Progress and Prospects of Tourism Climate Research in China

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Abstract: Tourism climate research is of great significance to the tourism industry because tourism is closely linked to climate. Based on an analysis of related core papers, this paper reviews the research progress on tourism climate in China in terms of research method, research process, and research topic. Research on tourism climate in China started later than similar research in some Western countries and the topics mainly focused on tourism climate resources, climate comfort for tourism, the impact of climate on tourists' behavior and emotion, climate and tourism seasonality, climate change and tourism development, etc. To provide scientific support for the sustainable development of China's tourism industry, we propose the following for future research, based on our review of the literature: (1) strengthening the theoretical study of tourism climatology, (2) constructing and improving the research content system, and (3) enriching relevant research in climate-sensitive areas.

Keywords: tourism climate; tourism industry; tourism activity; climatic change; Chinese tourism

1. Introduction

Tourism is undoubtedly one of the most important economic sectors in the world today. It is a large and fast-growing industry and an important contributor to local and global economies. As the World Travel and Tourism Council (WTTC) reported in 2019, the tourism industry contributed 10.4% of the world's GDP and provided 319 million jobs; besides, domestic tourism consumption accounted for 71.2% of total tourism consumption and continued to provide opportunities for economic development [1]. The Chinese tourism industry has also made remarkable achievements in recent years. The domestic tourism consumption in China reached 840.9 billion dollars in 2017 and China became the largest domestic tourism market in the world.

However, the tourism industry, particularly nature-based tourism activities, is considered sensitive to forecast climate impacts, which also makes tourism-dependent communities vulnerable to global climate change and its local effects [2]. Climate is intensely related to tourism, as it is both an important tourism resource that can be exploited and a significant limiting factor for tourism development [3]. The comfortable climate in a destination attracts tourists, while a bad climate spoils outdoor activities [4]. Climate leads to tourism seasonality as it has an impact on the tourism landscape and tourists' emotion and behavior, and ultimately affects a destination's attraction and tourism demand [5,6]. The background of climate change is most notable, wherein the relationship becomes more complex and has a profound effect on the tourism industry [7].

As an important part of the global tourism industry, it is necessary for China to pay attention to tourism climate research, which mainly studies the relationship between climatic factors and tourism activity, and provide scientific support for the sustainable development of tourism in China and even the world. For this purpose, this paper reviews Chinese tourism climate research with the following

research objectives: (1) illustrate the general situation of Chinese tourism climate research; (2) review the process of Chinese tourism climate research; (3) summarize the research topics of Chinese tourism climate research; (4) compare with other countries' tourism climate research; and (5) evaluate the status of Chinese tourism climate research and propose research prospects. The above research contents correspond with Section 2, Section 3, Section 4, Section 5, and Section 6 of this paper, respectively.

2. Literature Overview

2.1. Literature Collection

A systematic search of literature was undertaken to identify relevant studies on tourism climate, published between January 1991 and April 2019. We used the China Academic Journal Network Publishing Database (CAJD) found at www.cnki.net. A literature retrieval was conducted from the CAJD on the following three conditions: (1) studies which included "climate" and "tourism" as keywords; (2) the categories of the journal source were the Chinese core journal criterion of PKU, the Chinese Social Sciences Citation Index (CSSCI), and the Chinese Science Citation Database (CSCD) only; and (3) non-academic documents, such as government reports and newspapers, were excluded. In total, 272 individual relevant core articles (see Supplementary Materials), which were all published in Chinese, met our inclusion criteria for this review.

