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The Impact of Climate Change on European Tourism and Visitor Behavior

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ABSTRACT

Tourism is one of Europe's most economically significant sectors, yet its dependence on stable climatic conditions renders it highly vulnerable to global warming. This study examines how climate change is reshaping European tourism patterns, visitor behavior, and destination management between 2021 and 2024. Using a qualitative content analysis of academic research, policy documents, and media reports, the paper synthesizes evidence on the environmental, behavioral, and institutional dimensions of adaptation. The findings reveal that climate change is driving both physical and behavioral transformations: alpine and Mediterranean destinations face mounting exposure to snow scarcity, heatwaves, and wildfires, while tourists increasingly display spatial, temporal, and qualitative adaptation—shifting toward cooler, higher-altitude, or off-peak destinations and favoring sustainable, experience-based travel. European destinations such as Berlin and Barcelona have begun adopting "quality-over-quantity" tourism strategies, integrating climate mitigation, sustainable mobility, and visitor-management reforms. However, adaptation remains uneven; many operators continue to prioritize short-term recovery, and the rise of premium "low-impact" tourism risks excluding lower-income travelers. The study highlights an emerging need for integrated governance that aligns climate adaptation, social equity, and sustainable economic outcomes. Lessons from Europe are relevant for Indonesia, where rising sea levels, coral bleaching, and heat stress threaten major destinations. Drawing from European experience, Indonesia should implement climate action plans, diversify tourism products, strengthen community-based adaptation, and invest in low-emission transport infrastructure. The transition from climate-dependent to climate-resilient tourism will require coordinated policy, scientific insight, and ethical governance to sustain tourism's contribution under accelerating climatic change.

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BACKGROUND

Tourism is one of Europe's most economically significant sectors, accounting for roughly 10% of regional GDP, supporting millions of jobs, and generating substantial tourism expenditure. European tourists spent an average of €485 per trip in 2023.[1] European tourism volumes have rebounded strongly since the COVID-19 pandemic: by late 2024, foreign arrivals were about 6% higher than 2019 levels, and several large destinations (e.g., Spain and Italy) reported record or near-record arrivals and nights in 2023–2024. These figures illustrate both the sector's economic weight and its continuing attractiveness despite rising climate risks.

However, the industry's dependence on stable climatic conditions makes it especially vulnerable to global warming. Regional climate projections and demand models indicate a complex spatial reshaping of tourism: southern and coastal regions, which depend heavily on summer sun, beaches and outdoor leisure are projected to experience declines in summer tourism demand in some areas (up to ~9% under high-warming scenarios), while northern and cooler coastal/ inland areas may see increases in demand as travellers seek milder conditions.[2] At the same time, alpine and winter tourism faces a severe physical threat: recent studies show that many European ski resorts will suffer frequent snow scarcity under 2°C-4°C of warming (with a substantial share, ranging from ~25% to over 50% depending on threshold and adaptation assumptions facing recurrent low-snow seasons), placing medium- and low-altitude resorts at particular risk. These findings underline that climate change is not only a future problem but is already expected to alter regional demand patterns materially.

The summer of 2023 provided stark real-world evidence of these risks. Mediterranean heatwaves and a series of severe wildfires (e.g., large fires affecting Greek islands and southern Mediterranean coasts) forced mass evacuations and service disruptions, exposing tourists to acute safety and health hazards and generating negative destination imagery that can depress future demand.[3] Such events have also intensified local debates about carrying capacity and visitor quality: several European destinations (notably Venice, Barcelona, and parts of Spain and Italy) have accelerated policy measures to manage flows, ranging from entry fees, seasonal caps, and marketing shifts toward off-peak or higher-value tourism to reduce environmental stress and improve local liveability. These policy

shifts reflect the emergence of an explicit trade-off between short-term volume and long-term viability.

