism may signify little beyond deciding where to travel for their next vacation, the mass movement of people who enact tourism as tourists has a significant effect on many places and sites. The United Nations World Tourism Organization (UNWTO) provides the following definition of tourism: "Tourism is a social, cultural and economic phenomenon which entails the movement of people to countries or places outside their usual environment for personal or business/professional purposes" (20). Central to this definition is that tourism involves the mobility of peoples between places, theoretically polarized on a continuum between motivations for escapism from everyday life (21) or as a quest for an authenticity (for example, other cultures or nature) that is absent in the modernity of everyday life (22). This movement brings with it a range of economic, environmental, cultural, and social consequences that may be positive or negative for destinations (see 23–25).

This movement of people is primarily for travel for leisure and recreational purposes but also includes visits to friends and relatives as well as travel for health, religious, and business reasons. The majority of tourism may be understood as an act of voluntary dislocation from home, one that is firmly embedded into a culture of hedonistic consumerism that is expanding globally (26). It is often an experience sited at the human to nature interface, shared with others, whether on a densely populated beach epitomizing mass tourism or as an ecotourist exploring the environment of mountain gorillas.

Critical to its exponential growth in numbers and extension of its geographical reach since the mid-twentieth century has been the so-called Great Acceleration in economic development post 1950, a subsequent rise in living standards, and the creation of the mass consumer culture within which tourism is firmly rooted. Opportunities for tourism have also been facilitated by global democratization and the easing of visa regulations, e.g., the dissolution of the Union

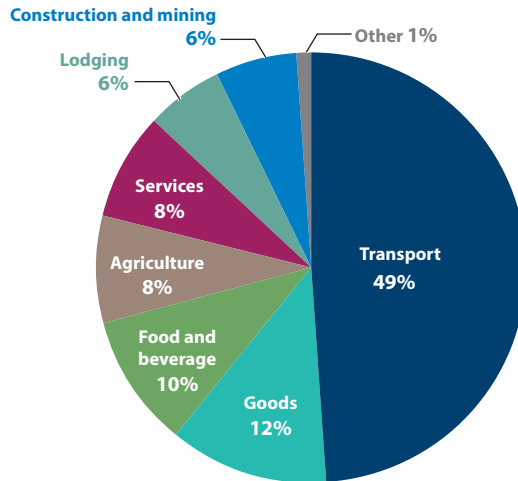


Figure 2

Tourism carbon footprints. Data from 31, 120, and the Sustainable Travel International's Carbon Footprint Calculator (<https://sustainabletravel.org/embeddable-carbon-calculator/>).

of Soviet Socialist Republics (USSR) and technological developments including the jet engine and information systems. Yet, a continued extension of the business-as-usual scenario of this post-1950 model into the future is environmentally unsustainable, as noted by calls for degrowth and regenerative tourism that is environmentally sustainable and facilitates just transitions toward carbon-neutral futures (16, 27; see also 28).

The predominant challenge to environmental sustainability is tourism's reliance on carbon-centric energy for mobility. Subsequently, although an industry and economic activity that is itself highly dependent on climatic and ecosystem stability, tourism is making a growing contribution to climate instability through the release of GHGs. Estimates of tourism's contribution to global GHG emissions vary between 12.5% (29), 10% (30), and 8% (31). The main component of these emissions originates from transport, with more than 40% coming from aviation and the rest from other activities (31). A key challenge for tourism's future is therefore how to achieve an environmentally sustainable carbon-neutral system, which entails addressing tourism's contribution to the triple planetary crisis of climate change, biodiversity loss, and pollution. The necessity to reduce tourism's carbon emissions is also a requirement for the sector meeting its commitment to the Paris Agreement and to SDG 13 on Climate Action to reduce emissions and to build climate resilience (32). **Figure 2** shows the range of activities that contribute to tourism's carbon footprint.

Of particular concern is the growing use of aviation as a means for tourism mobility. The transport-related GHG emissions of international tourism are forecast to grow 45% by 2030 over the 2016 figure, with air travel accounting for approximately 90% of this increase (32). The predicted demand for air travel before COVID-19 was of a near doubling in passenger numbers by 2038 to 8.2 billion compared to 3.8 billion in 2016 (33), as **Figure 3** shows. Although this will now likely take a few years longer to realize as a consequence of the pandemic, it is expected that by 2024 air passenger numbers will have recovered to pre-pandemic 2019 levels, continuing their exponential growth (34). Expressed in actual numbers, the largest growth of departures will occur in China, the United States, India, Indonesia, and Vietnam, and the fastest growing markets in terms of percentage will be in several African countries (34). Although current estimates of aviation's contribution to human-induced CO₂ emissions vary between 2.1% (35) and 4.9% (36),

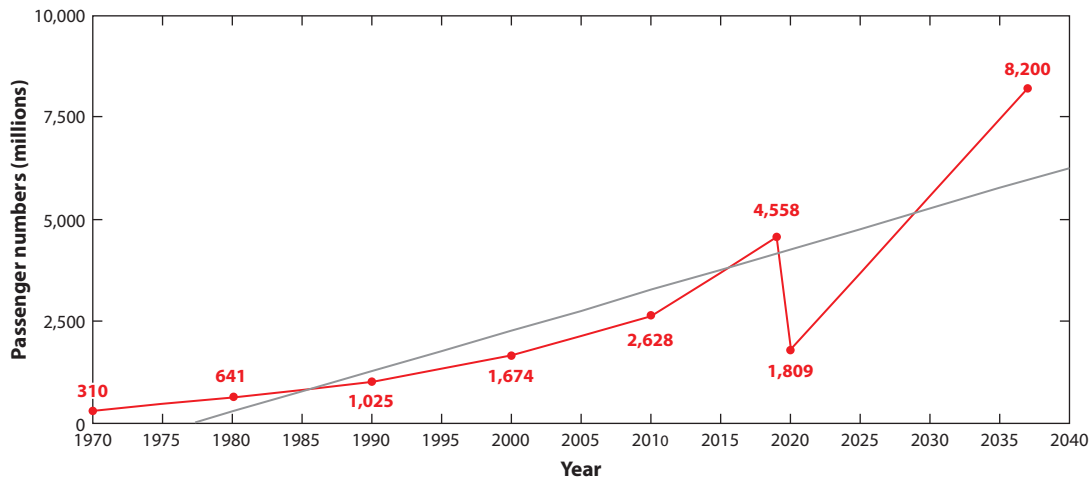


Figure 3

Growth in air transport passengers carried (actual and forecast). Data from 1970–2020 from the World Bank (124); 2020–2038 predictions per the International Air Transport Association (33).

taking into account the effects of radiative forcing makes it a top ten sector emitter (36). Rising passenger demand surpasses technological and management improvements to reduce GHG emissions, with estimates showing that aviation could consume 27% of the remaining global carbon budget designed to limit the increase in global warming to 1.5°C above preindustrial levels (37).

