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Key Factors For Successful Flood Disaster Knowledge Transfer In Riverbank Areas: A Literature Review

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ABSTRACT

Introduction: Floods are seasonal disasters when water capacity overflows from existing waves and drowns the surrounding land. The losses incurred by floods, especially indirect losses, rank first or second after earthquakes or tsunamis.
Methods: A systematic search of Cochrane, Google Scholar, PubMed, Scopus, Embase and Web of Science database reviews. The following keywords were used to conduct the literature search: "Flood", "Capacity Building", and "Natural Disaster".
Results: From the review of 14 abstracts and titles, six were determined to meet the research objectives. Overall, Interaction and Collaboration in Flood Disaster Knowledge Transfer, Experience, Social Learning, and Transdisciplinary Approach in Flood Disaster Knowledge Transfer, Knowledge Management and Absorption Capacity in Flood Disaster Knowledge Transfer.
Conclusion: Interaction and collaboration in flood disaster knowledge transfer is essential to reduce disaster risks and losses. Collaboration between all relevant sectors, such as government, business, community, academia, and mass media, can also help reduce flood risk through disaster programs. Experience, social learning and transdisciplinary approaches all play a role in improving the knowledge capacity and attitudes of communities in dealing with floods. Knowledge management and absorptive capacity in flood disaster knowledge transfer are also important to reduce disaster losses and improve disaster preparedness.

KEYWORDS

Flood, Capacity Building, Natural Disaster, Knowledge Transfer

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INTRODUCTION

Indonesia is located on the Pacific Ring of Fire, which is in a cluster of volcanoes and the meeting point of a number of land plates, making it vulnerable to natural disasters. Almost all types of natural disasters occur in Indonesia at any time so that people must behave in disaster response (Anies, 2017). Natural disasters are caused by various natural events or occurrences and can occur due to human actions such

as tsunamis, floods, earthquakes, landslides, volcanic eruptions, tornadoes, land and forest fires, and drought (Hidayanto 2020). Floods are seasonal disasters when water capacity overflows from existing waves and submerges the surrounding land (UU RI No. 24 Tahun 2007).

Based on Indonesian disaster data released by BNPB, in 2022 the number of floods in Indonesia was 2,403 cases with 92 deaths and 178,367 people suffering from floods. Meanwhile, in 2023 floods increased to 3,233 cases with 85 deaths and 90,187 people suffering from floods. Statistics for 2014-2023 obtained from BNPB show that floods ranked second as the most cases of disasters, namely 8,334 cases after the tornado disaster of 8,569 cases which ranked first (BNPB, 2023). Therefore, flood disasters need to be intervened through capacity building so that more people can be saved and reduce losses due to flooding.

Flood-prone areas are areas that often and have a high potential to experience flood disasters according to the characteristics that cause flooding. Slum areas, especially those built along riverbanks, are one of the causes of flooding because they can obstruct the flow of the river. This is exacerbated by the fact that most people still have the habit of throwing garbage in the river. In addition, river overflow floods are usually seasonal or annual and can last for days or weeks without stopping. The amount of flood volume depends on several factors, such as soil conditions (soil moisture, vegetation, temperature/seasonal changes), the condition of the land surface that is tightly covered by brick buildings, cement blocks, concrete, settlements/housing and the loss of water catchment areas/land conversion (Asdak, 2004). Floods can be categorized into two types: natural floods and floods caused by human activities. Natural floods are caused by rainfall, physiography, erosion and sedimentation, river capacity, drainage capacity and tidal influence. Meanwhile, floods due to human activities are caused by human actions that cause environmental changes such as changes in watershed conditions, residential areas around the banks, damage to land drainage, damage to flood control buildings, destruction of forests (natural vegetation), and improper planning of flood control systems.

Losses caused by floods, especially indirect losses, rank first or second after earthquakes or tsunamis (BNPB, 2013). Not only physical impacts are felt by the community but also non-physical losses such as schools being closed, the price of basic goods increases, and can even cause fatalities. Kodoatie and Sjarief (2006) provide several examples of the impact or loss of flooding, namely loss of life or resulting in injury, loss of property, damage to housing, damage to trade areas, damage to industrial areas, damage to agricultural areas, damage to drainage and irrigation systems, damage to roads and railways, damage to highways, bridges, and airports, damage to telecommunications systems, and others.

