High Temperatures and Tourism: Enlightenment from China

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Article

High Temperatures and Tourism: Enlightenment from China

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Abstract: Climate and its fluctuations have wide-ranging impacts on the tourism industry. High temperatures, as a typical meteorological and climatic factor, influence tourists' travel intentions and spatial behavior. This study conducted a descriptive analysis and market trend analysis of Chinese tourism during periods of high temperatures, revealing several key findings. Firstly, tourists seeking respite from summer heat exhibit a preference for short-distance trips and resource-rich destinations. Secondly, heat-escape tourism products undergo changes over time, gradually shifting towards mountainous areas and waterfront locations. Furthermore, taking Shanghai Disneyland as a case study demonstrates that the holiday system holds greater significance than temperature constraints. Despite experiencing a significant decline in the quality of their tourist experience in high-temperature environments, long-distance travelers are not deterred from choosing pre-booked tourism products by sudden bouts of hot weather.

Keywords: heat-escape tourism; heat-escape tourism; climate comfort ; Shanghai Disneyland

1. Introduction

Since the second Industrial Revolution, global warming has become an indisputable fact [1–3]. According to the Intergovernmental Panel on Climate Change (IPCC) sixth assessment report, the global average near-surface temperature has risen by about 0.99°C from 1850–1900 to 2001–2020, and it is expected that the cumulative increase will reach 1.5–2°C by the end of the 21st century [2]. With global warming, the frequency of extreme weather and climate events such as high temperatures, droughts, and hurricanes have presented an increasing trend.

July 2021 has earned the unenviable distinction as the world's hottest July and month ever recorded, according to the National Oceanic and Atmospheric Administration's National Centers for Environmental Information. Since the beginning of summer, heat has become the theme of the world. Europe, Asia, America, and Africa are suffering from rare high-temperature heat waves, and even the northern part of northern Europe in the Arctic Circle has experienced unusually high-temperature weather above 30°C. China is no exception. Since the beginning of summer, large-scale continuous high-temperature weather has occurred in many parts of China, and summer in China has become hotter [4,5]. The extremely high temperatures may continue to ravage the world in the next four years [2].

Since the 1980s, climate change has become a trendy topic affecting the sustainable development of tourism [6,7], with a significant impact on tourism destinations [8,9], tourist motivation [10,11], and seasonal tourism demand [12,13]. Affected by global warming, extreme high-temperature weather disasters occur frequently worldwide [2,14]. Due to its strong dependence, tourism has an

inherently high correlation and sensitivity to climate change, especially temperature (e.g., climate environment affects the layout of tourism facilities; climate differences cause seasonal tourism flows; etc.), which will have a greater influence [15,16]. Therefore, exploring and understanding the relationship between tourism and high-temperature weather is of great significance in promoting tourism. Global warming has had a wide-ranging and far-reaching impact on tourism, and its academic attention continues to rise. Scholars usually analyze the impact of climate change on tourism in terms of resources and facilities [17,18], tourism behavior and tourism flow [13], tourism industry and economy [19,20], and the impacts are pros and cons. Some scholars argue the positive impacts of global warming in various aspects. Global warming may improve the eco-tourism landscape in some areas [21], and promote an increase in outdoor tourism such as sunbathing [22]. It may also extend the summer alpine tourism season [23], optimize and adjust the structure of the tourism industry, and facilitate in launching new tourism projects (such as Arctic cruise tourism) [24]. However, other scholars believe that global warming has brought great disadvantages [25], resulting in the reduction and degradation of ecological landscapes such as glaciers and firns [9], beaches and coastal resources [15,26]. This may further lead to tourist visits declined [22,27], scenic spots' costs increased, and thus revenues shrank for tourism industry [9].

The 2018 China Heat-Escape Tourism Big Data Report shows that China's potential effective heat-escape tourism demand population is about 300 million (China Tourism Academy & Ctrip Travel Big Data Joint Laboratory, 2018). Considering the characteristics of the long consumption cycle and the high frequency of heat-escape tourism, the market scale is as high as 300 billion yuan. China owns the world's largest heat-escape tourism market. Hence, this study takes China as an example to explore the impact and effect of high-temperature weather on China's tourism and tourist travel, based on news reports, typical observations, and statistics, and conducts an exploratory analysis of tourism in China under high-temperature scenarios from three different perspectives. This study has five sections.Section 2 explores the market demand for heat-escape tourism from the perspective of demand and the evolution path of China's heat-escape tourism products from the perspective of supply. Section 3 describes the pattern and trend of summer tourism climate resources in China over the past 60 years. Section 4 studies the elasticity of supply and demand markets from the perspective of tourists, followed by the conclusions.

2. Heat-escape Market Demand and Supply

2.1. Market demand characteristics

Heat-escape tourism development has become a national strategy. The State Council of the People's Republic of China included "develop heat-escape tourism products, promote the construction of several of heat-escape vacation destinations" in its guidance to promote the development of comprehensive tourism (the State Council of the People's Republic of China, 2018). From the perspective of tourist interest in exploring typical meteorological and climatic factors, how do high temperatures affect tourists' travel willingness and spatial behavior?

