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MAPPING RESILIENCE RESEARCH IN DISASTERS AND FLOOD MANAGEMENT: A BIBLIOMETRIC ANALYSIS OF COMMUNITY AND SPECIAL NEEDS POPULATIONS

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Abstract:

The bibliometric analysis of this study is aimed at identifying the development of the knowledge landscape of resilience research in a disaster and flood context and focusing on community resilience and special needs populations. It is intended to map trends in publication, mental architectures, collaborative networks, and new thematic orientations in this interdisciplinary field. While disaster resilience has been gaining attention in the academic world worldwide, research on the disaster resilience of vulnerable and special needs groups is scattered and relatively small, which is hampering the creation of inclusive and evidence-based disaster risk reduction strategies. To fill this gap, a systematic bibliometric analysis was carried out by taking the data from the Scopus database. Using the advanced keyword

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search, 708 publications were found, which were screened, validated, and standardized in OpenRefine. The Scopus Analyzer was used to produce descriptive bibliometric indicators, and VOSviewer was utilized with the aim of mapping the co-authorship, the co-occurrence of keywords, as well as the thematic network. The results reveal that research production has steadily increased from 2015 to 2025, with a significant boost after 2020, indicating rising global interest in resilience research in the area of disaster, alongside flood studies. The United Kingdom (UK), Australia, the United States (US), Indonesia, as well as China, were found to be highly influential contributors, and they had significant international research collaboration. Using keyword co-occurrence analysis, four thematic areas emerged, reflecting the growing interdisciplinary nature of resilience research from environmental, social, health, and technological perspectives, namely *community resilience, disaster management, flooding,* and *public health*. However, the words that are specifically related to *special needs populations,* such as persons with disabilities, older adults, and other vulnerable groups, were rarely found, and there is a significant research gap on inclusive disaster resilience. This work adds to the literature by providing an overall picture of the intellectual evolution, research output, collaboration network, and thematic evolution of disaster and flood resilience research. Overall, the results provide useful evidence for researchers, policymakers and practitioners to further enhance inclusive Disaster Risk Reduction DRR policies and adaptive resilience frameworks. Additionally, the research highlights the importance of international cooperation and more in-depth research on vulnerable groups to facilitate the creation of equitable, sustainable, and people-centered approaches for building disaster resilience.

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Keyword:

Bibliometric Analysis, Community Resilience Disaster Resilience, Flood Risk Management, Special Needs Populations

Introduction

Floods constitute one of the most common and catastrophic natural hazards worldwide, leading to large economic losses, environmental damage, and high fatalities and morbidity. Community resilience is an essential element of disaster risk reduction and has been increasingly required in the face of the elevating frequency as well as intensity of flood occurrences, which are largely due to climate change, rapid urbanization, and changes in land use. In the literature related to disaster resilience, resilience is defined as the ability of individuals and communities, as well as institutions, to prepare for, withstand, adapt to, and recover from hazardous events

Journal of Tourism, Hospitality and Environment Management
JTHEM
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while continuing to function and promoting long-term sustainability. This is especially relevant for special needs groups, such as older people, persons with disabilities, people with chronic diseases, and socio-economically disadvantaged groups, who are often disproportionately exposed, vulnerable, and face barriers to recovery after a flood. It is important to obtain an understanding of the factors that influence resilience among these populations to develop equitable and inclusive disaster risk reduction strategies.

Community resilience is now being understood as a multi-faceted phenomenon that is influenced by the interplay of social, economic, environmental, institutional, and infrastructural capacities. Today's studies indicate that resilience is not just about the durability of buildings or structures, but also about social cohesion, community engagement, local knowledge, governance, and adaptive learning (Dewa et al., 2023; Madsen & O'Mullan, 2016; Patel, 2022). For instance, Madsen and O'Mullan (2016) showed that social connectedness, place attachment and community identity were significant factors in promoting adaptive capacity in rural communities in Australia. Similarly, Patel (2022) emphasized the role of collective action, local leadership, and collaborative community networks in enhancing the resilience of flood-impacted areas. The results confirm an increasing understanding that resilient communities are not just physically ready, but also socially well networked and institutionally coordinated.