Wijaya (2007) revealed that the ability to anticipate disasters in Indonesia is very minimal, which is a problem not only of disasters and their causes, but the anticipation of disasters is also a problem in itself. An early warning system requires a clear structure, flexible and alert institutions, as well as socialization that can touch all social layers with the aim that people are always alert to face disasters as a consequence of living in disaster-prone areas. According to Nurjanah et al. (2012), to increase community capacity, a strong role is needed in dealing with disaster threats related to programs/activities. The main goal is for the community to be able to anticipate disasters, be able to handle emergencies and be able to recover from disasters. Therefore, programs/activities that can be carried out to reduce the risk and impact of flood disasters include:

1. Education and training, research and development of disaster science and technology, disaster management through the application of technology and spatial mapping.
2. Early warning systems of various types of disasters
3. Disaster socialization through mass media
4. Disaster management training
5. Providing technical and non-technical support, increasing the active role of the community in disaster management, building community capacity on the recognition of threats and vulnerabilities in the region, education and training on environmental conservation and disaster

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risk reduction including flooding, must be held.

Capacity building in preventing flood disasters is an effort to increase the ability and willingness of organizations to keep up with changes and reduce disaster risks. This includes the development of resources, budgets, organizational culture and human resources. Institutional capacity building is needed to improve the ability and existence of BPBD (Badan Penanggulangan Bencana Daerah) in carrying out disaster management, such as flood disasters (Ulum, 2013). Capacity building can be done by various sectors, not only the government sector but also non-government sectors such as community organizations and individuals.

Capacity building in government in flood disasters is the process of increasing the ability of government organizations to perform their duties effectively and efficiently in order to minimize the potential flood hazards that exist in riverbank communities. This capacity building is carried out individually, in groups, and institutions or organizations, with the aim of ensuring organizational sustainability in achieving the goal of minimizing potential flood hazards and the targets concerned (Hapsari & Djumiarti, 2016).

Capacity building in the community is an effort to increase the capacity of individuals, groups, or organizations in achieving goals. Capacity building can improve the skills of individuals and organizations to prevent potential hazards during floods so that they can face challenges and take advantage of opportunities that arise when floods occur. Activities are designed to increase the knowledge, skills and resources needed to achieve desired outcomes. Capacity building can occur at multiple levels, including individual, organizational and community levels. Examples of capacity building activities in various sectors and industries include the application of capacity building in agriculture, tourism, health and education (Noya & Clarence, 2009).

The benefits that can be felt when capacity building in an effort to prevent potential flood hazards in riverbank communities are (Proxsis, 2023)

1. Improving the capacity and skills of individuals and organizations, so that they can deal with the issues at hand
2. Increase organizational effectiveness by identifying, developing and implementing effective strategies
3. Increase organizational sustainability and make organizations more self-sufficient and sustainable, so that they can maintain and improve existing programs
4. Increase support and collaboration
5. Improve well-being and health

MATERIALS AND METHODS

This research is a literature review conducted in 2024 to determine the key success factors of flood disaster knowledge transfer in riverbank areas. We conducted a systematic search of Cochrane, Google Scholar, PubMed, Scopus, Embase, and Web of Science database reviews. The following keywords were used to conduct the literature search: "Flood", "Capacity Building", and "Natural Disaster". Original peer-reviewed articles, abstracts, reports, and letters to the editor written in English and published between will be considered. Non-English articles, ongoing projects, review articles, and publications that address non-human research. A systematic registration review process was omitted due to expected data scarcity and topic requirements. The title and abstract of each article were examined, and the most relevant papers were selected using the inclusion and exclusion criteria mentioned earlier. To guarantee the quality of the selected articles, a checklist consisting of ten categories was created using relevant research. Afterwards, the full text of the selected articles was extensively examined to obtain significant results.

