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Determining the Bibliometric Profile of Birdwatching and Birding Research on Web of Science *

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Abstract
Numerous empirical studies have explored birdwatching and birding, but well-structured bibliometric research is needed to synthesize and understand the existing knowledge in this area. This paper presents a bibliometric analysis of birdwatching and birding research, evaluating 474 papers published on the Web of Science platform between 1976 and 2023. Co-authorship and keyword co-occurrence analyses were employed to assess the interdisciplinary nature of this research field. Key findings include author: birdwatching practices in tourism have experienced significant growth in the past decade; (2) Christoph Randler as the most prominent influential author; (3) the United States leads in document production, while Germany is prominent in citation count; (4) the University of Life Science ranks highest among institutions, but Eberhard Karls University leads in citation count; and (5) keyword trend network assessments indicate that birdwatching and birding are increasingly gaining attention in conservation, citizen Science tourism. In conclusion, birdwatching tourism research demonstrates considerable potential for further development and is expected to continue its upward trajectory.
Keywords: *Birdwatching, Birding, Bibliometric Analysis, Web of Science, VOSviewer*

*This study is not included in the study group that requires TR Index Ethics Committee Approval.

1. Introduction

The popular pastime entails the observation and study of wild birds in their natural habitat. In recent years, birdwatching has garnered significant attention from academics, practitioners, and policymakers due to its numerous contributions to environmental conservation, biodiversity study, and tourism development. The most widely researched areas include the socio-economic impacts of birdwatching on local communities (Balmford et al., 2015), the role of birdwatching in promoting ecological awareness and education (Brossard et al., 2004; Skibins et al., 2013), and the psychological and well-being benefits derived from birdwatching activities (Cox & Gaston, 2016; Ratcliffe et al., 2019). Additionally, several research has concentrated on the development of sustainable birdwatching tourism practices and their implications for conservation efforts (Ballantyne et al., 2011).

Given the growing body of research surrounding birdwatching, it becomes imperative to understand the research landscape and identify emerging trends. Utilizing quantitative tools and methodologies, such as bibliometric analysis, can offer an organized overview of the existing literature. Bibliometric analysis is a quantitative research method that can assess the research tendencies and patterns in a certain field. By applying bibliometric indicators such as co-citation analysis and keyword co-occurrence analysis, researchers can identify the leading authors and journals, and research topics in a specific field, as well as identify emerging research trends and future research directions. This study aims to conduct a bibliometric analysis of birdwatching research utilizing the Web of Science platform and VOSviewer software. Specifically, the research trends and patterns in the field of birdwatching are planned to be evaluated, the most influential authors and publications are intended to be identified, and the field's emerging research concerns are aimed to be analyzed. This comprehensive review will provide an up-to-date comprehension of evolution and its advancement in birdwatching research, thus offering valuable insights for researchers, practitioners, and policymakers. Moreover, the study's findings are expected to contribute to the field by identifying research gaps, highlighting potential avenues for future investigations, and facilitating the establishment of interdisciplinary collaborations among scholars. This bibliometric analysis of birdwatching research will enable us to assess the research landscape and recognize the key players in the field and help advance theoretical frameworks and inform evidence-based practice in the domain of birdwatching and ecotourism. By leveraging the analytical power of the Web of Science platform and VOSviewer software, this study is poised to make a significant contribution to the body of knowledge on birdwatching research (Van Eck & Waltman, 2010; Zhao & Strotmann, 2014).

The remainder of this work is structured as follows: In the next section, a summary and bibliometric analysis of the literature on birdwatching will be offered. In the part that follows, the data collection and analysis methods employed in this inquiry will be described. The findings of the analysis will be provided, including the most influential authors, journals, and research topics, as well as the emerging research trends in the field. The implications of the findings for birdwatching researchers, policymakers, and practitioners in related fields will be concluded and discussed.

2. Literature Review

Birdwatching tourism, a rapidly growing niche sector, is gaining attention from academics and practitioners alike due to its socioeconomic and environmental benefits, such as community development, employment, and habitat conservation (Sekercioglu, 2002; Steven et al., 2011). The popularity of this leisure activity has been fueled by increased interest in nature, technological advancements, and environmental conservation awareness (Cocker & Tipling, 2016; Balmford et al., 2009; Cordell, 2012; Sekercioglu, 2002). As birdwatching tourism expands, it is crucial to understand the motivations and preferences of birdwatching tourists to develop targeted marketing strategies and effective management practices (Steven et al., 2015). Recent research has explored various aspects of birdwatching tourism, such as birdwatchers' motivations (Randler, 2023), reasons for starting birdwatching (Randler & Marx, 2022), and the economic impacts of birdwatching on local communities (Czeszczewik et al., 2019).

2.1. Birdwatching/Birding Activity

Birdwatching, a recreational activity involving observing and identifying birds in their natural habitats, has gained popularity due to increased interest in nature, technological advancements, and environmental conservation awareness (Sekercioglu, 2002; Balmford et al., 2009; Cordell, 2012; Cocker & Tipling, 2016) It is a serious, cognitively demanding pastime where participants progress from novices to experts, making the recreation specialization framework applicable (Bryan, 1977; Tryjanowski et al., 2023).

Birdwatching or birding can be categorized in recreation specialization theory which is a behavioral continuum between generalists with minimal involvement and specialists with substantial involvement in activities like birding (Bryan, 1977; Tryjanowski et al., 2023). Birdwatchers are differentiated based on their engagement across behavior, skill and knowledge, and commitment domains (Eriksson et al., 2023). This theory has been extended to various outdoor recreation activities, recognizing the progression from novices to experts (Randler et al., 2022). Although both activities involve a love of birds and an appreciation for their beauty and behavior, birdwatching involves observing birds in their natural habitats without interacting with them, while birding focuses on identifying specific species and actively seeking out birds more professionally. In this study, the term "birdwatching" is used to refer to both birdwatching and birding activities.