There are several factors that contribute to the resilience of communities to flood hazards, and these factors are interrelated. A combination of effective early warning systems, resilient infrastructure, adaptive governance, access to healthcare and social services, and mobilization of local knowledge and human resources all contribute to the capacity of a community to anticipate, manage, as well as recover from flood events. Dewa et al. (2023) also highlighted the need for local disaster management committees with the necessary resources to coordinate disaster preparedness and ensure effective collaboration among stakeholders during disasters. Likewise, participatory research in Puerto Rico revealed that social learning processes, community participation, diversified approaches in flood management, and good relationships between the community and the emergency management agency significantly enhance local adaptive capacity (López-Marrero & Tschakert, 2011). These studies collectively emphasize the need for integrated governance mechanisms, with community participation and institutional cooperation, for effective flood resilience.

Although there is increasing awareness of community resilience, special needs populations are still disproportionately affected by flood disasters before, during, and after. Limited access to information, transport, health services, economic opportunities, and emergency support services lowers the ability of older persons, people with disabilities, and persons experiencing homelessness and other socially vulnerable people to act effectively in a disaster situation. For instance, Sundareswaran et al. (2015) found that enhancing the resilience of homeless people in Canada will involve integrated continuity planning, effective interagency communication, and ongoing collaboration between emergency management authorities and community-based organizations. The study also highlighted the importance of long-term investments in the social determinants of health for reducing disaster vulnerability and enhancing recovery outcomes for high-risk populations.

In light of these differences, DRR has increasingly sought to become more inclusive and community-based, while being aware of local contexts, cultural differences and differential vulnerabilities. Recent evidence reveals that DRR strategies are more effective when they actively involve local communities, incorporate indigenous and experiential knowledge, and

Journal of Tourism, Hospitality and Environment Management
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Volume 11 Issue 45 (September 2026) PP. 106-120

respond to the needs of vulnerable groups. For example, Craig-Scheckman et al. (2025) suggested that public and expert views can be integrated to improve disaster preparedness and climate resilience through inclusive and context-sensitive decision-making. Likewise, the Community Rating System (CRS) used by the Federal Emergency Management Agency (FEMA) in the United States (US) also rewards communities for implementing a comprehensive floodplain management program that helps mitigate flood hazards and enhance community resilience over time (Sadiq et al., 2020).

Despite the growing importance of resilience in disaster and flood research, the literature has been scattered across various disciplines, and little is known about the development of research themes, collaboration networks, and new knowledge on vulnerable populations. Specifically, there is a gap in the understanding of the representation of community resilience and special needs populations in flood resilience studies over time. It is crucial to fill this gap in knowledge to prioritize research and develop more inclusive disaster policies and resilience frameworks. Hence, this study adopts the bibliometric approach and systematically reviews the intellectual structure, publication trends, collaboration network, and thematic evolution of disaster and flood-related resilience research, focusing on community resilience and special needs populations. This study offers a map of the current state of knowledge, which will be useful to researchers, policymakers and practitioners who are interested in improving disaster resilience strategies that are equitable, adaptive, and evidence based.

