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Research Paper

# Systematic Literature Review (SLR): Explorations flood systems theory and appropriate modeling

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**Abstract**
Urban flood risk assessment conducts a comprehensive evaluation of hazard formative factors, hazard formative environment, hazard-affected bodies, and capabilities for disaster prevention and reduction in order to obtain an accurate assessment of flood risk levels. The current study aimed to conduct a systematic review of the existing literature on engagement outcomes, focusing on high-quality studies Each step of the SLR method and their results are explained in detail in the following subsections using SLR performed. Using the SLR method can help answer the objectives of this research in the form of: What type of modeling to overcome flooding This research uses the SLR method which aims to recognize, review, and evaluate Using bibliometric analysis.To achieve the goal of SLR, the variables of interest are organized based on the general characteristics of the article and the specific parameters used general information about the article includes year of publication, type of analysis (quantitative, qualitative, cartographic or mixed), type and scale of research, and the country or region where the research was conducted. The model consists of three components, including rainfall runoff, river channels, and flooding The flow in the channel was generated with a 1D diffusion wave model, and the outflow on the slope was generated with a 2D model.This article showed the basic steps that need to be followed to conduct SLR This method generates topic-specific existing knowledge, trends, and observed gaps and helps to draw relevant conclusions for policy makers and the scientific community. and the appropriate modeling is Press RRI refers to 2D grid-based fluid dynamics and is a model that combines a hydrological model and a flood model.

**Keywords**
*Flood, Risk, model, Systematic literature review*

## 1. INTRODUCTION

Global precipitation characteristics and flooding situations are assessed to undergo significant changes as a result of global climate change, including rising temperatures and predictions of different precipitation patterns for future mass climates (IPCC, 2014). Increasing strength and frequency of sustained extreme weather (Yang et al., 2019; Blöschl et al., 2019; Vormoor et al., 2015) and uncertainty of climate change scenarios can have catastrophic consequences (Stott, 2016; Chen et al., 2018; Swain et al., 2020).

As an important tool for flood prevention, flood risk assessment has substantial practical applications in flood risk management. It not only provides scientific and technological support for urban flood prevention and disaster reduction, but also leads to increased public awareness of flood risks. As a result, flood risk assessment has been a hot topic in the field of natural science and technology for decades (Zou et al., 2013). Urban flood risk assessment conducts a comprehensive evaluation of hazard formative factors, hazard formative environment, hazard-affected bodies, and capabilities for disaster prevention and reduction in order to obtain an accurate assessment of flood risk levels (Xu et al., 2022). Physical flood hydrodynamics models are developing rapidly and an increasing number are being used to simulate urban flooding (Dasallas et al., 2022), including shallow water dynamics models (e.g. Guan et al. (2023); Glenis et al. (2018); Sanders and Schubert (2019), simplified or reduced complexity dynamics models (Bates et al., 2010; Coles and Luo, 2017), and other commercially available software. In addition, research has been conducted Extensive focus on flood simulation at different scales, e.g. hydrology-based large-scale river course flood modeling (Yamazaki et al., 2014).

The current study aimed to conduct a systematic review of the existing literature on engagement outcomes, focusing on high-quality studies. This included a comprehensive and rigorous review of the existing literature to synthe-

size and analyze findings related to participation outcomes. More specifically, this study examines the scope, methods, data analysis techniques, and geographic and industry coverage of the articles identified in the systematic review. This information provides an overview of the breadth and depth of the commitment outcomes literature as well as insight into the research methods and contexts in which commitment outcomes have been studied. This helps minimize bias by performing a complete literature search. The most difficult question at this point is determining the scope of the study. After determining the scope of the research, setting research questions and research limitations will help determine appropriate research methods. Booth et al. (2016) applying the six steps and their descriptions are presented in Table 1. Each step of the SLR method and their results are explained in detail in the following subsections using SLR performed by Mengist et al. (2020) Using the SLR method can help answer the objectives of this research in the form of: What type of modeling to overcome flooding?.

## 2. EXPERIMENTAL SECTION

### 2.1 Method

Search strategy. A systematic literature review and meta-analysis were then conducted using the Preferred Reporting Items for Systematic Reviews. This research used the Systematic Literature Review (SLR) method which aims to recognize, review, and evaluate all relevant research so that the answer to a research question can be determined (Triandini et al., 2019). The need for the SLR research process lies in paying attention to transparency, transferability, and replication of work, which are the characteristics that make up the literature review system (Booth et al., 2016).

This research consists of several stages, namely formulating research questions, searching for literature, determining inclusion and exclusion criteria, selecting literature, presenting data, processing data and drawing conclusions. Research that uses tools and materials, needs to explain the sophistication of the specifications of the tools and types of materials used. For qualitative research, it is necessary to explain the function of the presence of researchers, subjects, informants, and data collection methods and describe the quality/reliability of the data.

