

Systematic Literature Review on Enhancing Disaster Resilience through Spatial Planning Strategies

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Abstract

PRISMA Framework in this case is indispensable as it has globally been accepted as a model to undertake a systematic literature review. Microsoft Excel Sheet was applied in analysing the results for presentation in bar and pie charts for effective unleashing of included studies. The included studies totalled 31 after the application of the inclusion and exclusion criteria. Analysis revealed that most of the disaster resilience literature published is geared towards spatial planning followed by flood risk resilience. Also, most of these case studies were found in Europe. However, none of these 31 studies was the same as the chosen topic. Meta-analysis was done through the application of the PRISMA framework. Most of the included studies were case studies from Europe which implies that they have benefited from disaster resilience literature whereas continents like Africa and New Zealand have not benefitted so much from publications. This is an opportunity for scholars to embark on more research on the chosen topic. A limited number was included and generalization on the outcome of this literature review must be accompanied by the assumption that: apply the study topic based on a geographic case study to avoid duplication. The analysis of the results from the 31 studies implies that none of the published studies have written on this research topic and scholars should explore it to reduce disaster occurrence as climate change looms high.

Keywords: Systematic Literature Review; Disaster Resilience; Spatial Planning Strategies; Vulnerable Communities; Climate Change.

1. Introduction

Disaster occurrences continue or intermittently cause shocks to humanity through the destruction of property or the claiming of lives. The trauma and psychological stress caused by the incidence of disasters either artificial or natural should be anticipated through strategic spatial planning. This research aims to furnish scholars with up-to-date trends and statuesque literature published on "enhancing disaster resilience through spatial planning strategies". The sustained progression of a field of research largely depends on the continuity and growth of research knowledge and capabilities. For a field to progress, it must be conscious of its historical patterns to obtain insights into possible future developments and implications that contribute to the accumulation of knowledge (Dwivedi et al., 2022). In general, the main purpose of review studies is to analyse what has already been done in the field. Review studies, despite contributing significantly to the development of knowledge, This paper detects gaps in the literature

captured and sets an ambition to contribute to the body of knowledge hitherto conducted and open new windows or grey areas for researchers to explore in the quest to safeguard humanity against disaster occurrence through spatial planning strategies.

Strategizing against disasters is the prior objective of most nations in an attempt to adopt a proactive approach to disasters instead of a reactive one. In 2017 alone, more than 200 papers were published on resilience in the field of risk and disaster management, a sevenfold increase from 10 years earlier (Graveline & Germain, 2022). The spectre of natural disasters looms large, often striking with devastating consequences, especially in vulnerable communities. With the increasing frequency and intensity of these events attributed to climate change, the imperative to fortify communities against their impact has reached critical importance. The European Union (EU) has firmly positioned itself as a global leader in promoting and implementing Nature Based Solutions (NBS) (Davies et al., 2021)

Most development interventions are not designed with a climate change ‘adaptation’ label, but they likely influence communities’ capacity to adapt to changing shocks and trends – whether as a result of climate change or other pressures associated with development (Jones et al., 2010). A framework for understanding and assessing adaptive capacity at the local level is needed to begin to understand how it can be supported through wider development processes at both local and national levels. Such a framework may in time serve as a platform to monitor progress, identify needs and allocate development resources to enhance a system’s ability to adapt to change. There is a need to change society as a whole, and this cannot be tackled by the mindset of traditional planning, with rigid procedures and tools. Instead, strategic spatial planning is believed to be a more proactive response, which calls for a more transformative practice (Albrechts, 2011). Spatial planning, as a proactive measure in disaster risk reduction, stands as a pivotal tool in mitigating vulnerabilities and enhancing resilience. However, traditional top-down approaches often fall short of addressing the nuanced needs and dynamics of vulnerable communities.

The research question in this systematic review is, how can spatial planning strategies enhance disaster resilience? Based on this research question, the following objectives are formulated: to apply the systematic literature review to thoroughly assess literature published on enhancing disaster resilience through spatial planning strategies. Identification of research gaps in the available literature and propose future research directions. This paper also seeks to delve into the efficacy of a strategic approach to spatial planning as a means of bolstering disaster resilience within vulnerable settings. In these contexts, where socio-economic disparities, inadequate infrastructure, and environmental susceptibility intersect, the role of spatial planning strategies in modelling sustainable cities becomes paramount.

