

Home > Frontiers in Environmental Science > Freshwater Science > Research Topics > The Urban Fluvial and Hydro-En...

The Urban Fluvial and Hydro-Environment System

3,204

Total Downloads

26k

Views

Download PDF →

Download EPUB →

Overview

Articles ²¹

Authors ¹⁰⁵

Impact

21 Articles

Sort by:

Views

Type

Date

Share on



Frontiers in Environmental Science

Articles

Research Topics

Editorial Board

urban
fluvial
and
hydro-
environ-
ment
system

Jaan H. Pu
· Manish
Pandey ·
Jiaye Li ·
Alfredo
Satyanaga ·
Snehasis
Kundu ·
Prashanth
Reddy
Hanmaiah
gari

y
Distribut
ion of
Quasi-
Uniform
Iterative
Binary
Tree
Network
s for
River
Network
s

Keyi Wang
· Li Zhang ·
Tiejian Li ·
Xiang Li ·
Biyun Guo
· Guoxin
Chen ·
Yuefei
Huang ·
Jiahua Wei

EFFECTS
of
Warmin
g and
Grazing
on
Rangela
nd
Vegetati
on on
the
Qinghai
-Tibet
Plateau

Chen Chen
· Tiejian Li ·
Bellie
Sivakumar ·
Ashish
Sharma ·
John D.
Albertson ·

mixes of varied contributions from Original Research to Review Articles, Research Topics unify the most influential researchers, the latest key findings and historical advances in a hot research area! Find out more on how to host your own Frontiers Research Topic or contribute to one as an author.

[More info >](#)

[Publishing fees >](#)



All journals

All articles

Submit your research

Search

Login

Frontiers in Environmental Science

Articles

Research Topics

Editorial Board

doi
10.3389/fenvs.2022

425
views

ORIGINAL...
Published on 24 De

Hysteretic
Implications for
Graded
Bed
Load
Sediment
Transport in

doi
10.3389/fenvs.2021

1,885
views

ORIGINAL...
Published on 08 De

ISPH
Simulation of
Solitary
Waves
Propagating
Over a
Bottom-Mounted
Barrier

doi
10.3389/fenvs.2021

1,929
views
1 citations

BRIEF...
Published on 08 De

Hydrological
Performance of
Green
Roof
Systems : A
Numerical

Frontiers in Environmental Science

Articles

Research Topics

Editorial Board

Flows

Le Wang · Dayu Wang · Alan Cuthbertson · Deyu Zhong · Gareth Pender



doi
10.3389/fenvs.2021

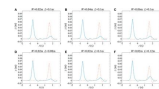
3,070
views

ORIGINAL...

Published on 16 Feb

Model

Dong Wang · Sheng Yan · Chen · Chen · JianGuo Lin · Xupeng Wang · Ehsan Kazemi



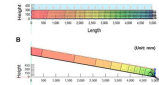
doi
10.3389/fenvs.2021

1,055
views

BRIEF...

Published on 25 Feb

Wooyoung Na · Changhyun Jun · Hyungjoon Seo · Yongmin Kim



doi
10.3389/fenvs.2021

1,805
views

ORIGINAL...

Published on 10 Mar



All journals

All articles

Submit your research

Search

Login

Frontiers in Environmental Science

Articles

Research Topics

Editorial Board

ce
Formula
e for
Sand-
Bed
Channel
s: An
Assessm
ent
Using a
Very
Large
Data Set

Hao Peng ·
He Qing
Huang ·
Guoan Yu ·
Hongwu
Zhang

Year	High Potential	Medium Potential	Low Potential
2021	10	20	24
2022	10	20	24
2023	10	20	24

Risk
Assessm
ent in
Urban
Fluvial
Areas
Using
the
Flood
Potentia
l Index

Robby
Yussac
Tallar ·
Golan
Mauregar
Geldoffer

Year	High Potential	Medium Potential	Low Potential
2021	10	20	24
2022	10	20	24
2023	10	20	24

Hydrody
namic
Charact
eristics
of Water
Flowing
Around
Piles

Mingwei
Liu · Liqin
Zeng ·
Linjian Wu
· Gang
Chen ·
Lilong
Shen · Erdi
Abi

Year	High Potential	Medium Potential	Low Potential
2021	10	20	24
2022	10	20	24
2023	10	20	24

Frontiers in Environmental Science

Articles

Research Topics

Editorial Board

ORIGINAL...

Published on 01 Mar

Numerical Simulation of Alpine Flash Flood Flow and Sedimentation in Gullies With Large Gradient Variations

ORIGINAL...

Published on 02 Mar

The Effect of Extreme Rainfall Events on Riverbank Slope Behaviour

Jeffery Nazrien Ng · Aizat Mohd Taib · Irfan Haziq Razali · Norinah

ORIGINAL...