First, the question is what is the level of flood risk in the watershed? (PP1), what method or modeling is appropriate to overcome flooding in the watershed using GIS (PP2). Second, a literature search was conducted on the Scopus database using the Publish or Perish application. The keywords used were "(Flood) AND (Risk) AND (Watershed) AND (GIS)" with the limitation of meaning

list of publishers, list of journals, type of journal or any information about the date or reference status of the document. However, using advanced search tools in Google Scholar, Scopus, Science direct will be useful to include citations not available in other databases. The search step involves using a search string to access the selected database to collect multiple relevant literature articles. By applying the search string in the selected database, the number of available documents will be known as the search results are shown in Table 2. However, the number of articles available The final analysis is influenced by the research criteria the researcher will use and the goals expected to be achieved. Additionally, the size and type of database used to search for relevant publications may determine the sample size used for analysis. The next step is the researcher records the article into the table. Then the researcher reviewed and studied the articles intensely, especially the research results section. At the end of the study, the researcher compared the findings of the several articles and made conclusions. Before conducting an actual systematic review search, a literature search should be conducted to refine search keywords to cover the goals of the targeted study.

## 3. RESULTS AND DISCUSSION

### 3.1 Method overview

The results showed a systematic literature review process with bibliometric analysis (Figure 1). The initial search through Scopus with the keywords "(Flood) AND (Risk) AND (Watershed) AND (GIS)" resulted in 328 articles. Then identification through the year of publication and the corresponding keywords became 100 and entered into Mendeley. And those that passed the title selection stage according to the topic, published in 2018 to 2022 and doctype (ar) as many as 69. Followed by absrtak screening on relevant Mendeley obtained about 27 articles. Based on monitoring in accordance with Floods, water precipitation risk, rivers and GIS. And those that were successfully reviewed amounted to 20 based on Floods, the risk of water precipitation, rivers and GIS as well as locations or geomers that correspond to the territory of Indonesia.

The following are the results of bibliometric analysis by filtering through VOSviewer www.vosviewer.com (Figure 2 and 3). The results of the first stage search in Scopus were then entered into Medeley and then exported to VOS viewer or Rstudio. VOSviewer is a useful software for creating and viewing directory measurement networks. This app is free to start finding distance research. The articles or knowledge sources we collect will serve as the initial dataset before we import it into the VOSviewer application. As usual, we can get this article data from Google Scholar, DOAJ, Dimensions, Science Direct or from journals we have accessed before our data is structured by reference applications. projection (Zotero or Mendeley), then we just need to save them as RIS. Using the RIS data format, the next data import is to import the dataset into Vosviewer, first know which visualizations we need, for example: visualizations related to titles, co-authors fake, keyword co-occurrence or content analysis depending on perspective. necessary to visualize with our searches we can visualize according to

**Table 1.** The frameworks for systematic research

| Framework Step | Outcomes | Methods |
|---|---|---|
| Protocol Search | Scope of research defined<br>Determine search strategy<br>Research search | There is only the flood system theory and its appropriate modeling.<br>Search string<br>Search the database |
| Appraisal | Selecting studies<br>Quality assessment of studies | Determine inclusion and exclusion criteria<br>Quality criteria |
| Synthesis | Extract data<br>Categorize the data | Classify data according to iterative definitions<br>Prepare for further analysis |
| Analysis | Data analysis<br>Result and discussion<br>Conclusion | Quantitative categories, descriptions, and narrative analyzes of organized data<br>Based on analysis, display trends, identify gaps and compare results.<br>Conclusion and recommendations |
| Report | Report writing<br>Journal article production | PRISMA Methodology<br>Summary of reported result for the public |

**Table 2.** Articles search keyword and Query

| Step | Keyword | Number of articles |
|---|---|---|
| 1 | "Flood" AND "Risk" AND "watershed" AND "GIS" | 328 |
| 2 | Pubyear Aft 2018 | 200 |
| 3 | Source | 140 |
| 4 | Doctype (AR) | 69 |

our needs. For example, we want to analyze how many authors have performed searches similar to our keywords. Or if the number is already fixed, we can continue by investigating whether the studies or authors correlate their results. Be like the image below. Here are the results of the search with the keywords "(Flood) AND (Risk) AND (Watershed) AND (GIS)" which resulted in 328 hits. The results were heavily centered on the keywords Flood and risk assessment followed by watershed.

Bibliometric analysis is the best way to write a paper because it allows you to take a more scientific approach to research. Using bibliometric analysis, you can evaluate the impact of an article by looking at how often other researchers cite it.

### 3.2 The results of the review are based on the conclusion of the article

To achieve the goal of SLR, the variables of interest are organized based on the general characteristics of the article and the specific parameters used to evaluate/measure/map.