1) Tourism Willingness. Recently, there has been a surge in people's willingness to travel, and summer tourism to escape the heat has become increasingly popular. A comparison of the 2023 China Summer Tourism Development Report and 2018 China Heat-Escape Tourism Big Data Report found that the overall willingness of residents to travel in the third quarter increased from 80% in 2018 to 94.6% in 2023, with a high willingness to travel and a further increase in demand in the heat-escape tourism market.Baidu index big data platform shows that the search popularity with summer tourism as the key word is rising this year.
2) Travel Groups. The three main market groups of heat-escape tourism (the elderly, students and teachers, and urban residents of high-temperature cities) represent about 300 million people with high potential effective demand for heat-escape tourism. Due to the institutional arrangement of winter and summer vacations and the natural, seasonal rhythms, students and

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teachers become the main force of heat-escape tourism. With the change in the concept of the elderly and the strong national social security system, the number of the elderly who have money and time and are willing to travel is increasing. What's more, summer brings a high incidence of cardiovascular and cerebrovascular diseases in the elderly, and heat-escape is especially important for them. Residents in traditional high-temperature areas also have a strong demand for heat escape, with a potential market size of more than 100 million people.

3) Short-range Orientation for Travel Groups. The cities most favored for heat-escape tourism tend to focus on first-tier cities and second-and third-tier high-temperature cities. However, in some cities, the main tourists come mainly from within and around the province, traveling short and medium distances. Provinces and cities with relatively developed economies and hot temperatures have relatively few local summer resources, and tourists prefer to go to cooler provinces, mainly long distances away, such as the Yangtze River Delta, the Beijing–Tianjin–Hebei region, the Pearl River Delta region, and the central and western "stove" cities. In addition, consumers in high-temperature cities create an obvious demand for heat-escape travel. Chongqing, Chengdu, and Hangzhou are the main sources of heat-escape tourists. However, some large provinces have rich heat-escape tourism resources, such as Heilongjiang, which is rich in forest, wetland, and lake resources. Yunnan, which has a spring-like temperature year-round, and Shandong, which has more developed coastal resources. Their main tourists are from within and around the province, mainly traveling short and medium distances, with a short-range orientation.

4) Resource Orientation for Travel Groups. The short-range orientation of travel groups refers to when tourists' demand for heat-escape tourism is met by tourism products in nearby regions. Such resources supporting these tourism products are widely distributed and dispersed. Pleasant climate in China illustrates a geographical pattern, and most regions in Northwest and Northeast China, as well as North and Southwest China, have favorable heat-escape climate conditions. Tourists also tend to choose these regions as heat-escape destinations. Even in the traditional high-temperature areas, such as the middle and lower reaches of the Yangtze River, there are abundant heat-escape climate resources, such as Lushan Mountain in Jiangxi, Mogan Mountain in Zhejiang, and Tiantangzhai in Anhui. The three core destination regions support the main market for heat-escape tourism in China: the wetland and forest resources in Northeast China, the coastal resources around the Bohai Sea, and the small town and lake resources in Yunnan.

2.2. The Evolution of Heat-escape Tourism Supply

Summer resorts are always an important motivation for summer travel. Essentially, escaping summer heat is the result of human beings adapting to the natural environment at all times. From the Lishan Palace, a place to escape the heat and enjoy some coolness in summer, to the construction of Chengde Mountain Resort and the Summer Palace in Beijing during the Qing Dynasty, summer vacation was enjoyed by emperors, royalty, and nobles of all dynasties, and it has become the main type of vacation for the upper class. People of all classes would stay in the mountain temple to survive the scorching heat. In modern times, foreign missionaries and entrepreneurs built villas on Lushan Mountain, created the Kikungshan resort, etc., each attempting to escape the heat, introducing to China the culture of leisure and vacation found in other regions and developed countries, and creating a heat-escape vacation in both the business community and in society to a certain extent [28]. With the continuous increase in national income, under the cloud of global warming, summer resorts

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have become an important motivation for summer travel, and heat-escape tourism products are constantly changing with and seeking new development opportunities.

1) Traditional Heat-escape

Heat-escape vacations have existed in China since ancient times. An ancient saying goes, "Escape the cold in winter and the heat in summer." There were two traditional ways to escape the heat: a) Heat-escape Gardens. Ancient gardens can be regarded as a prototype of tourist resorts, as they were often used as places for ancient emperors to escape the heat and deal with government affairs in summer. Chengde Mountain Resort is the largest surviving ancient imperial palace in China, a classical royal garden where the emperors of the Qing Dynasty escaped heat. During the intense heat of summer, the wealthy chose to build villas in the mountains with lush forests for temporary residence. In addition, private gardens, such as those in the south of the Yangtze River, were often places for feasting one's friends. b) Heat-Escapes in the Mountain Temples.The construction of villas is costly and laborious, and heat-escapers also chose to sojourn in mountain temples, particularly during the Tang Dynasty. On Qixia Mountain in Nanjing and Putuo Mountain in Hangzhou, visitors could take advantage of the shade of the tower to cool off, or climb to the top of the tower to bathe in the breeze.

2)Modern Heat-escapes

She Guitang, a tourism expert in the Republic of China, focuses on summer resorts from the perspective of tourism research. He proposes that the modern Chinese tourism industry began with the development of summer resorts by Westerners, and the prosperity of Chinese tourist areas in modern China originated from Western people's heat-escaping vacations. There are two main types of summer resorts in modern China, mountain and seaside, mainly distributed in the middle and lower reaches of the Yangtze River and in North China. The northern plains of China are hot and dry in summer, so summer recuperation is mostly located at the seashore, in Beidaihe, Qingdao, Yantai, and Weihaiwei. Southern China is sweltering, so most summer retreats are in the mountains, such as the middle and lower reaches of the Yangtze River, including Lushan Mountain, Mogan Mountain, and Kikungshan.