Despite the spreading globalism of tourism consumption, the major portion of tourism’s carbon footprint has been exerted by high-income countries (8). This raises ethical issues of responsibility and justification for a hedonistic-focused mobility that is contributing to climate change with a disproportionate effect on the world’s poor, which not only causes increased hardship but also results in climate refugees. Large inequalities exist in participation rates in recreational mobility with only an estimated 5–10% of the world’s population flying in any one year, the majority of whom come from the wealthiest countries (38), with 80% of the world’s population having never taken a flight (39). Even more iniquitous, just 1% of the world’s population accounts for more than half of the total passenger emissions generated by air travel (40).

These global inequalities in tourism participation and responsibility for the origins of its GHG emissions are replicated at a national scale, such as in the United Kingdom, where just 15% of the population took 70% of flights in 2018 (41). Similarly, air travel continues to remain the reserve of a small minority in Brazil (42), and in France just 5% of the population is responsible for 50% of tourism-related GHG emissions (15). That most air travel is attributable to a small and relatively wealthy demographic taking frequent leisure flights (41) has resulted in flying becoming a moral issue of the right of participation in an act of energy-intensive consumption, which has adverse effects for the world’s poor and natural environment (43).

This inequality of participation and the social exclusion of people from tourism has become of interest to tourism scholars in recent years (44, 45), raising questions of “Who is mobile?” and “What about immobility?” (46). A right of freedom of movement for the purpose of leisure is included in the 1948 UN Declaration on Human Rights (Articles 13 and 24), reinforced through Article 7 of the UNWTO’s Global Code of Ethics for Tourism, which declares our “right to enjoy the planet’s resources” (47). A significant challenge for tourism is therefore how to accommodate these rights within net-zero by 2050. As the above discussion indicates, it is evident that if the

world's population were to pursue tourism mobility in the way people of developed countries do, the limits of environmental sustainability would soon be surpassed.

Resource Depletion, Environmental Damage, and Equity

In addition to tourism's contribution to climate change, its exponential growth in numbers and extensive spatial reach has made it a voracious consumer of nature. Therefore, alongside an urgent need for the tourism sector to decouple itself from GHG emissions, there is also a requirement to respond to the overuse of other natural resources that service the industry, which has resulted in water shortages, ecosystem changes, biodiversity loss, and pollution. However, presenting a comprehensive picture of the breadth of tourism's global use of nature is challenging given the limitations of the global monitoring of its resource usage.

Attempting to formulate a measurement of resource usage, Gössling & Peeters (48) advocate the concept of resource use intensities. These formalize tourism's resource usage per unit of consumption, e.g., energy per guest night, providing metrics to aid tourism's management within planetary ecological limits. Utilizing this method, predictions are that overall resource consumption may rise by 93% for water and 189% for land use by 2050 over a baseline of 2010 (48). Similarly, the United Nations Environment Programme (2021) estimates significant rises in tourism resource usage into the future. They note that resource usage is growing commensurately with tourism's generation of solid waste, sewage, loss of biodiversity, and GHG emissions. In a business-as-usual scenario, by 2050 tourism's consumption of key resources would increase by 154% for energy and 152% for water, and GHG emissions would increase by 131% and solid waste disposal by 251% (30).

This increasing use of resources for tourism has been accompanied by concerns related to the political ecology of tourism and equity issues concerning access to and control over scarce resources. A notable example is water, which is not infrequently a scarce resource in places with tourism-dependent economies, where the industry may use excessive amounts of water to the detriment of local inhabitants who experience rising prices, water shortage, and increased hardships (see 49). For example, the development of golf courses in parts of Southeast Asia has been criticized for excessive water usage and their encroachment into protected forest areas, farmlands, and Indigenous territories (50). The consequential displacement of peoples for tourism development and the denial of people access to traditional natural and cultural resources raise political and ethical issues of the rights of local citizens and Indigenous peoples in the face of development.

Requirements for water use for hotel services, swimming pools, and other recreational activities like golf courses, sport hunting, and theme parks place stress on existing supplies and resources, especially in hot and tropical climates. Disparities in water usage between tourists and local people may be especially high in less developed countries, but even in more developed countries significant differences may exist. In Spain, for example, the consumption of water per tourist per day is between 450 and 800 L depending on season and geographic area compared to an average 127 L per day for a Spanish citizen (51). The hydric stress from the heavy use of water to service tourism destinations is likely to increase into the future in response to climate change, as many areas where tourism is a key economic player, including the Mediterranean, Northern Africa, the Middle East, Central America, and the northern and southern tips of South America, Southern Africa, Southern Indonesia, Australia, and most areas of Polynesia, will very likely register decreased rainfall in the next few decades (52). As water will be a contested and increasingly scarce resource for many in the Anthropocene, greater research attention is needed to address this and also the gender gap in studies of the tourism-water nexus and climate change (53).

It is particularly in destination localities that the negative impacts of tourism on other natural resources are also most evident. Recreational tourism development can place immense pressure

Overtourism:

a spatiotemporal concentration of tourists' activities exceeding the limits of acceptable change on human and environmental communities

on coastal ecosystems through land-use changes and overuse, threatening their biodiversity and ecosystem functions, including carbon capture and coastal protection. Especially vulnerable to change are wetlands and coral reefs, which can be subjected to destruction and degradation by the construction of tourist facilities, inadequate sewage infrastructure, and the behavior of tourists and local people (54, 55). Thus, in addition to land-use change for tourism development, e.g., the draining and destruction of wetlands, the inappropriate use of resources, for example, tourists walking on coral reefs and tour operators dragging their anchors through it, can cause habitat destruction and threaten long-term environmental and economic stability.