Published on 13 Apr

Numerical Investigation of Pollutant Transport in a Realistic Terrain with the SPH-SWE Method

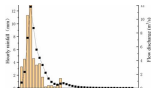
Lirong Tian ·

Frontiers in Environmental Science

Articles

Research Topics


Editorial Board



doi
10.3389/fenvs.2022

1,497
views

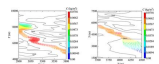
Montar ·
Othman A.
Karim ·
Safari Mat
Desa ·
Suriyani
Awang ·
Mohd
Syazwan
Faisal
Mohd



doi
10.3389/fenvs.2022

2,158
views

· Chen
Zhang



doi
10.3389/fenvs.2022

1,026
views

ORIGINAL...
Published on 11 Ma

ORIGINAL...
Published on 24 Au

ORIGINAL...
Published on 29 Au



All journals

All articles

Submit your research

Search

Login

Frontiers in Environmental Science

Articles

Research Topics

Editorial Board

Partial
and en
Masse
Dam
Failure
Induced
Debris
Flows

Anping Shu
· Le Wang ·
Fuyang
Zhu ·
Jiapin Zhu
·
Chengling
Pi · Ziru
Zhang ·
Huarez
Christian

ment
Criteria
for
Potentia
l
Landslid
es Based
on
Experim
ental
Studies

Sun-Gyu
Choi · Min-
Su Jung ·
Jae-Wook
Suk · Ho-
Jong Kim ·
Hyo-Sub
Kang ·
Hyang-
Seon
Jeong ·

aero-
elastic
respons
es of
floating
offshore
wind
turbine
under
couplin
g action
of
waves
and
winds

Bin Wang ·
Ying Li ·
Shan Gao ·
Kanmin
Shen ·
Zhenhong



All journals

All articles

Submit your research

Search

Login

Frontiers in Environmental Science

Articles

Research Topics

Editorial Board

10.3389/fenvs.2022
1,040
views

583
views

1,116
views

< 1 2 >

15 of 21 Articles

- Guidelines
- Explore
- Outreach

Follow us





[All journals](#)

[All articles](#)

[Submit your research](#)

[Search](#)

[Login](#)

[Frontiers in Environmental Science](#)

[Articles](#)

[Research Topics](#)

[Editorial Board](#)

© 2023 Frontiers Media S.A. All rights reserved

[Privacy policy](#) | [Terms and conditions](#)

SJR

Scimago Journal & Country Rank

Enter Journal Title, ISSN or Publisher Name



- Home
- Journal Rankings
- Country Rankings
- Viz Tools
- Help
- About Us

Forest Management Software

Assisi Software

Open

Frontiers in Environmental Science

COUNTRY

Switzerland

Universities and research institutions in Switzerland

Media Ranking in Switzerland

SUBJECT AREA AND CATEGORY

Environmental Science
└ Environmental Science (miscellaneous)

PUBLISHER

Frontiers Media S.A.

H-INDEX

50



Neutral Taste



Light Color



Smooth Texture



Creamy Mouthfeel

That's the Myco Ferment

Request your demo

Solve your biggest nutritional beverage development challenges with mycelial fermentation.

Make Myco FermentIQ™ your solution.

[Request your demo today!](#)



PUBLICATION TYPE

Journals

ISSN

2296665X

COVERAGE

2013-2021

INFORMATION


[Homepage](#)

[How to publish in this journal](#)

environmentalscience.editorial.office@frontiersin.org



Our natural world is experiencing a state of rapid change unprecedented in the presence of humans. The changes affect virtually all physical, chemical and biological systems on Earth. The interaction of these systems leads to tipping points, feedbacks and amplification of effects. In virtually all cases, the causes of environmental change can be traced to human activity through either direct interventions as a consequence of pollution, or through global warming from greenhouse gas emissions. Well-formulated and internationally-relevant policies to mitigate the change, or adapt to the consequences, that will ensure our ability to thrive in the coming decades are badly needed. Without proper understanding of the processes involved, and deep understanding of the likely impacts of bad decisions or inaction, the security of food, water and energy is at risk. Left unchecked shortages of these basic commodities will lead to migration, global geopolitical tension and conflict. This represents the major challenge of our time. We are the first generation to appreciate the problem and we will be judged in future by our ability to determine and take the action necessary. Appropriate knowledge of the condition of our natural world, appreciation of the changes occurring, and predictions of how the future will develop are requisite to the definition and implementation of solutions. Frontiers in Environmental Science publishes research at the cutting edge of knowledge of our natural world and its various intersections with society. It bridges between the identification and measurement of change, comprehension of the processes responsible, and the measures needed to reduce their impact. Its aim is to assist the formulation of policies, by offering sound scientific evidence on environmental science, that will lead to a more inhabitable and sustainable world for the generations to come.