2. Methodology

The website search platforms such as Scopus, Connected Papers and Google Scholar were widely used to generate databases on the subject matter. All of them are web-based internet sources for acquiring data for systematic literature review. They have immensely contributed as search engines for the facilitation of this paper as a means of soliciting historical literature to diverse contributions made in the quest to ameliorate the impact posed by the occurrence of disasters through spatial planning strategies. The search terms used are Disaster Resilience OR Spatial Planning. The development of the search terms was conducted in line with the Boolean Operatives (Linnenluecke et al., 2020). The data generated from the above sources were presented in tabular form giving details of each article. Since they were auto-generated it became easy for synthesis. The identification of the relevant data led to the creation of a database for relevant literature.

The search for data commenced on 1st December 2023. Through the above sources, 126 published papers were generated for screening. Application of the inclusion criteria allowed the inclusion of articles. Also, articles published in English were included as those written in other languages are not understandable. Also, all articles published between 2010 and 2023 on the subject were selected. Finally, publications closely related to the subject matter were included to satisfy the process to its successful conclusion. All publications that were made in books and conference papers were excluded. Publications made in other languages apart from English were excluded. Also, publications that did not relate to the research topic were excluded. Finally, publications outside 2010 to 2023 were excluded to limit results to current publications.

The PRISMA Framework was used to establish the inclusion and exclusion criteria for literature on the subject matter. The application of the PRISMA Framework in this case is indispensable as it has globally been accepted as a model to undertake a systematic literature review. Cochrane systematic reviews are conducted and reported according to rigorous standards. A study flow diagram must be included in a new review, and there is clear guidance from the PRISMA statement on how to do this (Stovold et al., 2014). The scope of the review focuses on all related articles and journals published on “enhancing disaster resilience through spatial planning strategies”. The website search platforms such as Scopus. In describing eligible research publications for each synthesis identification, the PRISMA framework was applied. This is illustrated in Figure 1.

