A Bibliometric Analysis of Publications showing the Research Trends of Natural, Emergency and Disaster Management in India from 1990 to 2023

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Abstract

This study aims to analyze the work done on Natural Disaster and Management Disaster using VOS Viewer software from 1990 to 2023. Different articles on Natural Disaster and Management Disaster were retrieved using one of the most popular Scopus databases. In this paper a database search outputs a total of 726 Articles on Natural Disaster from 1990 to 2023 were analyzed. Network analysis and Statistical analysis shows that maximum articles were published in 2022 and India contributed the largest number of documents. Scopus keyword search outcome 726 articles with English Language having the highest number. In this Bibliometric analysis Researcher's examine the Year of publication, Document by Funding Sponsor, Document by Country, Citation with Document, Bibliographic Coupling with document and source, Title and Abstract field, Document with Subject area, Document by Affiliation and Document by Author. Through the application of the SCOPUS database, we are able to determine the most significant publications whereas also examining the growth of the Natural Disaster field over time and the interrelated ideas that constitute up the conversation.

Keywords

Management Disaster, Natural Disaster, Scopus, Systematic Review, VOS viewer

1. Introduction

The vulnerability of tourist destinations to unforeseen disasters poses a significant threat to their image and the safety perceptions of visitors. Throughout history, natural hazards such as landslides, cloudbursts, earthquakes, and floods have plagued the Himalayan region, with floods emerging as the most destructive. These disasters have profound socio-economic impacts, particularly on communities residing in low-lying areas or near river basins. The escalating frequency of natural disasters in recent years has led to increased human casualties, property damage, and environmental degradation. Mountainous areas, characterized by uneven geography, inadequate soil cover, and animal grazing, are more susceptible to disasters like avalanches, landslides,

earthquakes, and flash floods. To mitigate the potential challenges arising from such disasters, destinations must possess adequate resources for disaster management. Global tourism's predisposition to unexpected occurrences underscores the critical need for contingency planning (Pant et al., 2018). Disaster management becomes indispensable for all tourist destinations, especially in the aftermath of crises such as natural disasters, terrorism, epidemics, war, and crime waves. These events can have devastating impacts on communities, regions, states, or nations, endangering the safety of both locals and visitors while also tarnishing the destination's reputation in the marketplace. It is imperative for all stakeholders connected to a destination to conduct comprehensive evaluations and develop alternative strategies to address varying levels of threat (Abid et al., 2021). Several variables have been identified that have the potential to damage the safety and security reputation of well-known tourist attractions, leading to crises (Waleed et al., 2023). These include international conflicts, terrorism affecting the tourism industry, targeted crime waves against tourists, natural disasters causing infrastructure damage, and health concerns related to epidemics and diseases. Collectively, these events can create an image that tourist destinations are neither secure, safe, nor attractive (Damaševičius et al., 2023). This complicates the efforts of officials and local communities to closely examine the different elements of disaster management plans. In response to these challenges, a bibliographic review was conducted as part of this investigation. Bibliometrics, involving data analysis on books, articles, and other published materials, was employed to monitor and assess the output and impact of researchers in the field of natural disasters and disaster management (Das et al., 2021). The VOS-viewer software, designed for creating and visualizing bibliometric networks, played a crucial role in analyzing relationships between publications. This software facilitates the identification of scientific collaboration, interdisciplinary research, and high-quality contributions, providing a comprehensive understanding of the field's dynamics. The visual representation of bibliometric data enhances the analysis of publication patterns and relationships between researchers, journals, and individual publications, contributing to a more nuanced understanding of disaster management in tourism. Disaster management plays a critical role in safeguarding communities, especially in regions prone to natural disasters like Uttarakhand, India (Chen et al., 2023). A comprehensive review of academic literature and reports underscores key issues and strategies in disaster management specific to this context. A recurring theme in the literature is the emphasis on precautionary measures and strategies for disaster reduction. Scholars (Dhuliya et al., 2018) argue for integrating disaster reduction measures into broader economic and social development plans, advocating for a shift from a reactive to an anticipatory approach. Coordination emerges as a crucial aspect of disaster management in Uttarakhand. Notably, the collaborative efforts of the Disaster Management Department, State Disaster Response Force (SDRF), and National Disaster Response Force (NDRF) during various disasters highlight the significance of interagency cooperation and well-defined response protocols (Verma et al., 2018). Local preparation is deemed essential, with (Pant et al., 2018) emphasizing the need for capacity-building and training programs covering various domains like healthcare, agriculture, and earthquake-resistant building (Prashar et al.,