2.2. Literature Characteristics

Most of these papers were published in academic journals in the fields of tourism science, resource science, and geography, as shown in Figure 1. The papers related to tourism science mainly discuss the connection between climate and the tourism landscape, tourists' behavior and emotions, and the tourism industry. Literature related to resource science discusses the characteristics, development, and evolution of tourism climate resources. Articles related to the geographical aspect analyze the comfort and suitability of the regional tourism climate.
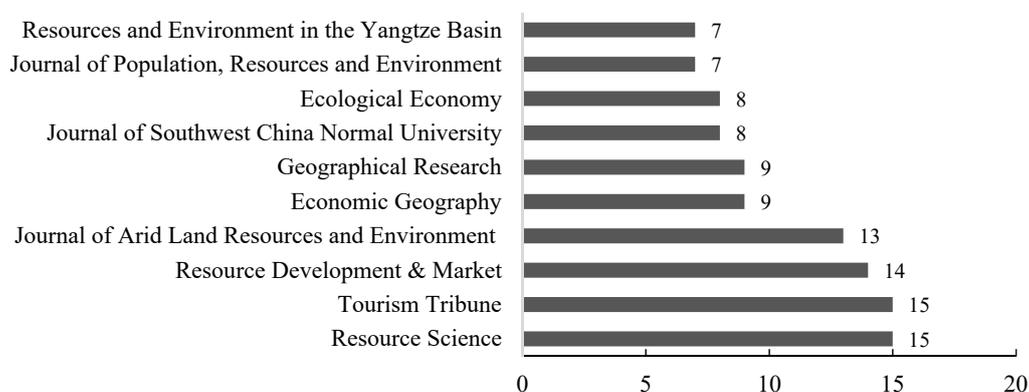

Figure 1. Top 10 journals with publications on tourism climate research.

2.3. Methods Used in the Literature

Both qualitative and quantitative methods were used in the data collection for tourism climate research, which included field investigations, questionnaires, meteorological statistics, digital elevation models (DEM), and networks. According to the statistics of the 272 studies, qualitative research is relatively less than quantitative research. The number of quantitative studies was 199, accounting for 73.2% of the total, while the number of qualitative research was 73, accounting for 26.8% only.

Qualitative methods are mainly used in research on tourism climate resources and the impact of climate/climate change on tourism. For the former, the main contents include the classification, distribution, evolution, and development of the tourism climate resource. For example, the advantages of tourism climate resources in Mt. Lu in Jiangxi Province were assessed and some suggestions

about its development were provided [8]. For the latter, the main research includes the influence of climate/climate change on the tourism resource/landscape and the development/design of the tourism resource/landscape under specific conditions [9]. For example, Zhang Cailie summarized the seasonal changes in tourism landscapes, such as flowering woods, geology, and landforms, and offered some advice concerning special interest tourism [10].

Quantitative methods are used relatively widely in the following research aspects: (1) the relationship between climate/climate change and the tourism resource/landscape, tourists' emotion and behavior, and the tourism industry; (2) the evaluation of tourism climate comfort/suitability; and (3) the assessment of the tourism climate resource. Mathematical models are important quantitative methods that are mainly used for evaluation and prediction. For example, Zhou Baohua adopted the Expert Opinions and Analytical Hierarchy Process (AHP) in the construction of the regional tourism climate resource evaluation model [11]; a tourism climate comfort evaluation model was built by Wang Yanfang et al. using the Fuzzy Analytical Hierarchy Process (FAHP) [12]; and a tourism climate risk assessment model based on the information diffuse theory was set up [13]. In terms of predictive models, Peng Jie et al. established a forecast equation for river driftage based on a fuzzy comprehensive evaluation [14]; Wu Pu et al. integrated a gravity model and related factors to construct a tourism demand model [15]; Lei Xiangjie et al. established an equation of precipitation's effects on tourism [16]; and Liu Shaojun et al. proposed a comfort index for tourism climate to forecast how climate change affects tourist flows [17].