 Join the conversation about this journal

Forest Management Software

Assisi Software

Open

Quartiles

FIND SIMILAR JOURNALS ?

options

Forest Management Software

Assisi Software

Open

1 Chinese Journal of Ecology

CHN

65%
similarity

2 Acta Ecologica Sinica

CHN

62%
similarity

3 Environmental Reviews

CAN

51%
similarity

4 Pedosphere

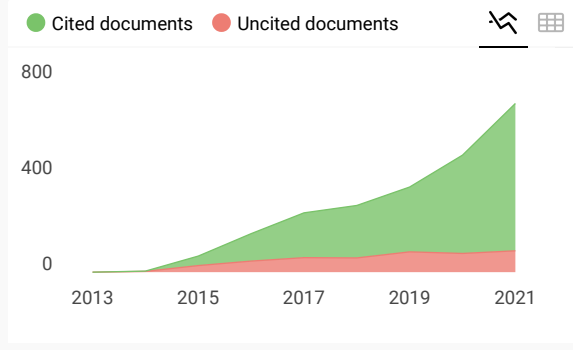
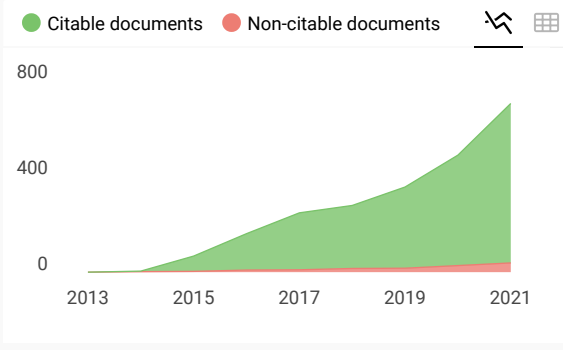
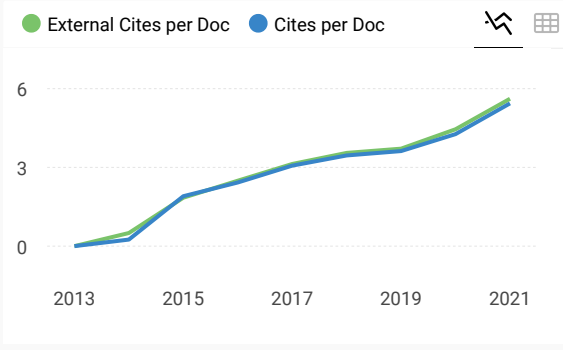
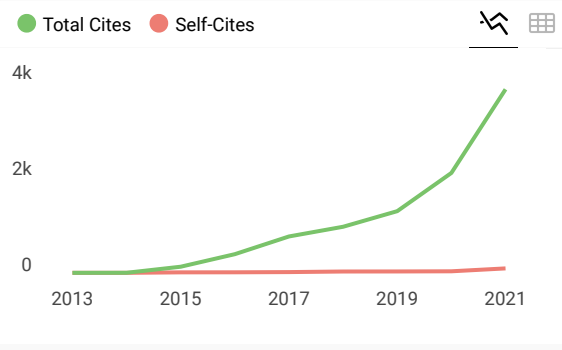
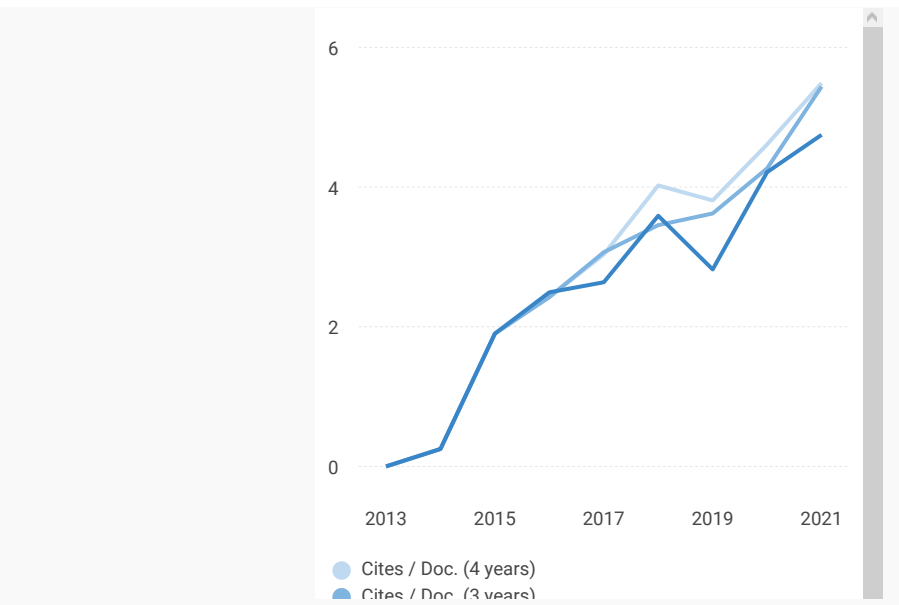
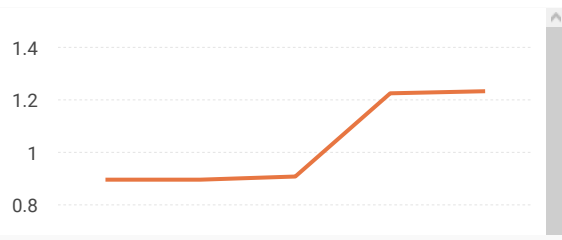
CHN