Since the late nineteenth century, birdwatching has been popular in industrialized nations and become a significant revenue generator, with birders typically having higher education levels and above-average incomes (Chen et al., 2022). In 2011, American birdwatchers spent $40.94 billion on birding, with $14.87 billion on travel, and in 2016, 45.1 million Americans were classified as migratory bird observers (Chen et al., 2022). In 2001, it was found that about 46 million people in the United States, aged 16 and above, were interested in birdwatching, commonly referred to as birders (La Rouche, 2003). A typical birder was found to be around 49 years old. A higher education level was possessed by many of them, and an income above the average was often reported. Regarding gender, female birders were found to be slightly more prevalent, accounting for about 54%. Married relationships were reported by 72% of these birders. It was observed that birdwatching was more appealing to individuals with higher incomes and education. For example, involvement in this hobby was reported by 27% of those residing in households with earnings of $75,000 or more. In contrast to activities like hunting and fishing, which were observed to be more dominated by men, birdwatching was noted to have a balance leaning more towards females (La Rouche, 2003).

2.2. Birdwatching Tourism

Birdwatching tourism, a rapidly growing niche segment, offers socioeconomic and environmental benefits, including community development, employment, and habitat conservation (Sekercioglu, 2002; Steven et al., 2011). This market attracts diverse travelers seeking unique experiences in natural settings (Steven et al., 2015). Key stakeholders include local communities, vacationers, government organizations, and NGOs (Steven et al., 2011). Birdwatching tourists are typically well-educated, high-income individuals motivated by observing rare species, learning about ecosystems, and socializing with fellow birders (Scott et al., 2005; Hvenegaard, 2017; Chen et al., 2022). They contribute significantly to local economies and support sustainable development and conservation (Sekercioglu, 2002; Hvenegaard, 2017; Chen et al., 2022).

Challenges to the sector include habitat degradation, climate change, overcrowding, and inadequate infrastructure (Lovelock, 2008; Steven et al., 2011; Hvenegaard, 2017). Addressing these issues requires collaboration among researchers, destination managers, local communities, and other stakeholders. Continued research is needed to understand birdwatching tourists' preferences and develop strategies for managing environmental and social impacts (Steven et al., 2015).

As birdwatching tourism expands, understanding these tourists' market characteristics and motivations is essential for targeted marketing strategies and effective management practices (Steven et al., 2015). Birdwatching tourists prioritize factors like natural beauty, accessibility, safety, and the presence of

knowledgeable guides when selecting destinations, and prefer accommodations demonstrating a commitment to environmental sustainability (Hvenegaard, 2017).

Birdwatching tourism has attracted the attention of researchers in the academic field and has been the subject of numerous studies. For instance, Randler (2023) evaluated the motives of birdwatchers and identified any motivational differences among European participants. This study confirms the earlier concept of wildlife-related motives and has practical implications for customizing programs, exhibitions, and guided tours. It also illustrates the possibility of utilizing these motives to recruit people for conservation initiatives and citizen science projects. The reasons for starting birdwatching have also been among interesting research topics. Randler & Marx (2022) found that social impact, environmental experience, and bird-related triggers were the most prevalent reasons for commencing birding. They also discovered gender variations between men and women, which has significant implications for program creators and nature conservation organizations. Similarly, Janeczko et al. (2021) collected data from 357 birdwatchers from Poland and other countries and found that the primary motives for birding are "to be close to nature" and "fascination with birds." Their findings have implications for policymakers and park managers in promoting birdwatching as a sustainable and environmentally friendly type of tourism, as well as for the design and management of infrastructure in national parks to fulfill birdwatchers' demands.

Bird habitats, which provide the infrastructure for birdwatching tourism, have also been an interesting research field. Zhang & Huang (2020) sought to understand a holistic examination of the interrelationships between the characteristics of the park, bird environments, and the park's appeal to birdwatchers. Their research included a three-month census of birds at 159 locations and mapping of avian habitat areas in Beijing's parks. The scale of the park permits the park to have more avian environments and birdwatching undertaking actions, according to the findings of this study, in which accessibility was identified as an essential factor for birdwatchers. Birdwatching is also a form of tourism with a substantial income-generating feature. This situation was covered in Czeszczewik et al.'s (2019) study. The authors examined the revenue earned by birdwatchers and other tourists visiting the Białowieża Forest (BF) across Europe in order to refute the economic basis for logging operations. They revealed that birdwatchers spend more money each day and spend more time in the BF than other visitors. Their study has important implications for policymakers and forest managers in promoting birdwatching as a sustainable form of ecotourism and conserving bird species threatened by logging activities.

The increasing popularity and economic impact of birdwatching tourism necessitate a comprehensive comprehension of the market, birdwatchers' motivations, preferences, and obstacles. This study's purpose is to perform a bibliometric analysis of the existing literature on birdwatching tourism in order to identify research trends, critical topics, and research gaps in the field. By mapping the cognitive framework of birdwatching tourism research, this study aims to provide scholars, destination managers, and other stakeholders with valuable insights to develop targeted marketing strategies, effective management practices, and sustainable policies that meet the needs of birdwatchers while addressing the environmental and social challenges facing the sector. The bibliometric analysis will contribute to the body of knowledge in birdwatching tourism and help influence future research directions, thereby contributing to the long-term sustainability of this niche tourism segment.

3. Method

This paper uses science mapping techniques, including co-word (co-occurrence) and co-authorship analysis. By using these methods to explore the academic landscape of a research field, it is essential to review the multitude of influential publications within that domain (Donthu et al., 2021). Using citation analysis, the leading publications in the study area can be comprehended. Co-occurrence (co-word) analysis is the primary term that accentuates the content of the studies and assists authors conducting similar research in locating pertinent articles (Tripathi et al., 2018). Co-authorship is correlated with a paper's impact, so the greater the number of authors a paper has, the more likely it is to be cited. There are

more scientific networks, such as conferences and seminars, where co-authored papers are presented. Additionally, seminars by multiple authors are eventually cited more frequently. This phenomenon is known as "Knowledge Diffusion"; the more knowledge is disseminated in the scientific network, the more attention, and citations it receives (Tahamtan et al., 2016). The examination additionally enables interactions to be defined throughout various periods of time, allowing researchers to look at the pattern of intellectual growth in relation to collaboration networks and providing aspiring scholars with valuable information to connect with renowned and innovative researchers in the field (Donthu et al., 2021).

