



**6th UNDERGRADUATE
SEMINAR ON BUILT
ENVIRONMENT
AND TECHNOLOGY
(USBET) 2023**

**SUSTAINABLE BUILT
ENVIRONMENT**

25 - 27 SEPTEMBER 2023

E-PROCEEDING

USBET 2023



e-Proceeding

**6th UNDERGRADUATE
SEMINAR ON BUILT
ENVIRONMENT
AND TECHNOLOGY
(USBET) 2023
SUSTAINABLE BUILT
ENVIRONMENT**

Published by,

Department Of Built Environment Studies And Technology
Faculty Of Architecture, Planning & Surveying
Universiti Teknologi MARA Perak Branch, Seri Iskandar Campus
usbet.fspuperak@gmail.com

Copyright @ 2023

Department Of Built Environment Studies And Technology
Faculty Of Architecture, Planning & Surveying
Universiti Teknologi MARA Perak Branch, Seri Iskandar Campus

This work is subject to copyright. All rights are reserved by the Publisher. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording or any information storage and retrieval system without permission in writing from the copyright owners.

eISSN 2821-3076



02 October 2023 | Perak, Malaysia
Universiti Teknologi MARA, Perak Branch, Seri Iskandar Campus

EDITORIAL BOARD

Editors-in-Chief

SR. NORAZURA MIZAL AZZMI (BS)

NADIRA AHZAHAR (BS)

Editors

TS. ZURAIHANA AHMAD ZAWAWI (BS)

SR. NAZHATULZALKIS JAMALUDIN (BS)

SR. SITI ZUBAIDAH HASHIM (BS)

NURHIDAYAH SAMSUL RIZAL (BS)

SR DR. NURUL FADZILA ZAHARI (BS)

NUR FADHILAH BAHARDIN (BS)

SR TS. DR. ALIA ABDULLAH SALLEH (BS)

SR TS. DR. SURIANI NGAH WAHAB (BS)

SR TS. DR. HASNAN HASHIM (BS)

SR NOORAZLINA KAMARUZZAMAN (BS)

SR MARIATY MOHD BAHARI (BS)

SR AIDA AFFINA ABDUL GHANI (BS)

DR. NOR DIANA AZIZ (BS)

SR AMIR FASHA MAT ISA (BS)

SR DR. NOR AMIN MOHD RADZUAN (BS)

PROF. MADYA SR DR. MOHD FADZIL YASSIN (BS)

SR TS. KHAIRUL AMRI RAMLY (BS)

SR. MOHD ASRUL HASIN (BS)

SR TS. MOHD KHAZLI ASWAD KHALID (BS)

SR MOHD DZULKARNAEN SUDIRMAN (BS)

SR DR. IRWAN MOHAMAD ALI (BS)

SR DR. MOHAMMAD HASZIRUL MOHD HASHIM (BS)

DR NURHASYIMAH BT AHMAD ZAMRI (BCT)

DR. PUTERI YULIANA SAMSUDIN (TP)

Editors-in-Chief

6th Undergraduate Seminar on Built Environment and Technology 2023

- E- Proceedings-

Organized by,

College of Built Environment (KAB) UiTM Perak Branch



THE CONSEQUENCES AND MITIGATION OF FLOODS AFFECTING TAMAN SRI MUDA, SHAH ALAM

Muhamad Anas Amsyar Muhamad Azizi¹, Suharto Teriman^{1*}

¹Department of Built Environment Studies and Technology,
College of Built Environment,
Universiti Teknologi MARA Perak Branch,
Seri Iskandar Campus,
32610, Seri Iskandar, Perak, Malaysia

*suhar429@uitm.edu.my

ABSTRACT

This study aims to identify the contributing factors of floods in Taman Seri Muda, Shah Alam and suggest suitable mitigation approaches to prevent future floods in the area. The study collects data through on site observation and questionnaire survey from homeowners affected by the floods. Data were analysed quantitatively. Results indicates that the floods were caused by multiple factors namely prolonged heavy downpour, clogged drains and high water tides which prevents water from flowing out to the Klang River. More than 40% respondents had experienced floods more than four times in the area. The floods also caused physical damages to their properties and left them with huge financial losses. Recommendations to risk of similar disaster include conducting periodic inspections and maintenance of monsoon drains, and using advanced weather tracking systems that help predict and prepare for impending floods, allowing authorities to issue timely warnings.

