

# A Bibliometric Analysis of Environmental Financing

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**Abstract.** *The main purpose of this paper is to analyse the interest in the field of environmental finance. The research methodology consists of a bibliometric analysis based on a quantitative research method in the form of an inventory of publication activity in the field chosen for study. The analysis consisted in querying the existing database in the Web of Sciences platform, where we find documentation such as journals, scientific papers, books and others. The query resulted in the display of 1038 scientific documents in the database. The results obtained from the analysis of the data collected from the Web of Sciences with the help of the VOSviewer software show the most cited articles, journals and authors and the existence of strong links between the main instruments adopted by different countries in the field of environmental funding.*

**Keywords:** financing, environmental protection, bibliometric analysis, VOSviewer

**JEL classification:** Q56, Q58, G23

## 1. Introduction

Environmental financing is a topic of particular interest in the context of global concerns about climate change, biodiversity loss and sustainable development. In a world where natural resources are increasingly scarce and pressures on the environment are steadily growing, the EU has taken a proactive approach to promoting environmental protection and supporting eco-innovation through its policies and initiatives.

The European Union has set an ambitious target of becoming climate neutral by 2050. The measures needed to achieve this ambitious target are difficult to implement, as the situation differs from country to country, with laws and circumstances specific to each Member State (Tutak, 2020).

The European Commission has set out an action plan for financing sustainable development, comprising three main strands the taxonomy of environmentally sustainable economic activities, the regulatory framework on disclosure rules for sustainable investments and the establishment of low-carbon benchmarks (European Commission, 2018a, 2019).

Environmental financing in the European Union (EU) is a key component of European environmental and sustainable development policy. This is reflected in the many European directives and regulations that promote environmental protection and the sustainable use of natural resources.

The European funds for environment and regional development have played a crucial role in transforming EU regions and economic sectors towards sustainable development. This funding has enabled innovative projects to preserve biodiversity, improve air and water quality and promote renewable energy. Green funding has thus been seen as a tool for action to mitigate climate change, as opposed to sustainable funding which targets projects that address environmental, social and governance issues at the same time. (Azhgaliyeva & Liddle, 2020; Claringbould et al., 2019). A

wide range of instruments addressing environmental finance have been identified such as: green bonds and loans, sustainable bonds, sustainability bonds and loans, and blue and social loans (*Spinaci, 2020*).

The main purpose of this paper is to document the interest in the research area of environmental finance, so I set out to conduct a bibliometric analysis of this field. The research methodology consists of conducting a bibliometric analysis, a quantitative research method, in the form of an inventory of publication activity in the aforementioned field. The main purpose of bibliometrics is to statistically analyse written publications (books, articles). It is primarily quantitative in nature and is most commonly applied at a higher level to scientific and academic literature and is used in scientific research in both exact and applied fields (such as engineering or computer science, mathematics, chemistry, physics, environmental and information sciences) and in the humanities and social sciences.

Financing environmental protection is of crucial importance for many aspects of society and ecosystems. It can support efforts to preserve natural resources, reduce environmental impacts and promote sustainable development. Investments in clean technologies, renewable energy and adaptation measures can make a significant contribution to reducing greenhouse gas emissions and limiting the impact of climate change. Adequate funding also enables the implementation and maintenance of national parks, nature reserves and other protected areas, thus contributing to the conservation of biodiversity and natural habitats.

In the following sections, we explore the evolution of research in environmental finance, identifying the most significant trends and contributions of researchers and institutions. Through this analysis, we aim to highlight the growing importance of environmental finance in the context of environmental policy and identify research gaps to guide future research and policy efforts in this vital area for the future of our planet.

Our bibliometric analysis will focus on four main directions and aims to answer the following questions: In which journals are papers on environmental finance published? Which countries are the authors from (countries of origin)? What are the keywords of these studies? How are these papers cited in the literature?

Thus, our analysis aims to illuminate the most frequently referenced articles, journals, and authors within the domain of environmental finance. Furthermore, by conducting co-citation analyses of authors and journals, we aim to delineate sub-fields and clusters of interconnected research within the environmental finance literature. Additionally, we will scrutinize the evolution of commonly cited keywords over time, shedding light on the changing landscape of interest in environmental conservation.