This research aims to identify the trends in birdwatching-related articles using bibliometric analysis. The research questions are written below:

1. What are the top countries and institutions working on birdwatching and birding-related articles?
2. What are the top journals and who are the authors working on birdwatching and birding-related articles?
3. What are the research tendencies in birdwatching and birding-related articles?etmektedir.

4. Data Collection and Result

VOSviewer is a publicly accessible application for creating and viewing bibliometric maps. Unlike commonly used bibliometric mapping applications such as SPSS and Pajek, VOSviewer prioritizes the visual display of bibliometric data. VOSviewer is particularly advantageous for exhibiting vast bibliometric images in an understandable manner (Van Eck & Waltman, 2010). Although several software tools can be used by scientometrics to analyze or visualize the bibliometric data, selecting a tool by bibliometrics depends on the analysis required. VOSviewer software provides the possibility to present the data graphically through category maps. The program organizes information and generates visualizations based on bibliographic coupling, co-authorship, citation, co-citation, and keyword co-occurrence (Merigó et al., 2016). The network connections visualize the keywords that appear more frequently in the same papers (Cobo et al., 2011).

Usually, earlier studies used bibliometric analysis based on the Web of Science and Scopus (Garrigos-Simon et al., 2018). The Web of Science platform provides the most influential research papers and serves as the primary metric in scholarly making choices (Cavalcante et al., 2021). Web of Science (WoS) is the most widely recognized and widely utilized database for scientific paper surveys. The WoS Core Collection was chosen as a fundamental search system to ensure that this study adheres to the established guidelines for bibliometric analysis (Bodnariuk & Melentiev, 2019) to comprise several sub-databases (Merigó et al., 2016). "birdwatching", "birding", and “watching bird” were the keywords used in this study in February 2023. The search phrase was: "birdwatching" (Topic) OR "birding" (Topic) OR "watching bird" (Topic). A total of 474 articles were found. Data were exported as Tab delimited files, including full records, and cited references to use for visualizing in VOSviewer software.

4.1. The Publication Years

Figure 1 displays the distribution by year of publications related to birdwatching and birding sourced from the Web of Science Core Collection. The chart lists the publication years on the left axis and the record counts on the right axis.

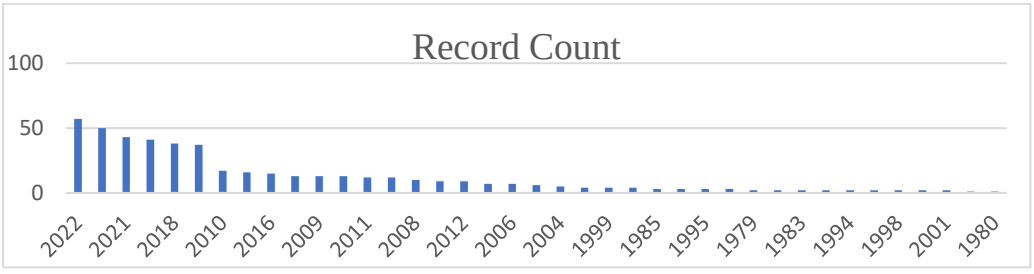

Figure 1. Publication by Year

With a total of 57 records, 2022 had the greatest number of publications, according to the data. Next, there were 50 publications in 2019, 43 publications in 2021, and 41 publications in 2020. With 38 records issued in 2018, 37 in 2017, and 17 in 2010, the majority of publications were released in the last decade. Other years with a high number of records are 2015, 2016, 2007, and 2009. Each of these years had 13 to 16 records. One to twelve much fewer recordings were found for the remaining years.

This trend demonstrates that interest in the scientific study of birds and birdwatching has grown over the past decade. Noting that most of these papers were produced during the previous ten years suggests that the growing interest in birdwatching is a relatively new phenomenon. Overall, the data demonstrate themes and concepts in the research literature over time on birdwatching.

4.1.1. Top Countries and Institutions

Co-authorship assessment of networks serves as an effective instrument for exploring collaboration patterns and trends in research fields. In the case of birdwatching research, VOSviewer was used to analyze the co-authorship relationships between 21 countries that have published research on this topic. The resulting network visualization reveals important insights into the collaborative landscape of this field.

Figure 2. Co-authorship Connected Network Map by Country

Figure 2 displays a network consisting of 43 links, which represent co-authorship relationships between countries. The total link strength of 54 signifies the cumulative strength of connections between all pairs of items in the dataset. VOSviewer mapping presents this data as either a single cluster or individual clusters within the software.

A threshold of 1 document per country was applied, resulting in the inclusion of 21 countries in the network. In the context of VOSviewer software, a threshold refers to a minimum value that must be met for the occurrence or strength of a relationship between items to be considered for analysis. Consequently, any association falling below the threshold value will be excluded from the study. VOSviewer allows for the application of thresholds to various relationship types, such as co-citations, co-authorships, and keyword co-occurrences. The choice of a threshold value depends on the research question and the data being examined. A higher threshold may result in a more focused study, while a lower threshold could yield a more comprehensive analysis that includes numerous weak relationships.

The visualization shows that the largest cluster of countries in the network is Cluster 1 with the red color, which includes Germany, the Czech Republic, Spain, Italy, Taiwan, Mexico, and Finland. These countries are highly interconnected, suggesting that they are active collaborators in the field. Cluster 2 with the green color appears to be a smaller group of countries, including England, Poland, and Sweden, with weaker connections between them compared to Cluster 1. Cluster 3 appears to be an even smaller group of countries, including Norway, South Korea, and the United America, with weaker connections still. Cluster 4 appears to be a pair of countries, Brazil, and Cuba, with only one co-authorship relationship between them.