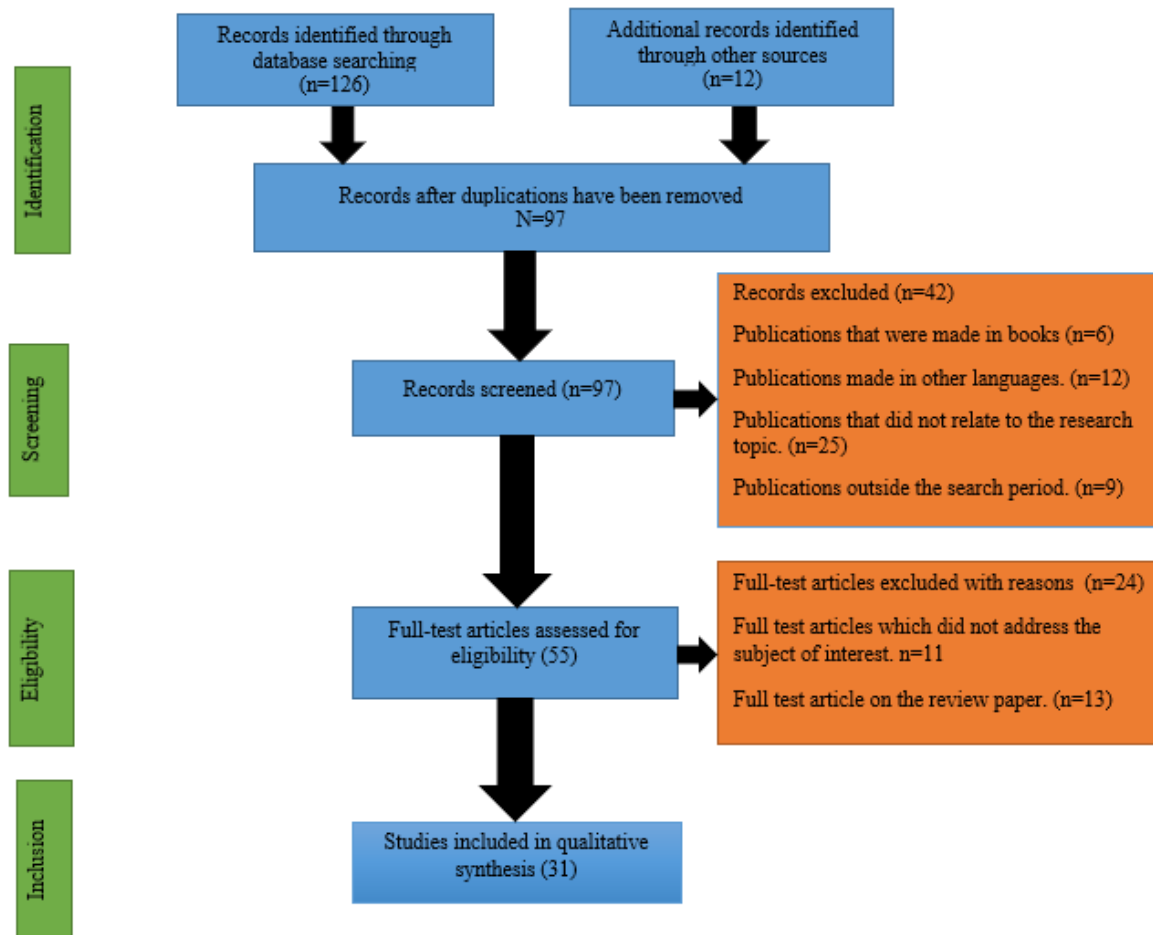


Figure 1: PRISMA Framework

Source: (Rahimi et al., 2023)

Screening of the results was based on the inclusion and exclusion criteria. Inclusion criteria may include relevance to the research question, publication date, and language. Exclusion criteria may include irrelevant topics, publication type, and study design.

Extract data: Extract data from the selected studies. This may include study design, sample size, data collection methods, and key findings.

3. Results

Synthesizing the results of the selected studies from the database is enough evidence to declare a generalization on the findings and observations made (Finfgeld-Connett, 2010). The key observations made include the identification of common research themes, patterns, and gaps in the literature. Further synthesis also revealed that these papers are provided in the following themes: hazard and risk analysis, flood behaviour analysis, assessment frameworks and metrics, and intervention strategies. The contributions are discussed in the broader context of the field of flood risk and resilience management and future research directions are identified for sustainable and resilient disaster management.

Publications from 2010 to 2023

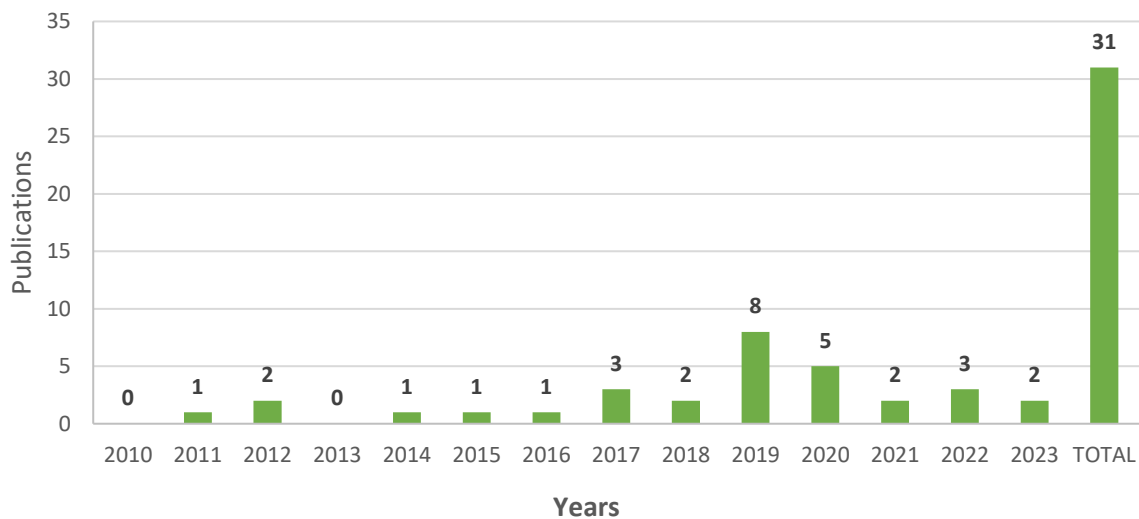


Figure 2: Publications from 2010-2023

Source: Authors’ construct, 2023

These figures are presented to broaden insight into the dynamics of the database captured for this literature review. Figure 2 represents the publications made spanning from 2010 to 2023 as the period for reviewing the literature on the chosen subject matter. The included publications totalled 31. The highest year of publication was 2019 which coincides with the occurrence of COVID-19. This implies more authors wrote and published disaster resilience papers not necessarily on health challenges but also on other resilience interventions such as flooding and climate change.