49%
similarity

5 Journal of Soils and Sediments

DEU

49%
similarity



← Show this widget in your own website

Just copy the code below and paste within your html code:

`<a href="https://www.scimagojr.com/journalsearch.php?q=21100826280&tip=sid&clean=0"`

SCImago Graphica

Explore, visually communicate and make sense of data with our **new data visualization tool**.



Forest Management Software

Assisi Software

Open

Metrics based on Scopus® data as of April 2022

Leave a comment

Name

Email

(will not be published)



The users of Scimago Journal & Country Rank have the possibility to dialogue through comments linked to a specific journal. The purpose is to have a forum in which general doubts about the processes of publication in the journal, experiences and other issues derived from the publication of papers are resolved. For topics on particular articles, maintain the dialogue through the usual channels with your editor.

Developed by:  SCImago

Powered by:  Scopus

Follow us on [@ScimagoJR](#)

Scimago Lab, Copyright 2007-2022. Data Source: Scopus®

EST MODUS IN REBUS
Horatio (Satire 1,1,106)

[Cookie settings](#)

[Cookie policy](#)





A Micro-Scale Study of Flood Risk Assessment in Urban Fluvial Areas Using the Flood Potential Index

Robby Yussac Tallar* and Golan Mauregar Geldoffer

Department of Civil Engineering, Universitas Kristen Maranatha (Maranatha Christian University), Bandung, Indonesia

OPEN ACCESS

Edited by:

Alfredo Satyanaga,
Nazarbayev University, Kazakhstan

Reviewed by:

Yongmin Kim,
University of Glasgow,
United Kingdom
Abdul Halim Hamdany,
Nanyang Technological University,
Singapore

*Correspondence:

Robby Yussac Tallar
robbyyussac@yahoo.com
robby.yt@eng.maranatha.edu

Specialty section:

This article was submitted to
Freshwater Science,
a section of the journal
Frontiers in Environmental Science

Received: 31 December 2021

Accepted: 31 January 2022

Published: 25 February 2022

Citation:

Tallar RY and Geldoffer GM (2022) A
Micro-Scale Study of Flood Risk
Assessment in Urban Fluvial Areas
Using the Flood Potential Index.
Front. Environ. Sci. 10:846450.
doi: 10.3389/fenvs.2022.846450

Worldwide, increasing various methods are being offered to solve the issue of flood disasters in urban fluvial areas, yet there is a relative lack of micro-scale studies concerning the flood potential index (FPI) to forecast future flood events in DKI Jakarta. With recent advances, the information of flood risk assessment can be monitored and communicated by using FPI embedded with a geographical information system (GIS)-based model. Therefore, the main purpose and concerned issue in this paper is how to relate the micro-scale study of flood risk assessment in the urban fluvial area in DKI Jakarta as the study case using FPI. Specific parameters were selected to develop and analyze FPI, involving three considerations: meteorological, physical-environment, and socio-economic aspects. The classification has also been developed by the analysis of data from rainfall, normalized difference vegetation index (NDVI) obtained from Landsat eight interpretation, and population density to produce a flood potential hazard map for each sub-district in DKI Jakarta during 2021–2024. The results of the completed analysis of classification for each sub-district in DKI Jakarta showed 10 sub-districts with high potential, 219 sub-districts with medium potential, and 32 sub-districts with low potential in 2024. Our findings also confirmed that using a GIS approach in identifying and measuring the FPI in DKI Jakarta for micro-scale areas is very helpful in order to develop better adaptive local flood management practices. For future works, the assessment not only produces a visualization of the flood potential index but also estimates possible damage due to the flood hazard itself.

Keywords: flood potential index, GIS, micro scale study, risk assessment, urban fluvial area

INTRODUCTION

Similar to many metropolitan cities around the world, DKI Jakarta is dealing with flood disasters. According to the previous report from Meteorological, Climatological, and Geophysical Agency of Indonesia (BMKG), DKI Jakarta has been recorded to have extreme floods, which have occurred in 2002, 2007, 2013, 2015, 2016, and the last in 2020. As the occurrence of flood events has become common, the number of flood risk assessments is increasing (Nastiti et al., 2015). Concerning these issues, various methods are being offered by using geographical information system (GIS)-based model applications in order to solve flood risk assessments in large-scale studies (Singh, 2019; Song et al., 2017; Valencia et al., 2020; Zhang H et al., 2019) and the relationships to the position of the groundwater table (Al Adaileh et al., 2019; Freitas 2016; Nistor et al., 2019; Olaniyi Oke, 2018; Suryawan et al., 2019; Syarif et al., 2013; Wu et al., 2011). Another method is by using the water index in order to describe or analyze water-related problems (Tallar and Dhian, 2021; Nayak et al., 2020; Wang et al., 2020;