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RESULTS

Studies addressing the key success factors of flood disaster knowledge transfer in riverbank areas are scarce in the literature. A combination of primary and secondary search strategies yielded 14 abstracts that were then screened by reviewers. After reviewing in detailing the full text of the selected articles, only about 6 articles were considered relevant to flooding, capacity building, and natural disasters. This paper is discussed according to:

Key factors for successful knowledge transfer Flood disaster in riverbank areas is a rare occurrence in the literature. Primary and secondary search procedures yielded 14 abstracts that were then evaluated by reviewers. After conducting a thorough analysis of the full text of the selected publications, it was concluded that only about six publications were related to flooding, capacity building, and natural disasters. This article discusses the following:

1. Table Article Related to the Topic

Author (year), country	Design	Purpose	Result
Valention et al (2023), Indonesia	Descriptive qualitative with a community work approach	to determine the level of community understanding of disaster mitigation	there is an increase in community knowledge about mitigation against natural disasters
Hidayatullah et al (2023), Indonesia	Descriptive qualitative with snowballing sampling and indepth interviews.	to find out the collaboration that occurs by stakeholders in flood disaster management, especially with BPBD, DPU, private parties and local communities.	there is negotiation in decision-making to minimize potential hazards in flooding, which is marked by the government, the private sector, and the community have participated in the socialization held several times by BPBD Semarang City and there is agreement and no conflict between stakeholders.
Setyowati et al., (2021). Indonesia	Community service by transferring knowledge through discussion, implementation, and evaluation with test instruments.	To assist communities around the river in raising awareness of river management.	The community can understand the importance of managing rivers and apply river management techniques to protect and preserve the river environment.
Yari et al., (2021). Indonesia	Quantitative descriptive with Cross-Sectional design. Sampling using Confinience / Accidental Sampling.	To determine the relationship between knowledge and attitudes with flood disaster preparedness among health students in DKI Jakarta.	A high level of knowledge affects disaster preparedness. A positive attitude can be a strong motivation to make efforts to reduce the impact caused by disasters.

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Author (year), country	Design	Purpose	Result
Selvyana et al., (2021). Indonesia	Descriptive correlation, data obtained through filling out questionnaires. The test in bivariate analysis is Chi Square.	To determine the relationship between experience and flood preparedness in Samarinda.	It shows that most teenagers have good experience in dealing with floods, but teenagers' preparedness still needs to be improved.
Bakti et al., (2023). Indonesia	Content analysis approach. Data and information collection techniques using the Publish or perish journal search application focused on Scopus google scholar indexed journals.	To build a transdisciplinary-based disaster risk reduction concept.	There is a conception of transdisciplinary-based disaster risk reduction in the pre-disaster and post-disaster phases. Thus, this article makes an important contribution to efforts to improve disaster preparedness and mitigation in educational institutions through a holistic and integrated transdisciplinary approach.

DISCUSSION

Interaction and Collaboration in Knowledge Transfer for Flood Disasters

A natural disaster is an event or series of events caused by natural factors that interfere with the life and livelihood of a community and result in loss of life, environmental damage, property, and psychological impact. In flood-prone areas, more knowledge is needed to minimize the potential flood hazards that may occur. Public knowledge can be enhanced through knowledge transfer activities, disaster education as well as direct supply practices. Disaster education plays an urgent role in reducing disaster losses (Shaw et al., 2015). Disaster learning can enhance the capacity of the population, both the knowledge capacity and the attitude of the community in the face of disasters, so that the preparedness of the people in face of the disaster will be increased and disaster loss can be suppressed (Annisa & Setyowati, 2019). In addition to disaster education, one way to maximize preparedness efforts is through collaboration between all sectors, one that can be applied is through the collaboration of disaster pentahelix. (Muhyi, 2017). One of the evidences of collaborative success in dealing with flooding was revealed in Heru Rochmansjah (2022) research in Bandung and Medan. They showed how the participation of private companies contributed greatly in reducing the risk of flooding. Furthermore, Sunarharum (2016), revealed that collaborative governance can overcome various barriers in society, such as: (a) differences in perception between government and society about flood handling, (b) limitations in technical literacy and knowledge of affected communities, and (c) limitation of government capacity in formulating targeted policies for mitigation. Research carried out by (Satria et al., 2018) also shows that private parties are also able to contribute and support through technology by creating a real-time web-based flood monitoring system to measure flood arrivals and conditions.