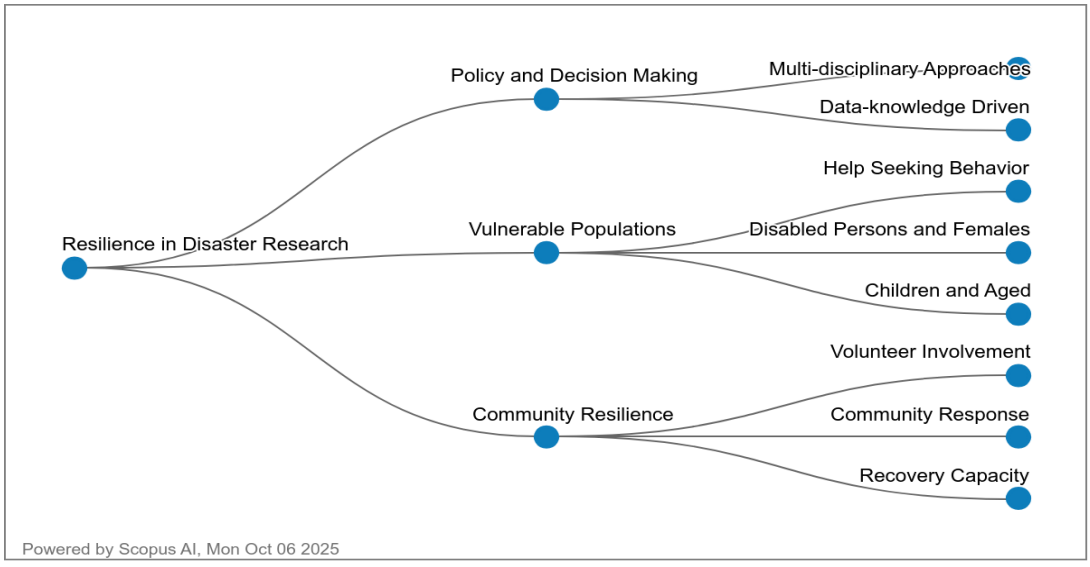

Figure 1: Concept Map of Key Components of *Resilience in Disaster Research*

The conceptual structure of the topic *"Exploring Resilience in Disaster Research of Community and Special Needs Populations"* is depicted in Figure 1. Three key clusters are identified on the map: policy and decision-making, vulnerable populations, and community resilience. However, new developments in policy and decision-making are evident, including the use of multidisciplinary approaches and the use of data in disaster resilience planning, with a focus on evidence-based frameworks in disaster resilience planning. The vulnerable populations cluster focuses on disabled persons, females, children, and the aged as specific target groups, as well as help-seeking behavior as an important aspect for disaster response and recovery. The community resilience cluster, meanwhile, emphasizes the importance of volunteer participation, community response, and recovery capability to enhance adaptation

Journal of Tourism, Hospitality and Environment Management
JTHEM
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Volume 11 Issue 45 (September 2026) PP. 106-120

and preparedness in society. In general, the conceptual mapping analysis indicates that resilience research has been moving towards inclusiveness and integration, connecting community-based approaches with the needs of vulnerable populations. This reflects a growing understanding of the value of working together, evidence-based, as well as socially just approaches to strengthen disaster and flood resilience.

In summary, strengthening the resilience of communities against flooding needs to be done in all aspects of the community, including social, environmental, economic, as well as institutional. There are special needs populations that have their own challenges requiring specific interventions and support systems. To create resilient communities, effective disaster management strategies and policies are needed that consider local contexts and actively engage diverse populations. Consequently, additional research is necessary to explore the multi-dimensional nature of resilience in addition to establishing standardized tools that can be used to measure and improve community resilience to floods.

Methodology

Bibliometrics works as a method of systematic approach for collecting, organizing, and examining bibliographic information in scientific literature (Alves et al., 2021; Assyakur & Rosa, 2022; Verbeek et al., 2002). Meanwhile, traditional bibliometric research mostly concentrates on descriptive indicators such as temporal distribution, publication venues, and the author's productivity (Wu & Wu, 2017). At the same time, advanced methods, such as document co-citation analysis, can be used to gain rich insight into the intellectual framework as well as the development of knowledge in a research area. Undertaking a comprehensive literature review involves a systematic and repetitive process that begins with determining the pertinent keywords, conducting extensive searches of databases, and concluding with careful analysis of the search results. This systematic approach helps in compiling a comprehensive and reliable bibliography and ensures reliable results (Fahimnia et al., 2015). In particular, this research focused on influential publications because they offer important insights and theoretical frameworks that inform academic discussions. Scopus was chosen as the main data source because it has a wide range of information and is already known for its credibility (Khiste & Paithankar, 2017; di Stefano et al., 2010; Al-Khoury et al., 2022). In order to guarantee academic rigor, only peer-reviewed journal articles were considered in the study, excluding lecture notes and books (Gu et al., 2019). The articles were systematically collected and examined through Elsevier's Scopus database from 2021 to October 2025.