Case Studies by Continent

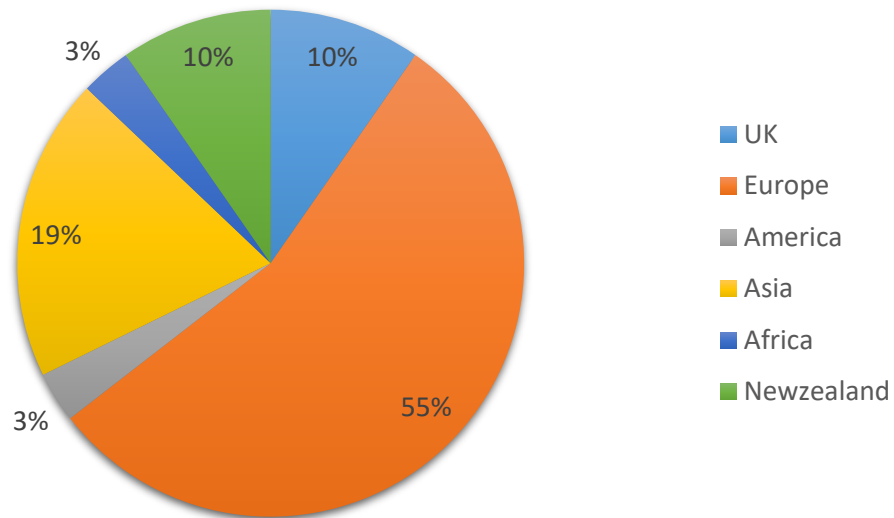


Figure 3: Case Studies by Continent

Source: Authors’ construct, 2023

Continent was not used as an exclusion criterion. Figure 3 demonstrates the case study areas of the publications made during the period for reviewing the literature. Europe is the leading continent for publications on disaster resilience followed by Asia.

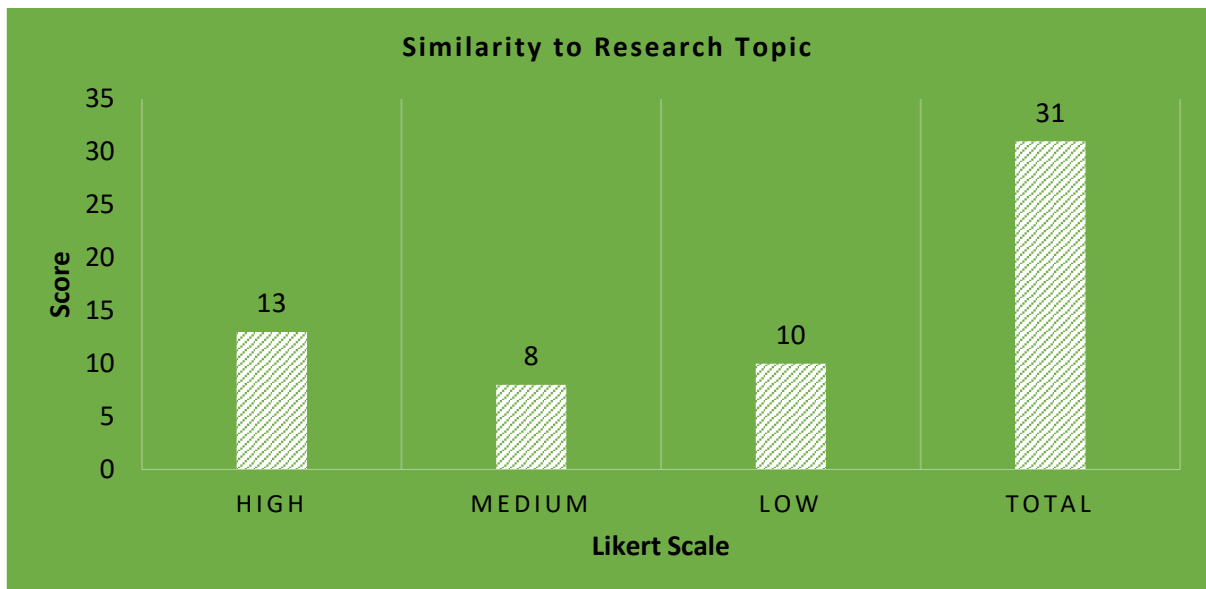


Figure 4: Similarity to Research Topic

Source: Authors’ construct, 2023

Figure 4 indicates the similarity of the chosen publications with the research topic on a Likert Scale of 1, 2 and 3 for low, medium and high similarity respectively. The relative closeness to the research area for reviewing literature was one of the inclusion criteria for the relevant publications for the period under review. 13 of the selected publications were highly similar to the chosen research topic and 8 were medium

similar to the chosen topic, however, 10 were lowly similar to the chosen research area. Since the research area did not coincide with any of the 31 selected topics then it offers an opportunity for researchers to leverage to develop robust thinking in disaster resilience.