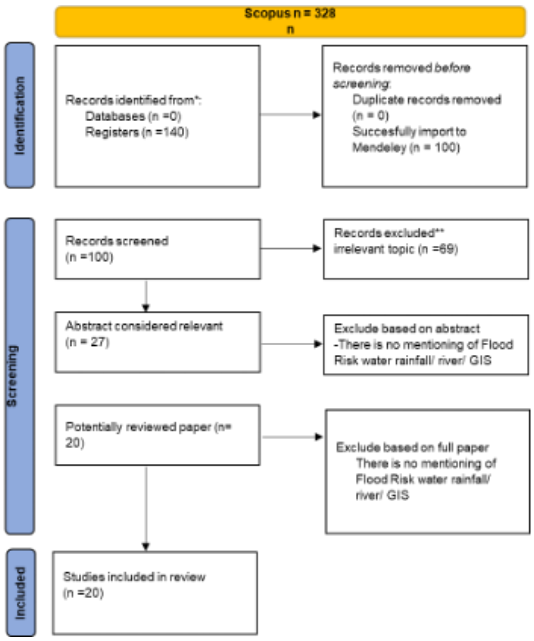


**Figure 1.** Systematic Literature Review process chart

General information about the article includes year of publication, type of analysis (quantitative, qualitative, cartographic or mixed), type and scale of research, and the country or region where the research was conducted. The region where the research was conducted. Therefore, the case study used ten variables of interest that were identified and presented in Table 3. Finally, data related to each selected article was extracted into an Excel spreadsheet for processing. data processing. Excel spreadsheet for data processing.