Keywords: *Floods, flood disaster, urbanisation, flood management*

© 2023 USBET, JABT, UiTM Perak Branch, All rights reserved

INTRODUCTION

Flood catastrophes have a long history of being a terrible force that may devastate towns, leaving a trail of devastation and sorrow. Heavy rainfall, overflowing rivers, or even human-caused activities can all contribute to flood disasters. Localised flooding can result from protracted, intense rainstorms that exceed drainage systems' capacity. Flooding can also be caused by inadequate or badly maintained drainage systems. Flooding could happen if the current system is unable to handle the amount of water produced by severe rainfall (Bibi, & Kebebew, 2023). Taman Seri Muda in Shah Alam had experienced a huge flood in December 2021 which has affected 14,000 of its residents and baffled the authorities as to the causes of the floods, which has never occurred at such magnitude before. The purpose of this paper is to investigate the contributing factors and consequences of the this floods in the study area. The objectives are to identify what actually causes the floos, to analyse the the type of damages suffered by the residents, and to suggest suitable mitigation approaches to prevent future floods in the area.

LITERATURE REVIEW

A flood is a type of natural catastrophe that happens when an excessive amount of water temporarily submerges normally dry area, due to surface water exceeding normal limits (Avram, 2021; Rendi & Liauw, 2023). Heavy rains, overflowing rivers, or dam failure can all cause it. Floods represent a threat to human life and safety and can seriously harm homes, infrastructure, and the environment (Bose & Navera, 2017).

Floods can occur as a result of natural causes or human causes. Low-lying terrain and proximity to waterways might increase an area's susceptibility to flooding. In these low-lying locations, water may build up during periods of severe rainfall. More extreme weather occurrences, such as torrential rain, may occur as a result of changing weather patterns brought on by climate change. As a result, there may be more flooding incidents in the impacted areas. High tides can also cause floods where the high river water cannot flow directly to the sea when it collides with the high tide. This will result in flooding, especially in areas near the sea. The small size of the river basin is also another cause of floods. Department of water and sanitation also mention that this is attributed to the small size of the river basin which is unable to accommodate the large water capacity and will result in flooding. Figure 1 refer to the results of the convergence of these forces may be disastrous (Ward, 1978; Bose & Navera, 2017).

Human action induced floods via uncontrolled, rapid urbanisation, whereby natural landforms and terrain are turned into concrete surfaces. This may lead to the reduction of land area that can be used to absorb water. This raises the risk of floods in locations like residential neighbourhoods by increasing surface runoff. The lack of

capable drainage infrastructure may also result in frequent flood occurrences. This is due to the fact that the existing drainage system is often too small to cover the area that has been developed (Department of Water and Sanitation, 2006).

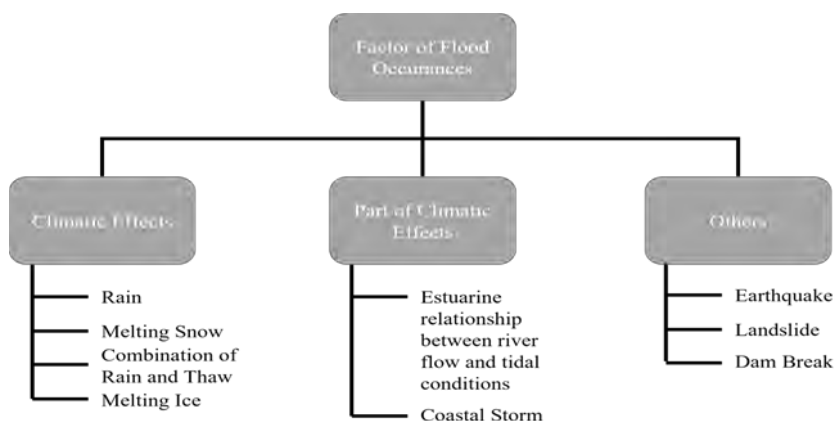


Figure 1: Clusters of Flood Factor Occurrences (Ward, 1978; Bose & Navera, 2017)

Flooding on a global scale is the most devastating disaster and the highest cause of death and destruction. Among the consequences of floods are washing and damaging the land that is formed and developed, rapid soil erosion and its roughness, soil damage due to the accumulation of large sediments, loss of livestock and wildlife, destruction of roads, bridges and houses, rapid filling of lakes and water spills as well as lack of adequate opportunities for water productivity (Javadinejad, 2022). Flood can have a negative impact on the surrounding population, resulting in the damage of property and the environment. The increase in the water level occurs rapidly compared to the average level to the peak level and represents one of the main causes of this flood event (Poesen and Hooke, 1997). People who live in low-lying neighbourhoods and on the sides of rivers are frequently affected by this flood, particularly those with low incomes or slum dwellers. As a result, it can be tough for people of this region to shift their property and possessions to a safe location in a timely manner to minimize property devastation. As a result, they were forced to abandon items that could not be rescued to ensure the welfare and importance of their family's life.

According to Ward (1978), floods have had many negative consequences on humanity and the environment, with numerous lives losing their homes and being swept away by powerful flood flows. However, the occurrence of such a flood has become impossible to predict, and the factors that influence the occurrence of such flood must be considered in terms of land use, floodwater condition, and flood-affected people's actions.