Figure 5: Publications by Authors'

Source: Authors construct, 2023

Authors who contributed to the publicity of these 31 selected articles are analysed in Figure 5 to appreciate their contributions within this period. Meng Meng M. Dąbrowski and D. Stead published 5 papers out of the 25 authors who published the 31 articles. P. V. Veelen and Zuzana were the second highest as each of them was able to publish 2 papers as compared to others who were able to publish 1 article.

Table 1: Included Studies Focus

NO.	Title	Abstract/Findings	Author	Similarity/Focus
1	Enhancing Flood Resilience and Climate Adaptation: The State of the Art and New Directions for Spatial Planning.	This paper provides a review of the recent developments in flood resilience, risk management, and climate adaptation; based on this, it positions planning research and practice within these works of literature.	(Meng et al., 2020)	Highly related. Focus on flood resilience in Asia.

2	Spatial planning in the face of flood risk: Between inertia and transition.	Given the greater risk of flooding in cities due to climate change, spatial planning systems are increasingly expected to contribute to flood resilience.	(Meng et al., 2022)	Highly related Focus on spatial planning and flood risk Asia
3	Flood Risk Mapping: Using Remote Sensing Technique to Identify the Influence Of Floods On Territorial Planning (A Case Study Of Shaki District, Azerbaijan)	The analysis method was used to determine the residential areas at risk and the level of risk. The Copernicus LULC map, the annual precipitation, and the DEM file were used as the database for the study.	Nofal Artunov, 2023.(Артунов, 2023)	Related Focus on flood risk in Asia
4	Evaluation of Kosovo municipal spatial plans quality and implementation: the case of Gjilan.	This paper will reflect on the development of the municipality after the realization of the planned activities, the current situation in the area and the achieved effects.	(Kelmendi, 2018)	Related Focus on Spatial Planning Europe
5	Unpacking principles of resilience mainstreamed in Ethiopia's local urban spatial planning documents: practices from Kombolcha, an urbanizing secondary city	Adopting and enforcing redundancy, diversity, robustness, and integration principles are required to create spatially resilient cities. However, no studies have demonstrated their significance and application to local urban spatial planning legal frameworks (policy documents) and plans.	(Maru & Worku, 2022)	Highly related Resilience and spatial planning with a focus on legal aspects. Africa
6	What Can We Learn from Planning Instruments in Flood Prevention?	The article explains the challenges of governance configured by a conflict between the spatial planning policy steered by local authorities and the risk prevention policy led by national authorities.	(Gralepois, 2020)	Highly related Focus on planning instruments and flooding

	Comparative Illustration to Highlight the Challenges of Governance in Europe.			Europe
7	Shifts in Spatial Plans for Flood Resilience and Climate Adaptation: Examining Planning Procedure and Planning Mandates	The paper examines the development of different spatial plans to address flood resilience in the Chinese city of Guangzhou, one of the most vulnerable cities to flooding and climate change.	(Meng, Dąbrowski, & Stead, 2019)	Highly related Focus on spatial planning and flooding. Asia
8	Models of Implementation of Spatial Plans: Theoretical Approach and Case Studies for Spatial Plans for the Special Purpose Area.	The study points to the need for and defines a model of implementation for spatial plans rooted in the theory of planning. The elements and contents of the proposed model of implementation suggest a logical, functional and temporal coherence of all planning decisions covered by the plan.	(Stefanović et al., 2018)	Highly related Focus on spatial plans and special purpose. Europe
9	The Impact of Participatory Planning Approach on the Quality Urban Design of Former Riverbank Brownfield Sites.	This participatory approach is explained in case studies of former brownfield sites situated on riverbanks in the cities of Trenčín and Bratislava. In both former riverbank brownfield sites the approach of public participation has been used in different phases and manners.	(Ladzianska et al., 2019)	Related Focus on spatial planning and river banks Europe
10	Urban Design of Former Riverbank Brownfield Sites.	The paper aims to present how good participatory planning can have a direct impact on urban design quality. This participatory approach is explained in case studies of former brownfield sites situated on riverbanks in the cities of Trenčín and Bratislava	(Ladzianska et al., 2019)	Related Focus on the spatial planning model