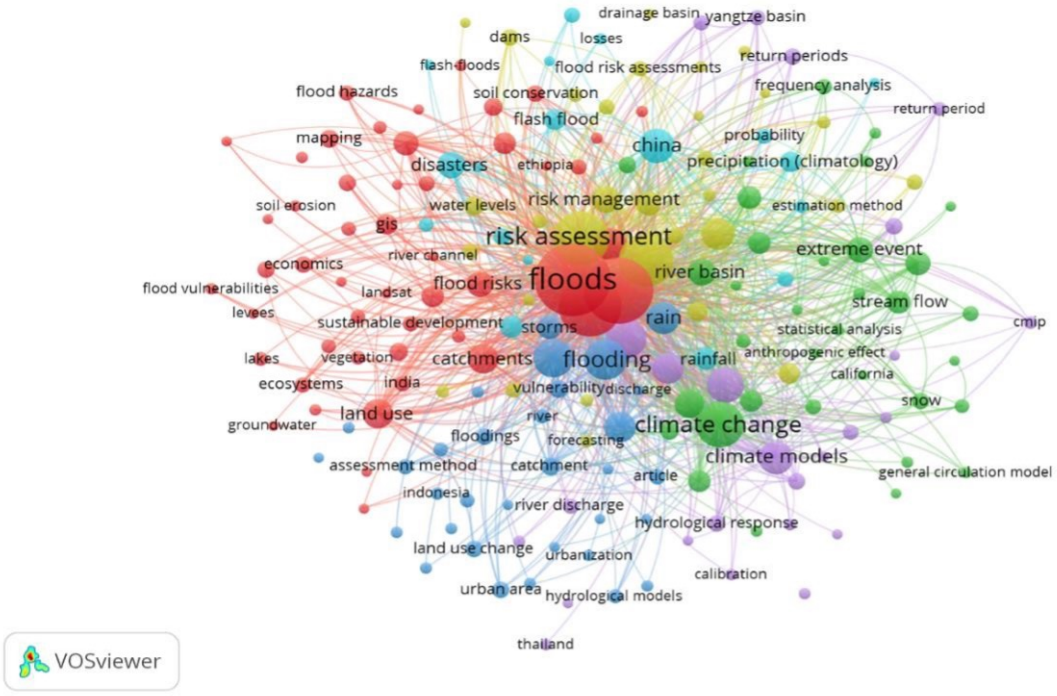


**Figure 2.** Bibliometric analysis results via VOSviewer

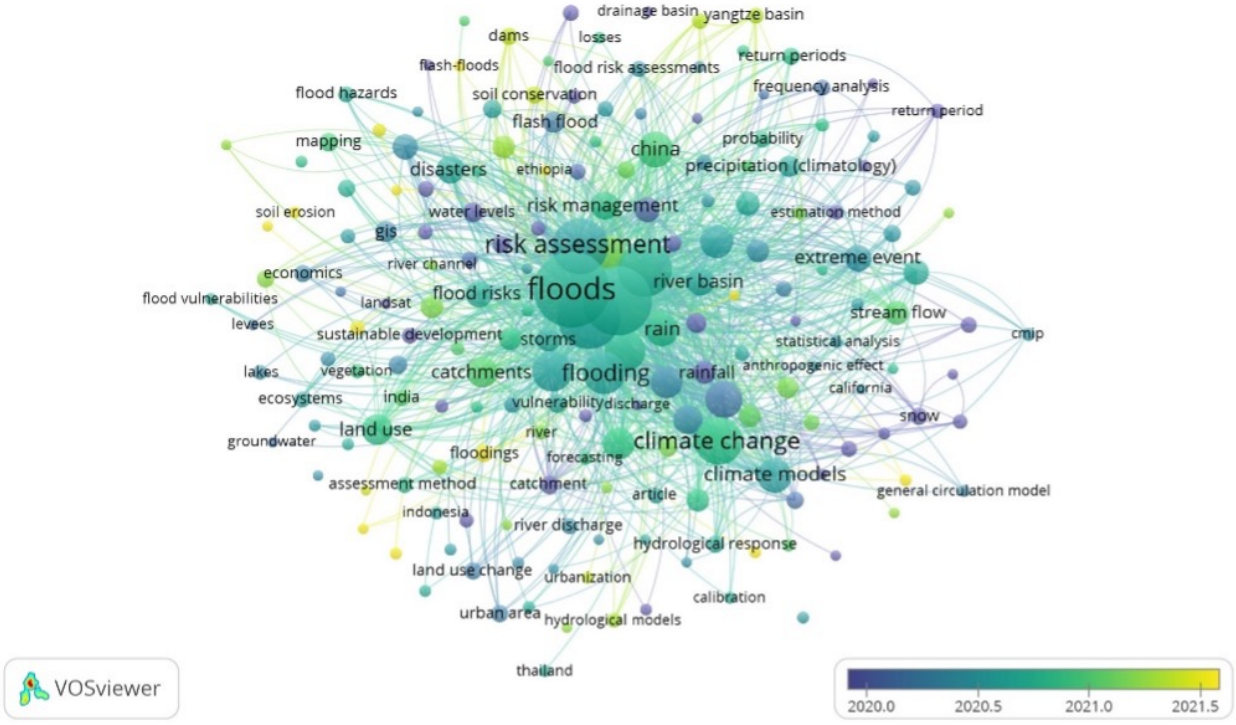


**Figure 3.** Bibliometric analysis results by year via VOSviewer

**Table 3.** Research Results on the risk of flooding and watersheds

| No | Research and Years | Journal and Title | Research Result |
|---|---|---|---|
| 1 | Ayenew and Kebede (2023) | Environmental and Sustainability Indicators - GIS and remote sensing-based flood risk assessment and mapping: The case of Dikala Watershed in Kobo Woreda Amhara Region, Ethiopia | In this study, flooding in the study area is ultimately caused by slope gradient, drainage density, proximity, soil type, and water level. The risk of flooding is greatest in the middle and lower catchments because this is where the runoff from the surrounding uplands meets, increasing in the lower catchments and decreasing in the middle. Based on the final composite flood risk map, it was determined that, respectively, low, medium, high, and very high flood risks were applied to 28.13%, 33.37%, 28.66%, and 9.84% of the area. This suggests that moderate to high flood hazard has been the main finding of this study. |
| 2 | Ariyani et al. (2023) | Geography, Environment, Sustainability Contributed Indicators To Fluvial flood Along River Basin In Urban Area of Indonesia | that in order to carry out flood prevention in an area it is necessary to determine the causal factors. These causal factors can be used to develop intervention measures and carry out flood risk management. The Ciliwung watershed covers two provinces, namely the province of West Java, and the province of DKI Jakarta, where the national capital of Indonesia is located, and since the Ciliwung river is the main cause of flooding in the capital city, most of the government's actions for flood control management include building downstream infrastructure. Mitigation efforts that have been carried out by the government include diverting the flow of the Ciliwung river to the west and east canals to reduce water discharge in the central Ciliwung and carrying out other flood infrastructure measures such as building embankments and raising riverbanks so that water can be immediately discharged into the river. |
| 3 | Nagu et al. (2021) | E3S Web of Conferences GIS Based Method for Flood Hazard Assessment in Kobe River Watershed North Maluku Province | Overall, Weda District is a flood-prone area, with 77.46 percent of land classified as not prone to flooding and 21.41 percent classified as floodprone. However, only 21.41 percent of the land is classified as prone to flooding. Only 1.13 percent of the land is protected against flooding, compared to the rest of the country. The height factor is the most important element affecting flood vulnerability in Weda District, where most of the land (16.34 percent) is at or below sea level, making it very vulnerable to flooding. When it comes to describing flood-prone areas in the form of a map that contains variables that affect flooding, Geographic Information Systems (GIS) excel. |
| 4 | Sriariyawat et al. (2022) | Journal of Disaster Research Fuji Technology Press | This study presents the process of combining numerical models and spatial analysis to simulate river discharge and flood inundation in terms of maximum flood inundation depth and flood duration map on the CPRB. The RRI model is used to simulate river discharge and inundation depth, and the maximum flood map in inundation, flood area, and flood duration were developed using ArcGIS. The inundation area error from the simulation can be caused by the difference in the definition of the flood area. When the frequency hyetograph of rainfall is developed based on the concept of monthly peaks, the results of flood discharge and inundation area between frequency cases clearly show differences. As for the results, the study found that the maximum flood inundation depths can reach up to 7.71, 8.28, and 8.78 m for return periods of 50, 100, and 200 years, during CPRB, respectively. |

