

A Bibliometric Review of the Dam Construction Impact

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Kata kunci:

Bibliometric review;
Dam; Construction;
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Abstract

Dams are crucial constructions for managing water supplies. However, the detrimental environmental effects of dam development have also drawn criticism. The influence of dam construction over the past fourteen years and new research trends are included in this study. This study aims to determine how many papers have been produced, how productive researchers are, and chart the evolution of dam impact publications. The analysis showed that 1312 publications related to the topic discussed were generated. The findings demonstrated that engineering and environmental studies were the main focus of research trends concerning the effects of dam development. This study provides an overview of the trends in the direction of existing literature for future research, and evaluation of research topics through existing topic clusters. China, the USA and the United Kingdom are the three leading countries in dam construction impact research in terms of publications.

INTRODUCTION

For the management and use of water resources, dams are crucial and valuable tools. Dams serve a number of purposes, including flood control, irrigation, hydropower production, and raw water supply (Song et al., 2018). Human population growth and economic development lead to an ever-increasing demand for water (Hong et al., 2016), thus increasing global dam construction (Zarfl et al., 2015). Dams change the amount, time, and frequency of flow, significantly impacting rivers' hydrological regime (Magilligan & Nislow, 2001, 2005, Graf, 1999, 2001). The detrimental effects of dam development on aquatic ecosystems and river environments are criticized by scientists (Nilsson et al., 2005, Bunn & Arthington, 2002, Baxter, 1977). In research (Poff & Hart, 2002) states that dams damage river ecosystems, energy input from the river from upstream is reduced (Vannote et al., 1980), and the wild animals' migrations are disrupted (Dugan et al., 2010). Mining activities in the upstream area have significantly impacted the surrounding environment, causing significant soil erosion (Ștefănescu et al., 2011). According to (KUOK et al., 2017) the sedimentation process commences with erosion, in which hydraulic forces remove particles from rocks, sediments, and geological materials. Natural erosion is relatively slower than erosion caused by human activities, which tends to occur faster.

A variety of evaluations have been conducted to provide a comprehensive overview of the effects of dam construction, including the influence of wind conditions on the construction of concrete dams (Chen et al., 2021), the impact of high-temperature outdoor working environments on the productivity of construction labor (Li et al., 2016). This research adopts an approach to categorize and review digital technology-based research on the impacts of dam development, which aims to assist researchers in determining future research directions. The impact of dam construction is discussed in this study over a time span of the last fourteen years. The primary objective of this paper is to conduct a comprehensive review of the literature regarding the effects of dam construction. This study aimed to ascertain the following: (a) the evolution of the number of international publications on the impact of dam development in Scopus from 2010 to 2023; (b) the productivity of researchers; (c) the number of publications based on institutional cooperation in publications on the impact of

dam development; and (d) the mapping of the development of dam development impact publications based on keywords and authors.

LITERATURE REVIEW

(a) Analysis Bibliometric, through quantitative analysis, the concept of bibliometric review and analysis contends that research is introduced to patterns and limitations (Pritchard, 1969), which has the potential to offer a unique perspective on the research process in a specific field. The physical aspects of scientific research and domains are visualized and their disciplinary structure is described through science mapping tools in bibliometric analysis (Akram et al., 2019; Van Eck & Waltman, 2010). To function scientifically, studies require information from the results. Scientific recommendations for publication are present in the classical input-output model to elucidate the research process and serve as output knowledge (Glanzel, 2003). A scientific field's physical aspects and structure are visualized and described using science mapping in bibliometric analysis. Figure 1 illustrates the research flow of bibliometric analysis in this investigation.