3)Contemporary Heat-escape Tourism

In recent years, heat-escape tourism has been proposed as an industry and has received considerable attention. With the rapid economic development and consumption upgrade, coupled with global warming, heat-escape tourism has become a new fashion pursuit and a rigid demand for people. In the context of the national strategy of comprehensive tourism, quality tourism, and the integration of culture and tourism, contemporary heat escapes offer a huge innovation development opportunity and development space. New types of heat-escape tourism products have become popular; besides mountain, forest, and waterfront heat escapes, there are now canyon, rural, and other forms of heat escape, represented by four major sectors: sub-altitude–plateau type in the southwest, forest–wetland type in the northeast, coastal–beach type around the Bohai Sea, and mountain plains–grassland type in the northwest. There seems to be an evolutionary path of "mountain–waterfront–comprehensive" in the development of heat-escape tourism (Figure 1).

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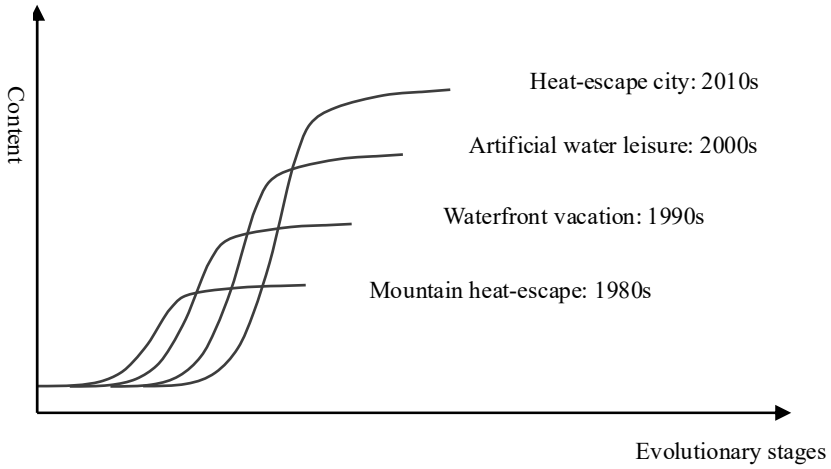

Figure 1. Evolution of Contemporary Heat-escapes in China

a) Mountain Heat-escapes: 1980s

Mountain heat escapes for leisure have a long history. Originally, before the Opium Wars, their main purpose was to live in seclusion, and to visit the mountains and temples. In the 1800s until the founding of the People's Republic of China, there were famous summer resorts such as Lushan Mountain in Jiangxi province, Kikungshan in Henan province, and Mogan Mountain in Zhejiang province, etc., and based traditional mountain tours, gorgeous villas and other architectural landscapes were added to expand heat-escape activities. Since the founding of the People's Republic of China there has been the mass leisure and vacation stage, with modern urbanites pursuing rehabilitation and recuperation, fitness and leisure, and sightseeing. Mountain heat-escape developed vigorously after the Reform and Opening Up, and began to decline after the 1990s. The rise of air conditioning, the competition of scenic spots, and new tourist resorts contribute to the decline in mountain heat-escape resorts [29].

b) Waterfront Vacations: 1990s

Waterfront tourism destinations are relatively traditional heat-escape resorts, relying on the water environment, including seashores, lakes, rivers, and islands. In the Late Qing Dynasty and Republican China, Western culture spread to China, and seashore resorts began to emerge, such as the Beidaihe Beach Resort in Hebei province. Waterfront tourism has gone through three stages of growth: medical treatment and health recuperation; entertainment and amusement; and complete vacations.From 1992 to 1995, the State Council of the People's Republic of China approved the establishment of twelve national tourist resorts in China. Tourist resorts have become an important concept in the development of the Chinese tourism industry since the 1990s. This is a turning point for the comprehensive development of Chinese tourism products from sightseeing-only to a combination of sightseeing and vacation products. Waterfront vacations have ushered in an era of great development.

c) Artificial Eater Leisure: 2000s

Water cultural activities in China can be divided into four stages. First came the swimming pool. The second stage began with the wading pool or the swimming pool/wading pool combination. Then, in the mid-1980s, China began to build some small water playgrounds, including waves, circulation pools, and slides. At this stage, there were few different types of amusement facilities, they had a small investment scale, and simple planning and design—the prototype of the water park. From the late 1980s to the early 1990s, China began to build medium-sized water parks. In this third stage, the area and investment scale increased significantly, the amusement park projects became more expensive and lucrative, scale and design were emphasized, and environmental art design was integrated. In addition, the water park moved from outdoors to indoors. The fourth stage is large and massive water parks from the early 1990s to 2000. The water park is no longer a single entity, but part of the urban landscape, with amusements, attractions, and environmental art, organically integrated into the modern, massive theme park.

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d) Heat-escape Cities: 2010s

China has formed the world's largest heat-escape tourism market, with tourists crowding out major domestic heat-escape destinations—especially tourism resort cities with good weather conditions and low temperatures. In the past, domestic tourism was dominated by the "scenic spot tourism" model. With the advent of the national tourism era, it is imperative to transform scenic spot tourism into comprehensive tourism [30]. Both supply and demand are booming. The globalization trend of heat-escape tourism is obvious. Heat-escape tourism will continue to promote the development of comprehensive tourism.