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| No | Research and Years | Journal and Title | Research Result |
|---|---|---|---|
| | | | In terms of flood duration analysis, it is observed that the longest flood duration can occur in Nakhon Sawan Province. The longest flood durations for return periods of 50, 100, and 200 years respectively were 159, 177, and 198 days. As for the results of the analysis of maximum flood inundation and flood inundation areas with different return periods, the amount of water from the PS River has no significant effect on flood inundation, flood duration, and flood duration in Phra Nakhon Si Ayutthaya Province. In contrast, floods in Nakhon Sawan Province and Phra Nakhon Si Ayutthaya Province are significantly affected by rainfall in the main CP River. Considering maximum flood inundation, flooding in inundation areas, and development of flood duration maps, this study can be useful for flood risk and vulnerability assessment in CPRB. For the CPRB, it is believed that climate change could exacerbate flood risk and make it more susceptible to inundation due to increased variability in rainfall, runoff, and sea level rise, along with its low-lying topography. Future research that will assess the impact of climate change on flood hazard in CPRB is suggested. |
| 5 | Edamo et al. (2022) | Journal Climate and change Flood inundation mapping under climate change scenarios in the Boyo watershed of Southern Ethiopia | Future variations in precipitation and temperature could be caused by climate change and eventually lead to hydrological extremes such as floods. Four climate models, namely UQAM-CRCM5, CCCma-CanRCM4, ICHEC-RACMO22T and CNRM-RCA4, were used. Climate change analysis was carried out for the baseline period (1976–2005), medium term (2041–2070) and long term (2071–2100). All climate models underestimate observed rainfall and maximum temperatures and overstate observed minimum temperatures. Areas that are flooded due to climate change show that the return period of 100 years is more at risk than the return period of 50 years. The expected average maximum inundation is 3.1 m under RCP8.5 in the 2080s. This indicates that 193 ha of land will be inundated in the long term under scenario RCP8.5. The findings suggest that the flood challenge will increase in the 2050s and 2080s due to climate change as one of the driving forces. Therefore, it is suggested that precautionary measures need to be taken to avoid flooding and flood damage in the study area in the coming period. This study will benefit cities, farming communities around riverbanks, government agencies concerned with risk management and local communities in Boyo's flood-prone areas |

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| No | Research and Years | Journal and Title | Research Result |
|---|---|---|---|
| 6 | Schilling et al. (2022) | Land An Approach for Prioritizing Natural Infrastructure Practices to Mitigate Flood and Nitrate Risks in the Mississippi Atchafalaya River Basin | research has shown that natural infrastructure practices have the ability to reduce risks from flooding and poor water quality, but rarely have any set of NI practices assessed at the larger catchment scale to reduce their combined risks. In this study, we cross the DAS-scale risks to flooding and nitrate exports in MARB with the potential locations of various NI practices to prioritize where NI interventions are most effective for combined risk reduction at the DAS scale in MARB. The prioritization scheme demonstrated at the HUC4 scale across the basin and highlighted at the smaller HUC12 watershed scale indicates that basins can be prioritized to determine the optimal watershed for the implementation of NI practices to minimize flooding and water quality risks. Through using the output from the national SWAT model to identify runoff and nitrate risks, and combining this with high spatial resolution GIS modeling of NI practice sites, we qualitatively rank watersheds ranging in size. |
| 7 | Qi et al. (2022) | environment. Res. Lett Economic growth dominates rising potential flood risk in the Yangtze River and benefits of raising health from 1991 to 2015 | The Yangtze River Basin accounts for about 30% of China's GDP and is the engine of the country's rapid economic growth. Floods in the Yangtze River Basin can damage the economy and human well-being. In this study, we quantitatively investigate the flood risk potential of the Yangtze River from 1991 to 2015. The following conclusions are presented based on this study. gga 2015. The following conclusions are presented based on this study. All authors discussed the results and contributed to the preparation of the manuscript. The authors declare that they have no competing interests. 17 3295–303 Data supporting the findings of this study are available upon reasonable request of the authors. 1138 other routes/areas will increase, and the level of flood protection required will also increase. We studied the effect of the level of flood protection provided by the embankment in this study, and the combination of different flood protection measures that can provide a level of flood protection similar to the height of the embankment can also be investigated in the future. First, we developed a framework by extending large-scale hydrological models, incorporating hydraulic models and longterm GDP data sets to measure the potential economic exposure to flooding on the Yangtze River. The developed framework has the potential to be used in other areas for flood risk studies. Second, we find that GDP growth increases economic exposure to flooding, while climateinduced variations in flood inundation areas and resulting economic exposure decrease overall. |