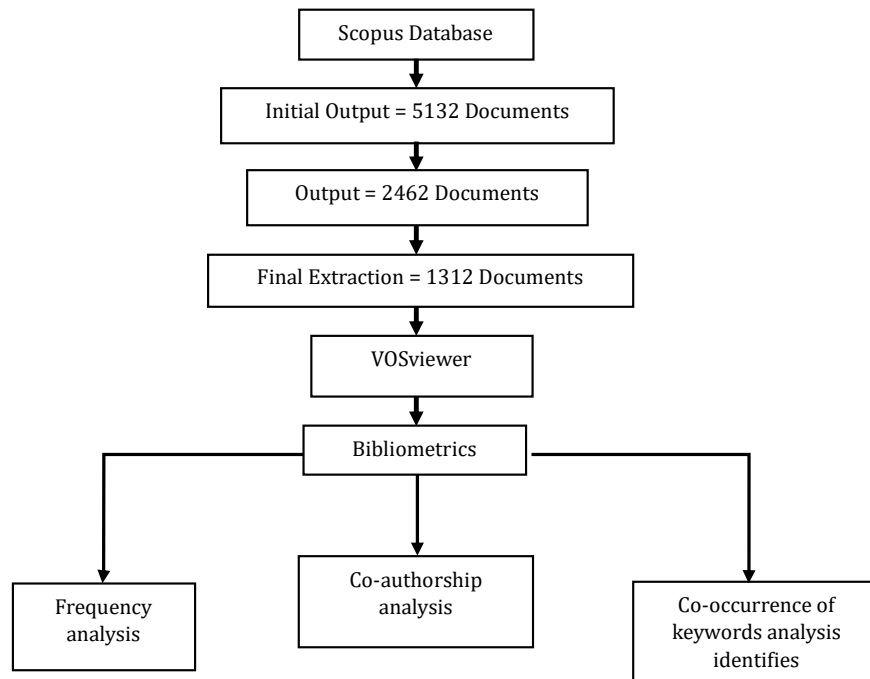


Figure 1. Research design summary

The primary sources of information for the documents utilized in this study were Scopus and Google Scholar. 'dam', 'construction', and 'impacts' were the search criteria employed to identify titles, abstracts, and keywords. EndNote X7 was utilized to import all comprehensive results for additional analysis. EndNote X7 is the industry-standard software utility for the efficient management and publication of bibliographies, citations, and references on Windows computers (Brouwer et al., 2014). Document information, publication year, author name, journal title, article title, abstract, keywords, document type, and country are retained for the purpose of more in-depth analysis. The bibliometric techniques adopted are as follows:

- i. Frequency analysis to analyse and investigate publications by publication type and source, country/region distribution, and number of publications annually.
- ii. A co-occurrence and collaborative network of authors in the indexed corpus of documents are included in the co-authorship analysis.

- iii. The co-occurrence of keywords analysis identifies the occurrence of correlated keywords or terms in digital technologies for the construction health and safety literature, analyses the concentration by global research over periods, and monitors the evolution of trends.

Scopus is the most comprehensive global literature review, containing citations that provide abstracts from a variety of peer-reviewed scientific and research literature (Tupan et al., 2018). Scopus effectively assists researchers in monitoring, evaluating, and visualizing a study. The Scopus database was chosen as a data source due to its extensive coverage and comprehensiveness (Hong et al., 2012; Hosseini et al., 2018). Scopus is a vast database that is rapidly expanding to provide academicians with access to information on specific scientific subjects and literature (Chadegani et al., 2013; Olawumi et al., 2017). The Scopus database was searched using online search terms to retrieve all pertinent papers for data collection. The specific keywords used were “Dam” AND “Construction” AND “Impact. A selection of publications published between 2010 and 2023 was made for the literature. The purpose of this filtering phase is to find relevant papers. The exhaustive framework of the literature search and indexing methodology employed in this study is illustrated in Figure 2.