2023). This approach empowers local populations to respond effectively to disasters, enhancing resilience in the long run (Riyadh et al., 2023). Given the recurring challenge of flash floods in Uttarakhand, public awareness and protective measures are pivotal (Pandey et al., 2018). Technology, particularly Wireless Sensor Networks (WSNs), is proposed as a vital tool for disaster detection and management (Singh et al., 2013). WSNs, with sensors strategically placed in disaster-prone areas, offer advanced monitoring capabilities and improved early warning systems, contributing to an enhanced disaster management infrastructure. Studies (Pande et al., 2010) focusing on floods in Chamoli district highlight the profound socio-economic impact on residents. They recommend promoting group involvement in coping strategies, individual participation through seminars, and providing emergency assistance to affected populations. This emphasizes the importance of addressing broader socio-economic consequences in disaster management strategies (Islam et al., 2021). The broader Indian context involves a multi-hazard, integrated disaster management approach (Hallwright et al., 2021). The National Disaster Management Authority (NDMA) plays a pivotal role in fostering a proactive, technology-driven sustainable development strategy, (Chumky et al., 2023) emphasizing prevention, preparedness, and mitigation (INDIA [Assisting State], 2022). However, bureaucratic obstacles and policy hindrances often impede effective disaster response (Varun et al., 2018). Data and information are integral to effective disaster planning, as evidenced by the "Mapping Climatic and Biological Disasters in India" report (Varun et al., 2018). Despite valuable data, bureaucratic hurdles and procedural confusion impede disaster response efficiency (Linardos et al., 2022). Local preparedness remains a challenge, and India's infrastructure is inadequate to handle the scale of disasters, necessitating increased investment in planning and response skills (Joseph et al., 2018). Climate change exacerbates the complexity of disaster management in India, making disasters more frequent and intense. The unpredictable nature of climate change demands adaptive and forward-thinking disaster management strategies. India is incorporating emerging technologies, including Artificial Intelligence, the Internet of Things (IoT), Big Data, and blockchain, to enhance disaster management (Varun et al., 2018). Drones, in particular, have proven successful in disaster assessment and relief operations. In summary, disaster management in Uttarakhand and India requires a proactive, multidisciplinary, and technology-driven approach. Integration of local preparedness, coordination, technology, and a multi-hazard strategy is crucial for reducing the impact of disasters and building resilience in vulnerable regions. The ongoing threat of climate change underscores the need for innovative and adaptive disaster management approaches.

2. **Methodology**

As of March 2023, the widely used SCOPUS database offered information for this study (Maguraushe, et al., 2023). The concepts of Disaster Management, India, and Disaster management are consonant keywords which have been utilized in article queries (Saregar et al., 2023). Since they detect the appropriate subject matter that has grown to the research goal and research field, we pay attention to the titles of the papers. Based on the query, 726 items in total

have been gathered, permitting us to carry out the bibliometric analysis. In order to construct and display the bibliometric networks for this article, we employed the VOS-viewer (Banerjee et al., 2021) Microsoft Excel was then employed to estimate the frequency bands of the published works and then generate the relevant graph and chart (Khan et al., 2022).

3.Analysis and Discussion

This study examines bibliometric variables- Year of Publication with growing rate percentage and cumulative, Document by Funding Sponsor, Document by Country or territory, Citation with Documents, Bibliographic Coupling with documents, Title and Abstract Field with Binary Coding, Document by Subject Area, Document by Affiliation and Document by Author (Gurpur et al., 2021).