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| No | Research and Years | Journal and Title | Research Result |
|---|---|---|---|
| 8 | Dembélé et al. (2021) | Contrasting changes in hydrological processes of the Volta River basin under global warming | A large ensemble of 12 GCMs from CMIP5 and 5 RCM from CORDEX-Africa was used to investigate the impact of climate change on water resources in the Volta River basin under the 3 RCPs. The climate projection data set was used to force a fully distributed Meso-Scale Hydrological Model over the 21st century. Hydrological process changes over the future periods 2021–2050, 2051– 2080 and 2071–2100 are forecast relative to the historical period 1991–2020. The results reveal contrasting changes in the hydrologic cycle, depending on the RCP and future projection periods. Compared to temperature, there is more uncertainty in the changing trend of the rainfall projections because there is only 63% agreement on the direction of change between the RCMGCM models, which leads to more uncertainty in predictions of hydrological variables. In fact, we found a strong sensitivity of hydrologic processes to climate variability. Spatial projections of future water availability per climate zone describe the pattern of "dry to wet, wet to dry" under RCP2.6 and RCP4.5. In contrast to the other RCPs, under RCP 8.5, projected climate change leads to a marked intensification of the entire hydrologic cycle, i.e. an increase in the magnitude of the hydroclimatic variables. Changes in the hydrologic cycle have important implications for future floods and droughts in the Volta basin, thereby strengthening the vulnerability of local populations to climate change. These findings can contribute to the elaboration of regional climate change adaptation and mitigation strategies. However, the significant inter-model variability of the climate models and the low to moderate agreement between the RCMGCM combination on the direction of change highlight the complexity and uncertainty associated with assessing the impacts of climate change on water resources. Therefore, more work is needed to improve climate modeling in West Africa. Strong collaboration between climate and water resources scientists, practitioners, and policy makers is key to advancing knowledge and development. |
| 9 | Gopalan et al. (2021) | Inclusion of flood diversion canal operation in the H08 hydrological model with a case study from the Chao Phraya River basin: model development and validation | Assessing the impact of flood diversion canals on flood risk reduction worldwide remains challenging. To address this problem, a flood diversion canal operating scheme was developed for the CPRB, a complex river network in Thailand with several natural and artificial diversion canals. The developed scheme was carefully designed and implemented into H08 GHM for the future management of flood waters in complex river networks around the world. |

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| No | Research and Years | Journal and Title | Research Result |
|---|---|---|---|
| | | | The validation results show that the diversion scheme can effectively simulate the flood diversion scenario observed in CPRB. Typical water diversion schemes with simple input data settings also show comparable performance, especially during the wet season. Main stream of water that is gradually diverted back to the point of destination under both canal schemes. This suggests that although the risk of flooding decreases at the diversion point, some risk remains at the destination. water causes a marked decrease in the CPRB annual average discharge, which is much greater under the common canal scheme than the regional scheme. In addition, both canal schemes reduce the number of flood days to near zero at most of the gauge stations considered. The overall simulation results show that the canal scheme currently implemented has the potential to reduce flood risk in the upper and lower CPRB, where there are many industrial and residential areas. However, their ability to withstand severe flooding must be further evaluated in the context of climate change. |
| 10 | Zhang et al. (2020) | Environmental Impact Assessment Review | This paper presents an integrated approach for large-scale flood risk mapping and assessment. To investigate the overall impact. Flood risks in YRB are primarily related to rainfall. GDP per capita, surface runoff factor, and vegetation cover local financial income, and erosion rates also play a relatively important role. We certify that we have no knowledge of competing for financial or personal relationship interests that could affect the work reported in this paper. The northeastern part of the YRB denotes very high-risk and high-risk integrated areas. The hazard varies significantly over time, whereas vulnerability and exposure risks change relatively less over time. The results are verified using the observed flood data for YRB from the year 1998, 2008, and 2016. This has proven to be a replicable approach for large-scale flood risk assessment, especially for assessments at the basin scale. Compared to small and medium-scale flood disasters, cross-basin and regional flooding can result in significant losses and significant impacts very large. Large-scale flood risk assessment requires investigation of detailed natural geographic information such as topographical terrain, flood hazard characteristics, and socioeconomic losses, at enormous human and financial costs. |

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| No | Research and Years | Journal and Title | Research Result |
|---|---|---|---|
| | | | Because of this, research often focuses on specific flood-prone areas such as coastal areas, metro systems, or reservoirs; administrative areas, districts, cities or provinces are also the focus. Risk assessment over a wider area tends to result in a decrease in the accuracy of the assessment and the more general indicators. However, a 1 km 1 km grid was used in this risk assessment to improve the spatial resolution of the prediction results. If a detailed analysis of potential flood risk indicators affecting a particular area is required, spatial distribution maps can be generated according to each of the indicators provided, and actual investigations can be carried out based on the advice of decision makers |

The classification phase involves classifying and processing the extracted data in preparation for further analysis, the final results of which are presented graphically. This includes qualitative and quantitative explanations as well as narrating the results, generating a discussion, indicating directions for future research work, and summarizing the conclusions. Data from the final list of selected articles can be summarized using basic descriptive and/or inferential statistical techniques. In this case study, descriptive statistics were used to calculate publication trends, evaluation indicators of publication date, spatial scale, type of review used, Flood system are less and less studied. Selected studies are classified according to year of publication and country where the study was conducted.

