

A bibliometric analysis of birdwatching tourism research: An exploration for emerging insights

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Abstract

In recent years, birdwatching has become one of the fastest-growing forms of nature-based tourism and is often referred to as avitourism. Birdwatching has a relatively long history, but many research questions and avenues of inquiry remain unexamined. We quantitatively reviewed the literature on birdwatching using VOSviewer version 1.6.16 and the Bibliometrix package for R to assess the growth of the field over time. The results show that a total of 1371 publications have been published on the topic between 1978 and 2022. The annual growth in the number of publications was 2.59% and publications written through international collaboration constituted 20.02% of the total research output. Researchers and commentators in the United States, United Kingdom, and Canada were the largest contributors. Our results showed that birdwatching, birding, and citizen science are the motor themes, which means they significantly contribute to the development of the field. Moreover, ecosystem services, cultural ecosystem services, and recreation are emerging themes that require further development. Future studies are expected to focus on fostering avitourism in developing nations through training and collaboration between local and international NGOs. Improvement of local livelihoods and grass-roots organization should be the focus of future efforts given the potential of avitourism as a source of income and incentive for wildlife conservation action.

Keywords: Avitourism, Birdwatching, Bird conservation, Bibliometric, VOSviewer.

Introduction

Birdwatching has developed from a popular recreational pastime to become one of the fastest-growing types of nature-based tourism (Poudel et al., 2017; Kutzner, 2019; Pintassilgo et al., 2021). Factors that have contributed to the growth of birdwatching, include increasing economic prosperity among certain source countries and affordability of long-distance travel; both of which have transformed birdwatching into a global industry (Şekercioğlu, 2003; Steven et al., 2015). Birdwatching is defined as a trip with the goal of detecting, identifying, and observing wild, free-living avian species for personal or educational purposes (Roig, 2008; Pintassilgo et al., 2021). Similar to other types of nature-based tourism, there needs to be a balance between tourism, sustainable management, and conservation of natural ecosystems and their living and non-living components (Pintassilgo et al., 2021). Despite the growth in the popularity of birdwatching, it has coincided with a dramatic decline in the population of many bird species (BirdLife International, 2018). According to the latest report by the World Wildlife Fund (WWF) (2015), bird populations have declined by more than 50% between 1970 and 2010. These declines have been mostly blamed on anthropogenic disturbances such as habitat loss and fragmentation, exploitation (e.g., agriculture, and fisheries), invasive species, and pollution (BirdLife International, 2018). This decline threatens the future of birdwatching, while at the same time drawing increased attention to areas where rare or threatened species might still occur (i.e., “last chance” tourism) (Hvenegaard, 2013). Tourism, even forms of tourism not primarily focused on birdwatching, can potentially threaten birds (Steven and Castley, 2013). However, there remains a paucity of research examining how birdwatching and the associated activities can negatively affect bird communities and ecosystems (Şekercioğlu, 2002). Some research suggests that avitourism can positively contribute to conservation (Şekercioğlu, 2003; Puhakka et al., 2011). Despite this, the current available information seems disjointed, with limited integration between social science, natural science, and conservation perspectives to formulate a comprehensive understanding of the effects of avitourism.

Given the rising popularity of avitourism (and potential concomitant impacts), the research interest on this aspect of the industry is expected to show a corresponding increase. A quantitative review of the academic literature on birdwatching is essential for understanding the past and present state of the field and predicting future trends, with the last comprehensive review having been published a decade ago, in 2013 (Steven et al. 2013). Bibliometric analyses can quantify and detect patterns

in the literature, identify hotspots, build cooperative networks, and predict the future direction of research (Picone et al., 2021; Cordeiro, 2019; Saggiomo et al., 2020; Su et al., 2022). Bibliometric analysis has found applications in different fields (Jiang et al., 2019; Chen et al., 2020; Hou et al., 2019; Bretas and Alon, 2021). The current study seeks to survey the global academic literature published on birdwatching and reveal the trends in the publications through a quantitative review using a bibliometric approach to identify the mode, structure, main themes, and trends in the available literature.

Materials and methods

This bibliometric study offers a review of research on avitourism. Items indexed in the Scopus database published between 1978 and 2022 were retrieved using “birdwatching”, “birding” “avitourism”, “birdwatching tourism”, “bird tourism” and “bird+tourism” as the search words. In total, 1371 records were found and bibliometric data were exported as full records and cited references. The bibliometric data were exported as complete records plus references. The bibliometric analysis process includes three steps: (1) Data collection and loading, (2) data analysis, and (4) data visualization.