A. Year of publication

The publication on Disaster Management and Natural Disaster had yet to be develop significantly for a few years before the word became well known in 2010 (Sood et al, 2021). Since then, the volume of Publication has grown dramatically year after year. Table 1 shows the growth percentage of publications followed by cumulative percentage and number of articles. In this table highest publication rate in 2021. Figure 1 shows the year wise publication rate of publication rate of Disaster Management and Natural Management in all over India.

Table1. Growth rate %

Year	No. of Published Articles	% (N=726)	Cumulative %	Growth Rate %
1990	2	0.275	0.275	0
1991	1	0.137	0.412	0
1995	1	0.137	1.549	3
2001	4	0.550	2.099	3
2003	4	0.550	2.649	1
2004	2	0.275	2.924	10
2005	11	1.515	4.439	8
2008	9	1.239	5.678	17
2010	18	2.479	8.157	10
2011	11	1.515	9.672	15
2012	16	2.203	12.289	18
2013	19	2.617	14.906	32
2014	33	4.545	19.451	32
2015	33	4.545	23.996	42
2016	43	5.922	29.918	36
2017	37	5.096	35.014	32
2018	33	4.545	39.559	51

2019	52	7.162	46.721	73
2020	74	10.192	56.913	83
2021	84	11.570	67.105	114
2022	115	15.840	82.945	93
2023	94	12.947	95.892	-1

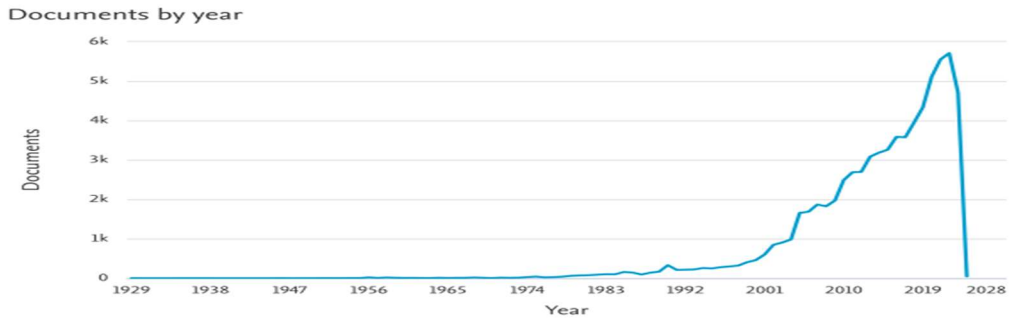
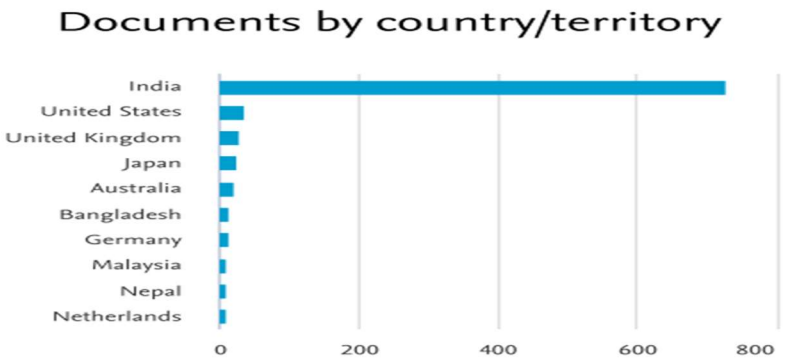


Figure 1. Publishing rate Year wise from 1929-2023

B. Document by Country and Territory

There are many countries which published many articles related to Natural Disaster and Management Disaster. Among all of them India is the largest country which published highest number of articles for Natural Disaster. Figure 3. Shows top ten countries which published articles of natural disaster. In this figure 3. Netherland is the country which shows lowest number of publication articles of Natural Disaster.