Resolving issues surrounding pollution from wastewater generated by tourism is critical for environmental limits and the sustainability of marine life. The addition of large-scale tourism development to coastal areas with inadequate sewage infrastructure places stress on ecosystems and detracts from the environmental quality of water recreation, not only threatening marine life but also the tourism economy. It is estimated that globally more than 80% of all wastewater, including human sewage, is discharged without treatment, with only 8% of wastewater being treated before discharge in low-income countries (56). Poor waste disposal infrastructure and practices have contributed to significant impacts on human and environmental health, including the creation of toxic environments (50). The common practice of untreated wastewater in developing countries is a consequence of a lack of good governance, infrastructure, technical and institutional capacity, and financing (50).

A major source of the discharge of untreated wastewater also comes from cruise ships, with Friends of the Earth (57) listing it as a major polluter of the environment. Capable of holding more than 3,000 visitors, the polluting effects of cruise ships can be exceedingly high. For example, the world's biggest cruise company emits 10 times more sulfur oxides in its European operations per annum than the total of Europe's 260 million cars (58). The effects of sulfur oxide emissions are harmful to public health and contribute to acid rain and acidification of the seas. Adverse cruise ship impacts on climate, public health, coastal communities, and marine ecosystems stem from a lack of good governance and poor business practices such as inadequate sewage treatment, air pollution reduction, and water quality compliance (59, 60). In addition to problems of water and air pollution, the off-loading of thousands of passengers by the large-scale cruise industry contributes in part to the overcrowding and overtourism in many cities, including Amsterdam, Barcelona, Dubrovnik, Venice, and Palma Mallorca in the Mediterranean area.

Overtourism and the Growth Paradigm

A growth-driven paradigm of tourism and modernization spread worldwide through globalization has exacerbated overuse of natural resources and adverse environmental and social impacts. For example, consolidation and globalization of the cruise industry aided by neoliberal policies have served to facilitate mass tourism while circumventing national labor laws, taxes, and maritime regulations by operating under flags of convenience (61–63). An unsustainable growth-driven paradigm is also evident in issues like overtourism, where destinations are overrun by mass numbers of visitors, resulting in the depletion of natural ecological goods, the destruction of cultural attractions, and negative social and economic impacts in the destination (64–66). Here, environmental impacts extend to impacts on physical sites and urban spaces, along with related loss of green spaces and damage to local ecosystems, exploitation of the local commons, etc. Although the term overtourism is frequently associated with the impacts of tourist overcrowding in urban destinations, it is symbolic of concerns about the impacts of global hypermobility on natural resources and society.

This overuse and overcrowding of places has on occasion been met by antitourism and sometimes antitourist attitudes among significant segments of the local population (62, 65). As such,

overtourism may be viewed as a failure to implement or a lack of sustainable policy and management of tourism (64). However, overtourism and tourism's overall adverse environmental and social impacts are also deeply entrenched in a paradigm of globalization and modernist values that privilege growth-driven market capitalism, commodification, and consumerism at the expense of locally situated sustainability values. These include ways of provisioning and inclusivity of diverse knowledge systems that can be brought to facilitate health ecosystems, social and environmental justice, and the well-being of human and nonhuman others (67). The COVID-19 pandemic has enabled many inundated destinations like Venice to pause and re-envision the growth-driven tourism paradigms toward degrowth and equitable sharing of their social and ecological spaces with tourists.

Resource Conservation and Carbon Neutral

Conversely to tourism's adverse impacts on ecosystems and climate change, there are distinct opportunities for environmental conservation through tourism. These include tourism having a positive economic and scientific impact on environmental conservation when limited to a community-based perspective that provides economic benefits to local and Indigenous people (68, 69). Beside creating livelihood opportunities, tourism revenues provide financial and technical support for the management of protected areas, especially in poorer countries if government financial support is limited or absent. The requirement for this economic support provided by tourism for environmental conservation is underlined by dwindling nature tourism to protected areas as a consequence of the COVID-19 pandemic having decreased incomes for local communities. A consequence of this has been a rise in deforestation and poaching in many areas as alternative sources of income are short (30). Subsequently, more research is needed that engages local communities and affected parties on how to capture the economic value of the plurality of utility that nature provides tourists.

However, the majority of the financial support from tourism for protected areas in poorer countries is dependent on international tourists, many of whom will have traveled by plane, thus making a contribution to GHG emissions and climate change that threatens biodiversity sustainability. Similar sustainability issues arise for small island developing states (SIDS) and other developing countries with a high economic dependency on international tourism, but which are also highly environmentally vulnerable to climate change impacts, e.g., the Maldives (70–72). Subsequently, the issue of how to ensure economic and environmental sustainability in destinations requiring the financial support of international tourism within a carbon-neutral tourism system is a significant challenge for tourism in the Anthropocene.

Other advantages of nature tourism include connecting people to its authenticity, enhancing education about the plurality of its values including spirituality, and the encouragement of ecoliteracy and a comprehension of nature's intrinsic value. Benefits also include those of improved mental health resulting from exposure and closeness to nature. Translated into an economic value through savings on national health service care to treat mental health problems, Buckley et al. (73) estimate this adds an additional value from tourism to national parks worldwide of greater than US\$6 trillion per annum. This utility is at least ten times the magnitude of the direct economic value of tourism to the parks (74). It is estimated that if people did not engage in discretionary self-funded visitation to national parks, the costs of mental health treatments would increase by an estimated 7.5% (73, 75).

ONGOING ISSUES AND RESEARCH DIRECTIONS

Resource pressures and equity issues caused by tourism necessitate an urgency to reassess its role in global society with an aim of ensuring its optimal use for a sustainable future. The most significant

threat to the longevity of human society and biodiversity in the Anthropocene is climate change. Given the paradox of tourism's high dependency on climatic stability while at the same time making a growing contribution to GHG emissions, the overarching challenge is how to transform tourism through mitigation and adaptation strategies to a decarbonized system. Achieving net-zero, or at least carbon-neutral tourism systems, relies on moving away from an existing model of high-carbon path dependency, which requires changes in the technologies and use of tourism transport systems. However, attempts to achieve the targets of the Paris Agreement and UN SDG 13 have to be counterbalanced by the social need to deliver prosperity and well-being, particularly for poorer countries where there exists a high livelihood dependency on tourism and few foreseeable development alternatives. Certainly any mitigation policy that resulted in curtailing aviation and tourism to less wealthy nations dependent on the industry would raise equity issues, illustrating the complexity of decision-making involved in climate change and tourism relationships.