Data Search Strategy

The process of collecting data in this research was strategically conducted through the Scopus database, which is known to have a detailed coverage of good-quality peer-reviewed literature. In order to obtain accurate as well as relevant results, an advanced search was conducted utilizing the string in Table 1, which yielded only articles with the specified terms in their titles. The process was narrowed to only the title field, thus excluding studies that mentioned the terms peripherally but were not directly related to the topics of disaster, flood, management, or risk. Only publications from 2020 to 2025 were included to reflect the most recent discussions and to avoid outmoded literature that may no longer represent the latest trends, policy directions or methodological developments in disaster risk management. Additionally, only English publications were searched to ensure that the materials could be analyzed and potential inconsistencies due to translation were avoided. A filtering of the data was also carried out

Journal of Tourism, Hospitality and Environment Management
JTHEM
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Volume 11 Issue 45 (September 2026) PP. 106-120

based on inclusion and exclusion criteria. Books, conference proceedings, and review papers were excluded because of methodological uniformity, and to enhance the empirical validity of the reviewed papers, only peer-reviewed journal articles were included. Subject categories were omitted because of the lack of applicability to the core of the studies. This filtering and screening exercise resulted in 1,259 articles being left in the final dataset, which was done up until October of 2025. It is a substantial body of literature developed over the last few years, because research on disaster and flood risk management has increased worldwide. This is particularly true in recent years with the rise of global warming and urbanization, and the vulnerability of infrastructure and communities around the world. The structured search approach, combined with clearly defined criteria, guarantees relevant and comprehensive data, laying the groundwork for more in-depth bibliometric and systematic analysis to uncover gaps, trends, as well as interdisciplinary insights in the field of disaster risk and flood management.

TABLE 1: The Search String.

Scopus	TITLE ((disaster OR flood OR flooding) AND Resilience AND (community OR "special need" OR disable)) AND PUBYEAR > 2014 AND PUBYEAR < 2026 AND (LIMIT-TO (LANGUAGE, "English"))

TABLE 2: The Selection Criterion Is Searching

Criterion	Inclusion	Exclusion
Language	English	Non-English
Timeline	2015 – 2025	< 2015

Data Analysis

VOSviewer is a user-friendly bibliometric software designed by Nees Jan van Eck and Ludo Waltman from Leiden University, the Netherlands. It is one of the most popular applications for bibliometric mapping and visualization (van Eck & Waltman, 2010, 2017). The program has been employed to produce clear network diagrams, to classify connected elements into categories, to make density maps, and it is a useful instrument for researchers to study and analyze scientific publications. It can be applied flexibly for a variety of purposes, such as studying co-citation, co-authorship relations, co-occurrence of keywords, and so on, to gain new insights into research environments. With its user-friendly design and regular updates, the platform offers an intuitive and efficient user experience, allowing users to interact with large volumes of data.

The major advantage of VOSviewer is that it can visualize complex bibliometric data in the form of maps and easy-to-understand diagrams. The tool is very useful for visualizing networks, grouping important elements, identifying co-occurrence of keywords and also for creating density-based maps. It has an intuitive interface that is accommodating to both novice and advanced researchers and offers a range of visualization options and extensive analytical

Journal of Tourism, Hospitality and Environment Management
JTHEM
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metrics to support academic research. The ability to combine the various data sources, including co-authorship, citations, and keyword networks, further strengthens the value and necessity of this program as a tool for bibliometric analysis.

For this research, data encompassing elements comprising authors, titles, citation frequencies, publication years, journals, as well as keywords, were extracted from the Scopus database in PlainText format, spanning the period from 2020 to October 2025. The collected data were subsequently examined through VOSviewer version 1.6.20, where clustering and visualization methods were applied to generate bibliometric maps. Unlike conventional Multi-dimensional Scaling (MDS), VOSviewer positions items in low-dimensional spaces where distances closely represent their similarity alongside the degree of association (van Eck & Waltman, 2010). Although VOSviewer exhibits conceptual foundations with MDS (Appio et al., 2014), it is differentiated by its application of a more efficient normalization approach for co-occurrence data. More precisely, it utilizes the association strength (ASij), which is formulated as:

$$AS_{ij} = \frac{C_{ij}}{w_i w_j}$$

where C_{ij} refers to the observed co-occurrence count between items i and j, whereas $w_i w_j$ indicate their corresponding occurrence frequencies. This measure captures "the ratio of the observed co-occurrence frequency of i and j to the frequency anticipated under the assumption that the items are statistically independent" (Van Eck & Waltman, 2007). Through this method, VOSviewer enables the resulting maps to precisely reflect the underlying framework of research domains, further strengthening its standing as a prominent tool for both bibliometric as well as scientometric analyses.