3. Mapping summer tourism climate resources in China

3.1. Data Sources and Methods

1) Data Sources

The 1961 to 2020 meteorological observation data required for the analysis (daily temperature, daily maximum/minimum temperatures, daily humidity, daily precipitation, daily sunshine, daily wind speed) were obtained from the China National Meteorological Information Center (http://data.cma.cn/) for 775 National Reference Climatological Stations (NRCS) and National Basic Meteorological Observing Stations (NBMOS). These data were analyzed for understanding the key patterns of temperature change in China following its recent history, capturing the key characteristics including average and maximum temperature, as well as its changing trend.

According to the seasonal definition in the Northern Hemisphere, the summer encompasses the period from the summer solstice, commencing on June 21st, to the autumnal equinox, concluding on September 22nd. The summer is widely acknowledged as one of the hottest seasons of the year, characterized by elevated temperatures and extended daylight hours. Consequently, this research article has chosen the summer as the designated period of focus.

2) Calculating Methods

Mieczkowski (1985)first proposed the specialized "Tourism Climate Index" (TCI), which incorporates climate variables related to thermal comfort, physical factors, and aesthetics in a comprehensive model for evaluating the comfort of tourism climates [31]. It is used to assess the suitability of specific climates for general tourism activities such as sightseeing and shopping. TCI is currently the most widely used comprehensive index for evaluating tourism climate [32,33]. Based on a literature review, Scott et al. (2016)adjusted the weighting and threshold criteria for the meteorological elements in TCI and developed the Holiday Climate Index (HCI) to more accurately assess the climatic suitability of leisure tourism destinations [34]. Each of the daily climate variables are rated on an optimal ranging from 0 to 10, based on the thresholds set out by Matthews et al. (1985) and Scott et al. (2016).The TCI and HCI takes the following expression:

$$TCI = 4CID + CIA + 2P + 2S + W \quad (1)$$

$$HCI = 4TC + 2A + 3P + W \quad (2)$$

Thermal comfort is represented byand, which are combinations of temperature and humidity. Among them,is derived from the combination of daily maximum temperature and daily minimum relative humidity, representing the Daytime Comfort index.is derived from the combination of daily average temperature and daily average relative humidity, representing the Daily Comfort index.represents the precipitation.represents the number of hours of sunshine. represents the wind speed.represents thermal comfort, measured by the Effective Temperature (ET,°C), which is calculated by combining relative humidity and daily maximum temperature.

3.2. Spatial pattern

China is a region that holds significant sensitivity and influence concerning global climate change. The China Meteorological Administration (CMA) published the Blue Book on Climate Change in China 2021, which emphasizes the continuation of climate system warming and the

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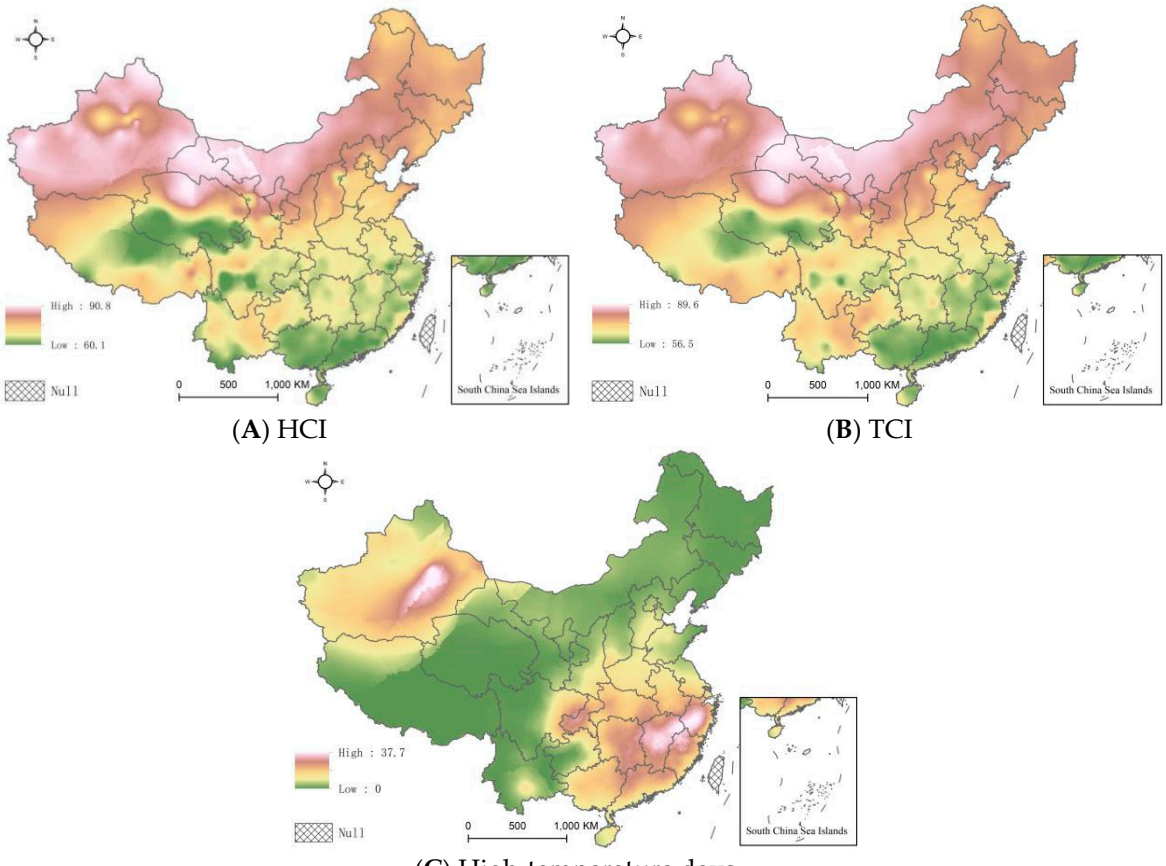
escalating risks associated with extreme weather and climate events. Notably, extreme high temperatures have exhibited a distinctive pattern characterized by heightened intensity, increased frequency, and prolonged duration (China Meteorological Administration, 2021). In meteorology, "High-temperature Days" refer to those when the daily maximum temperatures reach or exceed 35°C. Historical data indicate that China's summer is becoming increasingly hotter, with predictions from the National Climate Center (2020) pointing towards a substantial rise in occurrences of extreme high temperature events.