Malaysia is one of the most regular natural disasters affecting the country, which occurs nearly every year especially during the monsoon season. The coasts of peninsular Malaysia are the most prone to flooding especially during the northeast monsoon season from October to March (Figure 2).

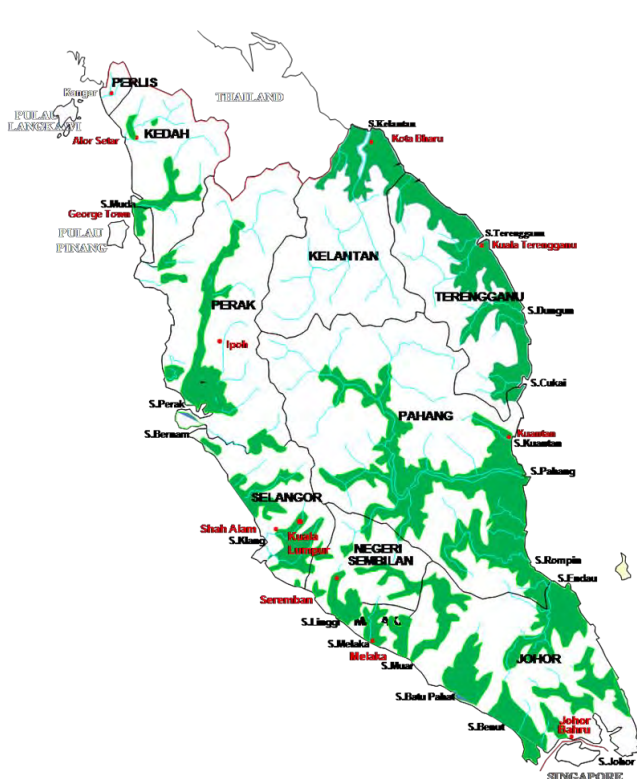


Figure 2: Flood Risk Areas in the Peninsula Malaysia (JPS Selangor, 2023)

METHODOLOGY

This study focuses on flood disaster that affected Taman Seri Muda, Shah Alam, Selangor, one of the most populated township in the state, with more than 9,000 houses and apartments occupied by mostly those in the M20 and B40 groups (Figure 3). The area faces flood risk many times, with the first major flooding occurred in December 1995. Since 2019, there have been multiple floods every year. The water level regularly reaches residents' knees, but they have grown to live with the floods.

However, the system was stressed beyond its capability in December 2021 when historic rainfall left much of Taman Sri Muda submerged for days. The township was one of the worst-hit areas in Shah Alam during the Dec 2021 floods which displaced over 14,000 people. Until today, the flood problem faced by the residents of Taman Sri Muda is still taking place whether it is a critical flood or otherwise.

The study uses collects data through on site observation and questionnaire survey. The observed elements are the existing drainage system while the questionnaire survey are conducted on the residents affected by the floods n Taman Seri Muda. A total of 114 respondents participated in the survey. Data were analysed quantitatively.



Figure 3: Taman Seri Muda Township (Shah Alam Municipal Council, 2023)

RESULTS AND DISCUSSION

Based on the observations that have been made in the study site, several factors were found to contribute to the occurrence of the flooding phenomenon that hit the Taman Sri Muda area. The small drainage system and lack of regular maintenance of the dam is the main reason causing the flood issue. During heavy rain, the flow of rainwater that goes through the drain or ditch overflows because the width of the drain is not able to accommodate rainwater and the flow of heavy rainwater. Furthermore, the existing dams to hold and release rainwater often suffer from problems in terms of function and poor maintenance, causing water in the drains or ditches to overflow to the residential areas of Taman Sri Muda. The uncontrolled disposal of garbage or solid waste is also an issue and a contributing factor to the occurrence of floods in the Taman Sri Muda area. This is because there are a few of the community's attitudes and residents in Taman Sri Muda who are irresponsible in throwing away garbage as they please, causing the drains to be filled with garbage.

The survey questionnaire revealed that a substantial portion of the respondents (40.4%), have experienced flash floods more than four times, 11% had faced flood between three and four times, while 31% had faced the floods twice (Table 1). This finding highlights the severity and recurrence of the flood issues in the area, indicating that a significant number of residents have been subjected to multiple flood events, potentially leading to considerable disruptions and damages to their lives and

properties. The frequent occurrence of flash floods underscores the urgency for comprehensive flood management strategies, investment in resilient infrastructure, and community-based preparedness and mitigation efforts to reduce the impact of floods on Taman Sri Muda residents.