Behavioral responses by tourists are evolving alongside these environmental and policy changes. Evidence from industry and academic sources in 2022–2024 indicates three concrete traveller adaptations: (1) spatial adaptation, choosing cooler or higher-altitude destinations (often in northern Europe or high mountains) during extreme summer heat; (2) temporal adaptation, shifting travel away from peak summer months toward spring/autumn; and (3) qualitative adaptation, favoring low-impact, experience-based or "off-the-beaten-track" options that are perceived as more sustainable or less crowded. Younger cohorts (Millennials and Gen-Z), who already prioritize sustainability and authentic experiences, are especially likely to incorporate climate risk into destination choice and timing. These behavioral tendencies both create opportunities (new markets for cooler destinations or shoulder-season products) and new pressures (rapid demand increases in previously less-visited areas and equity concerns for lower-income travellers).

Adaptation initiatives are proliferating in both the industry and policy realms but vary significantly in scope and ambition. In the Alps, trans-national projects such as BeyondSnow are developing socio-ecological resilience strategies for medium- and low-altitude snow destinations, promoting diversification away from pure snow dependence, improving water/energy efficiency for snow-making, and co-designing transition pathways with local stakeholders. Coastal and urban destinations, by contrast, are combining demand-management tools (entry fees, visitor regulations) with climate mitigation and adaptation planning to protect citizens and assets. Nevertheless, many operators still focus on short-term recovery and marketing rather than longer-term structural change, highlighting an urgent need for integrated policies that align mobility, destination management, and climate mitigation to protect both tourism livelihoods and ecosystem limits.

METHOD

This study employs a qualitative content analysis to explore how climate change influences European tourism and visitor behavior. The purpose of this approach is to synthesize diverse types of information, ranging from empirical research to policy narratives and media reporting in order to understand both structural dynamics (e.g., environmental and institutional changes) and perceptual dimensions (e.g., traveler attitudes, media framing, and destination image). Qualitative content analysis was selected because it enables researchers to systematically interpret textual material by identifying recurring themes, patterns, and meanings across multiple sources.[4]

The analysis was interpretive and comparative in nature. Rather than seeking causal relationships, it aimed to build a conceptual understanding of how different actors, researchers, policymakers, and tourists, frame and respond to the impacts of climate change within the European tourism context.

Data Sources

Two main categories of data were analyzed to ensure triangulation and contextual richness:

1. Academic Literature.
   Peer-reviewed publications were selected for their theoretical and empirical contributions to understanding tourism behavior and climate-related adaptation. The core materials include Ketter (2021), which examines European Millennials' tourism trends and sustainability orientations, and Bursa, Mailer, and Axhausen (2022), which provides insight into intra-destination mobility patterns and environmental challenges in Alpine tourism. These sources represent the structural, evidence-based dimension of the inquiry.
2. Media and Policy Reports.
   Contemporary media and institutional texts were used to capture real-time reflections of how climate change is reshaping tourism practice and discourse in Europe. This corpus includes articles by Martiny (2023) and Awaliyah (2023), which document societal and governmental responses to overtourism and climate crises, and a Kompas.com (2023) report that illustrates shifts in public interest toward European destinations. These texts were treated as narrative evidence of how tourism stakeholders and travelers perceive and react to climatic changes.[5,6,7]

The inclusion of both academic and journalistic materials allows the study to bridge the gap between empirical research and public discourse, offering a comprehensive perspective on tourism adaptation.

The interpretation was guided by an ecological systems perspective, recognizing that tourist behavior, destination policy, and environmental conditions are interdependent subsystems within a broader climate–society interface. This interpretive stance allowed behavioral adaptation to be conceptualized not merely as a reaction to environmental change but as an active force reshaping the future of European tourism.

This triangulated framework allows cross-validation between empirical studies and real-world policy reactions, emphasizing behavioral adaptation as both an outcome and driver of tourism transformation under climate change.