In this research approach, data collection is divided into three phases. Firstly, the bibliographic information was extracted from the Scopus database. Data retrieval resulted in obtaining 1371 records (journal articles, review papers, conferences, book chapters, and books, etc.) published between 1978 and 2022 worldwide by searching the Scopus database for birdwatching tourism. Secondly, we converted the acquired bibliometric database into a suitable format for further analyses. The database was in CSV format, as it was supported by the “Bibliometrix” R package. Finally, a quality assessment was applied. Microsoft Excel was used to check for duplicates, spelling mistakes words, and incomplete bibliographic information. These recognized errors were deleted before further analysis.

Bibliometric analysis

Data analysis and visualization were performed in Excel 2019, VOSviewer version 1.6.16, and the Bibliometrix package for R. Descriptive data (i.e., authors, country, and year) were retrieved from the Scopus website (www.scopus.com/sources) and were mapped in Excel 2019. The network of countries, journals, and keywords was created and visualized in VOSviewer (van Eck and Waltman, 2010). A summary of technical terms is provided in Table 1.

Table 1. Main terms in VOSviewer software (Van Eck and Waltman, 2020).

Term	Description
Link	Connection or relation between two items (e.g., co-occurrence of keywords).
Number of links	The number of links of an item with other items.
Link strength	Attribute of each link, expressed by a positive numerical value. In the case of co-authorship links, the higher the value, the higher the number of publications the two researchers have co-authored.
Total link strength	The cumulative strength of the links of an item with other items
Thematic map	The figure represents the internal and external relationships between keywords with density and connectivity, respectively, as well as centrality. Density is indicative of intra-cluster growth, and centrality shows the significance of a subject within a particular field and the strength of inter-cluster connections (Callon et al., 1991). The figure is composed of four quadrants, each corresponding to themes differentiated based on density and centrality (García-Lillo et al., 2023). The size of the bubbles corresponds to the number of publications containing the keyword.

Three field plot

We visualized the connections between countries, authors, and keywords using Sankey plots. In the resulting three-field plots, rectangles of different colors represent the elements. The height of each rectangle was determined based on the total value of the links originating from the corresponding element. A taller rectangle denoted an element with more connections.

Thematic map and evolution

Four clusters can be identified in the thematic map:

(1): Low density and centrality (emerging themes): The topics placed in the lower left quadrant need further exploration due to underdevelopment or being emerging subjects. These subjects have limited significance across the network and their development is slow within the network; however, they may present attractive opportunities for further research. (2): High density and low centrality (basic themes): The topics located in the lower right quadrant are the primary themes in the body of research and are central to the development of the field. These topics have high relevance across and inside networks. By identifying and developing these topics, bibliometric studies highlight the opportunities for further investigation. (3): High density and low centrality

(niche themes): Topics in the upper left quadrant are internally well-connected but have limited external connections, indicating their limited significance in terms of connection to broader research topics. (4): High density and centrality (motor themes): Topics in the upper right quadrant represent the major themes in the field and are central to the literature. They have high relevance and connectivity within and across the network. Given their centrality, bibliometric studies can shed light on their exact nature and guide future research. Sankey diagrams also can be used to illustrate themes and their development over time (Xiao et al., 2022). Each box in the diagram represents a theme, with the size of the boxes indicating frequency (Xiao et al., 2022). The lines connecting the boxes show the evolution of a theme with line thickness corresponding to link strength.

Co-occurrence analysis

In addition to generating word clouds, Sankey plots, and hotspot analysis we conducted a co-occurrence analysis to create clusters of keywords with a high degree of co-occurrence. Keywords were considered the primary unit of analysis as they encapsulate the main themes of a publication (Verrall and Pickering, 2020). In the co-occurrence graph, node size represents frequency, and line thickness corresponds to the number of related keywords (Neff and Corley, 2009).