Williams et al., 2019; Tallar and Suen, 2015; Tallar and Suen, 2016). Therefore, many studies have also combined the water index with a GIS-based model (Kawo and Karuppanan, 2018; Taloor et al., 2020), and further studies developed a flood index by using a GIS based-model (Yang et al., 2017; Zhang Y et al., 2019). Although improved tools and models have been used to analyze data concerning flood events, there is a relative lack of micro-scale studies concerning flood risk assessment combined with the flood potential index (FPI) to forecast future flood events in DKI Jakarta. Therefore, the main purpose and concerned issue in this paper is how to relate the micro-scale study of flood risk assessment in DKI Jakarta as the study case by using FPI. This paper presented the development of FPI as well as a flood potential hazard map for each sub-district in DKI Jakarta during 2021–2024.

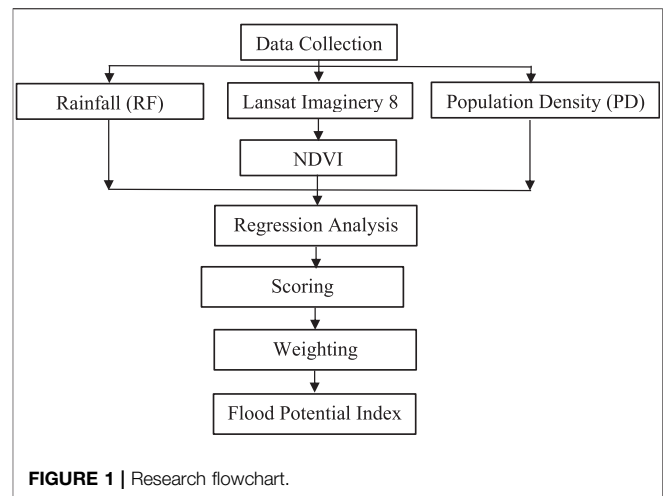
MATERIALS AND METHODS

Description of the Study Area

This research was carried out in DKI Jakarta, the capital city of Indonesia, located at 5,019'12" SL - 60 23' 54" SL dan 106,022' 42" EL- 106058' 18" EL with an average height of ± 7 m above the mean sea level (MSL). The western boundary of DKI Jakarta is Banten Province, and in the south and east, it is bordered by West Java Province. Administratively, DKI Jakarta is divided into five regions consisting of 42 districts and 261 sub-districts in total. The area of DKI Jakarta is 7,660 km², with a land area of 662 km² and a sea area of 6,998 km². The northern boundary of DKI Jakarta includes 32 km of coast, which is the source of 13 rivers, 2 canals, and 2 floodways. DKI Jakarta has a tropical climate with an average annual precipitation of 1.755 mm or about 146 mm per month. This condition causes some areas in DKI Jakarta to be prone to inundation due to high rainfall and high tide. Moreover, the population density is very high. It was recorded that the population in 2021 was more than 10 million residents with a population density of 16,262/km² or 42,120/sq mi.

METHODOLOGY

The FPI was developed by using three parameters: rainfall data, normalized difference vegetation index (NDVI), and population density. The parameters used in this study are considered as the representatives of three main aspects: physical, environmental, and socio-economic aspects. **Figure 1** shows that the initial step is to define considered parameters and collect secondary data. The data were collected from rainfall data, NDVI obtained from Landsat eight interpretation, and population density from Central Bureau Statistics of Indonesia (BPS). All the collected data were processed by using ArcGIS software version 10.5 as an application for the digital mapping process with the following steps: scoring, weighting, and overlaying methods. This scoring method gives a score to each parameter in order to determine the level in each classification. These four parameters will be scaled and weighted according to the order of their abilities and



conditions of the study area so that the results are obtained in the form of an FPI. In this study, the weighting method of the variables of FPI used is the ranking method. The ranking method is one of the modest methods in assigning weight values of variables by ranking order for each variable (Tallar and Suen, 2016). The class was divided into three classes: high, medium, and low potential. The ranking method was also performed by sorting each parameter used according to the level of importance. The result is an FPI map for DKI Jakarta during 2021–2024.