The results obtained from the analysis of Tourism Climate Index (TCI) and Holiday Climate Index (HCI) in Figure 2A,B reveal a significant disparity in the spatial distribution of tourist climate comfort during summer in China, particularly between the northern and southern regions. Generally, there is an increasing trend of tourist climate comfort degree with higher latitudes. The average duration of the summer tourism climate comfort period is 37.8 days. Notably, regions such as the Xinjiang Tarim Basin, central and western areas of Inner Mongolia, and certain parts of Yunnan Province experience a summer tourism climate comfort period exceeding 80 days, accounting for 85% of the season. Moreover, most northern areas offer a higher level of comfort for summer tourism compared to the national average, thus providing favorable climatic conditions for tourism development during this season. Conversely, due to the influence of subtropical high pressure systems, majority of southern regions experience a higher frequency of hot and rainy weather which leads to noticeably lower tourism climate comfort periods compared to the national average. In summary, areas with high altitude and low latitude generally exhibit a lower level of summer tourism climate comfort.



(**A**) HCI (**B**) TCI

(**C**) High-temperature days

Figure 2. Spatial patterns of National Annual Average HCI、TCI scores and High-Temperature days in China (1991-2020).

Analysis reveals that the occurrence of annual average high-temperature days is more prevalent in the southeast region compared to the northwest (with the exception of most parts of Xinjiang). However, high-temperature days are concentrated in the middle and lower reaches of the Yangtze River as well as certain areas in Beijing (Figure 2C). The middle and lower reaches of the Yangtze

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River represent focal points for several typical "hot stove" cities during summer in China. Notably, the Turpan Basin in Xinjiang exhibits a significantly higher value (101.2°F average annual high-temperature days), which can be attributed to natural factors such as elevated local temperature and intense sunshine.

3.3. Evolution trend

Large-scale continuous high-temperature weather events have been observed in various regions of China, characterized by pronounced extremes, a significant number of consecutive days, extensive spatial coverage, prolonged duration, and elevated minimum temperatures. To examine the changing trends in national summer tourism climate resources, a comparative analysis was conducted by calculating the difference in HCI and TCI scores as well as high-temperature days between two 30-year periods: 1961 to 1990 and 1991 to 2020. This calculation facilitated an investigation into spatially interpolated disparities, offering valuable insights into the dynamic state of summer tourism climate resources nationwide (Figure 3).