Results

Our searches revealed a total number of 1371 publications that met our applied criteria (Table S1). The number of annual publications and the associated trends can be useful indicators of research activity and popular topics. The annual total of publications between 1978 and 2022 reveals an exponential growth trend (Figure S1). Research on birdwatching can be divided into three stages based on the number of publications: 1978-2000 (less than 20 publications per year), 2001-2010 (between 20- 60 publications per year), and 2011-2022 (a significant increase in the number of publications, 62-120 publication). The least active years were from 1879 to 1977 (0 papers) while the most publications were published in 2021 (140 papers). The average number of citations per publication was 15.74, reflecting the importance of this research area in recent years. As shown in Table S1, 1371 publication were extracted from Scopus across 750 sources (Article, book, book chapter, etc.) between 1878 to 2022 (Table S1). These studies were written by 4012 authors. Most of the publications were articles (n=1000). Followed by conference papers (n=122), and book chapters (n=84) (Table S1). Nearly all the publications were written in English (90.9%), the

remaining publications included Spanish (30) Chinese (26), German (20), French (16), Portuguese (8), Dutch (6), Polish (4), Russian (4) Hungarian (2), Italian (2), Persian (2) Turkish (2), Croatian (1), Czech (1), Romanian (1).

Geographic research contribution

International collaboration in the field has mostly occurred between researchers from the United States (US), United Kingdom (UK), China and Canada. American researchers were most likely to collaborate (TLS = 190), followed by British researchers (TLS = 96) and Australian (TLS = 83) (Table 2, Fig.1). We identified 13 research clusters (Fig. 1). The first cluster (in red) consisted of eight countries includes: China, Indonesia, Malaysia, Morocco, Pakistan, Romania, Thailand and Vietnam, the second cluster (in green) included Czech Republic, Finland, Germany, Mexico, Poland and Taiwan, the third cluster (in blue) comprised a combination of African and European countries. The fourth cluster (in yellow) comprised five countries (Austria, India, Nepal, Sri Lanka, Switzerland), The fifth cluster (in purple) included only European countries. the sixth cluster (in turquoise) included Kenya, Nigeria, South Africa and Turkey, the seventh cluster (in orange) comprised Canada, Costa Rica, Spain and the United States. The eighth cluster consisted of 3 countries (Argentina, Brazil and Chile). Cluster 9 comprised three countries (Japan, New Zealand and Peru), cluster 10 comprised 3 countries (UK, Sweden and Russia), cluster 11 consisted of two Asian countries (China) cluster 12 (Australia) and 13 (France) comprized only one country. The US, UK, China and Canada had the largest number of international collaborations. In most publications written via international collaboration, at least one author was from a developed country (if not both). Fig. 2 presents the top 15 countries with the largest number of publications in the top journals. With the exception of the Germany, UK and Spain, research is often conducted with few international collaborations. Overall, there was a larger number of papers where the authors were from the same country (n=83%). The number of papers with domestic collaboration (n = 75%) is greater than that with international collaboration (n = 25%) (Table 3, Fig.2).

Table 2. Top 10 countries in terms of total link strength.

Country	Documents	Citations	Total link strength (TLS)
USA	312	9389	190
UK	118	2095	96
Australia	103	2369	83
Spain	60	969	62
France	31	740	49
Germany	48	643	48
South Africa	41	519	43
Canada	57	1779	40
China	90	984	40
Italy	36	540	31

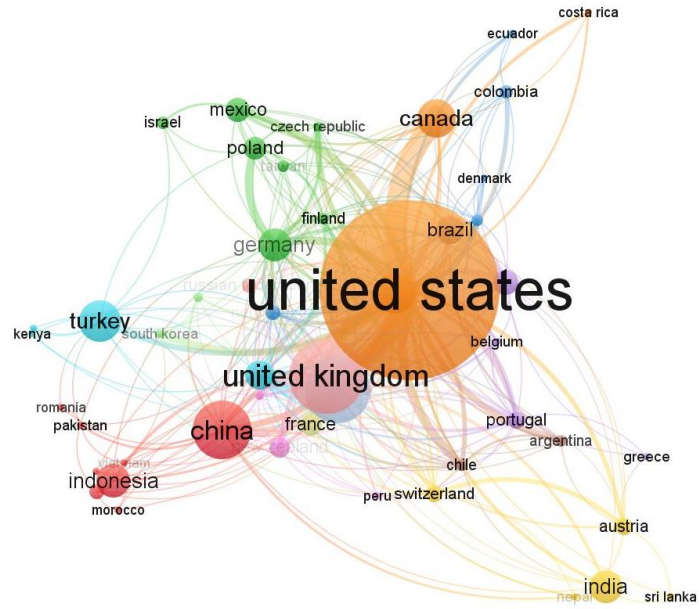


Fig. 1. Co-authorship network of countries.