3. Research Process

In the 1930s, Norval realized the importance of climate on tourists' choice of destination [18]. Furthermore, systematic research on the tourism climate emerged in the 1960s in Western countries and developed rapidly in the 1990s, while in China, research on tourism climate began in the 1990s. Figure 2 shows the annual number of core Chinese papers on tourism climate from 1992 to 2018 in China, which is a side reflection of the history of tourism climate research. In light of the annual number of tourism climate papers (Figure 2, Table 1), considering the regional climate situation in China, the research process can be divided into four stages: 1992–2007, 2008–2011, 2012–2015, and after 2015.
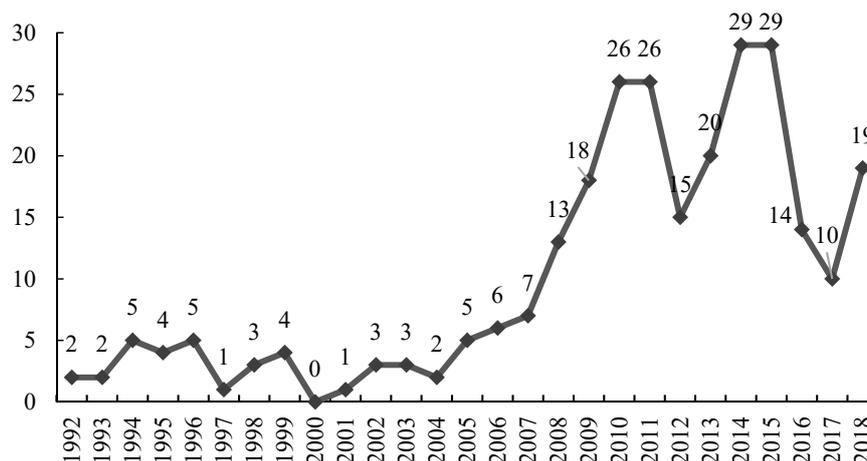

Figure 2. Publication of tourism climate core papers in China.

Table 1. Papers published on Chinese tourism climate research in different periods.

Year	Resource	Comfortable	Impacts on Tourists	Seasonality	Climate Change	Others	Total
1992–2007	25	20	0	3	2	3	53
2008–2011	14	28	3	11	16	11	83
2012–2015	5	41	3	16	20	8	93
2016–2018	6	10	9	1	8	9	43
Total	50	99	15	31	46	31	272

In total, 53 core papers were written during 1992–2007, with an annual average publication number of less than four. In this period, the climate in China was relatively stable and tourism climate did not attract research attention until 2008, when a snowstorm caused an unprecedented impact on Chinese tourism [19]. Since then, research on tourism climate started to attract attention and generated a research boom. There were 83 core papers written during 2008–2011, and the annual average number of publications increased to more than 20.

The characteristics of climate change (especially global warming) were more obvious in 2012–2015. For example, in the summer of 2012, temperatures in southern China exceeded historical extreme values and, in 2015, the number of hot days broke the historical record in Sinkiang. These high temperature events have gathered extensive attention of climate from the related academic community and society, triggering another research boom in 2012–2015. There were 94 core papers in total during that period, and the average number of publications was 23 per year. After 2015, the research related to tourism climate decreased slightly in smoothness. During the 2016–2018 period, 43 papers were written, with an annual average publication number of 14.

4. Research Topics

4.1. Tourism Climate Resources

Climate is an important tourism resource. A document titled *Classification, Investigation, and Evaluation of Tourism Resources* (GB/T 18972-2017), which was published by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China (AQSIQ), suggested that the tourism climate resource could be divided into two categories. One category is the meteorological landscape (including sunrise and light scenes) and the other is the weather and climate phenomenon landscape (including cloud and fog-prone regions, areas with extreme or special climate, and phenological scenes). In addition, it is believed that a comfortable climate in tourist destinations is also a type of tourism resource, as it possesses a core value for tourism use.

In terms of use-value of tourism climate resources, the study focuses on the analysis, regional plan, development, and utilization of the resource. Mt. Lu in Jiangxi Province has a suitable temperature, moderate humidity, and various meteorological sceneries [8]. According to the comfort index for the human body (CIHB), the tourism climate resources in the Sichuan province can be divided into three categories: the district of the summer resort, the district of the winter resort, and the district with a warm spring and autumn [20]. Specific climate conditions can be used in certain types of tourism, such as medical tourism [21]. Haikou city in Hainan Province is a superior choice for health tourism owing to its richness in negative oxygen ions in the air, which is good for health [22].

As an external factor, climate affects the supply of the tourism resource. According to the extent of the influence of climate conditions, the tourism landscape can be divided into strong-climatic landscapes, such as hot springs, waterfalls, and sunrises, and weak-climatic landscapes, such as strangely shaped pines, grotesque vistas, and mountains [23]. Climate conditions not only have an impact on the optimum viewing time of the natural landscape, such as the Danxia landform [24],

migratory birds' nests [25], and vegetation [26], but also affect the development and types of human landscapes, such as golf courses [27], cityscapes [28], and holiday resorts [29].