Beyond the bibliometric examination, we will concisely summarize and amalgamate the content of highly cited articles to furnish researchers with a comprehensive overview of the field and its principal themes.

What sets bibliometric analysis apart is its capacity to discern contributions from diverse fields and journals. This is made possible by the inclusive nature of article selection criteria, which transcends the narrow objectives of individual articles and avoids being constrained by the domain-specific expertise and subjective preferences of the analysts.

Within the realm of environmental finance, a truly multidisciplinary domain encompassing finance, economics, and environmental science, our bibliometric analysis is poised to identify the most influential literature. By doing so, it serves as an invaluable resource for those vested in the field, bringing attention to noteworthy contributions from various disciplines that might otherwise remain overlooked.

## 2. Methodology and data

In this paper, a bibliometric analysis was carried out using VOSviewer software to meet the analysis needs of different entities such as countries, institutions, journals and authors. This tool was useful in highlighting the evolution of the influence of environmental funding. Keyword analysis was used to assess research trends and topics of interest. This method, called Co-word Analysis, is one of the most important analysis techniques in the fields of bibliometrics and scientometrics. It involves identifying two keywords present in the same paper, generating clusters and examining the density relationship between common keywords, to explore popular research topics and trends of evolution, among other relevant aspects.

Bibliometric maps are products of innovations in scientometrics, facilitating analysis and understanding of the relationships and interconnections between various elements of scientific research, such as articles, authors, key terms or research areas.

The data used in this analysis were extracted from the Web of Science database. Given two concepts in the Web of Science thematic area, namely finance and environmental protection, we searched for articles, papers and book chapters. The Web of Science database provided 1038 academic papers related to these topics. The data, including records and references, were collected via a .txt file which was then uploaded into the VOSviewer software for analysis.

The procedure used to identify papers for bibliometric analysis consists of the following steps:

1. Searching the Web of Science-Clarivate for the main topic "environmental financing": The first phase involves performing a detailed search within the Web of Science-Clarivate platform focused on the main topic.

2. Extraction of the results found: After identifying the relevant results, they were extracted in order to obtain an appropriate list of academic papers.

3. Entering data into VOSviewer: The extracted information, including records and associated references, was collected in a .txt file. This file was subsequently loaded into the VOSviewer software, thus providing the data required for bibliometric analysis.

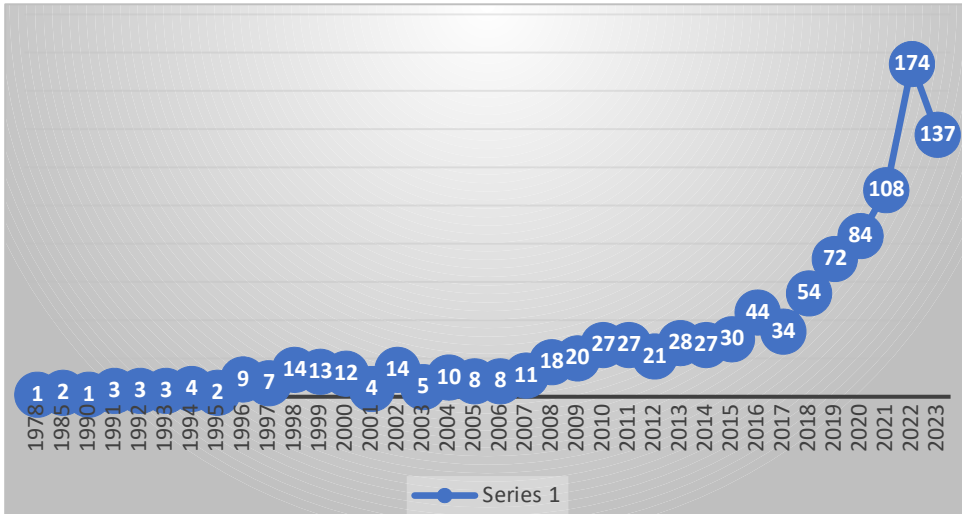
4. Data analysis according to several criteria: After loading the data into the VOSviewer, the analysis was performed taking into account several relevant criteria. These criteria may include, but are not limited to, frequency of occurrence, connections between various papers, and others.