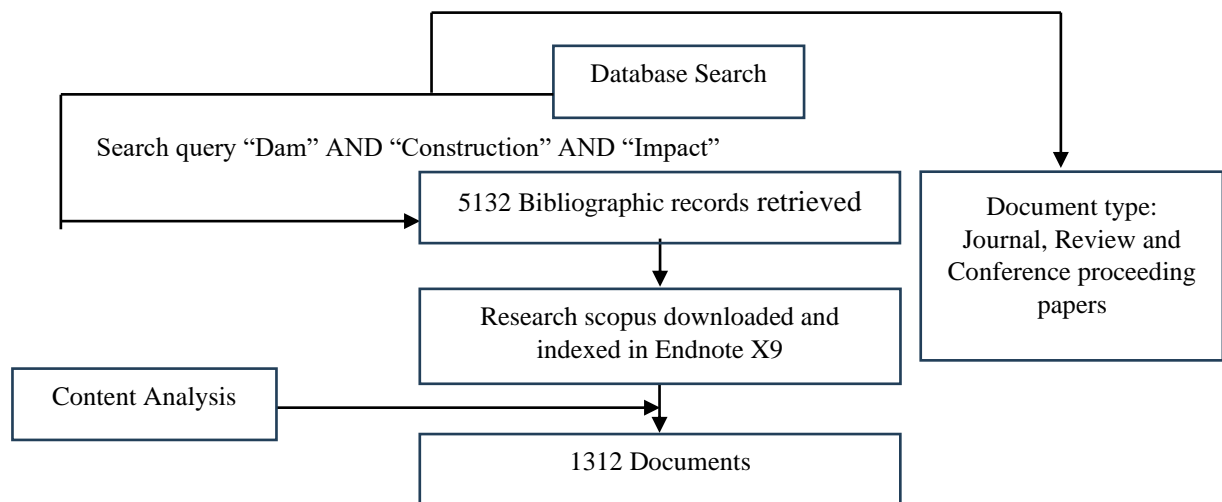


Figure 2. Outline of the methodology for literature search and indexing

(b) Bibliometric with VOS Viewer, The Visualization of Similarity (VOS) Viewer is a free computer program that facilitates the exploration and visualization of map bibliometric data (Leydesdorff & Rafols, 2012). The interactive program's options and functions facilitate the easy access and exploration of Vos Viewer's bibliometric data network, including co-occurrence relationships between keywords and concepts and the quantity of quotations (Van Eck & Waltman, 2011). The software has the ability to present extensive bibliometric networks in a manner that is readily comprehensible (Van Eck & Waltman, 2014). In comparison to other visualization software, VOS viewer is more user-friendly, free, and includes a network mapping feature. Labels and circles are employed to symbolize items in the visualization network. The relationship between the elements is indicated by the item-to-item distance in the network visualization (Van Eck & Waltman, 2014). In general, the stronger the bond between two items, the closest they are to one another. Links, which are represented as lines, are employed to establish connections between objects in the network. (c) A strategy for literature search and indexing, We selected the Scopus database as the data source due to its comprehensiveness and breadth (Hong et al., 2012; Hosseini et al., 2018). Scopus is widely regarded as the most significant and swiftly expanding scientific research database in terms of the information it provides to researchers regarding the literature in a specific field (Chadegani et al., 2013; Olawumi et al., 2017).

RESULTS

(a) Figure 3 displays the annual publication distribution, which delineates the number of publications per year from 2010 to 2023. Before 2016, no more than 80 pertinent papers were published per year. 2018 had a notable rise in comparison to the year before. In 2018 there were 104 publications, which is more than 40 articles more than in 2017. The quantity of publications in 2022 is trending downward, falling by 12 publications compared to 2020 and 5 publications compared to 2021. With 141 articles, 2023 has the most publications between 2010 and 2023. Previous research argues that the more attention on research on the topic, the more research will be concentrated on the topic (Oesterreich & Teuteberg, 2016; Zhou et al., 2013).