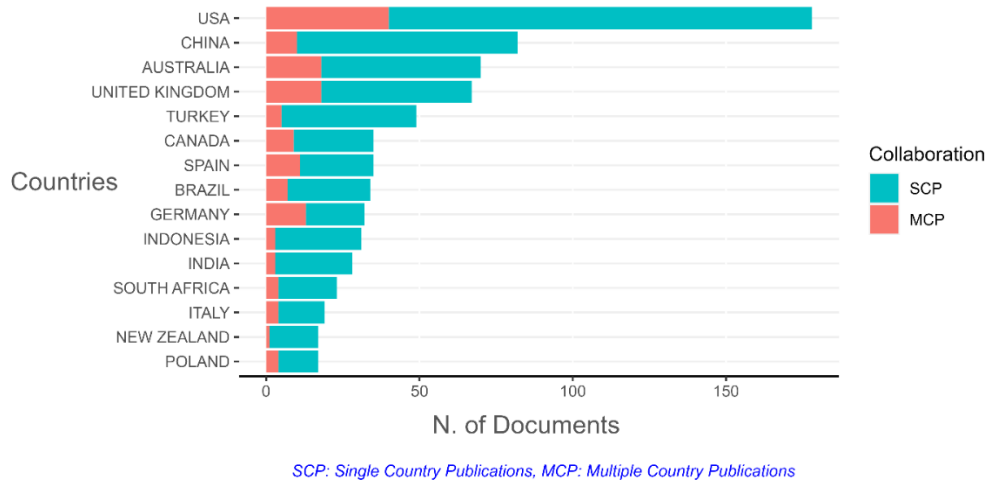


Figure 2. Corresponding author’s country for publications in the top 15 journals. The colours red and blue respectively indicate papers written with/without international collaboration.

Table 3. Corresponding authors' countries.

Country	Articles	SCP	MCP	Freq	MCP_Ratio
USA	178	138	40	0.13	0.225
China	82	72	10	0.06	0.122
Australia	70	52	18	0.051	0.257
UK	67	49	18	0.049	0.269
Turkey	49	44	5	0.036	0.102
Canada	35	26	9	0.026	0.257
Spain	35	24	11	0.026	0.314
Brazil	34	27	7	0.025	0.206
Germany	32	19	13	0.023	0.406
Indonesia	31	28	3	0.023	0.097
India	28	25	3	0.02	0.107
South Africa	23	19	4	0.017	0.174
Italy	19	15	4	0.014	0.211
New Zealand	17	16	1	0.012	0.059
Poland	17	13	4	0.012	0.235

Main keywords

When examined using a word cloud analysis, the most frequently used words in titles of publications were 'tourism', 'conservation' and 'bird/s' (Fig. 3). 'Tourism' was also the most frequently used word in the author nominated keywords, followed by 'ecotourism', 'conservation' and 'birding' (Fig. 3). Authors also nominated terms such as 'citizen science' and 'birds' relatively often (Fig. 3). The indexed keywords identified in our illustrative analysis included 'aves', 'bird', 'tourism' and 'biodiversity' (Fig. 3). The general words appearing in the word clouds such as "science", "China", "Colombia", "adult", and "human" do not convey significant information for our purposes here (i.e., identification of trends and hotspots). The frequency of "tourism", "birdwatching", and "ecotourism" has increased significantly in author keywords from 1985 to 2022 (Table 4).