Figure 3. Top 10 Country wise documents



C. Citation with documents

The number of citations per year indicates a researcher's output (Sahil et al., 2021). The citation ratings for the paper retrieved as of September 2023 are summarized in table 2. It shows the Citation Metrics for the total papers from 1990 to 2023. It shows highest citation year, highest citation, total citation, average citation, highest citation %, i-10 index and i-20 index. Figure 4 shows the citation with different countries and table 3 shows the top ten countries with highest documents and highest citation with their total link strength. According to this table 3 India has highest document 721 with highest citation 7813 with their total link strength 13229.

Figure 4. Citation with Countries

Table 2. Citation Analysis Citation Metrics

Table 3. Citation with different countries

Publication Year	1991-2023
Highest Citation Year	2008
Total Papers	726
Highest Citation	241
Total Citation	7814
Average Citation	10.777
Highest Citation %	3.084%
i-10 Index	94
I-20 Index	104

Country	Documents	Citations	Total Link Strength
India	721	7813	13229
United States	33	822	3914
Australia	18	550	2583
Malaysia	9	439	788
United Kingdom	27	399	3994
Bangladesh	13	332	2249
France	6	241	1582
Japan	22	230	1516
Germany	10	221	1937
China	7	166	749

D. Bibliographic Coupling with documents and Sources

When two works consider a single third work in their bibliographies, this is referred to as bibliographic coupling. This indicates there's an excellent likelihood the two sections deal with comparable subjects. If two documents cite a single document or documents shared, they are regarded as bibliographically coupled. When two publications cite a single article, this is referred to as bibliographic coupling and can be utilized to demonstrate the significance of one publication when compared to a collection of associated publications. This approach can be used in articles, publications, writers, organizations, and nations. Multiple citations allow for the analysis of the authors' bibliographic coupling to identify which articles and authors are correlated. Figure 5 and Figure 6 shows the Bibliographic Coupling with documents and sources whereas Table 4 shows the Bibliographic Coupling with Top 10 sources and Documents.

Figure 5. Bibliographhic coupling with documents

Table 4. Bibliographic Coupling with Top 10 Sources and Documents

source	documents	citations	Net link strength

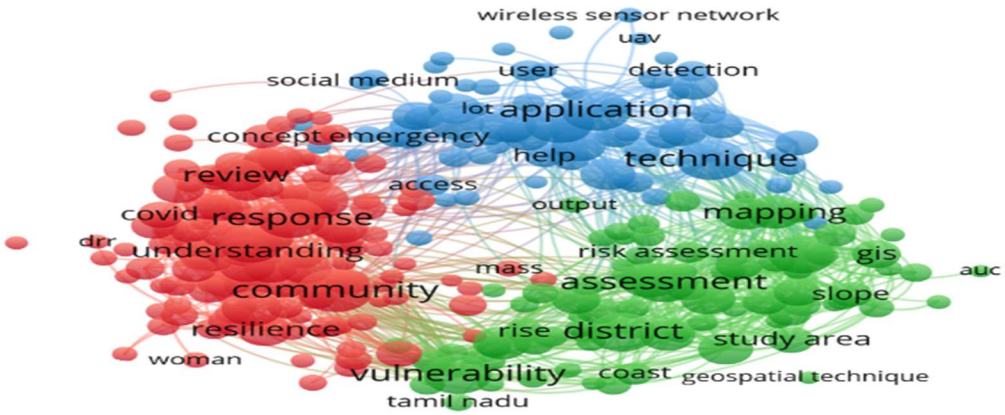
disaster advances	101	140	51
disaster prevention and management	27	237	12
international archives of the archives	24	73	7
international journal of disaster risk reduc.	24	656	43
journal of the indian society of remote sg.	18	182	8
sustainability (switzerland)	17	158	21
environmental earth sciences	12	333	22
environment, development and sustain.	11	114	19
progress in disaster science	10	57	12
disasters	9	292	42