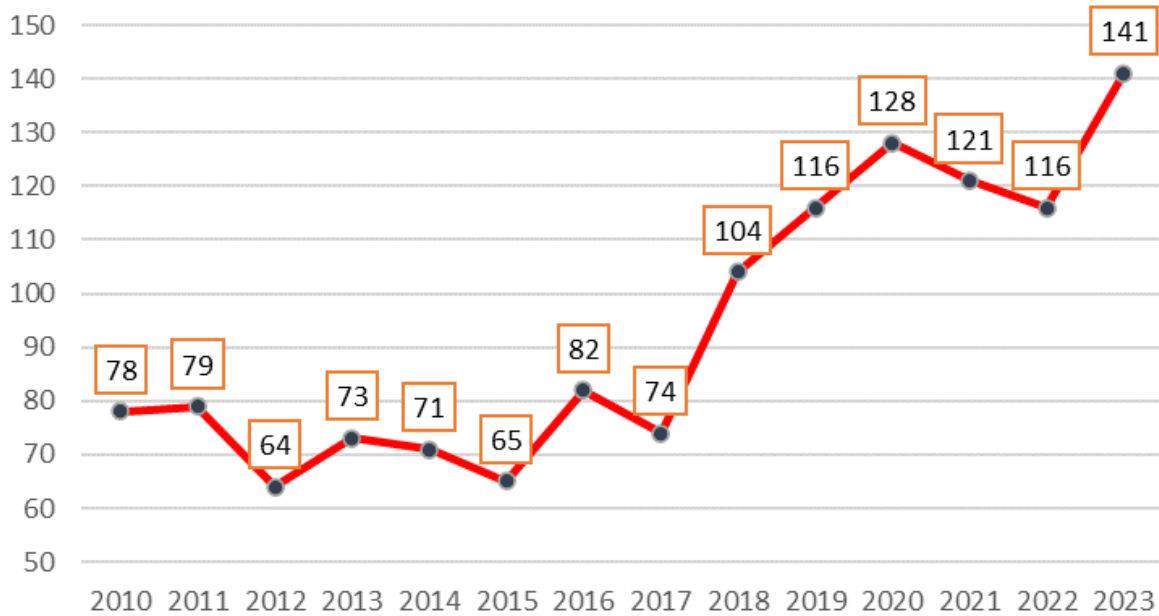


Figure 3. Distribution of annual publications

(b) Types of publications and source analysis, the many publication types, such as journal articles, conference papers, and review papers, are depicted in Figure 4. Most published materials on the impact of dam construction are journal articles, which make up 83.2% of all relevant documents. Following in second place are conference papers at 13.8%, and review papers at 3.0% during 2010-2023.

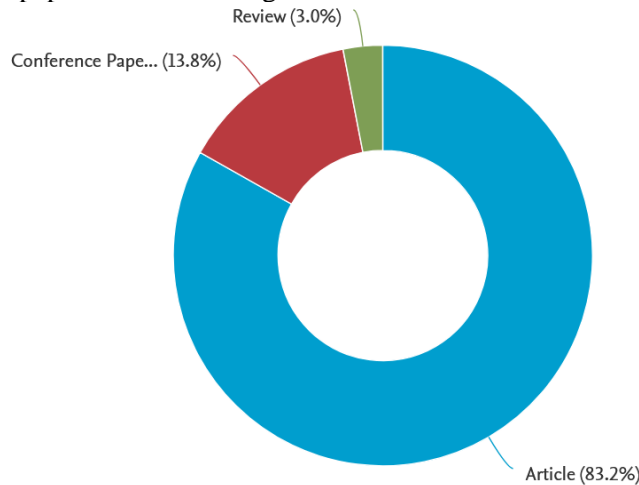


Figure 4. Type of publication

The order and quantity of citations for the top 20 most referenced publication sources are shown in Table 1. Citations and the quantity of documents retrieved from the Scopus analysis results. With 428 citations in 2015, the most cited source was an index-based methodology for evaluating patterns and trends in river fragmentation and flow regulation by worldwide dams at many scales that was published in the journal *Environmental Research Letters*. A study published in the *Journal of Hydrology* in 2012 with 376 citations, titled *Effects of the Three Gorges Dam on Yangtze River Flow and River Interaction with Poyang Lake, China: 2003-2008*, came in second.

Table 1. *Most cited publication sources.*

Author	Title	Year	Journal	Citation
Grill, G., Lehner, B., Lumsdon, A.E., ...Zarfl, C., Reidy Liermann, C.	An index-based framework for assessing patterns and trends in river fragmentation and flow regulation by global dams at multiple scales	2015	<i>Environmental Research Letters</i> , 10(1), 015001	428
Guo, H., Hu, Q., Zhang, Q., Feng, S.	Effects of the Three Gorges Dam on Yangtze River flow and river interaction with Poyang Lake, China: 2003-2008	2012	<i>Journal of Hydrology</i> , 416-417, pp. 19–27	376
Castello, L., Macedo, M.N.	Large-scale degradation of Amazonian freshwater ecosystems	2016	<i>Global Change Biology</i> , 22(3), pp. 990–1007	325
Sowers, J., Vengosh, A., Weinthal, E.	Climate change, water resources, and the politics of adaptation in the Middle East and North Africa	2011	<i>Climatic Change</i> , 104(3-4), pp. 599–627	315
Dai, Z., Liu, J.T.	Impacts of large dams on downstream fluvial sedimentation: An example of the Three Gorges Dam (TGD) on the Changjiang (Yangtze River)	2013	<i>Journal of Hydrology</i> , 480, pp. 10–18	304

Table 2. presents the top 10 journal sources with the largest citation scores and number of published documents in this research topic. The highest rank is occupied by science of the total environment with 91 documents and a citation value of 17.6. Furthermore, the second rank is occupied by water Switzerland with 76 documents and a citation value of 5.8. The last rank is occupied by environmental monitoring and assessment with a total of 18 publications and a citation value of 4.7. These journal sources make significant contributions to this research topic and are widely cited.