Research Question (5 RQ)

RQ1: What are the research trends in Resilience in Disaster and Flood Research when analyzed by year of publication?
RQ2: Which articles resemble the most highly cited contributions in this field?
RQ3: Which countries rank among the top ten in terms of publication output on Resilience in Disaster and Flood Research?
RQ4: What are the most frequently occurring and influential keywords associated with Resilience in Disaster and Flood Research?
RQ5: What are the patterns of co-authorship and collaboration among countries?

Journal of Tourism, Hospitality and Environment Management
JTHEM
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Volume 11 Issue 45 (September 2026) PP. 106-120

Findings And Discussion

What Are the Research Trends in Resilience in Disaster and Flood Research According to the Year of Publication?

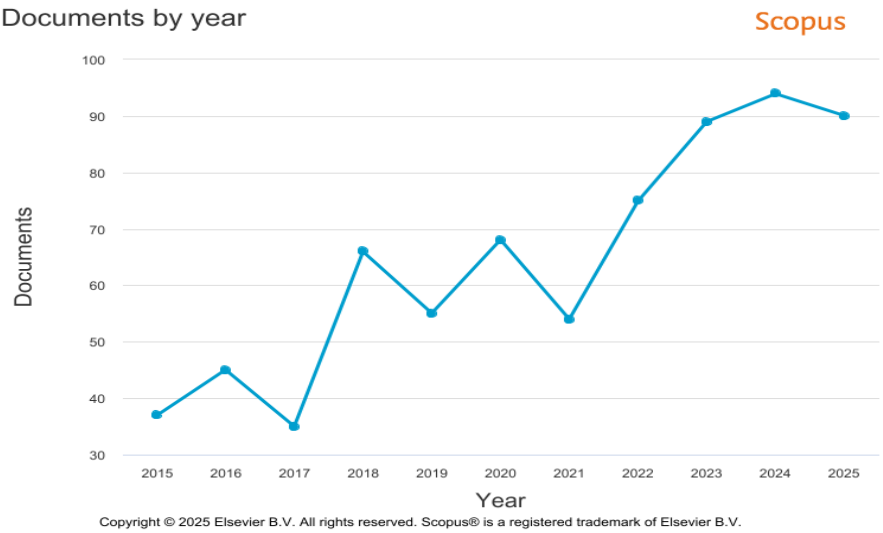

Figure 2: Number of Documents Relying on Year of Publication

The publication trend of resilience in disaster and flood research with the community and special needs population demonstrates a steady increase from 2015 to 2025, indicating the increasing interest of scholars in the field of research on resilience. In the first few years (2015-2017), the number of publications was still relatively small, with under 40 publications per year, indicating that studies on resilience within vulnerable and special needs groups were still in their infancy. Disaster research at the time was mostly on emergency response, hazard mitigation, and risk management, with less emphasis on inclusive resilience and the needs of at-risk populations. Since 2018, there has been a significant rise in publications, with 75 publications in 2022 and peaking at 94 publications in 2024. This steady development is happening in tandem with growing global awareness of the effects of climate change, the increased frequency and severity of floods and other climate-related catastrophes, and the adoption of the Sendai Framework for Disaster Risk Reduction 2015-2030, which advocates inclusive, people-centered strategies for disaster resilience. It also captures a growing trend in disaster studies that focuses on enhancing the resilience of communities, social vulnerability and equitable disaster risk reduction that takes the needs of vulnerable and special needs groups into account.

This slight variation in 2025, where the number of publications reduced marginally from 94 to 90, may be due to the publication lag or data indexing from the current year. However, the general trend of increasing values reflects a paradigm shift in resilience research toward including community involvement and the safeguarding of vulnerable populations such as persons with disabilities, children, women, and elderly people. The rise is also driven by the integration of other sectors such as disaster management, social sciences and public health, highlighting evidence-based strategies and community-based resilience models. The global recognition of the importance of equity, accessibility, and the adaptive capacity of diverse populations for effective disaster resilience is increasingly emphasized in research.

Journal of Tourism, Hospitality and Environment Management
JTHEM
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What Are the Most Cited Articles?