Central to progressive change in the tourism system are the people of the varied and fluid stakeholder groups that embody it, including tourists, industry, local communities, government, and nongovernmental organizations. Their values, attitudes, and behavior toward nature, cultural heritage, and social equity will be influential in directing the future of tourism's interaction with the environment in the Anthropocene. For tourism to be sustainable, there is a need to reconceptualize it as an issue of public responsibility as much as one of individual freedom and hedonism. This entails recasting the perceptual norms of tourism from the pursuit of a casual activity without negative consequences to one that is framed within environmental and cultural determinants. To understand how such a paradigm shift may be achieved and to formulate responses to specific resource issues will necessitate multidisciplinary and interdisciplinary research approaches from multiple disciplines. Below we outline key research themes requiring enquiry to help realize this paradigm shift.

Data Needs and Adaptation to Climate Change

Attempting to achieve carbon-neutral requires research on tourism-specific mitigation and adaptation strategies and more data to formulate creative responses to tourism's climate change challenges (76). Although old modernist measurements of tourism's progress are widely available, including its economic impacts and statistics on tourist flows, there is a sparsity and incompleteness of available data on the key environmental and social issues of sustainability and justice. These include equity of participation rates in tourism and levels of environmental pollution from the industry, including that of its complex supply chains.

These data gaps on environmental impacts present a profound challenge to strategy formulation aiming to make tourism sustainable and equitable within planetary limits. A challenge to data collection to enhance comprehension of tourism's environmental impacts is its nebulous character. There is a subsequent need for an ongoing process of assessing tourism's global impact on the whole environment in the efforts to manage its impacts and producing globally accurate data sets (48), including sophisticated monitoring, reporting, and verification of GHG emissions to aid evidence-based decision-making (32). This could be achieved through the creation of a network of worldwide observatories to monitor tourism's use of natural resources at a global level, similar to the UNWTO International Network of Sustainable Tourism Observatories (77) initiative that aims to measure economic, environmental, and social impacts to inform evidence-based decision-making at a destination level.

Global data sets are also needed to reflect the changes in the cultural diversity of markets for international tourism to capture the plurality of interpretations and understanding of the environmental and social impacts of tourism. There is an urgency to continue the shift from analyzing

tourism through a hegemonic Western cultural lens to reflect the variety of cultural lenses that now constitute tourism to aid its sustainable planning into the future. This includes enhancing definitional cohesiveness and reflecting the cultural diversity of constructions of both tourism and nature with the aim of achieving a shared *lingua franca*.

Proenvironmental Behavior and Holiday Travel

Although technological innovation has a critical role in creating a carbon-neutral and sustainable tourism system, it will be a part of the solution and not its totality. Central to tourism is the tourist and the willingness to adapt behavior to reduce tourism's carbon footprint will be essential for achieving this goal. However, individual concern for the environment tends to be unrelated to holiday behavior (78), suggesting either an unawareness of tourism's environmental impacts or the nonacceptance of it as a cause of climate change (78, 79). Buckley (80) suggests a state of cognitive dissonance exists, manifesting itself in a justification of holiday enjoyment even if aware that the environment is being damaged by tourism.

At its most manifest, cognitive dissonance is played out through participation in last-chance tourism (LCT) when tourists travel to environments highly vulnerable to climate change, such as the Arctic and Antarctic, to gaze on threatened features like melting glaciers or polar bears (76, 81). The annual average Arctic sea ice area is now at its lowest level during summer since 1850 and the late summer area at its lowest for more than a thousand years, whereas the global retreat of the world's glaciers is unprecedented in the past 2,000 years (52). There is an inherent ethical paradox of LCT, as travel to the destinations contributes to the climate change that is destroying them (79).

Increased LCT visitation has also had social impacts on destination communities, as the sense of intrusion into what had been remote and relatively unvisited areas creates adaptation challenges (76). This seeming desperation to visit environments that may disappear as a consequence of climate change raises a moral question of whether travelers are willing to acknowledge and respond to the harm they cause (81). Yet as an exemplar of cognitive dissonance, a justification for travel could be made on the basis of the economic support it lends local communities servicing the needs of tourists visiting LCT sites, overriding climate change concerns (82).

The desire for LCT seemingly supports Weaver's (83) observation that the norms of tourism mobility developed in recent decades will not change through some groundswell of voluntary social change but, instead, require coercion. With specific reference to flying, it appears the personal benefits outweigh the nebulous societal cost of climate change, with evidence suggesting that many travelers place responsibility for reducing GHG emissions on the industry and government (78). However, in the specific case of Sweden, raising the moral debate about flying ("*flygskam*"—flying shame) has resulted in 23% of Swedes saying they have opted out of air travel, and 18% chose a train over an air trip in 2018 (84). In the absence of available data, the impact of this nascent debate in other countries is unsure, but without similar individual responsibility and voluntary action to reduce flying being demonstrated in other countries, it is likely that government coercion will be necessary to change behavior.

Although the use of government coercion to reduce reliance on air travel may seem a radical step, lessons can be learned from the COVID-19 pandemic about the propensity for people to support such measures if they believe they are directly contributing to the greater good. It seems that the majority of people were willing to make behavioral adjustments during the pandemic when certain conditions were met. These include a widespread acceptance of a challenge confronting society that is detrimental to collective welfare combined with a belief that behavioral changes serve both self-interest and the greater good, and that the majority of people are abiding by the rules and

laws; i.e., there are few free-riders. In the context of aviation, flying less may be understood as an action of self-interest (protecting one's economic interests and health into the future) and an action for the greater good (protecting future generations and the global poor from the worst effects of climate change and helping to ensure biodiversity conservation). It may be that coercion is the only way to deal with the issue of regular flyers and aviation, especially if those willing to make responsible decisions are disillusioned with their sacrifices in the face of free-riders not acting responsibly.

Research is also required on the adaptation intentions of tourists to global warming as a key component of tourism systems and how these will influence tourism flows (85–87). Understanding how tourists will react to climate change predictions and actualities in destinations, for example extreme heat or storms or reduced snowfall, offers an effective way for assisting destinations to take adaptive measures (85, 86). However, it may also be that tourists will use new climatic conditions to change their behavior by traveling to closer destinations or engaging in more domestic travel (88). There is also a necessity to address the dominant climate change discourse in tourism, which portrays it purely as a threat to better understand the opportunities it may present for tourism in other places (76).