Table 2. *Most cited score publication sources.*

No.	Source	Document	Cite Score
1	Science Of the Total Environment	91	17.6
2	Water Switzerland	76	5.8
3	Journal Of Hydrology	61	11.0
4	Environmental Earth Sciences	33	5.1
5	Ecological Engineering	30	8.0
6	Ecological Indicators	29	11.8
7	Water Resources Management	23	7.4
8	River Research and Applications	21	4.6
9	Sustainability Switzerland	19	6.8
10	Environmental Monitoring and Assessment	18	4.7

(c.) Country/region distribution, the global distribution of publications by nation is depicted in Figure 5. The distribution of publications among nations is determined by the quantity of published papers. By rating the top 10 nations with the most publications, the Scopus analysis function provides the analysis results and document count. With a total of 486 publications between 2010 and 2023, China was found to have the most publications. With a total of 300 documents, the United States of America comes in second. The last rank is occupied by the country of Spain with a total of 39 documents. As shown in Figure 5, there are 10 countries or regions on 5 continents. This indicates that there is a large research focus on dam construction impacts compared to other continents. According to (Martínez-Aires et al., 2018) countries on the continent, they are the most digitally innovative countries, while further findings indicate that digitization in Africa is progressing slowly.

(d) Visualization, the following is a description of the visualization results obtained by VOSviewer and the Scopus database. Publication by author and network of co-authors, to identify the network of writers who have welcomed collaborative research on the impact of dam construction, a co-authorship network was established using VOS viewer. Co-authorship with the author's unit of analysis and complete calculation technique is the sort of analysis and calculation method that the VOS viewer defines. The writers who have the greatest citations in their papers on this research topic are listed in Table 3, indicating that they have significantly advanced the study of the effects of dam construction. Wang Y. (9 documents), Dong S. and Li, P. (8 documents), and Liu, S. (7 documents) were the most prolific authors on this subject, according to an analysis of the most prolific authors.

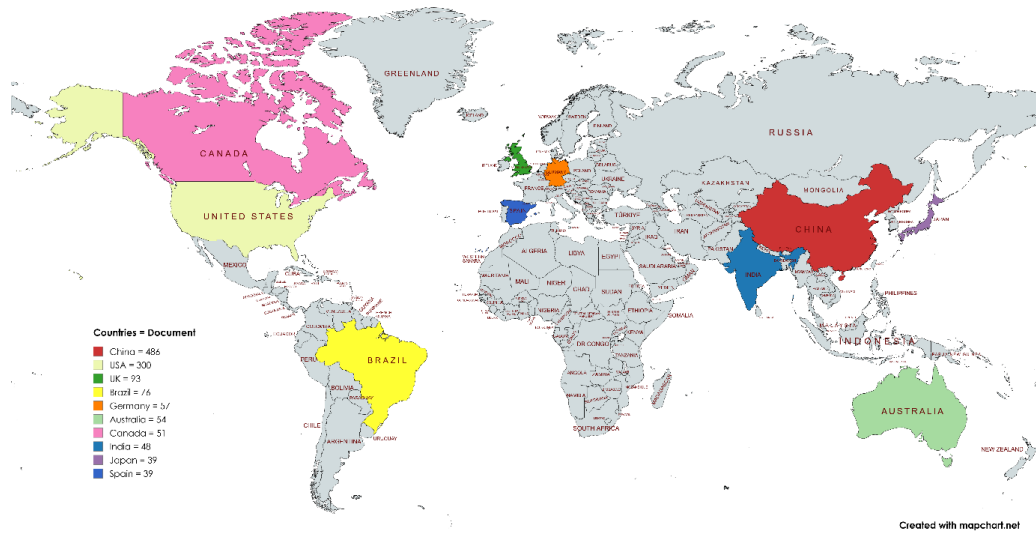


Figure 5. Distribution of publications by country and region.

Table 3. Number of publications per author.