DISCUSSION

Climate change is producing regionally differentiated but systemically consequential impacts on European destinations, with Alpine and southern (Mediterranean) areas showing the earliest and most visible signs of vulnerability. Quantitative climate–impact assessments now indicate that natural snow reliability at many European ski resorts is declining rapidly: a continent-wide analysis showed that, under ~2 °C of global warming, more than half of the 2,234 studied ski areas are projected to face a "very high" risk of insufficient natural snow during typical winter seasons and that risk rises close to ubiquity under more severe warming scenarios. These projections imply not merely shorter seasons but an erosion of the biophysical foundation of entire local winter economies.

Because resorts attempt to maintain operations, managers have increasingly relied on technological fixes such as widespread snow-making and grooming.

Recent empirical and modelling work confirms that snow-making substantially increases water withdrawals and energy use, and that in many basins these demands will intensify in a warmer climate (both because operators need more artificial snow and because natural snowmelt timing shifts). Case studies from the French and broader European Alps quantify measurable hydrological disturbance from grooming and snow-making and warn that water availability during critical periods may become the limiting factor for future snow production — not just machine capacity. Thus, artificial snow acts as an adaptation that simultaneously creates new resource constraints and greenhouse-gas trade-offs.

Recent regional syntheses and policy reports underline the same message at the landscape scale. Alpine adaptation assessments (e.g., BeyondSnow / Alpine Space reports) project upward shifts in the altitude bands that can reliably support snow-based tourism, concentrating demand at higher elevations and amplifying pressure on those ecosystems and infrastructure (ski lifts, water reservoirs, access roads). This spatial concentration increases the vulnerability of mountain catchments to cascading risks (water stress, biodiversity impacts, and energy demand peaks) and reduces the buffer capacity that a more distributed winter tourism system once provided.

At the Mediterranean and southern European extreme, the climate signal shows up differently but just as forcefully: heatwaves, prolonged droughts, and an escalating wildfire regime have started to produce acute safety incidents and reputational damage for destinations. The 2023 wildfire season in Greece, including significant evacuations from islands such as Rhodes and Corfu, became a high-visibility demonstration that climate hazards can rapidly interrupt the tourist season and impose immediate humanitarian and logistical burdens (evacuations, flight cancellations, accommodation displacement). The event also prompted exceptional policy responses (e.g., government relief or voucher programs for displaced tourists) and spurred discussion among operators and insurers about the rising cost and unpredictability of operating in fire-prone coastal zones.

The combined result is a regional paradox: climate change is eroding the environmental attributes that make destinations attractive (snow, mild summer weather, unburnt coasts), while simultaneously catalyzing governance and market innovations intended to limit or manage tourism pressure. Urban heritage and mass-tourism hotspots have moved relatively quickly to operationalize visitor-management instruments that were previously mostly theoretical: Venice's experimental day-tripper access fee and registration system (trialed and extended through 2024) is a concrete example of a city-level intervention meant to reduce peak load on fragile infrastructure and protect residents' quality of life. Barcelona has likewise scaled up integrated tourism-management planning with multi-year funding and district-level action plans that aim to reduce environmental impacts and distribute tourism activity more evenly across time and space. These measures show that climate-driven shocks can accelerate policy reform — but they also raise questions about effectiveness, fairness, and long-term resilience (e.g., whether fees actually reduce peak entries or raise local costs).

The evidence points to important distributional implications. Adaptation responses (artificial snow, concentrated investment in high-altitude resorts, pay-to-enter urban controls, or marketing of "cooler" northern alternatives) tend to favour better-resourced operators and wealthier tourists, creating the risk of spatial and socio-economic exclusion. Without coordinated water-resource governance, equitable insurance schemes, and policies that link adaptation finance to broader community benefit, adaptation could shift impacts and costs rather than resolve them. Recent multi-disciplinary work therefore calls for integrated strategies that combine climate mitigation, water and energy planning for resort operations, wildfire preparedness and evacuation planning, and socially sensitive visitor-management tools.