The Circular Economy and Limits to Growth

Alongside climate change mitigation and adaptation there is an urgency to arrest resource depletion caused by tourism and to incorporate it into a green and restorative economy. Central to this is an enhanced understanding of how circular economy practices can be applied to tourism. This theory rejects the established economic linear model of production and consumption, which it holds as self-destructive because of its assumptions of an unlimited supply of natural resources and an infinite environmental capacity to absorb waste. Instead, it treats waste as a new economic resource within which the “production cost–environmental damage–product price” is optimized (89), resulting in a reduction in aggregate economic throughput and thus reducing the human ecological footprint. It is a concept that stems from a belief that linear consumption will reach its limits in the foreseeable future (89) and is closely linked to an interpretation of sustainable development as a progressive social betterment achievable within the limits of ecological carrying capacity.

In addition to an exigency for tourism businesses and supply chains to actively engage with circular economy practices, there is a research gap concerning the implementation of tourist actions that are important to developing the circular economy, notably how these can be made attractive to pursue (90). The application of the circular economy paradigm to the tourist experience can subsequently be linked to the concept of instant utility, i.e., increasing the enjoyment of tourists, as a way to encourage proenvironmental behavior (PEB) and reduce waste (91). Emphasis is thus placed on the encouragement of PEB through the reward of enjoyment rather than by acting purely out of a sense of duty and responsibility. Nevertheless, the two are interrelated as a good experience enables good actions toward conservation, encouraging civic responsibility and much-needed policies for conservation of local to global natural areas of visitation (92).

Connections to Nature and Culture: Interrelated Ethics for Justice and Well-Being

The trends of increasing global urbanization and a reducing biodiversity emphasizes the opportunities for tourism to connect people to nature and enhance environmental virtue and sustainable lifestyles. Crucial to this process is research into how an interrelated ethic of justice and care practiced by stakeholders can contribute to the well-being of human and nonhuman others and promote sustainable tourism. This posthumanist approach seeks to transcend dualistic

perspectives (subject-object, human-environment, ecology-culture, etc.) for a relational ethic that enables caring for land through the inclusivity of diverse others and their plurality of knowledges (traditional, local, scientific) and worldviews (see 67, 93, 94). This inclusivity subsequently prioritizes the use of Indigenous knowledge in shaping the environmental and social outcomes of tourism.

An example of this is the practice of Etètung (“Vanuatu Women’s Water Music”) among the community of Leweton in Vanuatu, which demonstrates the profound relationships between cultural and environmental knowledge (95). Etètung, during which a small group of girls and women stand in a circle or semicircle in waist-deep water and rhythmically slap its surface to create a diverse repertoire of rhythms and pitches, has become an iconic practice of the village’s tourism. It is now demonstrated internationally, providing a forum for the sharing of climate knowledge and social justice globally, lending an Indigenous voice to the global climate discourse that remains dismayingly void of them (95). Integral to a relational ethic is Fraser’s principle of trivalent justice [redistribution, recognition, and representation (see 96, which offers valuable guidance to understanding historically entrenched discrimination)]. Its aim is to redress injustices, facilitating equity, voice, inclusiveness, and the well-being of diverse cultural groups (66, 97, 98).

An important juncture to a relational ethic that incorporates justice alongside care of the land and people for the benefits of human and nonhuman others (98) is the field of environmental ethics. The extension of ethical considerations to nonhuman others is a key principle of environmental ethics, including both sentient and nonsentient beings (99–101). Although the uptake of environmental ethics into tourism has been slow, not least because of a historic absence of a general “ethically-based tension” in tourism (99, p. 60), the embedding of the principle of the stewardship of nature into the sustainability paradigm is indicative of a repositioning of our place relative to the environment (101). Although a shallow shade of environmental ethics, as the primary rationale for stewardship is typically expressing support for long-term economic and human well-being, it is significant for recognizing that nature conservation is essential for our survival and a good quality of life. The impact of a stronger environmental ethic among tourism stakeholders would be likely to raise moral tension over the use of nature for tourism consumption. For example, rising tension over air travel is emphasized in the *New York Times* headers “Your Biggest Carbon Sin May Be Air Travel” (102) and “How Guilty Should You Feel About Flying?” (103). Moral dilemmas also arise over the use of animals in tourism and the harm that can be done to them (see 104, 105).

Artificial Intelligence and Virtual Reality

An emergent field of tourism research is the application of artificial intelligence (AI), robotics, and enhanced virtual reality to tourism. Referred to as the Fourth Industrial Revolution (106), AI and robotics are likely to have a significant effect on tourism in the Anthropocene. The development of AI itself is indicative of the next stage of the Anthropocene with machines and robots being connected and communicating with each other, permitting them to make autonomous decisions without human involvement (107), in essence establishing a partial post-*Homo sapiens* world.

To date, the application of robotics in tourism has primarily been within the hospitality sector and at some airports. The first fully robotic hotel opened in 2015 (108, 109) utilizing robot dinosaur receptionists and porters, although the use of robots has not been as successful as expected due to their breaking down and miscomprehending guests (108). How it will influence tourism’s relationship with the biosphere and natural resource usage is uncertain, but it is likely to play an increasing role in the future with creative and imaginative implementation strategies playing a significant role in enhancing environmental sustainability. However, more generally, in tourism

Nature-positive tourism: tourism based on principles of sustainability, justice, and ethics that apply to humans and nonhuman others

its widespread application will raise ethical issues of the replacement of human labor by machines and has implications for the tourist experience and a posthumanist ethic in an increasingly virtual and digitally driven world (109, 110).

The development of AI and robotics adds to the already considerable continuing advancements in information technology including virtual reality. A key issue for reducing resource usage and decarbonizing tourism is the extent to which enhanced information technology and virtual realism, combined with AI and robotics, will be able to produce authentic virtual tours and tourist experiences in the home without necessitating travel. The required life-style adjustments to COVID-19 have changed our conceptions of the dynamics of place and space, relocating work into the home for many people, while increasing online retail purchasing and leisure pursuits. Subsequently, the expectation to travel to work has reduced substantially, contributing toward a shift to a carbon-neutral home-work relationship.