By applying these steps, a detailed bibliometric analysis of the papers related to the theme "environmental financing" was carried out, based on information obtained from Web of Science-Clarivate.

## 3. Results and discussions

### 3.1. Volume and geographical distribution of published studies

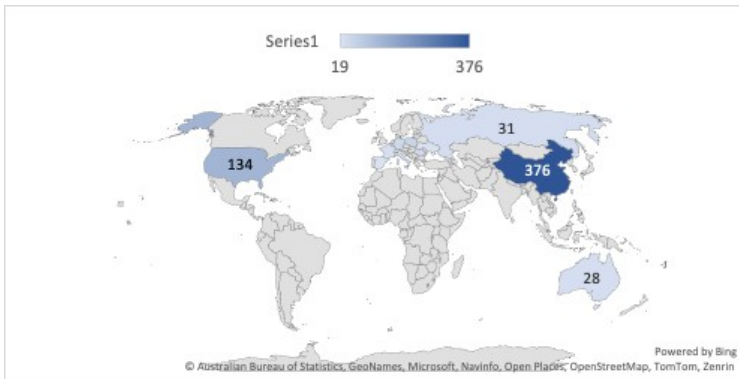
Figure 1 depicts the yearly count of publications on environmental finance spanning from 2006 to 2023, totaling 1038 articles, with 2023 representing publications until September in our database. A notable exponential surge in the volume of environmental finance articles is evident, particularly since 2015. Specifically, between 2015 and 2021, the annual number of articles on environmental finance indexed in the Web of Science database increased more than fivefold, escalating from 30 to 174 per year.



**Figure 1. The number of financing of environmental protection publications over time, 2006-2023**

*Source: Own calculation from Web of Science*

As depicted in Figure 2, the body of literature on environmental finance exhibits a genuinely global reach, with contributions originating from countries across all continents, encompassing 95 nations. Leading the list, China emerges as the foremost producer of publications on environmental finance, with 376 contributions, trailed by the United States (134), Poland (55), and the United Kingdom (55). Notably, Romanian researchers also demonstrate significant interest in environmental finance, with 41 publications attributed to them.



**Figure 2. Global distribution of Web of Science-indexed journal articles on financing of environmental protection by affiliation of the authors, 2005-2023.**

*Source: Own calculation from Web of Science*

### 3.2. Journals in which articles were published

The table reveals that environmental finance is indeed a multidisciplinary subject, as evidenced by articles appearing in journals specializing in environmental science (such as *Frontiers in Environmental Science* and *Environmental Science and Pollution Research*), energy (including *Energy Policy* and *Energy Economics*), and economics (such as *Energy Economics*). Additionally, publications are found in broad multidisciplinary journals like *Sustainability* and the *Journal of Cleaner Production*. Interestingly, among the top 10 journals by article count, only two are economic journals, with many prominent finance and economics journals with high academic impact notably absent.

**Table 1. Top 10 journals publishing articles on environmental finance by volume of articles**

Magazine	Editor	Theme	No. of items
<b>Sustainability</b>	MDPI	Multi-disciplinary.	59
<b>About. Science and Pollution Research</b>	SPRINGER	About. Sci.	46
<b>Frontier in Environmental</b>	FRONTIERS MEDIA NV	About. Sci.	51
<b>Journal of Cleaner Production</b>	ELSEVIER	Multi-disciplinary.	16
<b>International Journal of Environmental Research and Public Health</b>	MDPI	About. Sci.	16
<b>Plos One</b>	PUBLIC LIBRARY SCIENCE	Multi-disciplinary.	12
<b>Energy Economics</b>	ELSEVIER	Energy & Econ.	10
<b>Advances in Social Science Education and Humanities Research</b>	ATLANTIS PRESS	Multi-disciplinary.	9
<b>Journal of Environmental Management</b>	ELSEVIER	About. Sci.	9
<b>Energy Policy</b>	ELSEVIER	Economics; Environ. Sci.	8