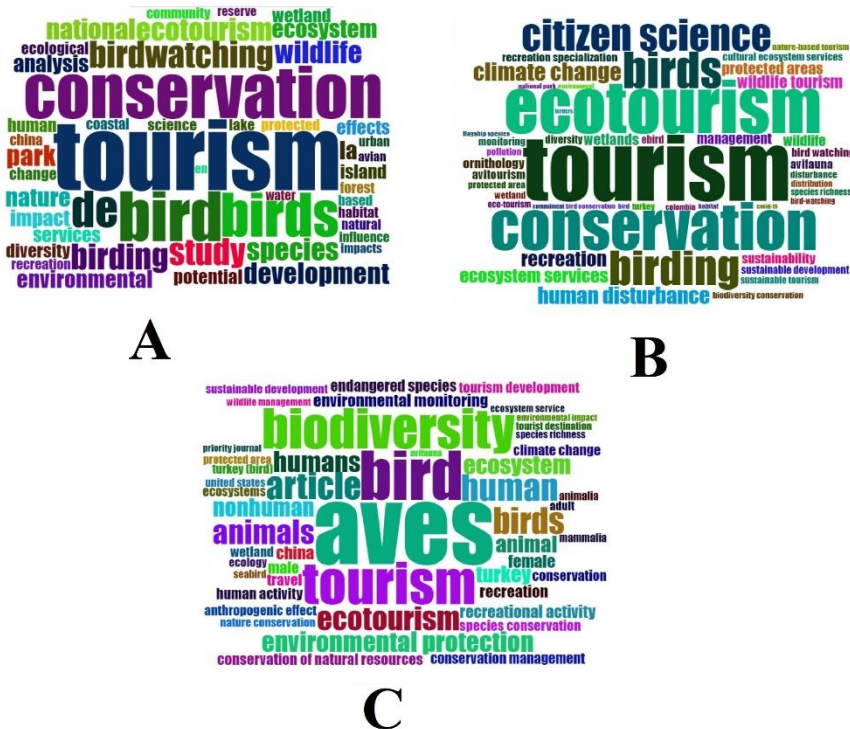


Figure 3. Word Cloud for the most common words in titles (A), author keywords (B) and, indexed keywords (C).

Table 4. The top 20 most frequently used keywords for periods (1985–2005), (2006–2015), (2016 – 2022).

Priority	Keywords	1985-2005	n	2006-2015	n	2016-2022	n
1	Tourism	57		Tourism	285	Tourism	504
2	Birdwatching	50		Ecotourism	285	Birdwatching	479
3	Ecotourism	48		Birdwatching	212	Ecotourism	454
4	Birding	24		Conservation	181	Conservation	341
5	Management	24		Birding	144	Birds	269
6	Conservation	22		Birds	133	Birding	247
7	Birds	22		Human Disturbance	121	Biodiversity	236
8	Human Disturbance	17		Biodiversity	78	Citizen science	177
9	Wildlife	15		Management	77	Human Disturbance	158
10	Recreation	7		Wildlife tourism	74	Climate change	118
11	Wildlife tourism	7		Recreation	64	Recreation	116
12	Protected Areas	5		Wetlands	50	Wildlife tourism	104
13	Wetlands	5		Wildlife	49	Wetlands	95
14	Biodiversity	4		Protected Areas	45	Protected Areas	94
15	Sustainability	4		Citizen science	43	Ecosystem services	92

16	Citizen science	3	Climate change	42	Management	88
17	Climate change	3	Sustainability	41	Wildlife	86
18	Avifauna	1	Avifauna	37	Avifauna	72
19	Ecosystem services	0	Ecosystem services	12	Sustainability	69
20	Ornithology	0	Ornithology	7	Ornithology	53

Three-field plots

Figure 4 presents the three-field plots for the country, keywords, and author. As shown in the figure, there are geographical preferences for certain keywords; for instance, there is a strong relative preference among authors from the US for “birdwatching”, “citizen science”, “conservation” and “ecotourism”, and for “birdwatching” among authors from Brazil (Fig. 4).

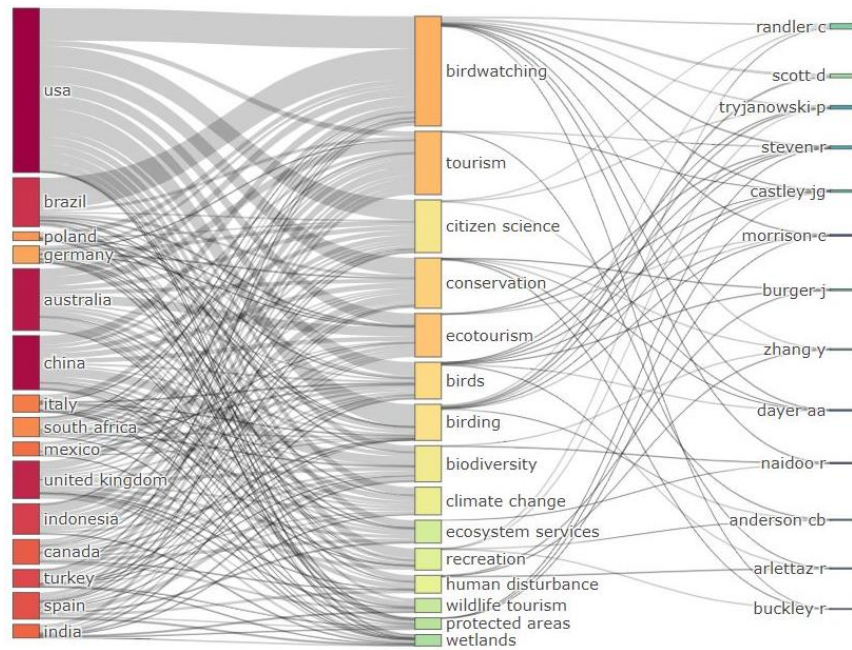


Figure 4. Three-field plot for countries, author keywords, and authors.