Figure 6. Bibliographic Coupling with Sources

E. Title and Abstract field with Binary Coding

The parts of your article which are most visible are the title and abstract. We invite reviewers to evaluate the title and abstract during the peer review process. Reviewers who were recently invited to review the manuscript are urged to say if they are willing to do this based only on the title and abstract. The title and abstract are going to read by more people than the rest of the paper if and when the manuscript is published. In reality, a lot of viewers will simply read the abstract and title once. For finding articles, a lot of people employ electronic search engines. They usually search through databases that only involve the article's title, author list, and abstract—all additional data has been removed, such as any keywords that the authors might have stated to the component. Figure 7. Shows the network of abstract and title field.

Figure 7. Network of Abstracts and Title Field



5. Conclusion

Disaster management in India is a complicated process that involves multiple sectors (Hossain et al., 2023). It includes reducing vulnerability before a disaster, implementing early warning systems, and conducting drills. During the response phase, there is a need for prompt and coordinated actions. The National Disaster Management Authority, along with state and district authorities, plays a key role in creating policies and building capacity (Huang et al., 2021). After a disaster, the focus is on rebuilding and restoring essential services and livelihoods. Effective disaster management requires strong institutional frameworks, sufficient resources, early warning systems, and community participation. The aim is to minimize the risk and impact of disasters through integrated planning, preparation, response, and recovery efforts involving government bodies, NGOs, communities, and individuals (Musthofa et al., 2020).

References

1. Banerjee, S., & Basu, S. S. (2021). Publication Trends in Research on Disaster Awareness: a bibliometric study based on PubMed. *College Libraries*, *36*(III), 34-45.
2. Hallwright, J., Handmer, and J. Progressing the integration of climate change adaptation and disaster risk management in Vanuatu and beyond. *Climate Risk Management*. 31, 100269 (2021).
3. GOI. (2023). India is a leader in disaster management, the world looks up to us for global challenges such as climate change: Dr. Jitendra Singh. Department of Science & Technology. Retrieved November 5, 2023.
4. Home Affairs, M. Disaster Management in India - A Status Report. Government of India Ministry of Home Affairs National Disaster Management Division National Disaster

Management Framework. Tenth Chapter on Disaster Management. Guidelines to State Governments SECTION-I. August (2004).

5. Hallwright, J., Handmer, and J. Progressing the integration of climate change adaptation and disaster risk management in Vanuatu and beyond. *Climate Risk Management*. 31, 100269 (2021).
6. Hossain, B., Sarker, M. N. I., Shi, G., & Sohel, M. S. (2023). Research trends on natural disasters in the context of India: A bibliometric analysis. *Disaster, Displacement and Resilient Livelihoods: Perspectives from South Asia*, 17-34.
7. Hou, L. X., Mao, L. X., Liu, H. C., & Zhang, L. (2021). Decades on emergency decision-making: A bibliometric analysis and literature review. *Complex & Intelligent Systems*, *7*, 2819-2832.
8. Huang, Y., Xu, C., Zhang, X., Li, L., & Xu, X. (2023). Research in the field of natural hazards based on bibliometric analysis. *Natural hazards review*, *24*(2), 04023012.
9. Mallika Joseph; D. C. Challenges of disaster management in India: implications for the economic, political, and security environments. Prevention Web (2011, November 10).
10. M. Emerging Technology Trends that can Transform Disaster Management in India – Ind Biz | Economic Diplomacy Division. Ind Biz | Economic Diplomacy Division (2021, May 3).
11. Musthofa, Z., & Indartono, S Disaster Mitigation Curriculum-Based on Local Wisdom to Support Sustainable Development Programs.(2020, January 1).
12. Negi, P., Yadav, S., & Ram, C. Impact of Flood on Socio-Economic Status – a Case Study of Sample Villages in Joshi Math Block, Uttarakhand. Towards Excellence, June, 44–55 (2022).
13. Linardos, V., Drakaki, M., Tzionas, P., & Karnavas, Y. L. (2022). Machine learning in disaster management: recent developments in methods and applications. *Machine Learning and Knowledge Extraction*, *4*(2).
14. Pandey, T. D., Bisht, N. S., & Sharma, R. Disaster Management in Mountain Regions: With Special Reference To Uttarakhand. Journal of Acharya Narendra Dev Research Institute, July. (2018).
15. Pant, Di., Verma, S., & Dhuliya, P. (2018). A study on disaster detection and management using WSN in the Himalayan region of Uttarakhand. Proceedings - 2017 3rd International Conference on Advances in Computing, Communication and Automation (Fall), ICACCA 2017, 2018-Janua, 1–6.
16. Abid, S. K., Sulaiman, N., Chan, S. W., Nazir, U., Abid, M., Han, H., & Vega-Muñoz, A. (2021). Toward an integrated disaster management approach: how artificial intelligence can boost disaster management. *Sustainability*, *13*(22), 12560.
17. Sood, S. K., & Rawat, K. S. (2021). A scientometric analysis of ICT-assisted disaster management. *Natural hazards*, *106*(3), 2863-2881.
18. Sahil, & Sood, S. K. (2021). Scientometric analysis of natural disaster management research. *Natural Hazards Review*, *22*(2), 04021008.