*Source: Own calculation from Web of Science*

Table 2 presents a ranking of journals based on the total number of citations received from the Web of Science, encompassing only citations to articles within this environmental finance database. The leading journals in climate finance literature underscore the interconnectedness of climate change (environmental science), energy policy, finance, economics, sustainability, and management. The journal receiving the highest number of citations is *Energy Policy* (731), with its top-cited articles concentrating on renewable energy investment and financing. Following closely is the *Journal of Cleaner Production* (686), emphasizing the significance of financing the shift to renewable energy sources within this literature. *Environ. Science and Pollution Research*, an environmental science journal, occupies the third spot (558), highlighting the interdisciplinary nature of the knowledge domain. Ranked fourth and fifth are two

interdisciplinary journals, Energy Economics (485) and Sustainability (558) respectively. Additionally, examining both tables 1 and 2 reveals that among the top 10 journals publishing articles on environmental finance, there is an absence of leading journals from the Finance field. Instead, only two journals from the economics domain, Energy Policy and Energy Economics, are represented. This observation suggests a limited interest among finance journals in featuring articles on environmental finance. Concurrently, it supports the notion that environmental finance is a multidisciplinary field, with articles predominantly appearing in journals focusing on energy policy, environmental science, climate change, economics, and cross-disciplinary publications such as the Journal of Cleaner Production and Sustainability.

**Table 2. Top 10 journals publishing articles on environmental finance by citations in Web of Science**

<b>Magazine</b>	<b>Editor</b>	<b>Theme</b>	<b>No. of quotations</b>
<b>Energy Policy</b>	ELSEVIER	Economics; Environ. Sci.	731
<b>Journal of Cleaner Production</b>	ELSEVIER	Multi-disciplinary.	686
<b>About. Science and Pollution Research</b>	SPRINGER	About. Sci.	644
<b>Sustainability</b>	MDPI	Multi-disciplinary.	558
<b>Energy Economics</b>	ELSEVIER	Energy & Econ.	485
<b>Journal of Environmental Management</b>	ELSEVIER	About. Sci.	308
<b>International Journal of Environmental Research and Public Health</b>	MDPI	About. Sci.	158
<b>Frontier in Environmental</b>	FRONTIERS MEDIA NV	About. Sci.	110
<b>Plos One</b>	PUBLIC LIBRARY SCIENCE	Multi-disciplinary.	42
<b>Advances in Social Science Education and Humanities Research</b>	ATLANTIS PRESS	Multi-disciplinary.	1

*Source: Own calculation from Web of Science*

One explanation for the lack of interest of Finance journals in publishing such articles may be that they prefer to publish articles based on selected theoretical models and empirical testing of these models, and less on articles that address practical problems that require an interdisciplinary approach.

We will continue our analysis with the most influential articles and authors in the environmental finance literature. Thus, if we analyse the Web of Science database the most cited article is that of the authors Engel et al (2008) who conducted a review of the main issues that have arisen in the process of establishing and implementing payments for environmental services. This analysed the size and design features of environmental payments programmes and compared them with alternative policy

instruments, highlighting the effectiveness and distributional implications of environmental payments.

Another article covering the situation in Germany *Frondel et al (2010)*, focuses on the effects of the Renewable Energy Sources Act (EEG), analysing the costs and associated implications for job creation and climate protection. Thus, the authors conclude that German renewable energy policy has failed to exploit the market incentives needed to ensure the cost-effective penetration of renewables into the country's energy portfolio. They pointed out that the support mechanisms provided by the government undermined these incentives in many respects.

At the forefront of the most cited articles are three studies examining the influence of green finance on environmental factors, productivity, and financing costs in China. Lee and Lee (2022) conducted empirical research to investigate the relationship between green finance development and overall green factor productivity. Utilizing panel data from 30 Chinese provinces spanning from 2006 to 2018, their findings reveal a significant enhancement in green productivity levels due to green finance development, with the implementation of green finance policies leading to even greater impacts.

Zhou et al. (2020) explored the nexus between green finance, economic growth, and environmental quality across 30 provinces and municipalities in China from 2010 to 2017. Their study models the influence of green finance on economic development, indicating a positive role in promoting economic growth while also contributing to environmental amelioration. Leveraging the Kuznets curve theory, they assessed the impact of green finance on the relationship between economic development and environmental quality, observing an enhancement in the correlation between the two.

Xu et al. (2020) delved into the effects of green credit on debt financing costs and maturity among different types of enterprises in China. Their analysis, encompassing 52 green enterprises and 81 polluting enterprises, revealed that green credit leads to increased debt costs for polluting enterprises but decreased costs for green enterprises.