Behavioral Adaptation: Shifting Patterns of Demand

Climate-related disruptions are already producing measurable reallocations of tourism demand across Europe. Empirical regional modelling and scenario studies from the European Commission's Joint Research Centre show a clear north–south redistribution of demand under warming scenarios: northern and some mountain regions tend to gain attractiveness. At the same time, many Mediterranean coastal areas are projected to lose summer bed-nights as heat stress and water scarcity intensify. Industry and booking data reported during the 2022–2023 heatwave episodes corroborate this pattern: travel agents and credit-card/booking aggregates documented rising bookings for Nordic and high-latitude destinations while southern destinations experienced heat-related cancellations and short-term demand drops.[8,9,10]

This spatial adaptation is supported by multiple modelling and meta-analytic studies published from 2021–2024. A 2024 meta-analysis of climate–tourism demand elasticities found consistent evidence that temperature and climate comfort indices have significant, asymmetric effects on tourism demand across regions and seasons, i.e., similar climatic shifts produce gains in cooler areas and losses in hotter ones. The meta-analysis also showed that the magnitude of demand reallocation depends on tourism type (beach versus nature versus urban) and the metric used to measure climatic suitability.

Complementary empirical work modelling regional TCI (Tourism Climatic Index) impacts found that coastal Mediterranean NUTS3 regions are particularly vulnerable to summer demand reductions. In contrast, many northern/western regions show potential increases in shoulder and even summer demand under moderate warming (JRC, 2023). Alongside spatial reallocation, temporal (seasonal) adaptation, deseasonalisation and stronger "shoulder-season" demand, is now well documented. Industry reports and travel-behaviour studies through 2023–2024 identify a sustained increase in bookings for spring and autumn as travellers seek to avoid peak-summer

heatwaves and overcrowding; travel operators have responded by extending their offering into shoulder months.

Recent climate-attractiveness modelling shows that moderate warming tends to extend acceptable tourism conditions into spring and autumn in many regions (e.g., urban and mountain sites), which supports lengthening of viable tourism seasons and institutional promotion of shoulder-season tourism as an adaptation strategy.[11,12]

Behavioural segmentation matters: younger cohorts such as Millennials and Gen-Z are disproportionately shaping these temporal and spatial shifts because of their greater flexibility, preference for experiential travel, and higher climate awareness. Studies from 2022–2024 indicate younger travellers are more willing to shift dates, choose alternative (cooler or less crowded) destinations, and pay for low-impact or "authentic" experiences; this cohort's preferences therefore magnify the observed trend toward shoulder-season travel and off-the-beaten-track choices.[13]

Systematic reviews of outdoor recreation and nature-based tourism also show that weather- and climate-related perceptions directly affect participation timing and destination choice, a mechanism that helps explain observed booking shifts. However, adaptation is not evenly distributed across socio-economic groups and destinations. Several analyses during 2021–2024 highlight that adaptation pathways which favour "high-value, low-impact" tourism (e.g., converting inexpensive mass-tourism offers into pricier, lower-volume experiences) risk pricing out lower-income travellers and shifting the social distribution of access to tourism benefits.[14,15]

Reports from destination case studies (e.g., Barcelona, Mallorca) demonstrate that upgrading accommodation and restricting cheap short-stay options can reduce mass-party tourism but often leave the same structural demand, displacing lower-cost operators rather than necessarily reducing total visitor numbers, with equity and livelihood implications for local workers and budget travellers.

From a mobility and operations perspective, intra-destination behaviour matters for emissions and resilience. Survey-based evidence from alpine tourism research shows that tourists' local mode choices (car vs. public transport, preference for scenic drives) are influenced by perceived on-site mobility convenience; such preferences can undermine low-carbon adaptation if visitors choose private cars because public transport is perceived as infrequent or inconvenient, an important caveat for destinations promoting climate-smart redistribution of demand to cooler mountain or northern sites.[16] Recent literature emphasizes that policy design must consider equity, behavioural realism, and multi-scale governance. Scenario and regional impact studies (2023–2024) recommend combining demand management (e.g., targeted visitor fees, off-peak incentives), supply-side investments (multimodal transport, water-efficient snow-making, green energy), and social protection measures for workers and small enterprises likely to be disadvantaged by market reconfiguration.[17,18,19] Without explicit measures to preserve affordable access and distribute adaptation costs, market-led transitions toward high-value, low-volume tourism may improve environmental metrics locally while worsening social inequities. A point also reinforced by cross-country analyses of tourism's effects on income distribution.