11	A comparative analysis of the land-use patterns of the post-socialist urban peripheries in Central and Eastern Europe.	This research aims to identify the land-use patterns that characterize urban peripheries in Central and Eastern Europe, after the fall of communism.	(Sandu & de Lille, 2019)	Highly related Focus on spatial planning Europe
12	Baltic Surveying 11 67 on the Improvement of Land Management Schemes and Programs of Social and Economic Development of the Administrative Districts In the Republic of Belarus.	The article provides a description of sectorial and regional planning in the Republic of Belarus which consists of a hierarchically organized system of socioeconomic development programs of the republic, its regions and districts as well as the complex documents of regional planning.	(Chyzh et al., 2011)	Related Focus on land management. Europe
13	Judicial Control of Spatial Plans as Prerequisite of Economic Development in Croatia.	The subject of this paper is the analysis of the procedure before the High Administrative Court regarding the legality of spatial plans, the course of the procedure, and the question of how this procedure affects the protection of the fundamental rights of the citizens.	(Held, 2019)	Related Focus on the legalities of spatial plans. Europe
14	Towards a Characterisation of Adaptive Capacity: A Framework for Analysing Adaptive Capacity at the Local Level.	A framework for understanding and assessing adaptive capacity at the local level is needed to begin to understand how it can be supported through wider development processes at both local and national levels.	(Jones et al., 2010)	Highly related Focus on the adaptive capacity of vulnerable communities UK

15	The governance of flood risk planning in Guangzhou, China: using the past to study the present.	The paper distinguishes two major transformations of the approach to dealing with water in Guangzhou. Historically, the city was built under the influence of Fengshui Philosophy and co-existed with water. Then, the approach shifted towards engineering-based solutions to contain flood risk under the stress of rapid city expansion	(Meng & Dubrwsoki, 2016)	Highly related Focus on the governance of flood risk. Asia
16	Lessons Learned from Applying Adaptation Pathways in Heat Wave Risk Management in Antwerp and Key Challenges for Further Development.	Analysis of the experience in the United Kingdom and the Netherlands in long-term planning in flood risk management shows that the adaptation pathways approach is effective in keeping decision processes going forward, to the final approval of a long-term plan, and helps increase awareness about uncertainties.	(Meng & Dubrwsoki, 2016)	Related Focus on heat wave Europe
17	Building climate resilience through nature-based solutions in Europe: a review of enabling knowledge, finance and governance frameworks.	Abstract The European Union (EU) has firmly positioned itself as a global leader in promoting and implementing nature-based solutions (NBS).	(Calliari et al., 2022)	High related Focus on climate resilience through NBS Europe
18	The Quest for Adaptation through Spatial Planning and Ecosystem-Based Tools in Resilience Strategies.	The present paper is an attempt to assess whether and how city strategies address the objective of an adaptation which interconnects the criteria of vulnerability, adaptability, and resilience through spatial planning.	(Salata & Yiannakou, 2020)	Highly related Focus on green infrastructure (GI) Europe.
19	Improving flood resilience through	We found, first, that literature is producing insights on increasingly technically advanced risk assessments	(Matczak & Hegger, 2021)	Highly related

	governance strategies: Gauging the state of the art.	and agent-based models but societal debate on justice in flood risk governance is getting attention. An emerging topic is that of citizen engagement.		Focuses on flood resilience Europe
20	Protection of Environmental and Natural Values of Urban Areas against Investment Pressure: A Case Study of Romania and Poland.	The findings indicate that national protection is required in both countries to ensure the effective protection of natural areas situated within city administrative limits that provide important ecosystem services.	(Legutko-Kobus et al., 2023)	Related Focuses on environment and natural values Europe
21	Collaborative spatial planning in the face of flood risk in delta cities: A policy framing perspective.	This study aims to explain the reasons for this difficulty through the case study of Guangzhou, a Chinese delta city that is highly vulnerable to coastal, fluvial and pluvial flooding, particularly in the context of a changing climate and rapid expansion of the urban fabric.	(Meng, Dąbrowski, Tai, et al., 2019)	Highly related Focus on spatial planning and flood risk Europe
22	Adapting to changing climate risk by local government in New Zealand: institutional practice barriers and enablers.	We examine how the roles and responsibilities of national, regional and local governments influence the ability of local government to deliver long-term flexible responses to changing climate risk.	(Lawrence et al., 2015)	Related Focuses on institutional arrangements New Zealand
23	Inside or Outside? The Impact Factors of Zoning–Land Use Mismatch.	The effect of plan implementation can affect sustainable land use and regional development. Empirical studies have shown that land development commonly and frequently fails to conform to land-use plans. However, neither qualitative nor quantitative studies are conducted to comprehensively explore the reasons for zoning–land use mismatch.	(Li et al., 2019)	Related with focus on land use planning mismatch Asia