In their study, Wang and Zhi (2016) examined the role of policies in green finance and the influence of green bonds on environmental conservation. They scrutinized the current state of green finance within the renewable energy sector, pinpointing various deficiencies while proposing solutions to ensure environmental equilibrium. These solutions include leveraging derivatives and fostering the development of climate derivatives markets and other secondary markets intricately linked with environmental preservation.

**Table 3. The 10 most influential articles on environmental finance ranked by Web of science citations**

Article	Journal	Type	No. of quotations
<b>Engel, S., Pagiola, S., &amp; Wunder, S. (2008) Designing payments for environmental services in theory and practice: An overview of the issues.</b>	Ecological economics	Empirical/ Review	1351
<b>Claessens, Stijn, and B. Burcin Yurtoglu. "Corporate governance in emerging markets: A survey."</b>	Emerging markets review	Survey	469
<b>Pattanayak, S.K., Wunder, S., Ferraro, P.J. Show Me the</b>	Review of Environmenta	Review	421

<b>Money: Do Payments Supply Environmental Services in Developing Countries?</b>	I Economics and Policy		
<b>Frondel, M., Ritter, N., Schmidt, C. M., &amp; Vance, C. (2010). Economic impacts from the promotion of renewable energy technologies: The German experience.</b>	Energy Policy	Empirical	356
<b>Lee, C.C., Lee, C.C. (2022) How does green finance affect green total factor productivity? Evidence from China,</b>	Energy Economics	Empirical	339
<b>Goulder, L.H. Parry, I.W.H, Williams III, R.C., Burtraw, D. The cost-effectiveness of alternative instruments for environmental protection in a second-best setting,</b>	Journal of Public Economics	Empirical	292
<b>Stafford-Smith, M., Griggs, D., Gaffney, O., Ullah, F., Reyers, B., Kanie, N., ... &amp; O'Connell, D. (2017) Integration: the key to implementing the Sustainable Development Goals.</b>	Sustainability science	Analytical	267
<b>Zhou, X., Tang, X. &amp; Zhang, R. (2020) Impact of green finance on economic development and environmental quality: a study based on provincial panel data from China.</b>	Environ Sci Pollut Res	Empirical	224
<b>Wang, Y., Zhi, Q., (2016) The Role of Green Finance in Environmental Protection: Two Aspects of Market Mechanism and Policies,</b>	Energy Procedia	Proceeding	223
<b>Xu, X., &amp; Li, J. (2020). Asymmetric impacts of the policy and development of green credit on the debt financing cost and maturity of different types of enterprises in China.</b>	Journal of Cleaner Production	Empirical	178

*Source: Own calculation from Web of Science*

Table 4 shows the 10 most influential articles according to co-citation analysis. To visualize the associations between authors, a co-citation map was created based on the frequencies of co-citation between the most cited and most co-cited authors over the entire observation period. A co-citation occurs when two articles in the environmental funding database jointly cite the same paper. The co-citation analysis has the advantage that it extends to the combined citation lists of articles, thus going



beyond the limits of our Environmental Protection Funding Database and Web of Science citation database.

**Table 4. The 10 most co-cited articles by documents in the Environmental Finance Database**

Article	Journal	Type	No. of co-citations
<b>Zhang, DY, 2019, A bibliometric analysis on green finance: Current status, development and future directions.</b>	Finance Research Letters	Bibliometric	20
<b>Porter, ME, Van der Linde, C. 1995, Toward a New Conception of the Environment-Competitiveness Relationship</b>	Journal of Economic Perspectives	Analytical	46
<b>Wang, Y; Zhi, Q. 2016, The Role of Green Finance in Environmental Protection: Two Aspects of Market Mechanism and policies.</b>	Energy Procedia	Proceeding	28
<b>Lee, C.C., Lee, C.C. How does green finance affect green total factor productivity? Evidence from China,</b>	Energy Economics	Empirical	24
<b>Liu, Xh, Wang, E., Cai, D. green credit policy, property rights and debt financing: Quasi-natural experimental evidence from China</b>	Finance Research Letters	Empirical	21
<b>Yu, CH., Wu, X., Zhang, D., Chen, S., Zhao, J. Demand for green finance: Resolving financing constraints on green innovation in China</b>	Energy Policy	Empirical	31
<b>Xu, X., Li, J. 2020, Asymmetric impacts of the policy and development of green credit on the debt financing cost and maturity of different types of enterprises in China</b>	Journal of Cleaner Production	Empirical	25
<b>Hu, G., Wang, X., Wang, Y. 2021, Can the green credit policy stimulate green innovation in heavily polluting enterprises? Evidence from a quasi-natural experiment in China</b>	Energy economics	Empirical	21
<b>Handlock, C.J., Pierce, J.R. 2010. New evidence on Measuring financial Constraints: Moving beyond the KZ Index</b>	The Review of Financial Studies	Empirical	28