Figure 5 presents the thematic map for the literature according to the analysis of internal and external relationships. According to the results, birdwatching, birding, and citizen science are the motor themes, which means they significantly contribute to the development of the field. Moreover, ecosystem services, cultural ecosystem services, and recreation are emerging themes that require further development.

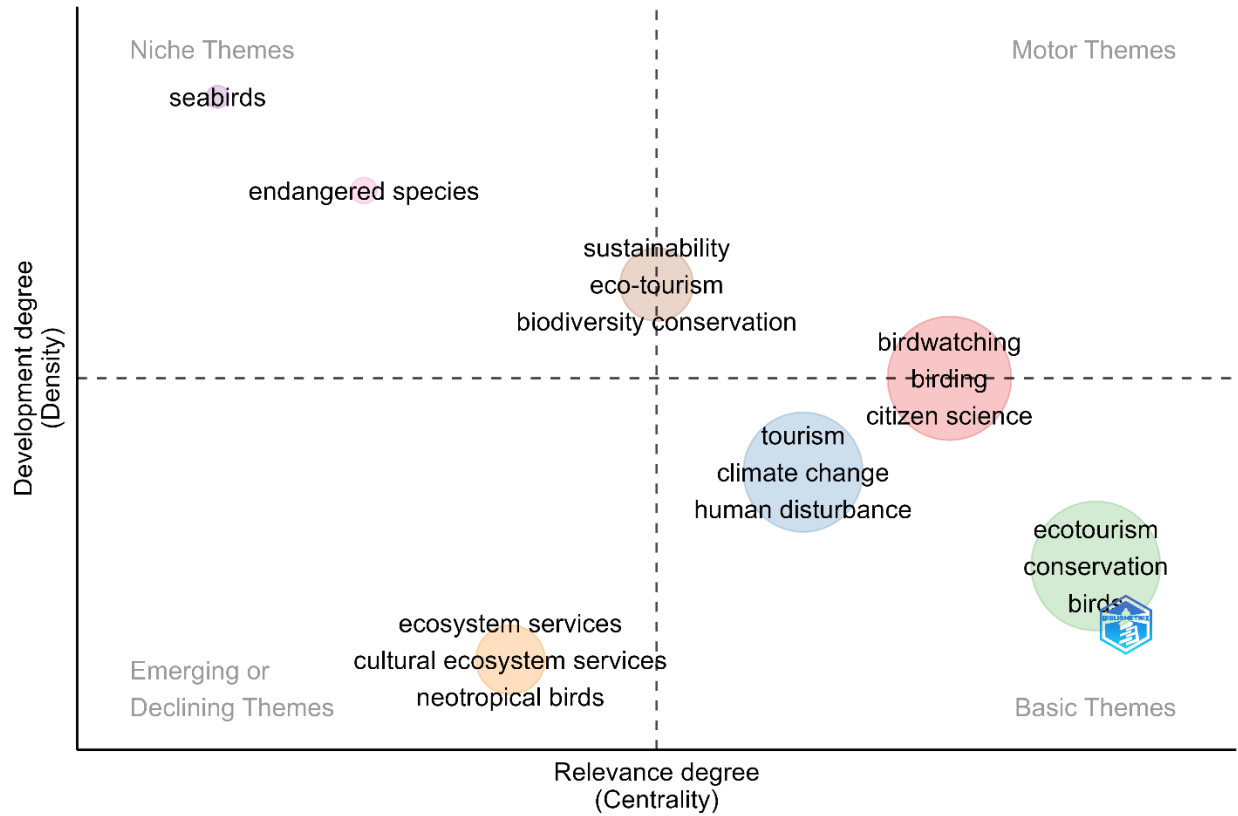


Figure 5. Thematic map in birdwatching research.

A Sankey diagram is used to show how different themes are connected and have developed in the past (Xiao et al., 2022). Each box in the map denotes a theme, and the size of the boxes is proportional to the frequency of the theme’s occurrences (Xiao et al., 2022). The flows connect each box showing the evolution traces of the theme, and the thicker the connecting line, the higher the linkage of the two themes (Fig. 6). It is noticeable that “ecotourism”, and “tourism” first appeared in 1878–2011, were further developed in 2012–2019, and continued to draw attention in the final time zone 2020–2022. Some objective indicators, such as “cultural ecosystem services” have only started to flourish in recent years (2020–2022).