24	Towards Integrated Flood Risk and Resilience Management.	There is a significant knowledge gap in the study of resilience concepts, assessment frameworks and measures, and management strategies. This editorial introduces the latest advances in flood risk and resilience management, which are published in 11 papers in the Special Issue.	(Fu et al., 2020)	Related With a focus on flood risk UK
25	Disrupting path dependency: Making room for Indigenous knowledge in river management.	This paper provides a case study for the creation, maintenance, and attempts to break path dependency within the management of rivers in the Rangitāiki Plains of Aotearoa New Zealand from the 1890s	(Parsons et al., 2019)	Related Focus on river management Newzealand
26	Developing Resilient Urban Waterfronts Integrating Adaptation into Urban Development and Management.	This paper explores to what extent climate adaptation can be integrated into processes of urban development and change, based on case study research in the Rotterdam waterfront area (Feijenoord). In this research “adaptation opportunities” are identified, by mapping all planned spatial investments in brownfield development, and urban renovation.	(van Veelen, 2017)	Related Focus on integration of climate adaptation into planning. Europe
27	A hybrid process to address uncertainty and changing climate risk in coastal areas using Dynamic adaptive pathways planning, multi-criteria decision analysis & Real options analysis: A New Zealand application.	This paper sets out what we learned by complementing multi-criteria decision analysis with DAPP and ROA when developing a 100-year coastal adaptation strategy in Hawke's Bay, New Zealand.	(Lawrence et al., 2019)	Related Focus on climate risk in coastal areas New Zealand

28	Development and appraisal of long-term adaptation pathways for managing heat risk in London.	This paper applies adaptation pathway methodology to urban heat risk management. We use spatially coherent downscaled probabilistic climate change.	(Kingsborough et al., 2017)	Related Focus on Heat risk UK
29	Regional challenges of climate change adaptation in Finland: examining the ability to adapt in the absence of national level steering.	The paper describes how voluntary initiatives at the regional and local levels have emerged, and regions have acted on adaptation in the absence of clear steering from the national level.	(Juhola et al., 2012)S.	Related Focuses on climate adaptation. Europe
30	Hurricane Sandy and Adaptation Pathways in New York: Lessons from a First-Responder City.	Climate change will significantly affect cities; and rapid global urbanization will increase dramatically the number of individuals, amount of critical infrastructure, and means of economic production that are exposed and vulnerable to dynamic climate risks.	(Rosenzweig & Solecki, 2014)	Related Focus on Hurricane Sandy. America
31	Assembling community energy democracies. Voluntary Sector Review.	This article offers a novel conceptualisation of democracy by viewing community energy projects as assemblages of heterogeneous elements and traces their enlacement with a wide range of social and political relations.	(Van Veelen & Eadson, 2020)	Related Focus on community mobilization for spatial planning. Europe

Source: Authors' Construct, 2023

Table 1 indicates the 31 Authors included in this systematic review and their research focus. These are empirical evidence against which inferences can be made about how similar the published topics are related to the chosen research topic. A summary of the results is tabulated in Table 2 and analysed in Figure 6.

Table 2: Summary of Included Studies Focus

Research focus	Score
Flood risk resilience	5
Climate change adaptation	6
Heat risk	2

Nature-based solutions	2
Waterfronts	2
Hurricane Sandy	1
Spatial Planning	13
Total	31

Source: Authors' construct, 2023

Table 2 summarizes Table 1 which is analysed in figure 6 to display the focus of the included studies. These are the main focus of the included studies which provides credence to the fact that, the majority of the included studies totalling 13 which is 49 percent out of the 31 included studies focused on spatial planning. Consequently, the confidence level for the included studies is very high.