4.2. Climate Comfort for Tourism

Climate is also a subsidiary tourism environment of tourism activity, which refers to climate comfort for tourism. Climate comfort for tourism is a climate condition in which people can ensure normal physiological processes and feel comfortable without any hot or cold driving measures [30]. A comfortable climatic environment is attractive to tourists. Some studies have analyzed a destination's climate environment using single indexes, such as air temperature, relative humidity, air composition [31], wind speed, and sunshine duration [32], while most studies have evaluated it using compound indicators [12,33], such as the humidity–temperature index, wind effect index, clothing index, and CIHB (Table 2). In terms of the spatial scale, research cases included destinations such as a scenic spot, county, city, province, region, and even the whole of China. In terms of the time scale, there were cases of day, week, ten days, month, season, year, and even half a century.

Table 2. Indexes of the evolution of climate comfort for tourism.

	Index	Sample Research
Single indicator	Air temperature, humidity, wind speed, sunshine duration, and so on	West Lake [31]; Hulunbeier city [32]
Compound indicator	Humidity–temperature index, wind effect index, clothing index, comfort indices for the human body, and so on	Panzhuhua city [12]; Chinese typical tourist cities [34]

Different tourism activities have different requirements for climate conditions. For example, in desert tourism, the threshold of temperature and wind speed should be set to revise the tourism climate comfort index [35], and sandstorm weather should also be considered [36]. Furthermore, the comfort for a tourism climate should be further considered under specific tourism activities; for example, for drifting activities, which are mostly carried out in mountain valleys, where the situation of rainstorms and thunderstorms should be taken into account [14].

The spatial and temporal characteristics of climate comfort for tourism influence tourists' travel so much that perfect climate information is of guiding significance for tourists to make travel plans [37]. However, some scholars have pointed out that when climate is not directly considered as a tourism resource that involves tourism activities, climate comfort only partly affects tourists' environmental perception and will not become the determinant for a tourist to judge whether a destination is suitable for travel [38].

4.3. Impacts of Climate on Tourists' Behavior and Emotion

Regardless of whether it is a tourism activity environment or a kind of tourism resource, climate has a significant influence on tourists, which is reflected in tourism demand, destination choice, and tourists' emotion.

In terms of tourism demand, air temperature, sunshine duration, precipitation, and climate comfort are important factors. A study on tourists visiting Hainan Province found that the temperature had a positive effect on tourism demand and that the sunshine duration had a negative impact in summer. However, in winter, temperature and sunshine duration have no significant impact on tourist demand, which can be ascribed to tourists' intuition that there is no winter in Hainan [15]. Network attention is a side reflection of tourism demand. The marginal effect coefficient between climate comfort degree and network attention is 0.786 [39], which further confirms the relationship between climate and tourism demand.

In terms of destination choice, affected by factors such as physical environment, local climate, global climate change, and personal preference, tourists with different backgrounds have different

considerations [40]. In general, the climate characteristics of destinations significantly affects potential tourists' travel decisions; namely, the lower the degree of climate comfort, the greater the impact of climate on the determination of a destination, and vice versa. A survey revealed that sunshine and warm temperatures are the most potentially favored conditions for tourists. Tourists prefer weather conditions contrary to the poor weather of their residential regions; for example, people in dry and cold areas prefer a wet climate, but those in high-temperature areas prefer cold and snowy weather [41].

In terms of tourists' emotion, they are affected by factors such as temperature, wind speed, relative humidity, and their different combinations. According to an analysis by Gao and Li, tourists' negative emotional values negatively correlate with temperature, the temperature and humidity index, and the wind effect index, but significantly positively correlate with the clothing index [42]. The tourists' positive emotion is irrelevant to the climate comfort index, and the integrated emotional value of tourists significantly negatively correlates with temperature, relative humidity, the temperature and humidity index, and the wind effect index and positively correlates with the clothing index. In order to understand how climate impact tourists' mental and physical health and restoration, a study by Chen et al., using as an example two coastal resorts in Hainan Province, found that tourists' satisfaction with climate positively affects their perception of health and restoration [43].