Overall, the network analysis suggests that birdwatching research is an international field with active collaboration among researchers in many different countries. By analyzing co-authorship by countries, leading countries and institutions in a research field can be identified, as well as potential areas for future

collaboration can be considered. It is important to know that in the VOSviewer, a connected network map of countries based on co-authorship means that the countries on the map have collaborated on research papers and share at least one co-author. However, top countries that published articles in birdwatching and birding fields may vary from co-authorship. Contingent on the Web of Science Core Collection the number of records for each country in birdwatching fields indicates the level of engagement and contribution of each country in the field. The USA has the highest number of records with 172, followed by England with 37, and Canada with 32. Other highly represented countries include Australia, Peoples R China, and Germany, with 28, 28, and 23 records respectively. The data provides insights into the global distribution of research activity in the field, with a total of 55 countries/regions represented. While some nations are extremely involved in research, others have fewer records, indicating a lower degree of participation. For instance, Albania, Brunei, the Democratic Republic of the Congo, Estonia, Ethiopia, Ghana, Greece, Guyana, Hong Kong, Kazakhstan, Nepal, Nigeria, Pakistan, Sao Tome and Principe, Scotland, Serbia, Sri Lanka, Tanzania, Uganda, and Vietnam each have a single record. These nations may represent possible growth and development regions in the field, and extra research might be performed to discover the issues contributing to their inadequate research output.

Figure 3 shows the top organizations in terms of their co-authorship counts in the field of birdwatching. The data presented in the following is based on the number of publications indexed in the Web of Science Core Collection database and VOSviewer mapping.

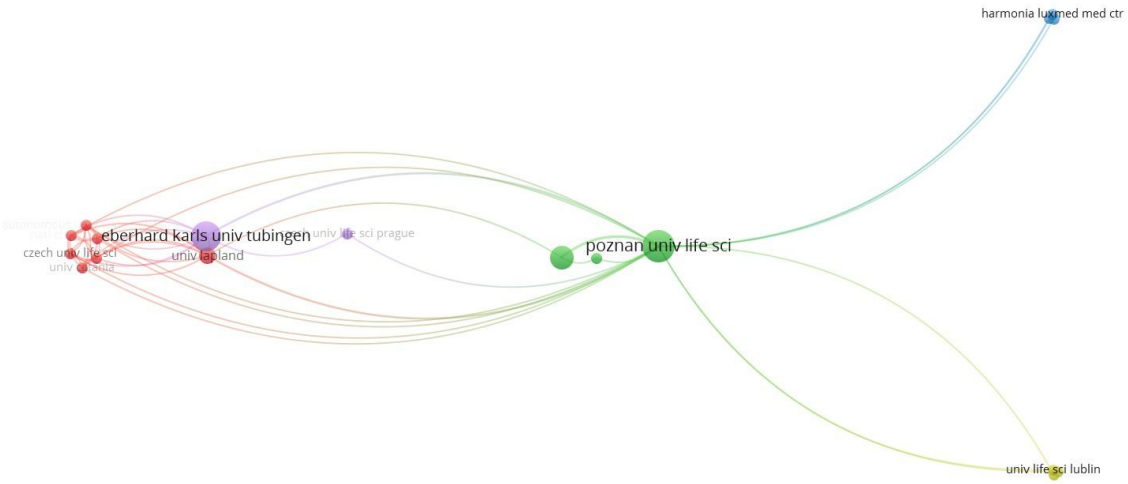

Figure 3. Co-authorship Connected Network Maps by Organizations

At the top of mapping cluster is the University of Life Sciences, with 21 Total Link Strengths and 7 total documents. This indicates that the University of Life Sciences is the most active collaborator in this field among all the organizations included in the analysis (Green cluster). The second-ranked organization is the Eberhard Karls University of Tübingen, with 10 Total Link Strengths and 6 co-authored publications (Purple cluster), followed by the University of Lapland, with 4 co-authored publications (Red cluster). On the other hand, other organizations in the top ten revolve around the Web of Science Core Collection database including the Eberhard Karls University of Tubingen, the United States Department of The Interior, and Cornell University. This data provides an overall summary of the most prolific organizations in terms of co-authorship. This information can be beneficial for researchers who are interested in locating possible partners or who want to know which organizations are leading in this subject.

4.2. Top Authors and Journals

Identifying top journals and authors in bibliometric analysis provides several advantages such as gaining insight into influential research and researchers, evaluating research productivity, and identifying emerging trends. This information can be useful for researchers looking to collaborate, improve their own research, or identify sources of information for their work.

4.2.1. Top Authors

The analysis is based on co-authorship as the type of analysis and "authors" as the unit of analysis. The analysis provides information on leading authors determined by the variety of published papers, citations, and total link strength. Figure 4 illustrates 17 authors out of 118 authors listed in the data. Among these connected authors, the number of documents published by each author ranges from 1 to 2, with most authors (47 out of 63) having published only one document. The number of citations for each author ranges from 0 to 176, with the most cited author having 247 citations. The total link strength ranges from 0 to 21, with the highest link strength being 21.