Table 1: Most Cited Authors

Authors	Title	Year	Source title
(Hong et al., 2021)	Measuring inequality in community resilience to natural disasters using large-scale mobility data	2021	Nature Communications
(Rao & Greve, 2018)	Disasters and community resilience: Spanish flu and the formation of retail cooperatives in Norway	2018	Academy of Management Journal
(Sadri, et al., 2018).	The role of social capital, personal networks, and emergency responders in post-disaster recovery and resilience: a study of rural communities in Indiana	2018	Natural Hazards
Asadzadeh, et al. (2017)	Operationalizing a concept: The systematic review of composite indicator building for measuring community disaster resilience	2017	International Journal of Disaster Risk Reduction
Imperiale & Vancla (2016)	Experiencing local community resilience in action: Learning from post-disaster communities	2016	Journal of Rural Studies
Qasim, et al., (2016)	Community resilience to flood hazards in Khyber Pukhthunkhwa province of Pakistan	2016	International Journal of Disaster Risk Reduction
Yoon, et al., (2016)	A measurement of community disaster resilience in Korea	2016	Journal of Environmental Planning and Management
Ostadtaghizadeh, et al. (2015)	Community disaster resilience: A systematic review on assessment models and tools	2015	PLoS Currents
Cox, R. S., & Hamlen, M. (2015)	Community Disaster Resilience and the Rural Resilience Index	2015	American Behavioral Scientist
Burton, C. G. (2015)	A Validation of Metrics for Community Resilience to Natural Hazards and Disasters Using the Recovery from Hurricane Katrina as a Case Study	2015	Annals of the Association of American Geographers

Journal of Tourism, Hospitality and Environment Management
JTHEM
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Volume 11 Issue 45 (September 2026) PP. 106-120

Where Are the Top 10 Countries Based on The Number of Publications?

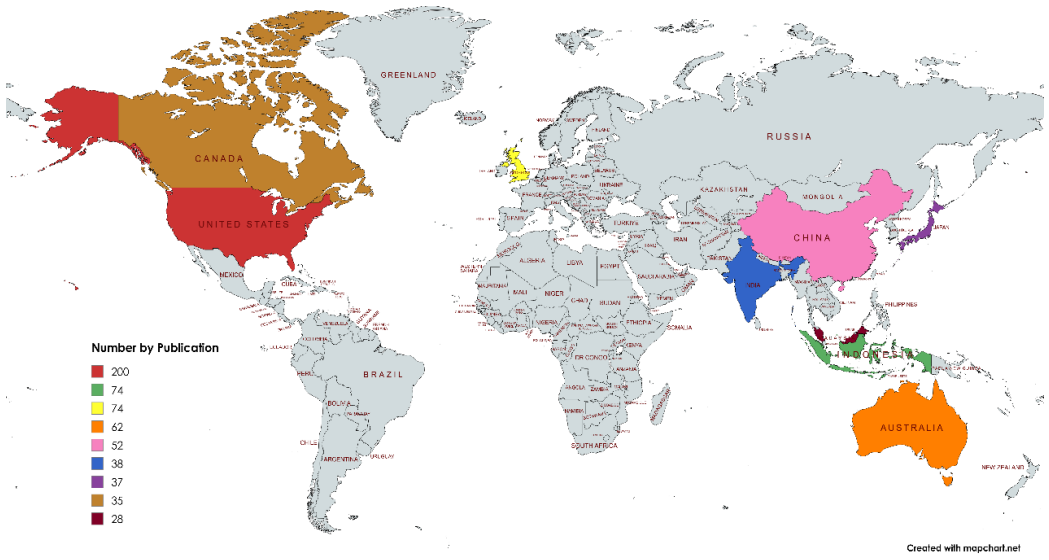

Figure 3: Country Mapping Based on Number of Publications

Research patterns by country indicate that for *community and special needs populations, resilience in disaster and flood management* is a very popular research area, with the US as the leading country with 200 publications, followed by Indonesia (74), the United Kingdom (UK) (74), and Australia (66). This is due to the US's long history of investing in disaster resilience research, the large volume of funding from disaster research agencies such as FEMA and NSF, and the high level of academic infrastructure that facilitates interdisciplinary collaboration between social, environmental and technological disciplines. Other countries, like the UK and Australia, also have high research outputs because they have proactive national policies on disaster risk reduction, climate resilience, and community adaptation. Indonesia's rising visibility is accompanied by increased attention to flood and disaster management in Southeast Asia, as Indonesia is extremely vulnerable to natural hazards and has been participating in various international projects on community resilience and reducing vulnerability.