RESULTS AND DISCUSSION

One of the most crucial water problems in DKI Jakarta comes from flooding. Recently, there has been extensive map coverage of flood hazard zones in DKI Jakarta; however, it is progressively perceived that flood risk related to natural hazards cannot be reduced solely by focussing on the hazard. Therefore, it is necessary to develop an appropriate method of indexing and mapping flood potential in detail. Despite its significance, previous flood risk assessment methodologies often underestimate levels of vulnerability in areas prone to hazards, yet it is the degree of vulnerability within sub-districts that determines the consequences of any given hazard. The result is an FPI map for DKI Jakarta during 2021–2024 (**Figure 2**). The results of the completed analysis of classification for each sub-district in DKI Jakarta showed 10 sub-districts with high potential, 227 sub-districts with medium potential, and 24 sub-districts with low potential in 2021; 12 sub-districts with high potential, 227 sub-districts with medium potential, and 22 sub-districts with low potential in 2022; 10 sub-districts with high potential, 222 sub-districts with medium potential, and 29 sub-districts with low potential in 2023; and 10 sub-districts with high potential, 219 sub-districts with medium potential, and 32 sub-districts with low potential in 2024 (**Table 1**). Based on the results, there are similarities of FPI in the prone areas of flooding in DKI Jakarta during 2021–2024. Flood mitigation and

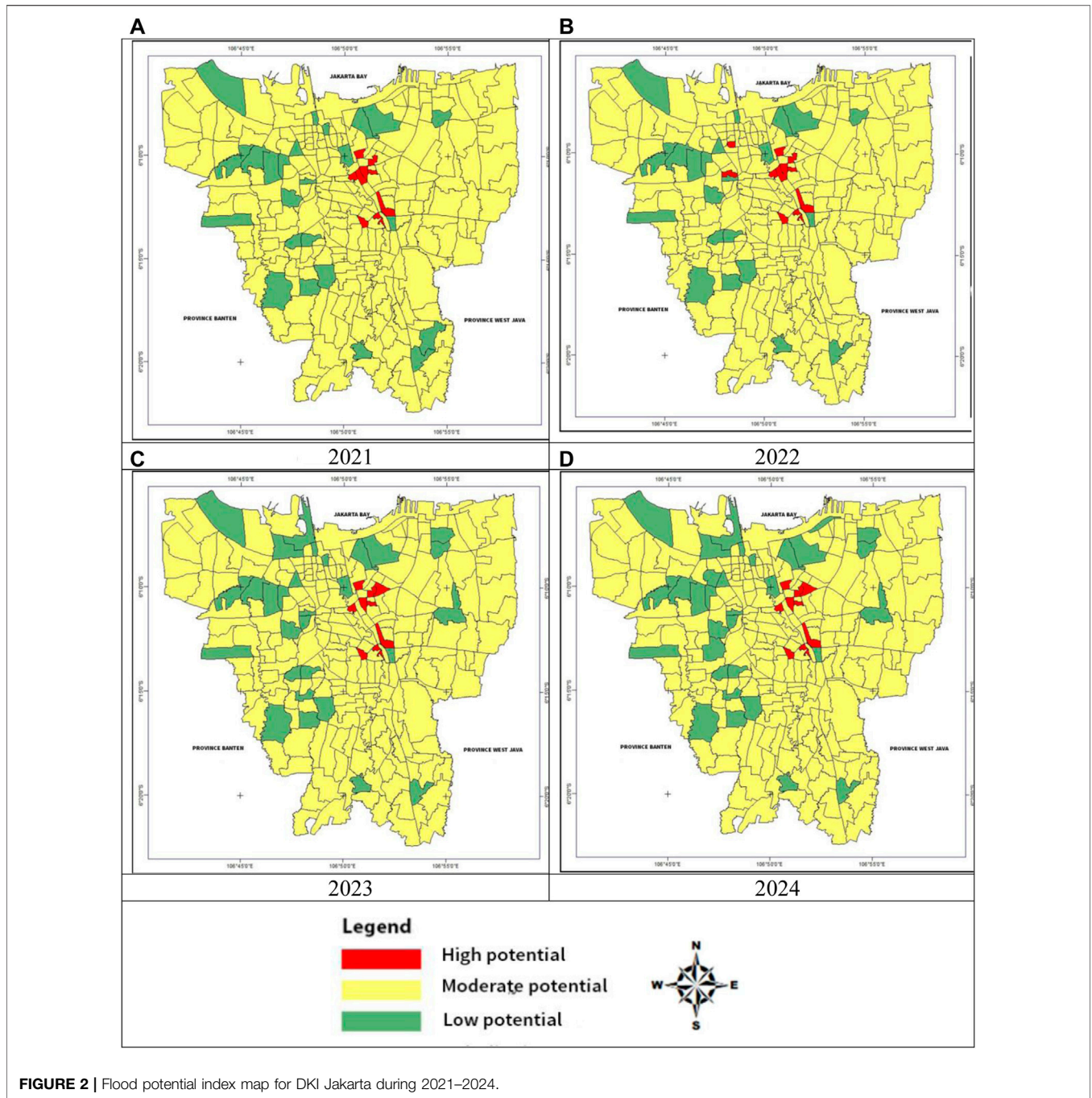


FIGURE 2 | Flood potential index map for DKI Jakarta during 2021–2024.

preparedness programs in the micro-scale should be implemented, such as rainwater harvesting technologies for

each sub-district. DKI Jakarta as an urban fluvial area has executed macro-scale flood mitigation and preparedness programs without considering the relationship between flood characteristics for each sub-district. Moreover, climate change-driven global warming is a factor behind repeated instances of severe flooding across the study area; however, this study proved that flood mitigation and preparedness programs can be implemented in local or micro-scale flood risk assessment. The need of appropriate early warning systems to predict flood characteristics, sufficient databases for assessing flood risk analysis, political will and coordination in local levels of

TABLE 1 | FPI classification in DKI Jakarta during 2021–2024.