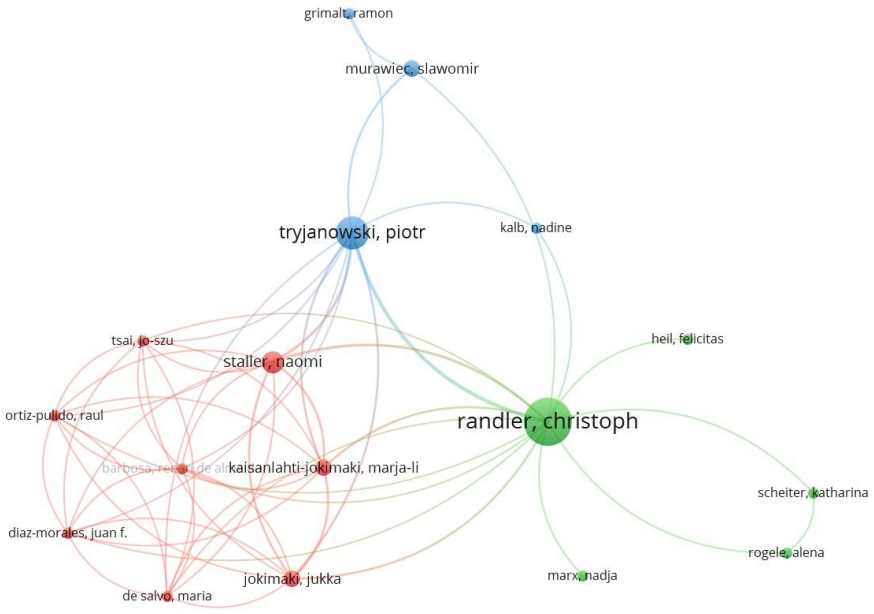

Figure 4. Co-authorship Connected Network Maps by Authorship

The leading authors based on the number of documents published in the field of birdwatching are as follows: Christoph Randler with 11 documents, Piotr Tryjanowski with 6 documents, Naomi Staller with 3 documents, and David Scott with 2 documents. In terms of citations, David Scott leads with 247 citations, followed by J.L. Crompton with 176 citations, and Li-Ju Chen and Wei-Peng Chen, both with 65 citations.

Co-authorship is often considered a vital factor in identifying authors who frequently collaborate with thought leaders or influencers in their field. Analyzing the number of documents published on the Web of Science core collection can help identify the leading authors in birdwatching and birding research. Out of the 474 publications on this topic, the most prolific authors include Randler C. with thirteen documents, Armistead HT. with twelve, Beehler BM with nine, and Tryjanowski P. with nine.

4.2.2. Top Journals

This analysis looked at the top journals that publish articles about birdwatching, using data from the Web of Science platform. A total of 322 journals were identified, with Library Journal, Biological Conservation, Ibis, Birds of Maryland Delaware and the District of Columbia, and Human Dimensions of Wildlife containing the most articles on this topic.

The Library Journal had the most articles, with 19 in total. This publication publishes articles on birdwatching in addition to library news, book reviews, and product reviews. It also gives valuable information on resources for birdwatchers, including books and websites, and incorporates interviews with birding professionals.

Biological Conservation and Ibis journals tied for second place together, with 10 articles each. Biological Conservation is an interdisciplinary publication that covers all areas of biodiversity conservation,

including research on the influence of birdwatching on bird populations. Ibis is an international publication that covers all elements of ornithology, including research on bird migratory patterns.

Birds of Maryland Delaware and the District of Columbia and Human Dimensions of Wildlife tied for a third place together as well, with nine articles each. Birds of Maryland Delaware and the District of Columbia is a field guide that provides information on birdwatching in those states, as well as articles on birdwatching and birding. Human Dimensions of Wildlife covers all elements of the human-wildlife relationship, including birdwatching and birding, and publishes articles on the economic and societal implications of birdwatching.

PLOS ONE, the Journal of Outdoor Recreation and Tourism Research Planning and Management, Ornithology Neotropical, the Journal of Sustainable Tourism, Ostrich, and Avian Research were also notable publications with at least four articles each. These publications cover a wide range of birdwatching and birding-related topics, including migration patterns, conservation efforts, economic and social ramifications, and more.

4.3. Research Tendencies of Birdwatching and Birding

In order to find trends related to study in the discipline of birdwatching, co-occurrence analysis with VOSviewer visualization is considered the best method. This tool enables researchers to determine which words and phrases are used most frequently in the literature related to these topics. By selecting the "All keywords" option for co-occurrence analysis, researchers can identify which words related to birdwatching are most commonly used in research. This option counts the frequency of each keyword appearing in the same document, allowing for the identification of common themes and topics. As can be seen in Figure 4, co-occurrence as the type of analysis and all keywords as the unit of analysis are taken, and several trends in research can be identified.

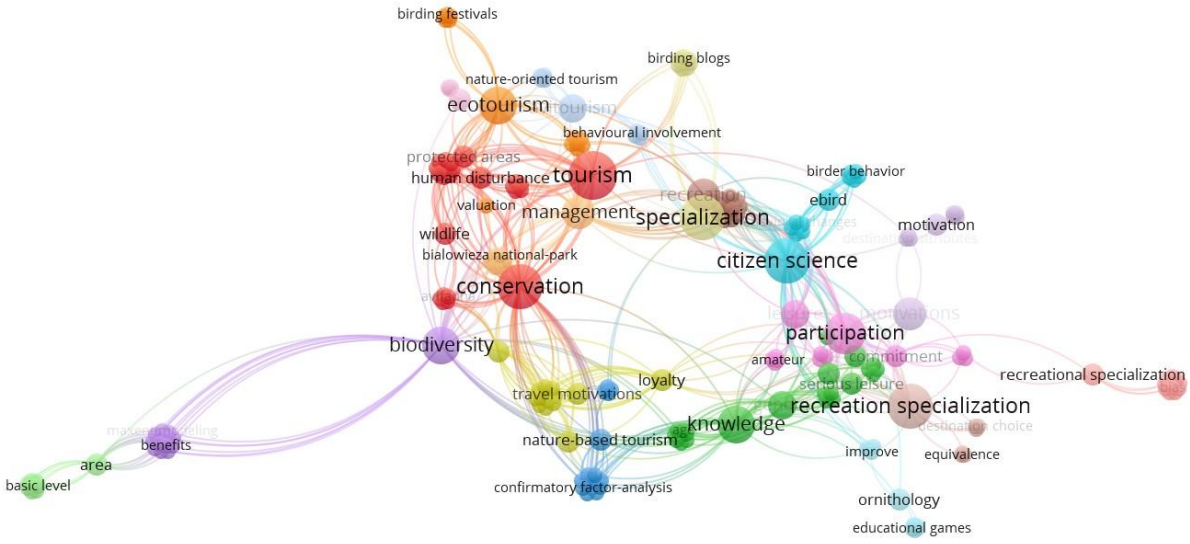

Figure 5. Co-occurrence Connected Network Maps by All Keywords

Additionally, the "Keyword Plus" option can also be useful as it counts the frequency of keywords appearing in the title, abstract, or author keywords of a document. This option provides more specific information that the "All keywords" option may not capture. Through this analysis, several trends in birdwatching research can be identified.