4.4. Climate and Tourism Seasonality

Seasonality is one of the most important characteristics of the tourism industry that heavily influences tourism development. A tourism seasonality measurement index system was constructed to identify those influential factors that could be categorized into social factors and natural factors [44]. In the system, social factors include the per-capita income of residents, the concept of anti-seasonal travel, government policy on paid holidays, line development of enterprise products, regional economic scale, exchange rate, and other factors [45,46]. Climate is the major factor affecting tourism seasonality, which can be reflected by the fact that the seasonal changes in climate have an impact on climate comfort for tourism, frequency of extreme weather, and so on [47,48].

Tourism seasonality is mainly reflected in the seasonal changes in tourist numbers. Research at different scales, such as tourism spots, cities, and provinces, suggests a close connection between climate and the number of tourists. Furthermore, there exist differences between domestic and overseas tourist numbers in terms of the spatial scale and time cycle. At the scale of tourism spots, the domestic tourist number shows remarkable regularity on the weekly, monthly, and seasonal scales, while the inbound number only shows regularity on the monthly and seasonal scales, having no regularity on the weekly scale [49–51]. At the city scale, multiple case studies revealed a positive correlation between the number of domestic tourists and climate comfort [52–54], and the yearly variation in the number of overseas tourists is divided into two periods, namely, dry season and rainy season, and it is mainly affected by climate comfort degree in the dry season and is evenly distributed in the rainy season [30,55]. At the provincial scale, the research case in Hainan Province shows that the comfort degree of climate is the main factor that influences the annual variation of tourist flows and tourists' decisions, and that air temperature correlates negatively with tourism flows [56].

Extreme weather, such as snowstorms, haze, and rainstorms, affects tourists' travel and personal safety, which further influences tourist numbers. Both the descending rate and descending number of inbound tourists caused by the snowstorm in 2008 in China show a direct correlation with the intensity of snowstorms [19]. Haze has a significant negative impact on tourism destination selection of urban residents and inbound tourists of various provinces and cities. Furthermore, the spatial distribution of inbound tourists' loss rate is generally consistent with that of the degree of smog pollution [57]. In years with less precipitation, Xi'an's domestic tourism income and tourist volume during the National Day Golden Week normally increase by 5% to 15%, while continuous precipitation may have caused a negative growth rate of about 10% [16].

In order to solve the dilemma of tourism seasonality, some scholars propose the concept of regional anti-season tourism, which refers to the adaptation of comprehensive tourism development

and systematic marketing in the off-season to attract tourists, thereby achieving the optimization and balance of regional tourist supply and demand during the year [45]. Although increasing the number of comfortable days in tourism can ease the pressure of tourist deficiency in the off-season [58], climate is a natural element that cannot be changed by man-made factors [46]. Thus, with more help from tourism participants, such as residents of tourism destinations, tourists, tourism enterprises, and local government, the problem of tourism seasonality can be solved from the perspective of the tourism environment, travel concept, tourism product development, tourism policy, and marketing [45,59,60].

4.5. Climate Change and Tourism Development

Tourism is a sensitive industry under the influence of global climate change [61]. The study of climate change and tourism development has focused on climate change in tourism destinations, the impact of climate change on tourism, and adapting strategies.

A climate analysis of Mt. Lu from 1995 to 2008 and Mt. Gongga in Sichuan Province from 1987 to 2007 found that the temperature and precipitation in the two places showed different degrees of increase [62,63]. Climate change indirectly affected the tourism comfort degree. From 1955 to 2010, the number of suitable days for tourism in Mt. Tai in Shandong Province, Mt. Huang in Anhui Province, Mt. Hua in Shanxi Province, Mt. Lu, Mt. Emei in Sichuan Province, Wutai in Shanxi Province, and Mt. Kongtong in Gansu Province increased, reflecting the significant response of tourism comfort to climate change [64]. To evaluate the impact of climate change on tourism climate and its risk, some scholars built a tourism climate risk assessment model based on the tourism climate index and information diffusion [13].