However, the extent to which so-called tourism without travel and the experience of a distant environment replicated in the home can feel authentic and fulfil human curiosity is uncertain. Early diametric theories of tourist motivation understood tourism as a search for a pseudoreality (21) or as a quest for an authenticity of nature and culture that is absent in the lives of urbanized peoples (22). The postmodern turn to simulacra and hyperreality paves the way to better understanding how pseudoreality through AI could be made seemingly authentic and valuable for virtual visitors (111). This is a significant research area that could contribute to attempts to reduce GHGs by promoting short-haul travel as well as hypermediated journeys. The use of AI technologies that bring experiences into the home also have the benefits of avoiding the hassles of travel, which have multiplied since COVID-19.

TOWARD NATURE-POSITIVE TOURISM

The creation of nature-positive tourism has to meet the challenges of being able to fulfil a universal right to tourism within environmental and social limits according to principles of social justice and equity. The fulfilment of this challenge will permit a sustainable future for tourists and those whose livelihoods are economically dependent on the sector while ensuring ecosystem and biodiversity conservation. This requires rethinking what “we” as a global society aim to achieve through tourism and the values that determine the evaluation of the success of its development. A continuation of tourism development according to modernist principles assessing its success through economic metrics, while ignoring the overuse of nature’s resources and exceeding environmental limits, does not provide for a sustainable future. Tourism’s role in climate change, biodiversity loss, and ecosystem destruction, alongside the threat of mobility pandemics like COVID-19, is a clear indicator of the urgency to change how we conceptualize and practice tourism (112, 113). Not least is the need for a widespread realization that the act of being a tourist is not simply a hedonic act without consequences.

Critically, there is a requirement for tourism to decouple itself from GHG emissions and respond to the overuse of other natural resources to meet the targets of the Paris Agreement and the UN SDGs. Besides advancements in environmental technology and management designed to mitigate negative impacts, the overuse of resources for tourism has to address issues of political ecology relating to the equity of resource access. Nature-positive tourism thus needs to embrace an ethical core, challenging the morality of overconsumption for hedonic purposes resulting in adverse environmental and social consequences for the world’s poorest peoples. **Table 1** summarizes the key challenges and potential solutions to address them.

Beside knowledge advancement through research, the realization of nature-positive tourism necessitates good governance, oversight, and regulation to address the scale and scope of tourism’s

Table 1 Issues and potential solutions for nature-positive tourism

Issues	Challenges	Examples	Potential solutions
<p>Tourism's increasing share of global GHG emissions: Overreliance for mobility on carbon-centric transport systems, especially aviation, giving tourism a high-carbon path dependency. Apart from transportation issues, energy use in lodging, food production, and waste management in the global tourism sector are also drivers of the problem.</p>	<p>Achieving a carbon-neutral tourism system by 2050 set against forecasts for exponential growth in demand for tourism and aviation use. The ability of the sector to meet its contribution to the Paris Agreement and Sustainable Development Goal 13 on Climate Action. The existing business-as-usual (BAU) model based on economic metrics is unsustainable. Despite marked improvements in aircraft efficiencies to reduce greenhouse gas (GHG) emissions, net benefits are negated by increasing demand (see 120).</p>	<p>Possible increase of 131% in GHG emissions by 2050 in the BAU scenario (30). Transport-related GHG emissions from international tourism are forecast to grow 45% over the 2016 figure by 2040, with air travel accounting for approximately 90% of the increase (32).</p>	<p>Systematic data collection to support evidence-based decision-making. Integration of tourism businesses and supply chains into a circular economy. Utilization of non-GHG emitting transport technologies where feasible. Shift in consumer behavior away from casual flying and changes to vacation-taking patterns, for example, longer stays in destinations replacing several shorter-stay trips; could be achieved through voluntary action arising from ethical and moral concern and/or fiscal and legal coercive measures. Advances in virtual reality and artificial intelligence to capture the authenticity of tourism experiences, reducing the motivation to travel, creating the oxymoron of “stay-at-home tourism”.</p>
<p>Exceeding limits of natural resource usage with adverse environmental, social, and cultural effects, including on Indigenous peoples: The overuse of natural resources is threatening sustainability, livelihoods, and human development of communities that draw on tourism.</p>	<p>Tourism development induces anthropogenic-driven negative impacts on nature that exceed its limits for resource regeneration, including land and water use; results in the destruction of natural habitat, biodiversity loss, and loss of ecological system functions; and raises issues of political ecology over the equity of access to natural resources between stakeholder groups.</p>	<p>Requirement for water use for hotel services, swimming pools, and other recreational activities like golf courses, sport hunting, and theme parks places hydric stress on existing resources. May cause lowering of the water table and diverting water courses away from Indigenous peoples and ecosystems. Destruction of wetlands from tourism development. Spoilation of coral reefs caused by tourists walking on and operators dragging their anchors through them. Exploitation of local and global commons and rising food insecurity necessitates greater attention to food justice and empowering local communities to steward land and resources and work toward community resiliency and well-being (114).</p>	<p>Need to plan and develop tourism according to sustainable principles through partnerships with government, nongovernmental organizations, industry, local communities, and Indigenous peoples. Arresting resource depletion through the holistic incorporation of tourism into a green, restorative, and circular economy. Policy prioritization of tourism as a means for ensuring nature conservation and human development in situations where ecosystems and biodiversity are attractive to tourists. Requirement for inclusivity of Indigenous knowledge systems to facilitate healthy ecosystems, alongside the integration of social and environmental justice and biocultural ethics into decision-making (97).</p>

(Continued)

Table 1 (Continued)