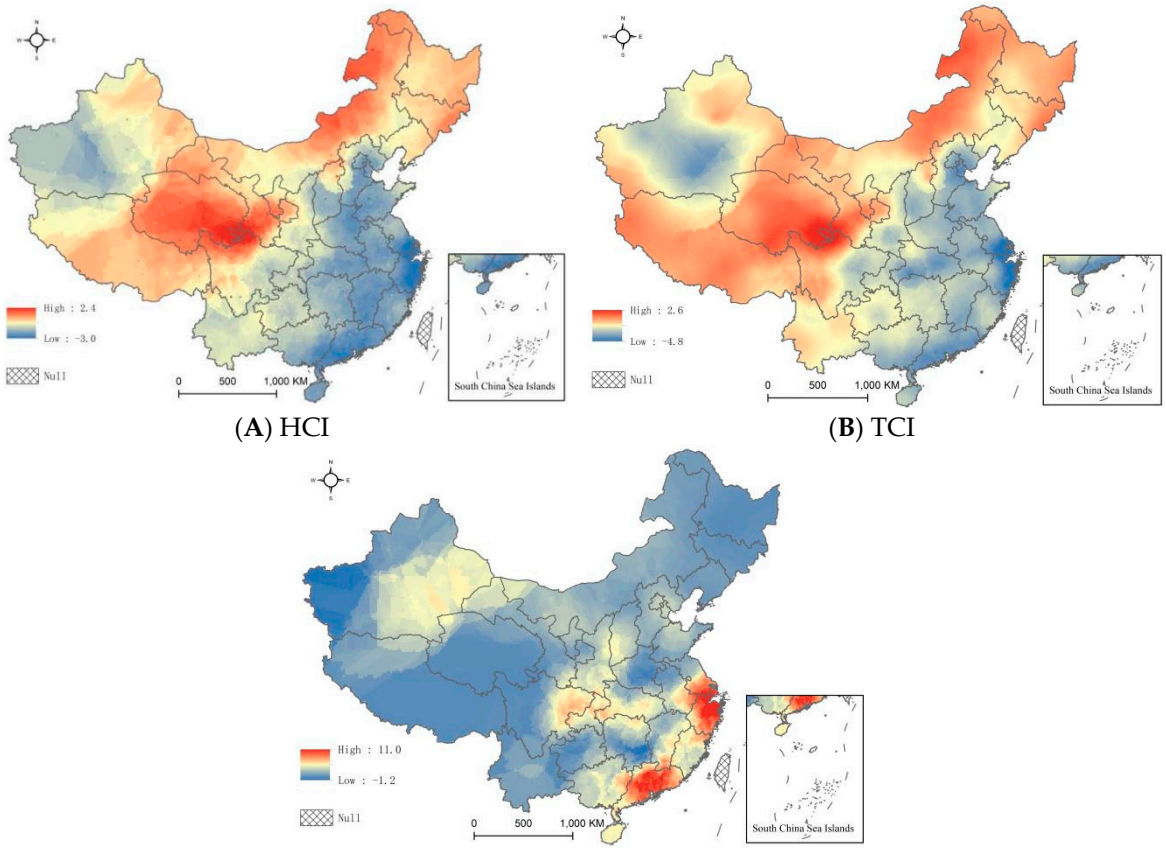

Figure 3. Spatial evolution of the annual average Spatial evolution of the annual average HCI、TCI scores and high-temperature days in China during 1961-2020 .

The results depicted in Figure 3 indicate the following trends: a) There has been a widespread decline in the overall summer tourism climate comfort degree across China, although certain localized regions have experienced an increase. b) Most areas exhibit a noticeable downward trend, with the southeastern region showing particularly prominent changes. The regions witnessing an increase in summer tourism climate comfort are primarily concentrated in high-latitude areas of China (northern Inner Mongolia and Heilongjiang) and high-altitude locations (first-tier altitude).c) A majority of the areas located east of the Black River-Tengchong line demonstrate a decrease, with significant declines observed in regions situated east of the "Huhuan Yong Line," including the middle and lower reaches of the Yangtze River and southeastern coastal areas.In contrast, West of the Black River-

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Tengchong line, areas such as the Xinjiang Tarim Basin (Taklamakan Desert) show a declining trend due to rising temperatures in desert regions and similar locales that significantly reduce summer tourism climate comfort. d) Over the past 60 years, there has generally been an increase in average annual high temperature days, with some notable increases observed in Northwest China, Northeast China, some areas of the Qinghai Tibet Plateau, and the southeast coastal areas. However, changes in the number of high-temperature days over the past 30 years are not evident or decreasing for southern North China Plain, certain regions along middle-upper reaches of Yangtze River, and southwest of the Qinghai Tibet Plateau.

Significant increases in summer tourism climate comfort have been observed in various regions, both in the northern and southern parts of China. In response to these notable increases, it is advisable to adjust local tourism development strategies and optimize the utilization of tourism climate resources facilitated by climate change. Conversely, areas where the increase in summer tourism climate comfort is not significant, particularly those experiencing a decline, should promptly respond by implementing appropriate measures to address the risks associated with climate change. It is crucial to mitigate and alleviate the adverse impacts of climate change. Therefore, regardless of whether it is in the northern or southern regions, it is essential to identify the areas with substantial increases in summer tourism climate comfort. For these regions, local tourism development strategies can be adjusted accordingly to maximize the utilization of tourism climate resources brought about by climate change. On the other hand, areas where there are insignificant increases or even decreases in summer tourism climate comfort should respond promptly by implementing measures to address the risks associated with climate change. It is crucial to mitigate and alleviate the adverse impacts of climatic changes.

4. Case Study: High-temperature Response of Shanghai Disney Market

The world's largest Disneyland, Shanghai Disneyland, has garnered significant visitor attention since its official inauguration on June 16, 2016. Based on the available data, we have computed the average monthly visitor count to Shanghai Disneyland along with the corresponding average monthly temperature, HCI and TCI scores from April 2017 to March 2018 (Figure 4). The number of visitors exhibits an upward trend during months characterized by higher summer temperatures and lower tourism climate comfort levels; conversely, it gradually declines as temperatures drop due to families' availability for travel during summers. Notably, a substantial decrease in tourist numbers occurred in September 2017 coinciding with the commencement of the school year. Conversely, there was an increase in tourist influx observed in February 2018 owing to the Spring Festival- China's most distinctive traditional festival. As tourism consumption continues its growth trajectory, traveling during the Spring Festival has progressively become a mainstream choice for tourists. Consequently, holiday schedules exert more influence over China's tourist numbers than temperature fluctuations.