19. Damaševičius, R., Bacanin, N., & Misra, S. (2023). From sensors to safety: Internet of Emergency Services (IoES) for emergency response and disaster management. *Journal of Sensor and Actuator Networks*, *12*(3), 41.
20. Maguraushe, K., Ndayizigamiye, P., & Bokaba, T. (2023, December). Trends and developments in the use of machine learning for disaster management: A bibliometric analysis. In *International Working Conference on Transfer and Diffusion of IT* (pp. 92-104). Cham: Springer Nature Switzerland.
21. Saregar, A., Haenilah, E. Y., Hariri, H., Putra, F. G., Diani, R., & Umam, R. (2022). Natural Disaster Education in School: A Bibliometric Analysis with a Detailed Future Insight Overview. *International Journal of Educational Methodology*, *8*(4), 743-757.
22. Prashar, N., Lakra, H. S., Kaur, H., & Shaw, R. (2024). Urban flood resilience: mapping knowledge, trends and structure through bibliometric analysis. *Environment, Development and Sustainability*, *26*(4), 8235-8265.
23. Chen, S., Xu, Z., Wang, X., & Škare, M. (2022). A bibliometric analysis of natural disasters and business management in tourism. *Journal of Business Economics and Management*, *23*(2), 305-326.
24. Chumky, T., Basu, M., Onitsuka, K., & Hoshino, S. (2022). The current research landscape of disaster-induced migration: A systematic review and bibliometric analysis. *International Journal of Disaster Risk Reduction*, *74*, 102931.
25. Riyadh, A. M., Cova, T. J., Brewer, S. C., Collins, T. W., Medina, R. M., Siebeneck, L., & Hohl, A. (2024). Spatial Analysis of Disaster Resilience Research: A Bibliometric Study a manuscript for submission as a Review Article to International Journal of Disaster Risk Reduction by. *International Journal of Disaster Risk Reduction*, 104896.
26. Waleed, M., & Sajjad, M. (2023). On the emergence of geospatial cloud-based platforms for disaster risk management: A global scientometric review of google earth engine applications. *International journal of disaster risk reduction*, *97*, 104056.
27. Das, B. K., Pandya, M., Chaudhari, S. P., Bhatt, A., & Trivedi, D. (2021). Global research trends and network visualization on climate action: a bibliometric study. *Library philosophy and practice*, *5818*.
28. Khan, M., Parvaiz, G. S., Tohirovich Dedahanov, A., Iqbal, M., & Junghan, B. (2022). Research trends in humanitarian logistics and sustainable development: A bibliometric analysis. *Cogent Business & Management*, *9*(1), 2143071.