Author	Affiliation	Document
Wang, Y.	North China Electric Power University, Beijing, China	9
Dong, S.	Beijing Forestry University, Beijing, China	8
Li, Peng	Xi'an University of Technology, Xi'an, China	8
Fearnside, P.M.	Instituto Nacional de Pesquisas Da Amazonia, Manaus, Brazil	7
Liu, Shiliang	Henan Agricultural University, Zhengzhou, China	7
Singh, Vijay Prasad	Texas A&M University, College Station, United States	7
Wang, Dong	Nanjing University, Nanjing, China	7
YANG, Zhifeng	Guangdong University of Technology, Guangzhou, China	7
Li, Qiongfang	Hohai University, Nanjing, China	6

The overlay visualization network, which has 132 links overall, is depicted in Figure 6. The strength of an author's connections with other writers is known as the co-authorship linkages' total strength (Van Eck & Waltman, 2014). To show the relationships between authors, collaboration patterns, and clusters, the overlay visualization network is displayed. The visualization results show that the 12 authors have the same level of strength and collaborative research among them.

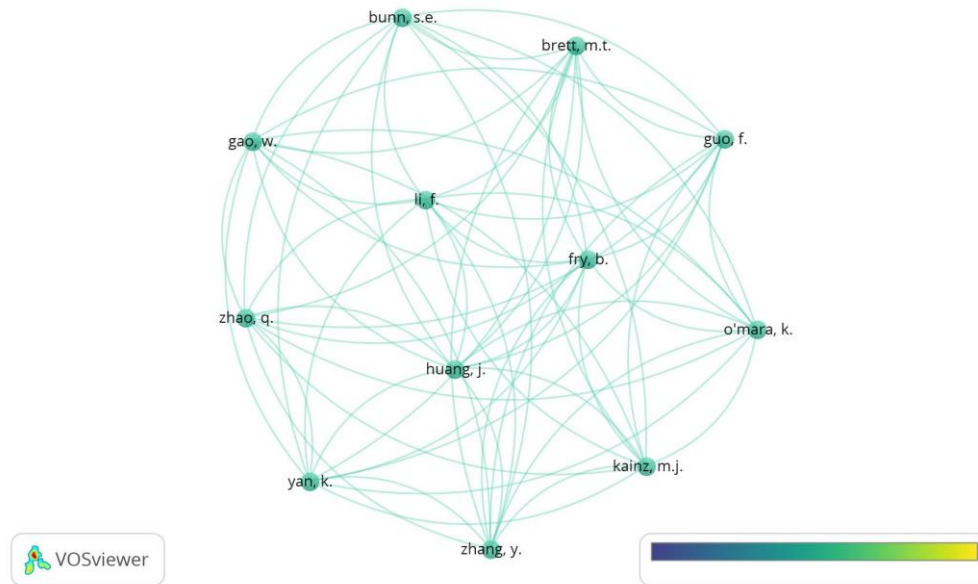


Figure 6. Publication Country/region distribution.

Publication by author and network of co-authors, to identify the fundamental structure and clustering about the impact of dam construction, event analysis based on keywords was carried out. Using VOS viewer software, the co-occurrence network was derived from 307 terms in total. Binary counting is the method of calculation that is employed. Figure 7 displays the bare minimum of 23 keywords that occur at the same time. This displays a network visualization map of three concurrently appearing term clusters.