The most frequent keyword in birdwatching and birding research is "conservation," which appears in seven articles with 82 total link strengths. This indicates that conservation is a major research focus in the field. "Citizen science" is the second most frequent keyword with a total of 71 total link strengths, followed by "tourism" with 70 total link strengths. The frequent appearance of keywords such as "ecotourism",

"avian tourism" and "birdwatching tourism" also suggests that tourism and its impact on birds and their habitats is a popular research topic. Researchers also show involvement in societal and cultural aspects of birdwatching as indicated by the frequent occurrence of keywords such as "gender" and "community-based conservation". The use of technology and theoretical frameworks from other fields in birdwatching and birding research is also evident through the appearance of keywords like "actor-network theory" and "computer vision".

The COVID-19 pandemic has also had an impact on birdwatching research, as evidenced by its appearance as a keyword. Although some keywords appear only once, they still provide valuable insights into the research interests of some researchers. Additionally, the increasing importance of technology in birdwatching research is evident through the appearance of keywords like "digital photography" and "digital objects".

In general, the analysis suggests that conservation, tourism, and citizen science are the primary focuses of birdwatching research. Aside from biodiversity and social and cultural factors, technology is also of interest. Research in this field can benefit from these findings, which help guide future studies.

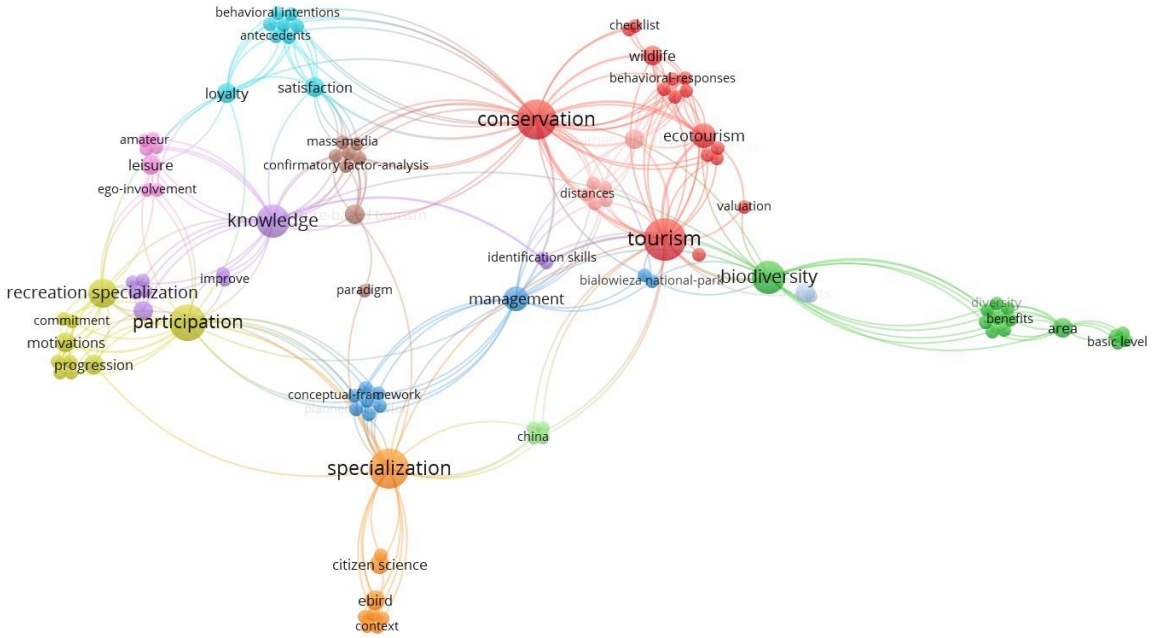

Figure 6. Co-occurrence Connected Network Maps by Keyword Plus

Figure 6 showcases the application of the "Keyword Plus" feature in VOSviewer, which produces supplementary keywords apart from the ones supplied by the authors. This enables a more in-depth understanding of research patterns in the realm of birdwatching. In this figure, the full count approach was employed, signifying that each keyword occurrence was considered, regardless of its placement in the article. The minimum occurrence for a keyword to be part of the analysis was set at 1, and all 118 keywords satisfied this criterion. The data extracted from VOSviewer supplied a list of keywords with corresponding occurrences and overall link strength. Link strength illustrates the degree of connection between two keywords, founded on their frequency of co-occurrence.

The analysis uncovered several significant trends in birdwatching research. For example, the term "citizen science" was recurrent, with 7 instances and a total link strength of 59. This link strength of 59 insinuates a robust relationship between "citizen science" and other keywords within the dataset, emphasizing its importance in the field. This indicates that citizen science is a crucial research area in this domain, potentially because of its capacity to facilitate public involvement in data gathering and conservation endeavors.

Another trend that surfaced was the emphasis on biodiversity and conservation in birdwatching research. A bibliometric analysis revealed that the term "biodiversity" appeared five times with an overall link strength of 42, while "conservation" surfaced seven times with a total link strength of 77. This suggests that birdwatching and birding are essential in fostering the preservation of bird species and their habitats. Furthermore, the analysis highlighted the relevance of avitourism, with the term "avitourism" emerging three times with a total link strength of 16. The study also underscored the role of gender in birdwatching and birding research, as the term "gender" emerged three times with a total link strength of 28. In general, this analysis provides valuable insights into prevailing research patterns and central topics within the sphere of birdwatching and birding. Researchers can employ this information to enhance their comprehension of the field and pinpoint areas for future exploration.

5. Discussion and Conclusion

This research performs a bibliometric analysis of the birdwatching field. This examination spans 32 years (1980–2023), which encompasses the entire period of publication on this topic and enables many publications that enable a comprehensive overview. This is a significant contribution of the paper, as there are no previous evaluations in this field of study. This research develops bibliometric analysis visualizations of birdwatching research using the Web of Science platform and VOSviewer software. The objective of the study is to understand the current state and trends of birdwatching research. The findings of the research questions reviewed indicate that the increasing interest in birdwatching is largely due to the growing awareness of biodiversity conservation and the role of birdwatching in promoting ecotourism (Steven et al., 2017). With more people taking up birdwatching as a recreational activity, there is a growing need for scientific research on this topic, as evidenced by the rising number of publications (Dallimer et al., 2012).