In the meantime, China, India, Japan, Canada, and Malaysia have a moderate contribution, depending on the focus of research and the allocation of resources to studies on resilience and inclusivity. The number of publications from China (52) and India (38) may be due to a growing focus on climate adaptation and urban resilience, respectively, and Japan's (39) may reflect its powerful disaster management system after disasters such as the 2011 tsunami. The lower number of outputs by Malaysia (28) could be attributed to limited funding and fewer specialized disaster research centers. On the other hand, recent efforts suggest that community-based and inclusive disaster resilience is receiving increasing attention in the country. In general, this distribution highlights the extent to which countries' research products are in line with their vulnerability to disasters and their institutional capacity to conduct interdisciplinary and policy-oriented research.

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 11 Issue 45 (September 2026) PP. 106-120

What Are the Popular Keywords Related to The Study?

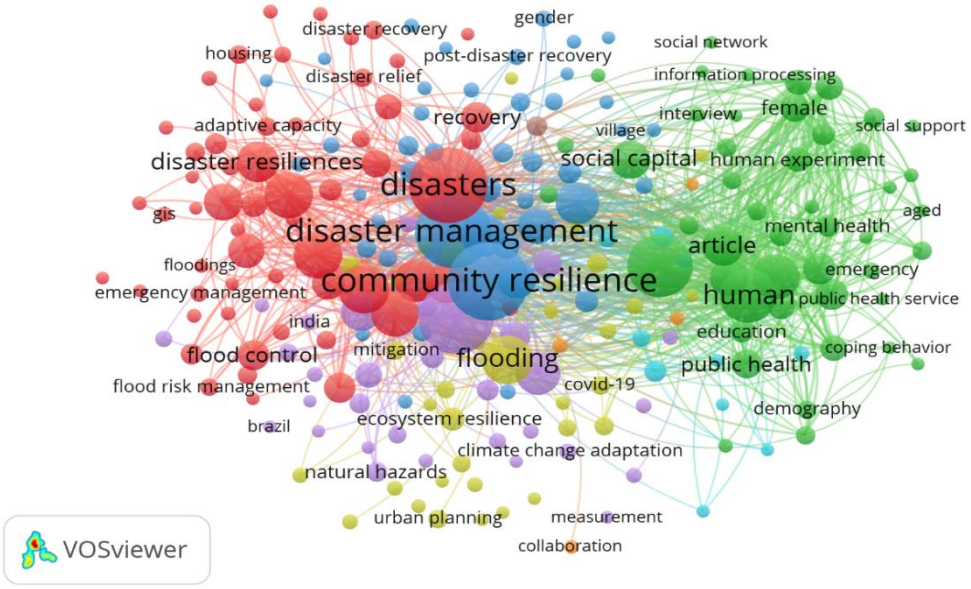

Figure 4: Keywords Associated with Resilience in Disaster and Flood Research

By applying an analysis of co-occurrence of author keywords with VOSviewer, key conceptual relationships and thematic structures in the research on resilience, disaster, and flood management can be identified. It is a bibliometric approach to examine the co-occurrence of specific keywords in academic publications, reflecting the intellectual connections between research areas. In this analysis, all of the counting methods were applied, which means that all occurrences of the keyword were counted equally. Only 231 of 3,170 keywords met the minimum criterion of at least five occurrences. Eight clusters were created, indicating important research themes, with a minimum cluster size of five. The strongest links are between the most frequently co-occurring terms, such as *"community resilience"* (176 occurrences), *"disasters"* (163), *"disaster management"* (156), *"resilience"* (150), and *"flooding"* (68), suggesting their centrality in the field of disaster and resilience studies.

The results suggest that resilience research has developed from a multi-dimensional and interdisciplinary point of view. The high co-occurrence of terms such as *"climate change," "floods," "vulnerability," "public health," "social capital,"* and *"adaptive capacity"* indicates that environmental, social and health aspects have been combined in disaster resilience research. Newly surfaced terms like *"community participation," "risk assessment," "sustainable development,"* and *"psychological resilience"* reflect an increased focus on community involvement, inclusive disaster planning, and mental health. This networked web is part of the body of knowledge, focusing on the shift in resilience research from traditional disaster management to a comprehensive perspective that includes social inclusion, adaptive governance, and sustainability. It also reflects a paradigm shift towards community-based resilience strategies and data-driven approaches, supporting the global conversation to lower disaster risks and build adaptive capacity for all populations, including special needs populations.