The Table 3 is a table containing the results of a total of 10 reviews with all topics and conclusions aimed at finding appropriate references for bias to create appropriate research backgrounds.

Articles 1-2 that to prevent flooding in an area it is necessary to identify the cause. These causal factors can be used to develop flood risk management and intervention measures. The Ciliwung River basin includes two provinces, namely West Java Province and DKI Jakarta Province, where the capital of Indonesia is located, and since the Ciliwung River is the main cause of flooding in the capital, most of the Government's actions in Flood control management includes construction downstream. Mitigation efforts undertaken by the government include diverting the flow of the Ciliwung River to the West and East channels to reduce water flow in the central part of Ciliwung and implementing other infrastructure measures against flooding such as building dikes and raising river banks so water can overflow. immediately drop it into the river. Overall, Articles 1-2 that to prevent

tan Weda is a flood-prone area, with 77.46% of the land area classified as not flood-prone and 21.41% classified as flood-prone. However, only 21.41% of the land area is classified as flood-prone. Only 1.13% of land area is protected from floods compared to other areas. Elevation factor is the most important factor influencing flood vulnerability in Weda district, where the majority of land (16.34%) lies at or below sea level, making the area highly vulnerable to flood.

Articles 3-6 This paper presents the process of combining numerical modeling and spatial analysis to simulate river discharge and flooding in terms of maximum inundation depth and inundation duration maps in the CPRB. The RRI model was used to simulate river discharge and inundation depth, and maximum inundation maps for inundation, inundation area, and inundation duration were developed using ArcGIS. When we developed the rainfall frequency hitegraph based on the concept of monthly peak, the results of flood discharge and floodplain showed significant differences between frequency cases. In the CPRB period, the inundation depth is 50 years, 100 years, and 200 years, respectively, and the inundation depth can reach 7.71 meters, 8.28 meters, and 8.78 meters.

From the perspective of flood duration analysis, it is known that the longest flood duration can occur in Nakhon Sawan province. The longest flood duration at 50, 100, and 200-year return periods are 159, 177, and 198 days. The results of floodplain analysis with different maximum inundation amounts and inundation periods in Phra Nakhon Si Ayutthaya Province show that the water volume of PS River has no significant effect on inundation, inundation duration, or inundation duration. Considering the development of maximum flood inundation, floodplain inundation, and flood duration maps, this study can be useful for flood risk and vulnerability assessment in CPRB. CPRB believes that climate change will increase flood risks, and the increase in variable.

Articles 7-10 applied six steps and their description is presented in Table 1. Each SLR method steps and their outcomes are explained in detail in the following subsections

 

**Table 4.** Review article by filter "Flood modeling"

| Number | Article |
|---|---|
| Article 1 | Created a flood disaster risk map. Based on the final composite flood risk map, it was determined that, respectively, low, medium, high, and very high flood risks were applied at 28.13%, 33.37%, 28.66%, and 9.84% of the area. |
| Article 2 | Mitigation efforts that have been carried out by the government include diverting the flow of the Ciliwung river to the west and east canals to reduce water discharge in central Ciliwung and carrying out other flood infrastructure measures such as building embankments and raising river banks so that water can be immediately discharged into the river. |
| Article 3 | Creates a flood class in the Weda sub-district and takes the form of a map containing variables that influence flooding, a superior Geographic Information System (GIS). |
| Article 4 | This study presents the process of combining numerical models and spatial analysis to simulate river discharge and flood inundation in terms of maximum flood inundation depth and flood duration maps on CPRB. The RRI model is used to simulate river discharge and inundation depth, and maximum flood inundation maps, flood area, and flood duration were developed using ArcGIS. The inundation area error from the simulation can be caused by differences in the definition of the flood area. |
| Article 5 | Creates a specific flood prone class because climate change then causes hydrological extremes such as floods. Four climate models, namely UQAM-CRCM5, CCCma-CanRCM4, ICHEC-RACMO22T and CNRM-RCA4, are used as weather parameters. |
| Article 6 | Through using output from the national SWAT model to identify runoff and nitrate risk, and combining this with high spatial resolution GIS modeling of NI-practice sites, Create watershed scale modeling maps. |
| Article 10 | Large-scale flood distribution maps using 1998, 2008, and 2016 data. This has proven to be a replicable approach for large-scale flood risk assessment. |