The study's co-authorship network analysis provides valuable insights into the collaborative landscape of birdwatching research. The visualization of this network reveals that birdwatching research is an international field with active collaboration among researchers from several countries, including Germany, the Czech Republic, Spain, Italy, Taiwan, Mexico, and Finland. The study indicates that these countries are highly interconnected and actively collaborate in this field. The University of Life Sciences is the most active collaborator in this field, followed by the Eberhard Karls University of Tübingen and the University of Lapland in terms of co-authorship counts. Researchers interested in locating potential collaborators or identifying leading organizations in this field may find this information useful.

Leading authors and journals in the field of birdwatching can be helpful to researchers seeking to collaborate, improve their research, or identify sources of information. Christoph Randler, Piotr Tryjanowski, Naomi Staller, and David Scott are among the prominent authors based on the number of documents published and citations. The analysis also identifies primary research focuses on birdwatching and birding, such as conservation, tourism, citizen science, technology, and social and cultural aspects. Co-occurrence analysis using VOSviewer visualization effectively determines frequently used keywords in birdwatching and birding research. The most commonly used keywords in birdwatching research are "conservation," "citizen science," and "tourism," indicating that conservation, tourism, and citizen science are the primary focuses of research in this field. The analysis also highlights the significance of avitourism, gender, and technology in birdwatching research, providing useful guidance for future research.

This study's co-authorship network analysis provides insights into the international collaboration landscape, top organizations, prominent authors, and leading journals in birdwatching research, which is useful for researchers and practitioners. The study identifies Germany, the Czech Republic, Spain, Italy, Taiwan, Mexico, and Finland as the most active countries in birdwatching research, with close collaboration among them. Key figures in the field include Randler, C., Tryjanowski, P., Staller, N., and Scott, D. Conservation, tourism, and citizen science are emerging as the primary research foci in birdwatching, with growing attention given to the importance of technology and social and cultural

aspects. To this all, our research contributes to the development of new methods and techniques for bibliometric analysis and gives a more comprehensive understanding of the dynamics and evolution of scientific knowledge.

The study provides funding agencies and academic institutions with applicable insights. Using the findings, funding agencies can identify underfunded or emerging areas of research and make informed decisions regarding funding priorities. Academic institutions can use the findings to evaluate the quality and impact of faculty members' research and to identify potential research partners and collaborators. In addition, the study can help business and industry stakeholders identify new opportunities for innovation and collaboration with academic institutions.

This paper makes valuable contributions to the field, but it is crucial to pay attention to limitations as well. Firstly, the study relies solely on a single database to retrieve information, which may not provide comprehensive coverage of the subject matter. Web of Science was used as a platform, but other academic platforms like Scopus can be used by future interested researchers, which offers a vast series of documents. Secondly, only the topic of the documents was considered by the study's search algorithm, which limited the search. However, other possibilities, if chosen, might result in documents not directly related to the birdwatching field. To maintain the focus of the study works that were not directly related to the field were chosen to be excluded. Furthermore, only published journal articles written in English were analyzed by the study, which may underestimate research conducted in other languages. Also, the bibliometric analysis provides the possibility to choose other techniques such as bibliometric coupling, and citations which weren't the focus of this study, but future interested scholars can use these techniques instead. Lastly, this study utilized the VOSviewer software to visualize bibliometric data maps to provide an understandable image of the field of study, but this kind of research can be done in other software such as BibExcel, Pajek, RStudio, and other related software.

In conclusion, this study provides valuable insights into the current state and trends of birdwatching research, emphasizing the growing interest in the field as a result of increased awareness of biodiversity conservation and ecotourism promotion. The analysis of the co-authorship network presents international collaboration patterns, top organizations, prominent authors, and leading journals, which can guide collaborations between researchers and practitioners. The analysis identifies primary research focuses in birdwatching and birding, including conservation, tourism, citizen science.

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References

Balmford, A., Beresford, J., Green, J., Naidoo, R., Walpole, M., & Manica, A. (2009). A global perspective on trends in nature-based tourism. *PLoS Biology*, *7*(6),1-6.

Balmford, A., Green, J. M., Anderson, M., Beresford, J., Huang, C., Naidoo, R., & Manica, A. (2015). Walk on the wild side: estimating the global magnitude of Visits to protected areas. *PLoS Biology*, *13*(2),1-6.

Ballantyne, R., Packer, J., & Sutherland, L. A. (2011). Visitors' memories of wildlife tourism: Implications for the design of powerful interpretive experiences. *Tourism Management*, *32*(4), 770-779.

Bodnariuk, M., & Melentiev, R. (2019). Bibliometric analysis of micro-nano manufacturing technologies. *Nanotechnology and Precision Engineering*, *2*(2), 61-70.

Brossard, D., Shanahan, J., & McComas, K. (2004). Are issue-cycles culturally constructed? A comparison of French and American coverage of global climate change. *Mass communication & society*, *7*(3), 359-377.

Bryan, H. (1977). Leisure value systems and recreational specialization: The case of trout fishermen. *Journal of leisure research*, *9*(3), 174-187.

Cavalcante, W. Q. D. F., Coelho, A., & Bairrada, C. M. (2021). Sustainability and tourism marketing: A bibliometric analysis of publications between 1997 and 2020 using VOSviewer software, *Sustainability*, *13*(9), 1-21.

Chen, W., Flatnes, J. E., Miteva, D. A., & Klaiber, H. A. (2022). The Impact of Deforestation on Nature-Based Recreation: Evidence from Citizen Science Data in Mexico. *Land Economics*, *98*(1), 22-40.

Cobo, M. J., López-Herrera, A. G., Herrera-Viedma, E., & Herrera, F. (2011). Science mapping software tools: Review, analysis, and cooperative study among tools. *Journal of the American Society for Information Science and Technology*, *62*(7), 1382-1402.