Year	Number of sub-districts		
	High Potential	Medium Potential	Low Potential
2021	10	227	24
2022	12	228	21
2023	10	222	29
2024	10	219	32

government concerning flood problems, and appropriate mitigation programs are several issues that are aims for reducing vulnerability to flood problems in the micro-scale model.

CONCLUSION

The study presented proposes a general methodology to assess and map FPI at a detailed, micro-scale level. This captures aspects that are considered crucial and representative of reality (physical, environmental, and socio-economic aspects). These results provide as clear a picture as possible of the reality of the FPI map within DKI Jakarta, leading to a better understanding and guidance for future flood risk management activities in DKI Jakarta. Our findings also confirmed that using a GIS approach in identifying and measuring the FPI in DKI Jakarta for micro-scale areas are very helpful in order to develop better adaptive local flood management practices. It is obvious that the GIS-based method has a great role to play in flood risk assessment because flood is one of many natural hazards with multi-dimensional variables. The FPI had several advantages: 1) a low-cost and micro-scale flood monitoring program that could be used in developing countries and 2) a useful tool for water resource agencies, especially for local agencies, to manage waterbodies and to raise public awareness of flood problems for its data as its data could be easily understood and interpreted. At present, there lacks a framework for monitoring and measuring the flood risk assessment in the micro-scale that enables these institutions to operate and develop and link up the three-

pillar idea of sustainable development: environmental (the idea of staying within a biophysical carrying capacity), social (providing a society constructed on the values that people wish to live by), and economic (providing an adequate material standard of living). For future works, the assessment not only produces a visualization of FPI but also estimates possible damage due to the flood hazard itself; furthermore, the application of FPI can also be implemented in other countries.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/Supplementary Material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

RT devised the project and the main conceptual ideas and wrote the manuscript. GG worked out almost all the technical details and performed the analysis.

ACKNOWLEDGMENTS

The authors gratefully acknowledge the support for this research provided by Maranatha Christian University, Indonesia, and under collaboration research with Hydraulics and Ocean Engineering Department, National Cheng Kung University, Taiwan R.O.C.