The influence of climate change on tourism is manifold, including tourism attraction, tourists' psychology and behavior, and the tourism industry. Climate change makes peaches blossom earlier [65], accelerates glacial melting [66,67], and damages culture heritages [68]. These changes in tourism attractions indirectly influence tourists' emotion and behavior. A case study in the Qinling area showed that the significant rise in temperature is the most important reason for tourists to go out and travel, and the tourists' perception of climate change has an important direct positive impact on ecotourism behavior [69]. In addition, climate warming causes winter tourist flows in southern China to rise, while tourist flows in summer decline [70]. Tourists' emotional and behavioral changes caused by climate change ultimately influence the regional tourism industry [17].

Global warming is an obvious trend around the world [71]. Against this background, summer tourism (or summer economy) and low-carbon tourism are gradually emerging. The comfortable and cool climate in summer is the most basic condition for summer tourism [72], and the summer climate in China comprises five categories; namely, the Southwest-plateau type, the Central and Eastern-mountain type, the Northeast-mountain and plain type, the Northwest-mountain and plateau type, and the Bohai rim surrounded by low hills type [73]. However, summer tourism mostly adopts competitive-oriented development patterns, which means taking the promotion of comprehensive competitiveness as a core task, relying on resources to develop hardware facilities and soft environments, and cultivating a strong competitive summer tourism destination and product system [74]. In this way, it is meaningful for summer tourism to study the concept model of the summer tourism index [72] and to evaluate the competitiveness [75] and suitability of summer tourism [76].

Low-carbon tourism is the response to the proposition that carbon emission leads to climate warming. Some scholars think that there is a contradiction between tourism development and carbon emission [77], while others hold that tourism is superior in energy conservation and emission reduction [61]. Even though the two viewpoints are contrary, the target of low-carbon tourism is the same, namely, taking into account both tourism development and carbon emission reduction. With this goal, related research offers a scientific basis and profound suggestions from the aspects of carbon emission measurement [78,79], development path [80], policy framework, and strategic measures [81].

In conclusion, the impact of climate change on tourism is complex [82]. It has different effects on various aspects of tourism development [83]. Consequently, some scholars put forward

proposals related to the awareness of climate change, adapting ability, safeguard mechanisms, protection of the tourism resource, exploration of tourist products, and international exchange and cooperation [61]. Although the Chinese government has taken energy conservation and emission reduction seriously and has set a relatively complete policy system to address climate change [84], the tourism administrative department needs to further develop more targeted countermeasures in different aspects, such as international climate cooperation, departmental resource integration, emission reduction and investment, and environmental awareness propaganda [85].

5. Discussion

The framework emerging from the review of the existing literature shows a great interest in tourism climate in China, which is closely related to the development of the Chinese tourism industry. During the period 2008–2015, climate change caused the frequent occurrence of extreme weather events, which had a significant effect on China's tourism industry. Correspondingly, the impact of climate change on tourism has become a major issue in the study of the Chinese tourism climate.

Most studies have focused on climate comfort for tourism, tourism climate resources, the relationship between climate and tourism, and the development of tourism. Although these research topics are similar to those in other countries, China's tourism climate research has not yet established a convincing theoretical system, and the research perspective is singular. For example, in the study of the impact of climate change on tourism, many studies have focused mainly on the negative impact (or challenges) but have ignored the positive impact (or opportunities). Further, the studies have paid more attention to the effects of climate change on tourism and less attention to the contribution of tourism to climate change. The mechanism of the interaction between climate and the tourism system has not yet been clarified.

In the study of climate comfort for tourism, the Holiday Climate Index (HCI) [86], the second-generation climate index for tourism [87], and the tourism climate index based on hourly weather data [88] were proposed to correct the deficiency of past indexes, while China's relevant research applied indexes mechanically, without consideration of specific situations. In a study of the impact of climate change on tourism, Grillakis et al. analyzed the impact of global warming at two degrees on summer tourism in Europe [89], and Mendez et al. examined the detrimental or beneficial potential economic effects of global climate change based on occupancy rates in hotels and weather conditions [90]. Relatively, the research conclusions of China are simple. In addition, many issues, such as tourism climate insurance [91] and low-carbon tourism stakeholders' behavior and relationships [92,93] remain blank in China's tourism climate research.