Journal of Tourism, Hospitality and Environment Management
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Volume 11 Issue 45 (September 2026) PP. 106-120

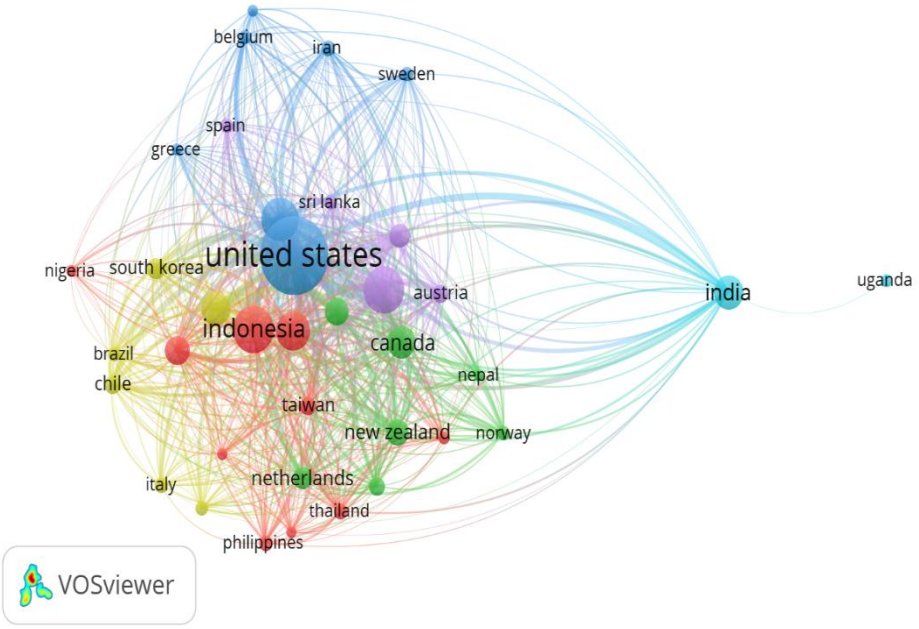

Figure 5: Co-Occurrence Analysis of Countries

The country-level co-authorship network analysis employing VOSviewer can help visualize patterns of research collaboration between countries and identify global partnerships in the field of disaster risk management and resilience studies. The analysis is carried out using co-occurrence of authorship, in which a relationship is established between countries based on the co-authorship of researchers from those countries in the same publication. The full counting approach was adopted, whereby each co-authorship connection was assigned a count irrespective of the number of contributors participating in each collaboration. Among 84 countries, 37 achieved at least five publications. With the application of a minimum cluster size of five, six distinct clusters were identified, corresponding to the main research clusters worldwide. The node sizes correspond to the number of publications, while the thickness as well as color of links represent the level of collaboration and the groups of collaborations. The top contributors and collaboration hubs were found to be the US (201 documents, 4,864 citations), the UK (76,2400), Indonesia (74,414), Australia (64,1613), and China (52,962).

The results reveal a highly globalized and interconnected research landscape, with advanced economies like the US, the UK, and Australia functioning as key research hubs with high research productivity and cross-country collaboration. Developing countries like Indonesia, Malaysia, Bangladesh, and India, meanwhile, are seeing increased engagement, and the development of disaster resilience and management in vulnerable areas of Asia is gaining traction. From the clustering of the indicators, there is strong evidence of partnerships for knowledge sharing, capacity building, and localizing global resilience frameworks that have been initiated between the North and South and between regions. These findings fill a gap in the body of knowledge by demonstrating the benefits of global cooperation in terms of the quality of research, diversity of perspectives, and innovation in addressing global challenges concerning climate adaptation, disaster risk reduction, and community resilience. In addition, the current context of the emerging role of Southeast Asian countries demonstrates a regional

development of scientific networks to be more resilient to disaster threats and inclusive of Southeast Asian regions.

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