Policy and Industry Responses

European destinations are actively experimenting with adaptation and mitigation strategies, but the evidence from 2021–2024 shows a mix of progress, limits, and uneven implementation. Several large-scale analyses and policy documents (JRC; EEA Climate-ADAPT; ETC) highlight a clear pattern: climate change is already reshaping seasonal demand and the geographic distribution of tourism, forcing destinations to rethink not only infrastructure but also visitor management and product offer. For example, regional modelling and scenario work find a northward and altitude shift of tourist demand as summer heat intensifies in southern Europe and snow reliability declines at lower alpine altitudes. These redistributions are measurable as changes in booking patterns and seasonality (deseasonalisation) and have been modelled in European Commission research.

Urban destinations such as Berlin and Barcelona have therefore pivoted toward 'quality' or 'city-compatible' tourism policies that emphasize the compatibility of visitor flows with resident life, cultural preservation, and environmental performance, rather than pursuing visitor-volume growth at all costs. VisitBerlin and Barcelona's destination management reports show concrete policy shifts: emphasis on sustainable mobility, local-experience products, and campaign tools that steer tourists to less congested sites (e.g., "Going Local" style approaches in Berlin). These policy pivots are consistent with a broader European DMO trend of prioritizing qualitative metrics (visitor behaviour, dwell time, carbon footprint per visitor) over raw arrival figures.[20,21]

In mountain and alpine regions, robust recent scholarship (systematic reviews and empirical studies through 2024) documents both acute vulnerability and the beginnings of structural adaptation. Nature-Climate-Change-based modelling shows major risk for ski tourism: large shares of current ski resorts face severe snow shortages under 2 °C warming scenarios, which prompts short-term technological responses (snow-making, energy-intensive solutions) and longer-term product diversification (summer mountain biking, year-round nature tourism). Systematic reviews of mountain tourism literature to 2024 also underline a shift in academic attention toward how mobility, seasonality, and route/itinerary choice interact with climate pressures. These studies conclude that, while technical fixes (snow-making, snow-saving mats) can temporarily lower risk, they can increase water/energy demands and are not scalable solutions for every resort.

On the visitor behaviour side (2021–2024 evidence), a growing body of work documents three adaptive responses among tourists: (1) spatial substitution, choosing cooler/northern or higher-altitude alternatives; (2) temporal shifts, traveling outside peak heat periods (spring/autumn); and (3) activity substitution,

favoring cultural/urban or slow-travel experiences over climate-sensitive beach or snow holidays. Empirical analyses of arrivals and temperature correlations show summer heat can reduce arrivals to very hot destinations, while warmer autumns may increase shoulder-season demand in cooler regions. This behavioural evidence matches DMO observations and international travel-industry reports that promoted "coolcation" and climate-resilient itineraries in recent years.

Nevertheless, industry response remains uneven. While some DMOs and large operators are integrating climate risk assessments and promoting resilient itineraries, many small businesses remain reactive (focusing on recovery after disruption rather than proactive climate-proofing). Policy guidance (UNWTO toolkits, Interreg Blueprints) and EU case studies provide practical frameworks, but uptake varies due to capacity, funding, and institutional fragmentation. The European Travel Commission's 2022–2023 outputs emphasize a need for DMOs to develop climate action plans and to coordinate transport, mobility, and visitor-management strategies. Yet the translation of such plans into local action is still in progress.[22,23,24,25,26]

There is an important equity dimension: adaptation strategies that prioritize "quality tourism" (higher yields, higher prices) risk excluding lower-income tourists and changing the socio-economic mix of visitors, with consequences for access and local livelihoods. Scholarship on the tourism transition to low-carbon models highlights justice issues (who can adapt, who pays, and who benefits). It warns against solutions that shift costs onto less powerful stakeholders. This ethical/political component is central to designing adaptive governance that distributes risks and benefits fairly among host communities, businesses, and visitors.