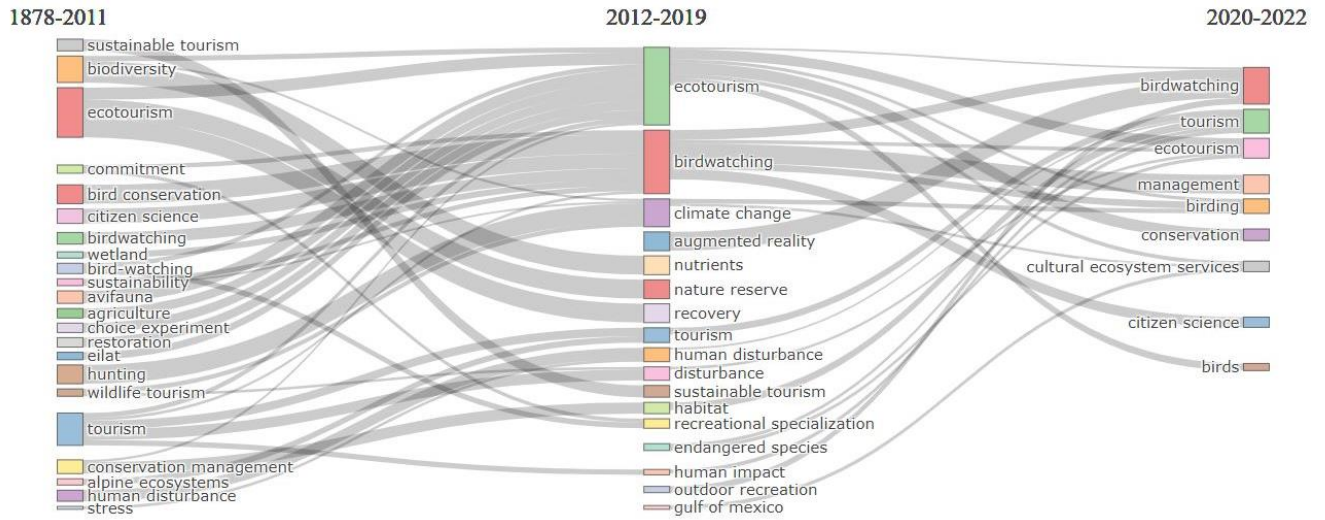


Figure 6. Thematic evolution in birdwatching tourism research.

The research foci identified for birdwatching research include (1) birdwatching and citizen science and (2) ecotourism and sustainable tourism. (3) bird conservation (4) ecosystem services and cultural ecosystem services and, (5) ecotourism and birdwatching tourism (Fig.7).

history in North America (Connell, 2009) but very little research has been conducted in Asia despite the region's high biodiversity and endemism.

Research directions

The changing nature of birdwatching research

Past studies have identified a number of directions in the field. Steven et al. (2015) reviewed 66 studies published between 1989 and 2014 and found that research had been concentrated in the northern hemisphere. Studies in the field have mostly focused on the economic impacts, the motivations of tourists, and the tourism market. Şekercioğlu, (2002) reviewed the role that birdwatching can play in community-based conservation as well as the opportunities and challenges associated with avitourism. Moreover, the authors provided recommendations for improving the contributions of avitourism to conservation. The combination of the VOSviewer and Bibliometrix package allowed us to quantitatively review the literature and identify key authors, major journals, academic collaborations, and research directions. Future studies are expected to focus on documenting the fostering of avitourism in developing nations through training and collaboration between local and international NGOs. Improvement of local livelihoods and grass-roots organization should be the focus of future efforts given the potential of avitourism as a source of income and conservation action.

High frequency of the terms "Tourism", "Birdwatching", "Ecotourism", "Conservation", "Birds", "birding", "biodiversity" and, "Citizen science" in the top 20 list of keywords between 1985 and 2022 reflects increasing global focus on studies understanding the roles of citizen science in bird conservation. Citizen science is an effective tool for monitoring environmental change over large geographic areas (Donnelly et al., 2014). It is becoming increasingly popular, in places such as North America and some European countries, to engage amateur people in the collection of scientific data (bird counts, bird migration, etc.) to support long-term environmental monitoring (Greenwood, 2007; Donnelly et al., 2014). Between 1878 and 2011, scholars in WVCs published papers mainly about ecotourism, tourism, biodiversity, and bird conservation. However, in the following 2012-2019, "ecotourism", "birdwatching", and, "climate change" was the most popular topic. This result provides us with the developing trends of topics published in the birdwatching field. Some field, such as "cultural ecosystem services" has only started to flourish in recent years.