REFERENCES

- Al Adailleh, H., Al Qinna, M., Barta, K., Al-Karablieh, E., Rakonczai, J., and Alobeiaat, A. (2019). A Drought Adaptation Management System for Groundwater Resources Based on Combined Drought Index and Vulnerability Analysis. *Earth Syst. Environ.* 3 (3), 445–461. doi:10.1007/s41748-019-00118-9
- Freitas, C. R. D. (2016). "Drought," in *Natural Hazards in Australasia*. Editors C. R. de Freitas and J. Goff (Cambridge: Cambridge University Press), 32–50.
- Kawo, N. S., and Karuppannan, S. (2018). Groundwater Quality Assessment Using Water Quality index and GIS Technique in Modjo River Basin, central Ethiopia. *J. Afr. Earth Sci.* 147, 300–311. doi:10.1016/j.jafrearsci.2018.06.034
- Nastiti, K. D., Kim, Y., Jung, K., and An, H. (2015). The Application of Rainfall-Runoff-Inundation (RRI) Model for Inundation Case in Upper Citarum Watershed, West Java-Indonesia. *Proced. Eng.* 125, 166–172. doi:10.1016/j.proeng.2015.11.024
- Nayak, J. G., Patil, L. G., and Patki, V. K. (2020). Development of Water Quality index for Godavari River (India) Based on Fuzzy Inference System. *Groundwater Sustain. Develop.* 10, 100350. doi:10.1016/j.gsd.2020.100350
- Nistor, M.-M., Rahardjo, H., and Satyanaga, A. (2019). Development Assessment of the Singapore Land: A GIS Spatial-Temporal Approach Based on Land Cover Analysis. *Gt* 14 (2), 60–73. doi:10.21163/gt_2019.142.06
- Nistor, M. M., Rahardjo, H., Satyanaga, A., Hao, K. Z., Xiaosheng, Q., and Sham, A. W. L. (2020). Investigation of Groundwater Table Distribution Using Borehole Piezometer Data Interpolation: Case Study of Singapore. *Eng. Geology.* 271, 105590. doi:10.1016/j.enggeo.2020.105590
- Olaniyi Oke, M. (2018). Assessment of Meteorological Droughts in Abeokuta, Southwestern, Nigeria. *J. Climatol Weather Forecast.* 06. doi:10.4172/2332-2594.1000235
- Singh, A. (2019). Remote Sensing and GIS Applications for Municipal Waste Management. *J. Environ. Manage.* 243, 22–29. doi:10.1016/j.jenvman.2019.05.017
- Song, D., Gao, Z., Zhang, H., Xu, F., Zheng, X., Ai, J., et al. (2017). GIS-based Health Assessment of the marine Ecosystem in Laizhou Bay, China. *Mar. Pollut. Bull.* 125 (1), 242–249. doi:10.1016/j.marpolbul.2017.08.027
- Suryawan, A., Yuliantoro, I., Subarudiand Prayitno, H. (2019). Resilience Process Due to Drought of El Nino 2015 at Marampit, the Outermost Island of the Indonesia. *IOP Conf. Ser. Earth Environ. Sci.* 306, 012016. doi:10.1088/1755-1315/306/1/012016
- Syarif, M. M., Barus, B., and Effendy, S. (2013). Penentuan Indeks Bahaya Kekeringan Agro-Hidrologi: Studi Kasus Wilayah Sungai Kariango Sulawesi Selatan. *J. Tanah, Lingk.* 15 (1), 12–19. doi:10.29244/jitl.15.1.12-19
- Tallar, R. Y., and Dhian, B. A. (2021). A Viable Drought Vulnerability index for Outermost Small Islands in Indonesia. *Groundwater Sustain. Develop.* 15, 100698. doi:10.1016/j.gsd.2021.100698
- Tallar, R. Y., and Suen, J.-P. (2016). Aquaculture Water Quality Index: a Low-Cost index to Accelerate Aquaculture Development in Indonesia. *Aquacult Int.* 24 (1), 295–312. doi:10.1007/s10499-015-9926-3
- Tallar, R. Y., and Suen, J.-P. (2015). Identification of Waterbody Status in Indonesia by Using Predictive index Assessment Tool. *Int. Soil Water Conservation Res.* 3 (3), 224–238. doi:10.1016/j.iswcr.2015.06.009
- Taloor, A. K., Pir, R. A., Adimalla, N., Ali, S., Manhas, D. S., Roy, S., et al. (2020). Spring Water Quality and Discharge Assessment in the Basantar Watershed of Jammu Himalaya Using Geographic Information System (GIS) and Water

- Quality Index(WQI). *Groundwater Sustain. Develop.* 10, 100364. doi:10.1016/j.gsd.2020.100364
- Valencia, J., Monserrate, F., Casteleyn, S., Bax, V., Francesconi, W., and Quintero, M. (2020). A GIS-Based Methodological Framework to Identify Superficial Water Sources and Their Corresponding Conduction Paths for Gravity-Driven Irrigation Systems in Developing Countries. *Agric. Water Manage.* 232, 106048. doi:10.1016/j.agwat.2020.106048
- Wang, P., Qiao, W., Wang, Y., Cao, S., and Zhang, Y. (2020). Urban Drought Vulnerability Assessment - A Framework to Integrate Socio-Economic, Physical, and Policy index in a Vulnerability Contribution Analysis. *Sustain. Cities Soc.* 54, 102004. doi:10.1016/j.scs.2019.102004
- Williams, P., Kliskey, A., McCarthy, M., Lammers, R., Alessa, L., and Abatzoglou, J. (2019). Using the Arctic Water Resources Vulnerability index in Assessing and Responding to Environmental Change in Alaskan Communities. *Clim. Risk Manage.* 23, 19–31. doi:10.1016/j.crm.2018.09.001
- Wu, J., He, B., Lü, A., Zhou, L., Liu, M., and Zhao, L. (2011). Quantitative Assessment and Spatial Characteristics Analysis of Agricultural Drought Vulnerability in China. *Nat. Hazards* 56, 785–801. doi:10.1007/s11069-010-9591-9
- Yang, M., Xiao, W., Zhao, Y., Li, X., Lu, F., Lu, C., et al. (2017). Assessing Agricultural Drought in the Anthropocene: A Modified Palmer Drought Severity Index. *Water* 9 (10), 725. doi:10.3390/w9100725
- Zhang, H., Xu, Y., and Kanyerere, T. (2019). Site Assessment for MAR through GIS and Modeling in West Coast, South Africa. *Water* 11 (8), 1646. doi:10.3390/w11081646
- Zhang, Y., Huang, S., Huang, Q., Leng, G., Wang, H., and Wang, L. (2019). Assessment of Drought Evolution Characteristics Based on a Nonparametric and Trivariate Integrated Drought index. *J. Hydrol.* 579, 124230. doi:10.1016/j.jhydrol.2019.124230

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's Note: All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

Copyright © 2022 Tallar and Geldoffer. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.