CONCLUSION

Climate change has evolved from an environmental concern into a systemic force fundamentally restructuring Europe's tourism geography, visitor behavior, and policy frameworks. Across the continent, the past few years (2021–2024) have made clear that extreme weather events, rising temperatures, and ecosystem degradation are not temporary disturbances but enduring realities that redefine the seasonality, spatial patterns, and sustainability of tourism (François et al., 2023; Steiger, 2024). These disruptions have triggered adaptive responses from both destinations and travelers, resulting in the gradual emergence of climate-aware tourism models.

The empirical evidence shows a dual trajectory of adaptation. On one side, tourists are demonstrating behavioral flexibility through spatial and temporal substitution. Favoring northern, higher-altitude, or cooler destinations and adjusting travel times to avoid heat extremes (Chang et al., 2024). They are also showing an increased preference for low-carbon, experience-based, and culturally immersive travel, consistent with the sustainability-driven values of Millennial and Gen Z travelers identified by Ketter (2021). On the other side, destinations are progressively integrating mitigation and adaptation strategies, shifting from mass-tourism growth models toward resilience-oriented governance. European cities such as Berlin and Barcelona have institutionalized quality-over-quantity approaches, while Alpine regions are experimenting with multimodal mobility, eco-certification, and diversification of year-round tourism products (Bursa et al., 2022; Martiny, 2023). These transitions illustrate that the future of tourism will be determined as much by governance innovation as by climatic conditions.

However, the transformation remains uneven. Many operators still adopt reactive rather than preventive adaptation measures, addressing immediate crises, such as wildfires or heatwaves without embedding long-term structural change (Awaliyah, 2023). Furthermore, the growing focus on "premium" or "quality" tourism carries the risk of social exclusion, potentially marginalizing lower-income travelers and small tourism enterprises (European Travel Commission [ETC], 2023). Addressing this inequity requires policies that balance environmental imperatives with economic inclusivity, ensuring that the transition to climate-resilient tourism does not become a privilege for the wealthy but a pathway toward shared sustainability.

The lessons from Europe hold critical implications for Indonesia, a tourism-dependent archipelagic nation equally vulnerable to climatic disruption. Rising sea levels, coral bleaching, heat stress, and extreme weather events threaten iconic destinations such as Bali, Lombok, and Raja Ampat. Indonesia must not wait for irreversible losses to act. Drawing from European experience and global policy frameworks (UNWTO, 2023; Interreg, 2024), Indonesia can adopt a proactive adaptation agenda that integrates climate action into tourism governance at all scales. This includes developing regional climate action plans, diversifying tourism products to include upland and off-season destinations, investing in low-emission transport infrastructure, and promoting ecosystem-based adaptation such as mangrove restoration and coral rehabilitation (Setiawati, 2023). Equally important is empowering local communities and micro-tourism enterprises through capacity-building, inclusive financing, and participatory decision-making—ensuring that adaptation is equitable, locally grounded, and resilient over time.

Ultimately, the challenge and opportunity lie in transforming the tourism sector from a climate-dependent to a climate-resilient system. Achieving this requires integrating scientific research, behavioral insights, and governance innovation into a coherent policy framework. The European experience demonstrates that resilience is not achieved through technological fixes alone but through institutional learning, cross-sector collaboration, and ethical governance that values people and ecosystems equally. For Indonesia and other emerging destinations, embracing this paradigm will not only protect tourism's economic contribution but also position the sector as a leading force for sustainable development in the Anthropocene.

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