Cocker, M., & Tipling, D. (2016). Birds and people. London, UK: Random House.

Cordell, H. K. (2012). Outdoor recreation trends and futures: a technical document supporting the Forest Service 2010 RPA Assessment. *General Technical Report-Southern Research Station, USDA Forest Service*, (SRS-150), 150-167.

Cox, D. T., & Gaston, K. J. (2016). Urban bird feeding: Connecting people with nature. *PLoS ONE*, *11*(7), 1-13.

Czeszczewik, D., Ginter, A., Mikusiński, G., Pawłowska, A., Kałuża, H., Smithers, R. J., & Walankiewicz, W. (2019). Birdwatching, logging and the local economy in the Białowieża Forest, Poland. *Biodiversity and Conservation*, *28*(11), 2967-2975.

Dallimer, M., Irvine, K. N., Skinner, A. M., Davies, Z. G., Rouquette, J. R., Maltby, L. L., Warren, P., H., Armsworth, P., R., & Gaston, K. J. (2012). Biodiversity and the feel-good factor: Understanding associations between self-reported human well-being and species richness. *BioScience*, *62*(1), 47-55.

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*, 285-296.

Eriksson, L., Johansson, M., Månsson, J., Sandström, C., Eklund, A., & Elmberg, J. (2023). Are birdwatchers willing to participate in local goose management? A case study from Sweden. *European Journal of Wildlife Research*, *69*(2), 1-28.

Garrigos-Simon, F. J., Narangajavana-Kaosiri, Y., & Lengua-Lengua, I. (2018). Tourism and sustainability: A bibliometric and visualization analysis. *Sustainability*, *10*(6), 1-23.

Hvenegaard, G. T. (2017). Visitors' perceived impacts of interpretation on knowledge, attitudes, and behavioral intentions at Miquelon Lake Provincial Park, Alberta, Canada. *Tourism and Hospitality Research*, *17*(1), 79-90.

Janeczko, E., Łukowski, A., Bielinis, E., Woźnicka, M., Janeczko, K., & Korcz, N. (2021). Not just a hobby, but a lifestyle: Characteristics, preferences, and self-perception of individuals with different levels of involvement in birdwatching. *Plos one*, *16*(7), 1-9.

La Rouche, G. P. (2003). Birding in the United States: A demographic and economic analysis: Addendum to the 2001 National survey of fishing, hunting and wildlife-associated recreation (Vol. 4, No. 2). Division of Federal Aid, US Fish and Wildlife Service.

Lovelock, C. E. (2008). Soil respiration and belowground carbon allocation in mangrove forests. *Ecosystems*, *11*, 342-354.

Merigó, J. M., Cancino, C. A., Coronado, F., & Urbano, D. (2016). Academic research in innovation: a country analysis. *Scientometrics*, *108*, 559-593.

Randler, C. (2023). Progression through time: Development of birdwatcher careers based on propensity score matching. *Cogent Social Sciences*, *9*(1), 1-11.

Randler, C., Diaz-Morales, J. F., Jokimäki, J., Ortiz-Pulido, R., Staller, N., De Salvo, M., Tryjanowski, P., Tsai, J. S., de Almeida Barbosa, R., & Kaisanlahti-Jokimäki, M. L. (2022). Birding recreation specialization—A test of the factorial invariance in eight languages. *Journal of Leisure Research*, *54*(3), 330-336.

Randler, C., & Marx, N. (2022). Initial involvement into birding: triggers, gender, and decade effects—a mixed-methods study. *Humanities and Social Sciences Communications*, 9(1), 1-10.

Ratcliffe, E., Gatersleben, B., & Sowden, P. T. (2019). Bird sounds and their contributions to perceived attention restoration and stress recovery. *Journal of Environmental Psychology*, *65*, 221-228.

Sekercioglu, C. H. (2002). Impacts of birdwatching on human and avian communities. *Environmental Conservation*, *29*(3), 282-289.

Scott, D., Ditton, R. B., Stoll, J. R., & Eubanks Jr, T. L. (2005). Measuring specialization among birders: Utility of a self-classification measure. *Human Dimensions of Wildlife*, *10*(1), 53-74.

Skibins, J. C., Powell, R. B., & Hallo, J. C. (2013). Charisma and conservation: charismatic megafauna's influence on safari and zoo tourists' pro-conservation behaviors. *Biodiversity and Conservation*, *22*, 959-982.

Steven, R., Morrison, C., & Castley, J. G. (2017). Exploring attitudes and understanding of global conservation practice among birders and avitourists for enhanced conservation of birds. *Bird Conservation International*, *27*(2), 224-236.

Steven, R., Morrison, C., & Castley, J. G. (2015). Birdwatching and avitourism: a global review of research into its participant markets, distribution, and impacts, highlighting future research priorities to inform sustainable avitourism management. *Journal of Sustainable Tourism*, *23*(8-9), 1257-1276.

Steven, R., Pickering, C., & Castley, J. G. (2011). A review of the impacts of nature based recreation on birds. *Journal of environmental management*, *92*(10), 2287-2294.

Tahamtan, I., Safipour Afshar, A., & Ahamdzadeh, K., (2016). Factors affecting number of citations: a comprehensive review of the literature. *Scientometrics*, *107*, 1195-1225.

Tripathi, M., Kumar, S., & Babbar, P. (2018). Bibliometrics of social science and humanities research in India. *Current Science*, *114*(11), 2240-2247.

Tryjanowski, P., Murawiec, S., & Randler, C. (2023). No such thing as bad birding weather but depends on personal experience. *Leisure Sciences*, *45*(4), 1-14.

Van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, *84*(2), 523-538.

Zhao, D., & Strotmann, A. (2014). The knowledge base and research front of information science 2006–2010: An author cocitation and bibliographic coupling analysis. *Journal of the Association for Information Science and Technology*, *65*(5), 995-1006.

Zhang, Z., & Huang, G. (2020). How do urban parks provide bird habitats and birdwatching services? Evidence from Beijing, China. *Remote Sensing*, *12*(19), 1-15.