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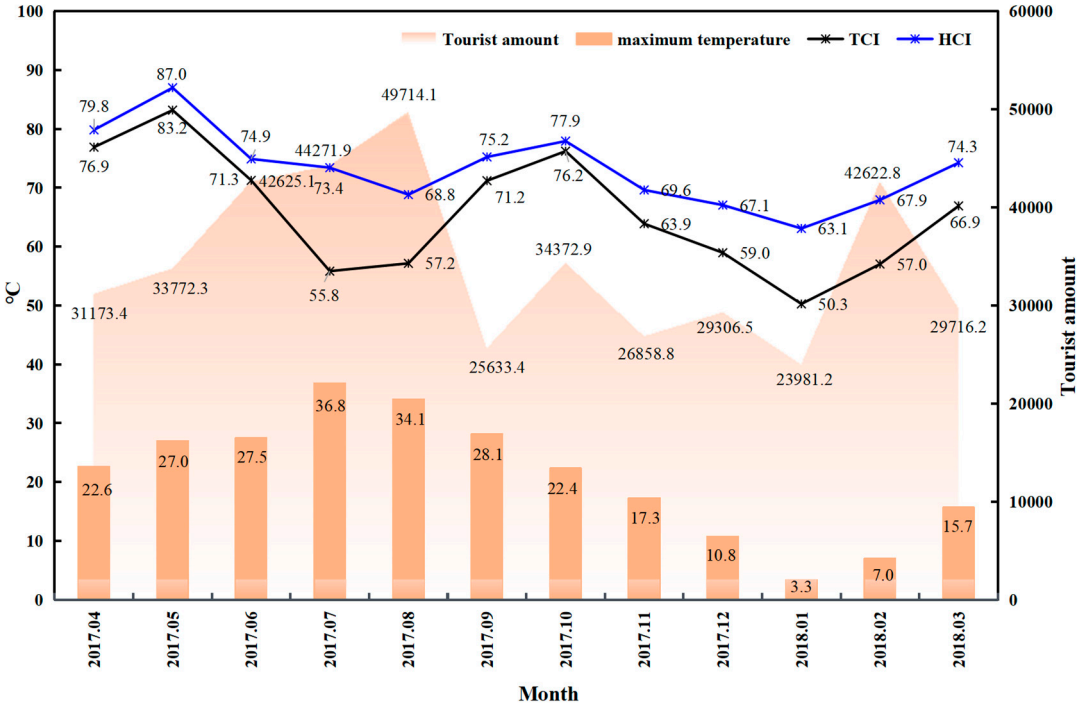

Figure 4. Average monthly number of visitors to Shanghai Disneyland and average monthly temperature changes (April 2017 to March 2018).

Regarding the impact of temperature on visitor numbers under holiday constraints, a strong correlation has been observed between temperature and tourist numbers in parks. Based on statistical data from July to August 2017 (Figure 5), which includes the daily number of tourists in the park and corresponding temperature values, it is evident that fluctuations in temperature closely correspond with changes in tourist numbers. This finding suggests that high temperatures significantly influence tourist behavior when not constrained by holiday regulations.

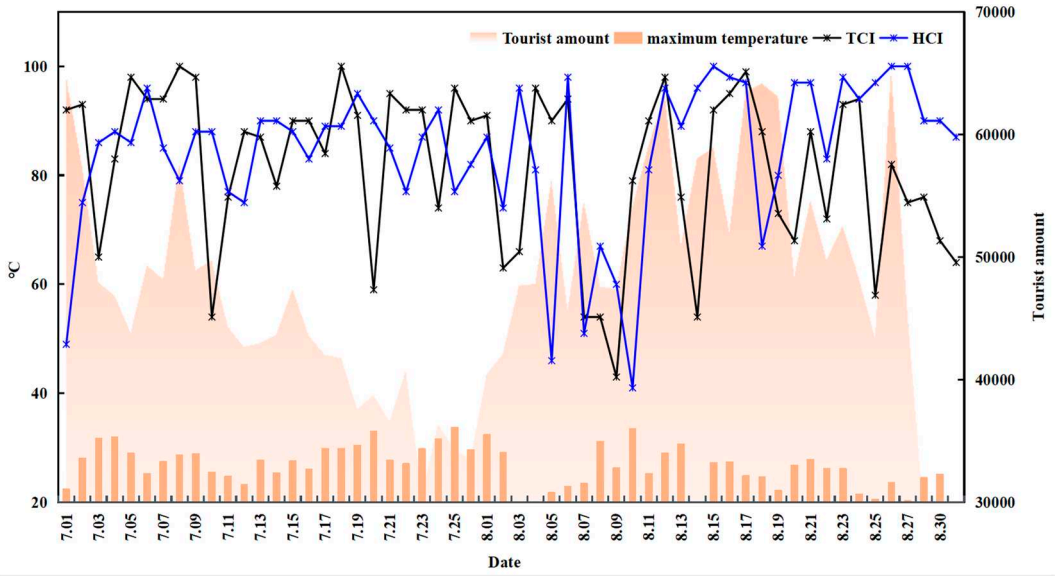

Figure 5. Average monthly number of visitors to Shanghai Disneyland and average monthly temperature changes (April 2017 to March 2018).

The statistics show that the number of tourists is higher on weekends than on weekdays, with a peak on Saturday. Wednesday is the period with the lowest number of tourists to Disney. It can be

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observed that holidays strongly influence the weekly pattern. Under the constraints of the holiday, how does temperature impact tourist numbers? On weekdays, from Monday to Friday, there is a clear correlation between temperature and the number of park visitors, with both factors positively related. However, during summer vacation weekends, tourist numbers are still influenced by the holiday regime, at which point the effect of temperature weakens (Figure 6). Temperature is also less constrained during long holidays in China. The restriction of the holiday system is more significant than that of temperature.