*Source: Own calculation from Web of Science*

### 3.2. Co-appearance network of keywords of publications related to environmental finance

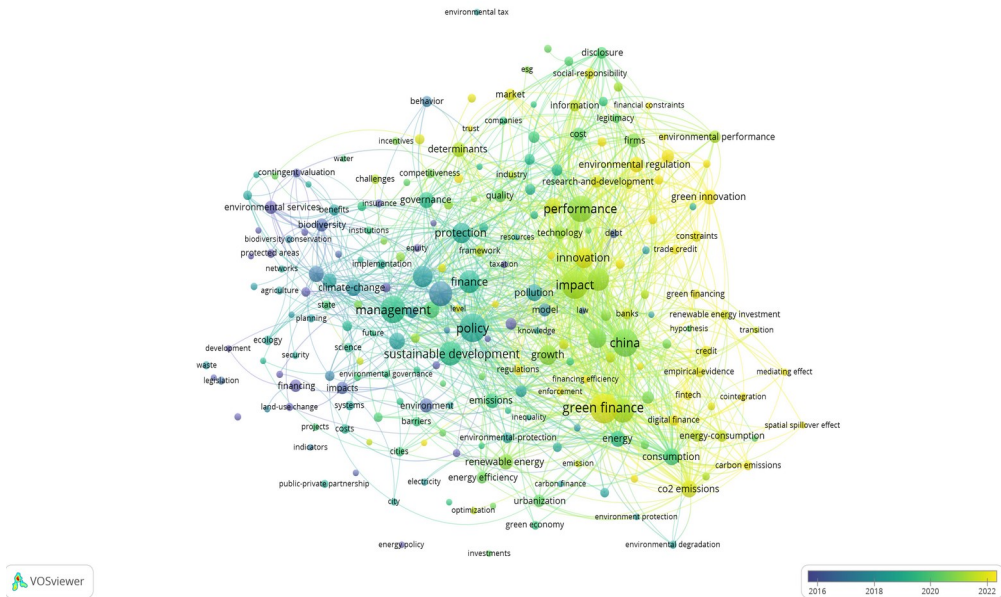
Keyword analysis focuses on highlighting the most persistent keywords versus their co-occurrence. Thus, it is important to note that only keywords mentioned by the author in the abstract are considered. This analysis carried out conveys important information that can be used to clarify the issues that are considered essential for environmental financing. It can be noticed from table 1 that environmental financing is linked to green financing, environmental protection and sustainable development. China is the key player in the fight for environmental protection, which is why it appears, surprisingly, as an important research target, ranking 4th in the keyword ranking. Environmental regulation, although not in the top 10 keywords, is nevertheless visible in Table 5. Green innovation, green credits and sustainable finance are also in the same position, which clearly highlights the importance that this *Green field* is playing in recent times.

**Table 5. Top 10 keywords**

<b>Keywords</b>	<b>Frequency</b>
<b>Green finance</b>	91
<b>Environmental protection</b>	63
<b>Sustainable development</b>	61
<b>China</b>	78
<b>Climate change</b>	28
<b>Sustainability</b>	45
<b>Finance</b>	53
<b>Economic growth</b>	58
<b>CO<sub>2</sub> emissions</b>	30
<b>Pollution</b>	28
<b>Renewable energy</b>	24

*Source: Own calculation via VOSViewer*

This analysis counts the number of documents in which two keywords are presented together (highlighted in each document by the authors). After analysing the 1028 papers identified in the database, the VOSViewer software highlighted 4151 words. To perform the analysis, the minimum number of occurrences of a keyword within the documents was chosen to be 5, and in this case the software highlighted 227 words that meet this condition. Figure 4 shows the most important keywords and nodes between keywords, respectively: the larger the keyword and node, the higher the weights; the smaller the distance between nodes, the stronger the relationship between them. Also, co-occurrence is more frequent when we have thicker lines. A series of related keywords or a group of keywords is indicated with the same colour. Thus, the programme identifies six clusters. The figure below represents the keywords with the most frequent co-occurrences.