Issues	Challenges	Examples	Potential solutions
<p>Overtourism: Although overtourism is usually deemed as local specific, it is symbolic of concerns about the impacts of global hypermobility on society and natural resources. It is a pointer to the dangers of a more widespread exceedance of the limits of resource usage from tourism.</p>	<p>Overcrowding in popular destinations, causing resident protests against tourism and demands for government action in controlling visitor numbers Negatively impacts the quality of citizens' lives and visitor experiences</p>	<p>Adverse economic impacts, e.g., rising rental and property costs forcing local people out of the market as more properties are leased to accommodate tourists Overtourism in many cities including Amsterdam, Barcelona, Seville, Dubrovnik, Venice, and the Mediterranean city of Palma Mallorca (see 56, 61)</p>	<p>Enhanced planning for socially sustainable tourism and measures to control tourist numbers, including the regulation of travel by low-cost airlines and cruise ships Banning of Airbnb rentals and restrictions on the numbers of people permitted to visit a site or specific place Imposition of a tourist tax to support sustainable tourism initiatives and reduce demand (see, e.g., 7, 123, pertaining to the Balearics)</p>
<p>Pollution: The exponential growth of tourism and overuse of resources result in negative by-products for the environment and society.</p>	<p>Tourism causes various types of pollution (air, water, noise, aesthetic). Besides contributing to global GHG emissions, transport systems in destinations and transit zones contribute to air and noise pollution Addition of tourism development to coasts, the most popular areas for recreational tourism, adds pressure on inadequate sewage infrastructure Aesthetic pollution as a result of uniformity and density of construction that is devoid of authenticity and localized cultural practices Global challenge of marine plastics pollution; more ocean plastic waste found near popular tourist destinations (see 119)</p>	<p>Discharge of untreated sewage into coastal areas and from cruise ships Estimated that more than 80% of wastewater, including human sewage, is discharged without treatment, with only 8% being treated before discharge in low-income countries (56) Uniformity of coastal development of tourist zones that is inauthentic and unintegrated with local ecosystems Marine plastics pollution from plastic bags and water bottles left by tourists</p>	<p>Need for improved environmental planning, policy, and management accompanied by infrastructure development Fiscal adjustment measures to ensure environmental costs are included in prices according to the “polluter pays” principle Introduction of ecotaxes Push for pro-environmental behavior by all stakeholders including tourists in line with the circular economy model Inclusiveness of local and Indigenous knowledge in architectural design, construction, and tourism development to facilitate cultural well-being and integration with local ecosystems (see 84, 98, 122)</p>

(Continued)

Table 1 (Continued)

Issues	Challenges	Examples	Potential solutions
<p>Stakeholder (human) behavior toward nature: Tourism is an anthropogenic and frequently anthropocentric activity. The values, attitudes, and behavior tourism stakeholders demonstrate toward nature are crucial to determining environmental sustainability.</p>	<p>Need to transform environmental attitudes and tourism stakeholders' behaviors that result in exploitative encounters with nature; these include a lack of concern about the rights of nature, the prioritizing of short-term financial gain at the cost of environmental destruction, and a state of cognitive dissonance that justifies holiday enjoyment even when aware that the environment is being damaged by tourism</p>	<p>Last-chance tourism is when tourists travel to environments highly vulnerable to climate change, such as the Arctic and Antarctic, to gaze on threatened features like melting glaciers or polar bears (79). This also includes tourism safaris in sub-Saharan Africa, where American and European tourists travel for the gaze of savage animals and are attracted by "the show" of species that are in danger of extinction.</p>	<p>Utilizing nature tourism to connect people to its authenticity and enhancing ecoliteracy through education about the plurality of its values, including its intrinsic value and the development of a stronger environmental ethic for the evaluation of our actions Tourism stakeholders' integrated ethic of justice and care for tourism that ensures the well-being of human and nonhuman others (100)</p>
<p>Right to tourism and the equity gap: How to accommodate a right to tourism and enjoyment of the planet's natural resources within a carbon-neutral scenario</p>	<p>Significant social inequalities in participation rates in tourism and associated per capita resource usage exist between and within countries. The major part of tourism's carbon footprint has historically been exerted by consumers in high-income countries. Only a small proportion of the global population has traveled internationally. Raises ethical and moral challenges of climate justice, as it is the world's poorest who are at the most risk from climate change and lack of access to resources Demographic social divides exist within countries in participation rates, challenging a universal right to participation in international tourism</p>	<p>Greater collaboration between diverse tourism stakeholders in the Global North and the Global South are needed, with greater voice and inclusiveness of diverse groups in discussing how to reduce the divide and the gaps between rich and poor in many territorial contexts of the globe. It would address ethical and practical issues related to the richest communities' responsibilities regarding climate change impacts in the Global South.</p>	<p>The Glasgow Declaration on Climate Action in Tourism, Sustainable Travel International, and similar entities offer global and local examples of how to deal with the issue (see 85, 86). Engaging local communities in a more responsible attitude for tourism planning is a long-term strategy to facilitate sustainable transportation and energy use in lodging, food production, and waste management in the tourism sector. Use smart tourism, social media, and virtual technology responsibly and integrate them into regional planning (see 100, 121).</p>

negative impacts. New approaches to provisioning are required that enable ecological and social resilience while facilitating individual and communal well-being in destinations. Action must be coordinated and integrated from the local to the global, in order to effectively address tourism mobilities and impacts that transcend local and national boundaries (114).

Thus, a transition to nature-positive tourism should be able to support the livelihoods and well-being of individuals economically dependent on it, especially in places with limited alternative human development options. This includes the economies of many SIDS and regions of developing countries that are economically dependent on aviation for tourist arrivals. Whereas for some countries with expanding national economies there is a propensity for increasing levels of domestic tourism, thereby reducing dependency on international markets, for many countries this is not viable. Subsequently, although securing ways to modify consumer behavior to fly less is essential for a transition to a carbon-neutral tourism sector and for tourism's GHG emissions to remain within a defined permissible limit of the remaining carbon budget, this needs to be achieved in accordance with an equity principle to sustain tourism-dependent livelihoods. A further factor for consideration is that the economic receipts from tourism are also often necessary to support the designation, management, and protection of natural ecosystems as protected areas in the Global South.

Besides government, the role of social movements and locally active nonprofit and nongovernmental organizations (NGOs), as well as an engaged public, is crucial to driving local action as well as policy change. For example, the global challenge of marine plastics pollution is being tackled in the Mediterranean context by a local Cyprus-based NGO. The Cyprus Sustainable Tourism Initiative is a nonprofit organization established in 2006 to facilitate sustainable tourism. Several of its initiatives directly tackle marine plastics in the Mediterranean, for example, by visiting hotels and working with staff and tourists to raise awareness and reduce plastic consumption and waste (114, 115).