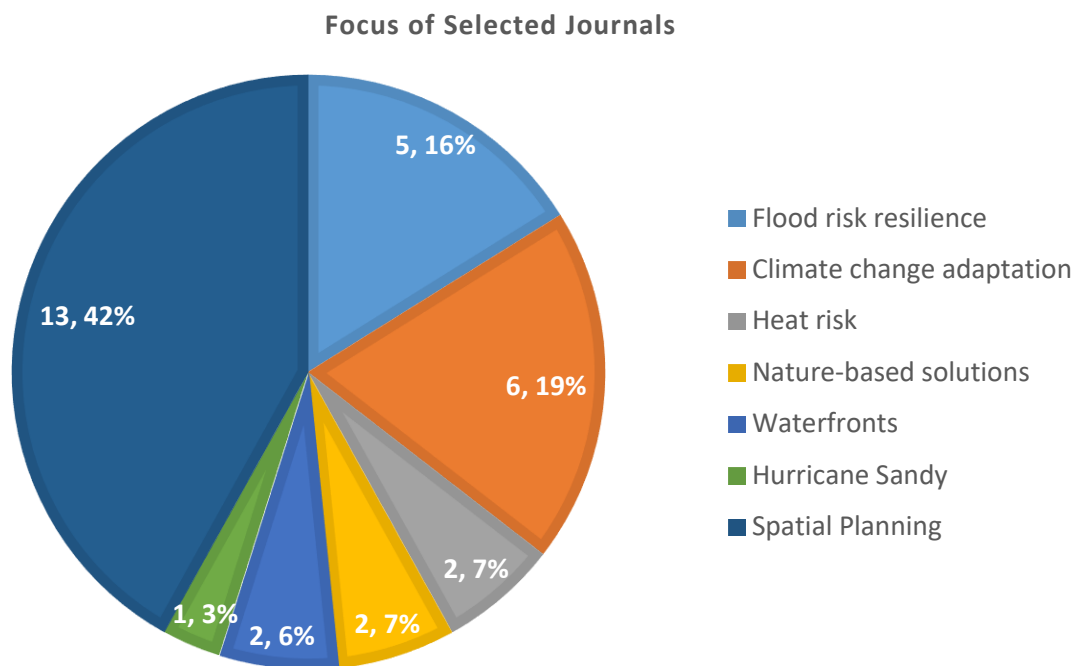


Figure 6: Focus of Selected Studies

Source: Authors' construct, 2023

When it comes to resemblance, disaster resilience in spatial planning leads the 31 examined research with 42 per cent. Disaster resilience in climate change adaptation also accounts for 19 per cent which ranks next. This result confirms that the 31 articles that made up this review's sample were chosen with minimal bias in existing literature.

4. Discussion

In synthesizing the results of the systematic literature review comprehensively, the PRISMA Framework analysis has clearly illustrated the methodical procedure by which researchers can use the selected topic, "enhancing disaster resilience through spatial planning strategies," to ensure formidable disaster resilience through spatial planning strategies. The majority of the authors in the publications that were evaluated focused on flooding; nevertheless, disasters should be considered holistically, encompassing not just starvation but also fire outbreaks, car accidents, wind storms, earthquakes, and volcanic eruptions.

After reviewing the selected journal's abstract, methodology, important findings, research gaps, and conclusions, their focal areas provided sufficient proof for eligibility for selection during the systematic

literature evaluation. Where appropriate, figures have been used to support the database that was sourced from different websites to clarify the steps involved in adding to the body of knowledge that has previously been acquired.

In terms of resemblance, disaster resilience in spatial planning leads the 31 examined literature with 42 per cent. Disaster resilience accounts for 19 per cent and flood resilience is the third with 16 per cent. This result confirms that the 31 papers that made up this review's sample were chosen with minimal bias in the existing literature. Spatial planning remains an antidote to all dimensions of disasters notwithstanding the natural occurrence of some of these incidents. Spatial dimensions affect all activities embarked upon by people, hence its strategies remain indispensable so far as disaster occurrence is concerned.

5. Conclusion

We have reviewed the materials on improving disaster resilience through spatial planning strategies in this systematic literature review. The role of spatial planning in reducing disaster risk and vulnerability, the opportunities and challenges of incorporating disaster resilience into spatial planning, the best strategies and resources for putting disaster resilience into practice, and the assessment and tracking of spatial planning outcomes for disaster resilience are the four main themes that emerged from the review.

Our review has discovered that spatial planning can play a significant role in enhancing disaster resilience by addressing the underlying causes of disaster risk, such as exposure, hazard, and capacity, and by promoting sustainable and inclusive development. However, we have also found that many gaps have not been addressed in the previous research such as barriers and constraints that hinder the effective integration of disaster resilience into spatial planning, such as lack of awareness, coordination, resources, data, and participation.

To address these gaps and provide recommendations for future research paths related to spatial planning strategies and techniques, we have proposed strategies to address the issues posed by disasters. The measures encompass fortifying the legal and institutional structures, augmenting the capability and cooperation of relevant parties, improving the accessibility and calibre of data and information on disaster, and involving and integrating marginalized populations and groups in the process of spatial planning. Researchers have the opportunity to leverage these grey areas in their efforts to develop a robust capacity for disaster resilience and climate change adaptation

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