**Figure 3. Keyword analysis**

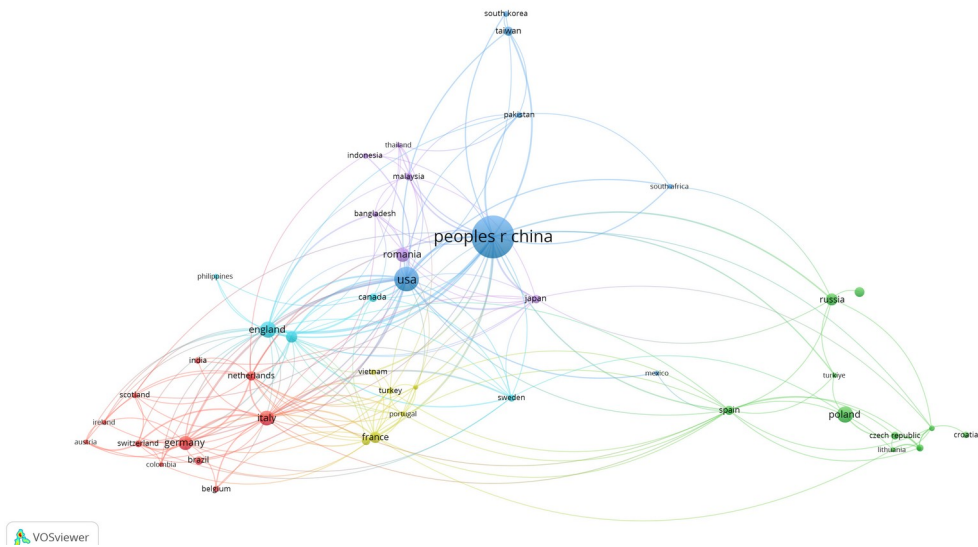
Source: own calculation via VOSviewer

If we look at the evolution of the use of keywords over time, we see a shift from "Conservation", "biodiversity", "financing" in 2016 to "green finance", "green innovation", "environmental regulation", "environmental performance" in 2022. This evolution of keywords confirms that studies on green finance related to climate change are still relatively new in this literature.

The first cluster, with the highest number of words, contains 17 items, and is led by the word "climate change" with 28 occurrences, followed by "finance" with 18 occurrences and "environmental regulation" with 24 occurrences. So environmental regulation and climate change together with the possibilities of financing as well as the well-defined links with the other clusters contribute immensely to the financing of environmental protection.

### 3.1. Co-authorship network analysis by country

The analysis of the co-authorship network by country highlights the relationships between researchers and the network they build. In this analysis, the dots represent countries and the line width and distance highlight the degree of collaboration between researchers. In this stage of the analysis, we will consider a minimum of five documents and three citations per country. Under these conditions the software identified 94 countries, but only 46 countries meet the conditions mentioned above, and are brought together by the relationship between 6 clusters.



**Figure 4. Co-authorship network by country**

*Source: own calculation via VOSviewer*

The highest linking power in the co-authorship network is given by China, for which the software identified 378 documents, and about 5321 citations, and is followed by the USA with only 127 documents and 4934 citations and England with 53 documents and 1179 citations. Of these countries China and the USA are in the same cluster, having quite strong collaborations as can be seen from the relatively small distance and thickness of the linking lines.

As far as Romania is concerned, it has contributed to the approach to the topic through the 16 articles identified in the Web of Sciences database and 60 citations, highlighted by direct links with countries such as China, Australia and Portugal.