To have an engaged public in the sustainable tourism debate requires a combination of knowledge of the issues, a willingness to make behavioral changes, and the development of an ecoliterate society. Just as nature-positive tourism would integrate all its economic activities into a circular model to eradicate resource depletion, waste, and pollution, the concept of a circular flow is applicable to the enhancing of PEB and environmental literacy through nature tourism. A key component of environmental literacy extends beyond purely knowledge and concern about nature, to include an affective component of delight about the beauty, mystery, and bounty of the world (116). Tourism experiences in nature frequently embrace such sentiments offering opportunities for people to emotionally connect to nature in a way they generally cannot in urban environments. By using tourism to facilitate the creation of an enhanced environmental literacy including an affective attachment to nature, individuals are likely to have a higher propensity to adjust their behavior to remediate or prevent further environmental problems, creating a positive holistic relationship with nature. The development of an ecoliterate mindset would in turn have the propensity for encouraging environmentally sustainable experiences and practices as integral to tourism consumption.

Environmental consciousness could also be raised through government legislation requiring clearer messages about how our choice of travel and accommodation purchases influence GHG emissions. For example, it could be made compulsory for aviation advertising to exhibit warning messages about the contribution of GHG emissions from your chosen flight to global warming. This would follow a similar principle to the way cigarette packs are required to provide public health warnings of how smoking may cause cancer, for example, "Your flight from Madrid to San Francisco contributes as much to global warming as heating your house for a year and a half."

Frequent-flyer taxation levies and the implementation of personal carbon allowances are examples of other measures that could be applied to aviation to limit the quantity of flying.

Through an analysis of the creation of nature-positive tourism, we have emphasized in this article the existential threat of climate change that tourism research must respond to and highlighted a range of other subjects that require knowledge creation. Some crucial priorities include considering degrowth strategies and shifting from what has proved to be an unsustainable Western-centric paradigm of modernization and neoliberal globalization. A clear global agenda for coordinated climate change action in travel and tourism is essential in addition to national and local actions, to achieve the commitments of governments to comply with the Paris Agreement and the UN's SDGs, and for the tourism sector to be carbon neutral by 2050. Achieving these ends will require concerted, collaborative action on policy and practice in tourism, as well as a paradigm shift toward a more caring, just, and ethical tourism, as we have highlighted as the principal theme of this article. Crucial agenda items include engaging diverse worldviews and biocultural ethics (98, 117) and pluralistic knowledge systems including traditional and Indigenous knowledge and methodologies (116, 118), with greater inclusivity and collaboration with the Global South, to address the global threats that face tourism in the Anthropocene. A key responsibility of tourism researchers thus lies in facilitating engaged learning and praxis to advance carbon-neutral goals, biodiversity conservation and ecosystem health in tourism destinations, and enable just transitions, climate justice, community resilience, and sustainable futures.

SUMMARY POINTS

1. The exponential growth of recreational mobility in recent decades has necessitated an increasing usage of environmental and natural resources for tourism. Tourism is recognized as one of 12 central global-scale geophysical forces reshaping the earth for human purposes, emphasizing the requirement for analysis of its relationship with the environment. Its growth is rooted in a paradigm based on principles of modernity that threaten environmental sustainability. New approaches to provisioning are required that enable ecological and social resilience while facilitating individual and communal well-being in destinations.
2. Dependency on carbon-centric transport, especially air travel, makes tourism a significant contributor to greenhouse gas emissions, and its overuse of natural resources causes water depletion, biodiversity loss, and environmental pollution. As an economic sector highly dependent on climatic and ecosystem stability, environmental degradation simultaneously endangers tourism's viability and the well-being of peoples whose livelihoods are dependent on it. The necessity to reduce tourism's carbon emissions is also a requirement for the sector meeting its contribution to the Paris Agreement.
3. Conversely to exceeding environmental limits, tourism can enhance comprehension of the plurality of nature's values, aiding the development of ecological literacy and affective emotional responses and benefitting mental health. The development of ecoliteracy has the propensity to encourage environmentally sustainable practices as integral to tourism and everyday life. Tourism visitation of nature also lends biodiversity conservation an economic value and provisions opportunities for local and Indigenous people. Revenue streams from tourism also provide financial and technical support for the management of protected areas.

4. The benefits of tourism are not universally shared, and its excessive resource usage is primarily associated with Western-centric lifestyles and consumerism. Tourism's expanding contribution to climate change and resource over-usage that most stridently negatively impacts the world's poorest citizens creates ethical and moral challenges to an unlimited hedonistic mobility. The overuse of natural resources for tourism raises issues of political ecology and equity of resource usage concerning access to and control of scarce resources between the Global North and Global South. A significant subsequent challenge is how to fulfil an individual right for freedom of movement and the enjoyment of tourism within environmentally sustainable limits.
5. Overtourism and last-chance tourism are symbolic of the need to rethink the purpose of tourism to transcend to a nature-positive model that is just and ethical. It must be compatible with locally situated sustainability values and support the well-being of those economically dependent on it, most especially in places with limited alternative sustainable development options. To achieve this, there is a need to reconceptualize it as an issue of public responsibility as much as one of individual freedom and hedonism. This entails recasting the perceptual norms of tourism from the pursuit of a casual activity without negative consequences to one that is framed within environmental and cultural determinants encompassing diverse worldviews and biocultural ethics.

FUTURE ISSUES

1. How can the tourism system be decarbonized and circular economy practices be utilized for its adaptation into a green and restorative economy to achieve its optimal use for a sustainable future?
2. How can the individual right to a freedom of mobility and enjoyment of the world's resources be met according to environmental limits? How can resource pressures and associated ethical and justice issues caused by tourism attain a wider public recognition? Which criteria and values should be used to determine the success of tourism?
3. How can tourism experiences be utilized in post-humanist approaches to connect people to nature and enhance environmental virtues and sustainable lifestyles?
4. Can tourism's environmental challenges be tackled by voluntary social change or is coercion necessary? Are coercive measures to change tourist behavior, e.g., frequent-flyer taxation and the limiting of numbers to combat overtourism, socially acceptable?
5. What is the future potential for artificial intelligence and enhanced virtual technologies to be able to replicate authentic tourism experiences within the home? Would this decrease the desire to travel or increase it?
6. How can a clear global agenda for coordinated climate change action in travel and tourism be achieved in a complex multistakeholder system?

DISCLOSURE STATEMENT

The authors are not aware of any affiliations, memberships, funding, or financial holdings that might be perceived as affecting the objectivity of this review.

ACKNOWLEDGMENTS

We thank the *Annual Review of Environment and Resources* Editorial Committee, in particular Diana Ürge-Vorsatz, for the invitation to prepare this review. We are grateful to Marie-Thérèse Wright for aiding in the editing and production of this article and Savitha Viswanathan for assistance producing the figures.

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