Research methods of tourism climate in China are relatively simple and are not as diverse as those in other countries. For international research examples, the Information Diffusion Model (IDM) and Geographical Information Systems (GIS) were applied to the spatial risk analysis of excessive rainfall [94]; the HadCM3 model and general equilibrium models were used to predict the impacts of climate change on tourism [88,95]; and Bagozzi's reformulation of the attitude theory was introduced to examine the relationships between climate expectation–disconfirmation and the behavioral intention of tourists in purchasing tourism climate insurance [91]. Those studies combined theories or models of sociology, meteorology, systematics, and psychology, showing rich and diverse research methods. While early studies on the Chinese tourism climate gave priority to qualitative description, later studies prioritized quantitative and model analysis. There were some problems with the application of Western research methods in China. For example, to evaluate climate comfort for tourism, the W.H. Terjung method used several seemingly climatic factors to replace the monthly maximum relative humidity and the monthly minimum relative humidity, both of which were unavailable data in China's meteorological statistics. What is more, the calculation of the wind efficiency index did not consider the height of the human activities site, and the evaluation criteria of physiological and climatic indexes, such as temperature and humidity, could not be adjusted properly according to local conditions; those studies were divorced from reality.

As a final consideration, the available literature showed that tourism climate is a multidisciplinary and comprehensive discipline focusing on tourism and climate, which involves tourism, climate, geography, psychology, economics, physiology, etc. It is obvious that the number of disciplines involved in Chinese tourism climate research is relatively little.

6. Conclusions and Prospects

This paper first analyzed the characteristics of the core literature on tourism climate research in China. There were 272 related core works presented, most of which were published in academic journals of resource, tourism, and geography. It then summarized the research process, according to the development of China's tourism industry and climate situation. China's climate research started in the 1990s and developed slowly until 2008 when a snowstorm heavily destroyed Chinese tourism industry and caused a research upsurge of the tourism climate in 2008–2011. During 2012–2015, warming climate events intermittently happened and another research fever emerged. Finally, this paper has given a detailed overview of tourism climate resources, climate comfort for tourism, impacts of climate on tourists, climate and tourism seasonality, and climate change and tourism development.

According to the climate predictions of relevant research, the temperature and precipitation in China will continue to show regional and complex changes [96,97]. The tourism industry will face challenges by climate. Therefore, tourism climate research should be attached more attention. According to the current situation and features of Chinese tourism climate research, this paper makes the following recommendations for further research:

1. Strengthening theoretical research on tourism climate. The research on tourism climate started late and developed slowly, and most of the existing research are case studies. The lack of theoretical research and restricts the application of the research results. The theoretical research of the tourism climate should draw experiences from related disciplines, such as climate, tourism, economics, geography, psychology and behavior theory, and establish an analytical framework of "climate/climate change–tourism elements–tourist behavior," and enhance the theoretical research with the combination of China's tourism industry.

2. Constructing a comprehensive research content system. Tourism climate research should continue to expand the research field in combination with practical issues and emphasize the relationship between climate/climate change and any element of tourism activities. China's tourism climate research need form a structural integration content system. Many research contents should be included in this system, such as the tourism climate preferences for different tourist groups; the differences in the impact of climate on tourists before, during, and after travel; the consideration of extreme weather in the comfort assessment of tourism climate; tourism climate insurance; low-carbon tourism stakeholders' behavior and relationships; etc.

3. Enriching relevant research in some climate-sensitive areas. The impact of climate on tourism is significant, especially in climate-sensitive tourism activities, such as glacial tourism and coastal tourism. It is therefore necessary to strengthen the research on climate-sensitive areas in China, such as the Qinghai-Tibet Plateau. It is a typical high-altitude area with unique significance in climate change and tourism research. A set of tourism environmental factor indicator systems with a reasonable structure as well as scientific evaluation methods should be established to comprehensively assess the impact of climate change on tourism resources and the environment of the Qinghai-Tibet Plateau. In addition, it is necessary to explore the preferences and behavioral characteristics of tourists and, accordingly, evaluate the possible economic and environmental benefits of tourists' behavioral changes in the Qinghai-Tibet Plateau against the background of climate change.

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