In order to understand the interest in environmental financing of the most important countries we have taken the results generated by VOSviewer with the information from each country in the table below, as follows:

**Table 6. Co-authorship network analysis by country**

<b>Crt. no.</b>	<b>Country</b>	<b>Documents</b>	<b>Citations</b>
1.	Peoples R China	378	5321
2.	USA	127	4934
3.	England	53	1179
4.	Italy	44	618
5.	Germany	40	1164
6.	Netherlands	18	745
7.	Australia	27	622
8.	France	26	396
9.	Japan	15	492
10.	Spain	18	243
11.	Switzerland	12	1522
12.	Sweden	11	439
13.	Canada	16	600
14.	Malaysia	13	401

15.	Portugal	6	61
16.	Turkey	9	158
17.	Bangladesh	7	242
18.	Greece	16	188
19.	Lebanon	5	79
20.	Pakistan	8	137

*Source: own calculation via VOSviewer*

Also worth mentioning are countries whose number of articles is quite small, but whose citation is relatively high compared to other more developed countries from the perspective of our topic under analysis, such as Portugal and Turkey or Pakistan and Bangladesh.

### 3.2. Author's co-citation analysis on environmental financing

The most frequently cited author, with 292 citations to 8 articles, is Wang Yao of the Central University of Finance & Economics in Beijing. His most cited article co-authored with Zhi (Wang and Zhi, 2016) considers green finance to be a new financial model that emphasizes both environmental protection and the need for economic returns.

**Table 7. Author's co-citation analysis on environmental financing**

Author	Institution	Country	No of works	No. of Web of Science citations
Wang Y	Central University of Finance & Economics BEIJING	PEOPLES R CHINA	8	292
Liu L	Southeast University School of Economics and Management, NANJING	PEOPLES R CHINA	5	55
Tang DC	Nanjing University of Information Science & Technology	PEOPLES R CHINA	5	12
Howell JP	Rowan University Rohrer College of Business GLASSBORO	USA	4	16
Li Y	Southwest University, CHONGQING	PEOPLES R CHINA	4	43
Liu Y	Qingdao University	PEOPLES R CHINA	4	115
Xu L	Hunan University	PEOPLES R CHINA	4	13
Yang L	Guangxi University of Finance & Economics	PEOPLES R CHINA	4	62
Zhang R	Xian Jiaotong Liver Pool Univ, SUZHOU	PEOPLES R CHINA	4	399
Zhang XL	Hunan Agricultural University	PEOPLES R CHINA	4	34

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Source: Web of Science

#### 4. Conclusions

This study presents an analysis of environmental protection funding from a bibliometric perspective, in order to observe whether this topic is important to researchers, thus we reached the following conclusions from the study.

The literature on environmental finance exhibits a truly global presence, with contributions stemming from countries across all continents, encompassing a total of 95 nations. Notably, China emerges as the leading producer of publications on environmental finance, boasting 376 contributions, followed by the United States with 134, Poland and the United Kingdom each with 55. Additionally, the engagement of Romanian researchers is evident, with 41 publications reflecting their interest in environmental finance. In a subsequent analysis, the co-citation examination of scholarly articles within the realm of environmental funding revealed the prominence of six key nodes. Among these, China and the United States notably stand out as the countries with the highest volume of publications. We also observed an exponential increase in the volume of environmental finance articles, especially since 2015.

Keyword-based analysis highlighted the most frequent keywords by identifying their co-occurrences. Many keywords relevant to the topic were also identified. The software used highlighted keywords of major importance such as green finance, environmental protection and sustainable development. The analysis reveals that looking at the evolution of keyword usage over time we see a shift from "Conservation", "biodiversity", "financing" in 2016 to "green finance", "green innovation", "environmental regulation", "environmental performance" in 2022. This evolution of keywords confirms that studies on green finance related to climate change are still relatively new in this literature.

The most frequently cited author is Wang Yao of the Central University of Finance & Economics in Beijing. His most cited article co-authored with Zhi (Wang and Zhi, 2016) in which several inadequacies are highlighted, and a number of solutions are proposed to ensure ecological balance. Such solutions are aimed at the use of financial derivatives and the development of the climate derivatives market and other secondary markets in close connection with environmental protection. The analyses in this article also highlight changing trends in the topics of interest to researchers in the field of environmental finance.

As for the limitations of this study, it's important to note that due to the ongoing updates to the database, the findings presented here—such as the count of published papers and citation rates—are subject to change over time. Consequently, they may not always reflect the most current outcomes.

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