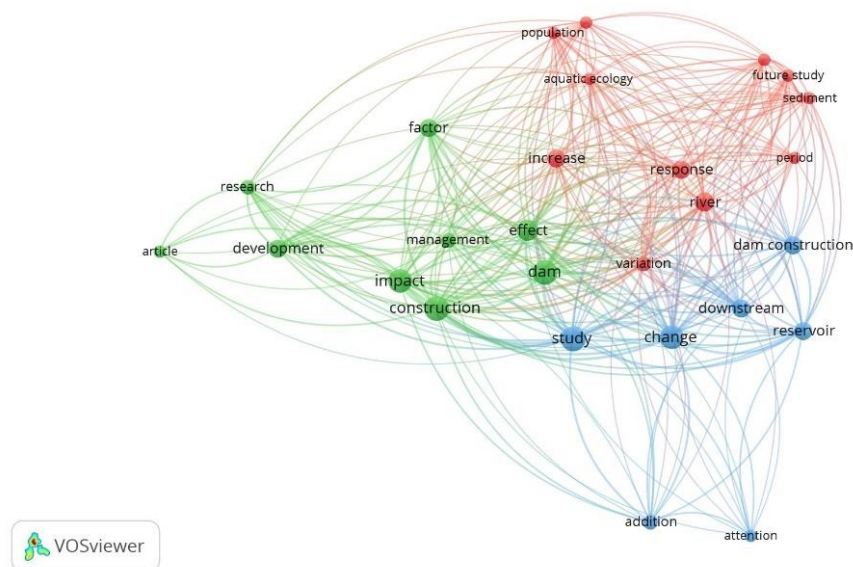


Figure 7. A cluster visualization map for keywords that appear together

Publication by subject area, Event analysis based on the subject area of publications was conducted using scopus analysis to distinguish subject area clusters on the topic of dam construction impact. Figure 8 shows 11 types of subject areas. Environmental ranks first with the largest percentage of 42.7%, then Engineering ranks second with a percentage of 13.4%. Medicine ranks last in subject area clustering with a value of 1.1% and Other subject areas are a mixture of several subjects combined with a value of 3.8%. This can illustrate that the topic of dam construction impact has a lot of impact on the environmental and engineering subject areas.

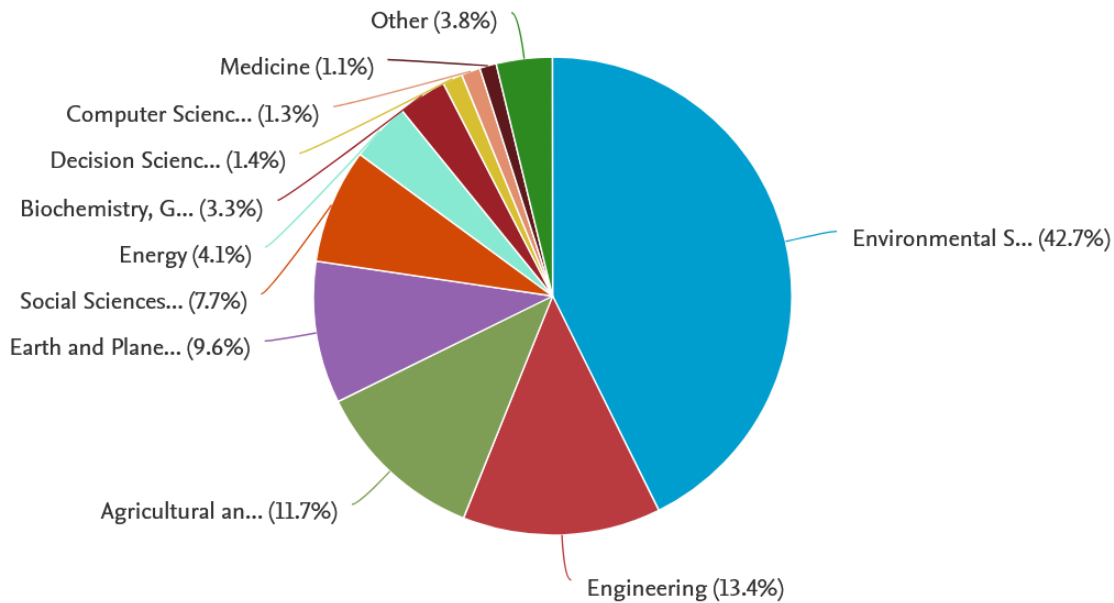


Figure 8. Cluster Visualization Map for co-occurring keywords

CONCLUSION

Globally, the concept of the impact of dam construction has received widespread attention. A bibliometric research of 1312 pertinent publications from the Scopus database was used to investigate the effects of dam construction. We performed a frequency and co-occurrence analysis to find publishing trends by co-authorship by country, distribution by country or area, number of publications per year, publication source, and kind. An overview of trends in the direction of the literature is given in this study for future research, and research concepts are evaluated using pre-existing subject groupings. The distribution of publications and publication patterns across various nations and regions from 2010 to 2023 were determined. In terms of publications, the three top nations for dam construction effect research are China, the United States, and the United Kingdom. The Scopus database served as the basis for this investigation, and the authors advise that future studies use a variety of datasets.

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