using the SLR done by Mengist et al. (2020). The Yangtze River basin generates about 30% of China's GDP and is the driving force behind the country's rapid economic growth. Floods in the Yangtze River basin can have negative effects on the economy and human well-being. This study quantitatively investigated the flood risk potential of the Yangtze River from 1991 to 2015. Conclusions are presented based on this study. Based on this study, the following conclusions are drawn. 17 3295–303 Data supporting the results of this study are available on reasonable request from the authors. First, we developed a framework to measure potential economic exposure to Yangtze River flooding by extending a large-scale hydrological model and incorporating a hydraulic model and a long-term GDP dataset. The developed framework may be used for flood risk research in other fields. A large ensemble of 12 GCMs from CMIP5 and 5 RCMs from CORDEX-Africa was used to study the impact of climate change on water resources in the Volta River Basin under three RCPs. The climate projection dataset was used to force a fully distributed mesoscale hydrological model for the 21st century. Changes in hydrological processes for the future periods 2021–2050, 2051–2080, and 2071–2100 are projected compared to the historical period 1991–2020. The results show contrasting changes in the water cycle depending on the RCP and future forecast period. Compared to temperature, the change trends in precipitation forecasts are more uncertain with only 63% agreement on the direction of change between RCMGCM models, increasing the uncertainty in the forecasts of hydrological variables. Spatial projections of future water availability by climate zone show a "dry-to-wet, wet-to-dry" pattern based on RCP2.6 and RCP4.5. RCP 8.5: Projected climate change will lead to significant intensification of the overall water cycle. H. Increase in the magnitude of hydroclimatic change. Changes in the water cycle have important implications for future floods and droughts in the Volta Basin, thereby increasing the vulnerability of local populations to climate change. However, the significant climate change

 

between models and the low to moderate agreement between RCMGCM combinations regarding the direction of change highlight the complexity and uncertainty associated with assessing the impacts of climate change on water resources. Close collaboration between climate and water scientists, practitioners, and policy makers is key to advancing knowledge and development. Assessing the impact of flood diversion channels on flood risk reduction around the world remains a challenge. To address this issue, a flood diversion management plan was developed for his CPRB, Thailand's complex river network with multiple natural and man-made diversion channels. The developed scheme has been carefully designed and implemented in the H08 GHM for future flood management in complex river networks around the world. The validation results show that the diversion scheme can effectively simulate the flood diversion scenario observed in his CPRB. A common water diversion system with simple input data settings also shows comparable performance, especially during the rainy season. The main flow of water that is gradually returned to its destination as part of both canal systems. This suggests that although the risk of flooding has decreased at the detour point, some risk remains at the destination. Water causes a significant reduction in the average annual runoff of the CPRB, which is much greater in shared canal systems than in regional systems. The overall simulation results indicate that the currently implemented canal project has the potential to reduce flood risk in the upper region. This paper presents an integrated approach for mapping and assessing large-scale flood risks. Results are matched with observations.

## 4. CONCLUSION

It can be concluded that many articles with the Flood keyword dominate and it can be concluded that the average Flood topic uses hydrodynamic modeling. This article is a systematic literature review (SLR) with the aim of summarizing the findings of university research conducted between 2018 and 2022 using a rigorous methodology and systematically identifying, evaluating and interpreting all selected studies to provide answers to convey the research questions examined. Overall, the final 69 articles indicate that progress has been made in understanding university research activities. The report highlights the diversity of university contexts and research objectives, and shows that university performance is a valuable study. However, it is necessary to evaluate the results of research on improving the quality of higher education. Using various research performance studies, for this research we conducted a systematic theoretical review in organizations, especially universities, ignoring some issues regarding leading journals, active researchers, and the most commonly used methodologies. and countries that are research locations related to higher education research results. We conclude that SLRs equipped with the specified method have several strengths and limitations. Articles are submitted from various countries with different characteristics and policies, the number and types, as well as the goals and strategies of each university, so that the intellectual nature of the course can be captured. Several studies have acknowledged this limitation and defined and measured it in different ways. Although attempts have been made to correct these discrepancies, we recognize that there are nuances that have been overlooked when comparing studies that circumvent the limitations of publication bias. By focusing on studies published in the database and using the highest criteria and deadlines, it is possible to exclude relevant studies and limit creativity and innovation. However, we believe that our SLR cameras can make useful contributions to theory and research. We structurally map out current research in feasible research areas. This article showed the basic steps that need to be followed to conduct SLR This method generates topic-specific existing knowledge, trends, and observed gaps and helps to draw relevant conclusions for policy makers and the scientific community. and the appropriate modeling is Article Anurak Sriariyawat et al., 2022 by title Journal of Disaster Research Fuji Technology Press RRI refers to 2D grid-based fluid dynamics and is a model that combines a hydrological model and a flood model. The model consists of three components, including rainfall runoff, river channels, and flooding The flow in the channel was generated with a 1D diffusion wave model, and the outflow on the slope was generated with a 2D model. present a process that combines numerical models and spatial analysis to simulate both river discharge and flooding in terms of maximum flood depth and flood duration maps on the CPRB. The RRI model was used to simulate both river discharge and inundation depth, and maps of maximum flood, inundated area, and inundation duration were created using ArcGIS.

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