New themes in birdwatching research

Our results showed that citizen science is the motor theme, which means it significantly contributes to the development of birdwatching. Furthermore, ecosystem services, cultural ecosystem services, and recreation are identified as an emerging field in this area that needs to be developed. Cultural ecosystem services (CES) directly impact sustainable development and human well-being (Yang and Cao, 2022). Birds provide a number of ecosystem services including provision (as food, clothing, and ornaments), regulation (pollination, pest control, and seed dispersal), support (nutrient cycling), and cultural services (nature-based tourism) (Michel et al., 2020). Birdwatching is central to regions participating in avian conservation as a source of natural capital and ecosystem services (Liu et al., 2021). CES are among the least studied ecosystem services (Graves et al., 2019). CES spans mental health, recreation, and aesthetics (Graves et al., 2019) and can play a more central role in decision-making given its direct impact on popular support for conservation and stewardship of nature (Chan et al., 2012). Given that ecosystem services, ecosystem cultural services, and recreation were identified as emerging fields, more attention is needed to address the gaps in the literature regarding these subjects. Moreover, a better understanding of the ecosystem services provided by birds can contribute to more effective management of ecosystems, which can in turn aid in climate change adaptation, finding alternative livelihoods where traditional uses are no longer sustainable, and additional economic opportunities to foster the well-being of local communities.

Opportunities for better integration of birdwatching and conservation practice

Co-occurrence analysis of author keywords identified 5 main foci in birdwatching includes (1) birdwatching and citizen science (2) ecotourism and sustainable tourism. (3) bird conservation (4) ecosystem services and cultural ecosystem services and, (5) ecotourism and birdwatching tourism. Among the identified foci, citizen science could play an important role in bird conservation.

The effectiveness of citizen science in environmental studies has been shown in Europe (Schmeller et al. 2008), Australia (Wolcott et al. 2008), Canada (Beaubien and Hamann 2011), and the US (Bonney et al. 2009; Dickinson et al., 2012) as indicated by a recent increase in the number of publications in the scientific literature (Donnelly et al., 2014). The use of citizen science data for ornithological research and bird conservation is useful (de Camargo Barbosa et al., 2021). Citizen scientists can serve as a considerable resource, especially where ornithologists are scarce and field research is costly (de Camargo Barbosa et al., 2021). Because birds have many threats in our change world, citizen scientists play a key role in efforts to understand and conservation of birds.

With more support and training, citizen scientists can play an important role in guiding future studies and promoting conservation action around the world. (de Camargo Barbosa et al., 2021). Some of the limitations in this research include: (1) This study used 1371 papers from only one database, which does not represent all of the papers published globally in this field. Therefore, the conclusion and the results should only be interpreted within the context of birdwatching research from this database. (2) Bibliometric analysis can only be applied to literature published in indexed journals and does not cover unpublished research, research in non-indexed journals, and non-printed research such as reports, etc., (3) Another important limitation of the bibliometric analysis is the authors citing themselves. Also, authors may sometimes cite inaccurate work and fail to cite the more outstanding research.

Conclusion

The current bibliometric study is the first bibliometric review of birdwatching using the Bibliometrix package in R and VOSviewer to provide insights into the current status and progress of birdwatching research. The present study summarizes the global publication information related to birdwatching, including the annual trend in publications, distribution of countries, authors' productivity, collaborations, and keyword analysis by applying bibliometric indicators. Birdwatching research has increased substantially in the past decade, with the USA and other high-income countries dominant in birdwatching research globally. This study has also evaluated influential papers and provided information for future research direction. Today, the databases of publications and articles in the field of birdwatching have been sufficiently enriched that it is possible to look for scientific footprints among them to examine related issues and trends. Although birdwatching has an extensive history, the bulk of research interest on the topic is relatively recent (i.e., post-2017) and continues to grow. Birdwatching tourism has great potential as a source of income for local communities and provides motivation for environmental education about the importance of biodiversity and conservation. This form of tourism also incentivizes the protection of natural habitats. It is hoped that the findings from this bibliometric analysis will shed light on the developing research community on birdwatching and provide information on potential collaborators and promising areas for future research directions.

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