Knowledge Management and Absorption Capacity in Knowledge Transfer Flood Disasters

Decreased quantity and quality of rivers due to human behavior in water management. The majority of middle-to-bottom communities still have a hard time listening to exhibitions about behavior in keeping

the river environment clean. The conservation construction of the river as done by the community service team is carried out in three stages. The first phase is to carry out knowledge transfer with discussions about good and proper river management that opens up public insight with the aim of preserving river ecosystems can enhance river benefits for human life. The second stage is the implementation of river administration through a clean river program that implements sustainable river technology management. The solution of river problems must be done continuously because rivers from one side to the other are one unity whose effects interact. The third phase is to study the knowledge and understanding of the community after the knowledge transfer and implementation of river management. Public awareness will be increased by continuous education and support regarding river concerns.

Knowledge in good disaster management supports disaster response preparedness. Preparedness is an important effort done especially by medical personnel such as nurses who are at the forefront of health care to respond to disasters. Some of the factors that cause disasters to cause great casualties and losses are due to a lack of understanding of the characteristics of hazards, behaviour that causes a decline in natural resources, insufficient early warning information so that it is unprepared, and inability to cope with disaster. (Rosida & Adi, 2017). The higher the knowledge level, the better the level of flood preparedness. A positive incentive will also be a motivation in an effort or action for maximum flood disaster management.

Experience, Social Learning and the Transdisciplinary Approach to Flood Disaster

The community's experience in the face of flood disasters plays an important role in the transfer of knowledge about the disaster. In addition, the experience of individuals and communities in the face of flood disasters is also an important foundation in understanding its social and psychological impact. Research by Smith et al. (2018) emphasizes that the experience of individuals and communities in the face of flood disasters can be a valuable capital in building resilience and adaptation. Thus, the experience of society in the face of flood disasters can be a valuable source of knowledge in disaster mitigation and disaster management efforts. The importance of community experience in the transfer of knowledge about flood disasters is also reinforced by research by Nugroho (2007) which highlights that public preparedness in the face of flood catastrophe can be demonstrated through attitudes and knowledge to anticipate disaster. Thus, the experience of people in the face of flood disasters is not only a reflection of the challenges they face, but also a valuable source of knowledge in strengthening the preparedness and resilience of people.

This is also reinforced by the Jones (2019) findings that show that social learning from flood disaster experiences can increase risk awareness and strengthen social networks in communities. In the context of knowledge transfer against flood disasters, social learning plays a crucial role in strengthening risk awareness and building society's adaptive capacity. A study by Nugroho (2007) highlighted that public preparedness for flood disasters can be reflected in attitudes and knowledge to anticipate disaster. It affirms that social learning, which involves collective understanding and interpersonal interaction in the context of flood disasters, can be an important foundation in mitigation and response efforts. Thus, social learning integrated with other scientific concepts can enhance the ability of communities to cope with flood disasters.

Meanwhile, transdisciplinary approaches to knowledge transfer to flood disasters have proven effective in research by Brown & Lee (2020), where the integration of various scientific perspectives helps in designing more effective and sustainable solutions. In addition, a transdisciplinary approach also requires the collection of relevant secondary and primary data. Primary data collection can be done through observations, informant recruitment, and in-depth interviews. By conducting comprehensive data analysis, the transdisciplinary approach can produce more effective and sustainable solutions in the

transfer of knowledge to flood disasters.

CONCLUSIONS

In studies related to key factors of success in the transfer of knowledge of flood disasters in river basin areas, it can be concluded that Interaction, Collaboration, Experience, Social Learning, Transdisciplinary Approaches, Knowledge Management and Absorption Capacity are important factors in knowledge transfer against flood hazards. Interaction and collaboration between related sectors, such as disaster pentahelix collaboration, can maximize community preparedness efforts in the face of potential flood dangers. Social learning from flood disaster experiences can raise awareness of risks and strengthen social networks in communities. A transdisciplinary approach to knowledge transfer against flood disasters, which integrates a variety of scientific perspectives, can help design more effective and sustainable solutions. As well as knowledge in good disaster management supports in disaster response preparedness, and public preparation for flood disasters can be reflected in attitudes and knowledge to anticipate disaster.

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Conflict of Interest

The authors state that they have no financial or interpersonal conflicts that would have appeared to impactthe research presented in this study

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