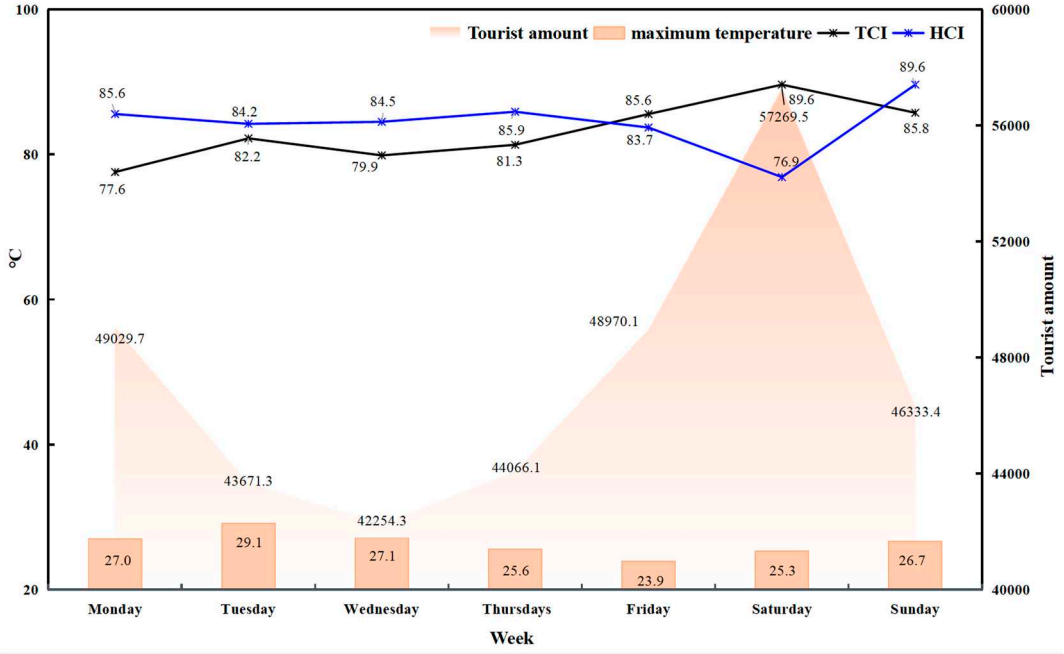

Figure 6. Average number of tourists in Disney on weekdays and weekends during summer vacation (July-August 2017).

The significance of the holiday system outweighs that of temperature constraints. Based on online comments from tourists visiting Shanghai Disneyland, collected by the Customer Evaluation Center-An Affiliate of SAQ (CEC·SAQ), it has been observed that winter and summer vacations are considered as low points in terms of tourist experience. These extended vacation periods are more suitable for family group travel, leading to a surge in visitor numbers. Moreover, winter and summer vacations coincide with frequent occurrences of extreme weather conditions, resulting in compounded negative effects on the overall tourist experience during these periods. Furthermore, long-distance tourists are not significantly influenced by sudden high-temperature weather events when it comes to their pre-booked tourism product choices or the corresponding supply in the market due to limited elasticity.

5. Discussion and Conclusion

In the past century, there has been a significant global climate change characterized by warming. The tourism industry is profoundly impacted by climate and its fluctuations, influencing tourists' travel preferences and behavior as well as altering the product structure and supply within the industry. This chapter delves into an analysis of China's tourism situation under high-temperature scenarios, outlining a distinct "relationship between high temperature and tourism" in Chinese context, ultimately drawing the following conclusions.

1)Over the past 50 years, the northern regions of China have predominantly experienced an annual average temperature increase, with varying degrees of warming observed in the northeastern part, Inner Mongolia, and the western basin. The occurrence frequency of high-temperature events in China has also undergone changes following global warming and extreme climate events. Notably, there is an increasing trend in extreme high-temperature events across China. In the 21st century,

significant warming will persist in China's climate, particularly in the northern areas. Consequently, there will be a substantial rise in the probability of extreme high-temperature events during summer.

2)In terms of demand, the heat-escape tourism market driven by high summer temperatures generally exhibits a "short-range orientation" and a "resource orientation". High temperature, as a typical meteorological and climatic factor, influences tourists' travel willingness and spatial behavior, with an increasing inclination towards heat-escape among tourists.

3) In terms of supply, pioneer summer tourism products undergo changes over time, following an evolutionary path of "mountain-waterfront-comprehensive". Prior to the 1980s, the forefront was occupied by "mountain heat-escape" products. The 1990s witnessed a surge in the development of "waterfront vacation" products. In the 2000s, there was an increasing trend towards "water creation for leisure" products. Since the 2010s, comprehensive tourism focused on urban heat-escape has garnered significant attention. With the advancement of immersive and experiential tours, tourists' demands for tourism products have become more profound, diversified, and personalized. The essence of heat-escape tourism lies in abundant and highly appealing offerings that provide a high-quality service experience in cool and pleasant summer climate resources.

4) The holiday system holds greater significance than temperature constraints. Taking Shanghai Disneyland as an example, the flexibility of the supply and demand market is compromised when it comes to certain tourism products in high-temperature environments, resulting in a substantial decline in experiential quality. However, for long-distance tourists, sudden high-temperature weather does not exert sufficient influence to alter their pre-booked tourism product choices or weaken the corresponding product supply; thus, the market lacks elasticity.

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