Table 1: Respondents' Experiences of Experiencing with Floods

Flood Frequency	Frequency	Percentages
1 Times	19	16.7
2 Times	36	31.6
3 Times	5	4.4
4 Times	8	7.0
More than 4 times	46	40.4
Total	114	100.0

Almost 90% respondents faced various problems during the aftermath of floods, indicating that the floods have had a diverse impact on their lives (Table 2). The most significant problem reported was property damage, which affected 48.2% of respondents, highlighting the extensive destruction caused to homes and property by floods. In addition, 10.5% of the population faced problems with the supply of food and aid, indicating challenges in accessing important resources during flood events. Pollution problems were reported by 13.2% of respondents, emphasizing the environmental impact of flooding in the area. Other issues include damage to electrical goods, mental and emotional disorders, communication disorders and financial problems, each affecting a smaller percentage of the population. It is important to note that although some respondents reported no problems (10.5%), most residents faced significant challenges, with property damage being the most prevalent concern. This data highlights the urgent need for a comprehensive flood mitigation strategy, improved infrastructure, and community-based initiatives to address the various problems experienced by the residents of Taman Sri Muda.

Table 2: Types of Problems Facing Respondents

Types of Problems	Frequency	Percentages
Property Damage Problems	55	48.2
Home Damage Problems	4	3.5
Problem of Damage to Electrical Goods	7	6.1
Mental and Emotional Disorder Problems	3	2.6
Food and Aid Supply Problems	12	10.5
Pollution Problems	15	13.2
Interruption of Communication	3	2.6
Financial Problem	3	2.6
No Problem	12	10.5
Total	114	100.0

The flood disaster in Taman Sri Muda residents have caused a diverse range of destruction and losses (Table 3). The most prevalent type of damage reported is "All Damage," affecting a significant majority of respondents (60.5%), indicating that a large portion of residents has endured multiple forms of damage, including damage to houses, vehicles, and electrical goods. The data also reveals specific types of damage faced by individuals, with 11.4% reporting damage to houses, 14.9% to vehicles, and 9.6% to electrical goods. It is noteworthy that 3.5% of respondents reported "No Damage," implying that a portion of the community was fortunate to have avoided direct losses during the flash floods. Nevertheless, the prevalence of damages, especially those encompassing multiple aspects of residents' lives, underscores the urgent need for comprehensive flood mitigation strategies, improved infrastructure, and community-based initiatives to address the various challenges faced by Taman Sri Muda residents.

Table 3: Type of Damage Incurred by The Respondent

Type of Damaged	Frequency	Percentages(%)
House	13	11.4
Vehicle	17	14.9
Electric Goods	11	9.6
All Damage	69	60.5
No Damage	4	3.5
Total	114	100.0

Data shown in Table 4 indicates that the floods have resulted in varying degrees of financial impact on individuals and households. A small percentage, accounting for 3.5%, reported "No Total Loss," indicating that some residents were fortunate enough to avoid significant financial losses during the floods. However, the majority experienced financial setbacks, with 32.5% reporting "More Than RM 14,000" in total loss damage, suggesting substantial financial burdens. Additionally, 28.1% reported losses ranging from RM 9,001 to RM 14,000, and 21.1% reported losses between RM 1,001 and RM 5,000. A smaller percentage of respondents reported losses of RM 5,001 to RM 9,000 (6.1%) and less than RM 1,000 (8.8%).

The data reveals the financial strain experienced by a significant portion of the community, with a notable number of residents facing substantial financial losses. These findings emphasize the urgent need for financial assistance, support programs, and relief efforts to aid those affected by the floods in rebuilding their lives and properties. Moreover, comprehensive flood mitigation strategies and improved infrastructure are essential to minimize the risk of future flood-related financial hardships for Taman Sri Muda residents.

Table 4: Total Loss Damage by Respondent

Total Loss Damage	Frequency	Percentages (%)
No Total Loss	4	3.5
Less Than RM 1,000	10	8.8
RM 1,001 – RM 5,000	24	21.1
RM 5,001 – RM 9,000	7	6.1
RM 9,001 – RM 14,000	32	28.1
More Than RM 14,000	37	32.5
Total	114	100.0

Taman Sri Muda community is aware of the urgent need for flood management strategies and comprehensive infrastructure improvements. Table 5 shows that the most common suggestions, with 57.9% of respondents, was to improve the drainage and dam systems, indicating the importance of improving existing infrastructure especially the drainage networks to better manage floodwaters and increase water flows. Respondents also emphasised the importance of providing better Temporary Evacuation Centers (PPS) (16.7%), having flood mitigation plans (8.8%), improving flood management systems (7.0%), and conducting regular monitoring (7.0%) to ensure an initiative-taking response to potential flood events. This data illustrates the community's initiative-taking involvement and awareness of the various strategies needed to effectively address the issue of flooding.

Table 5: Respondents' Suggestions

Suggestion	Frequency	Percentages (%)
Improve the Drainage System and Dam	66	57.9
Provide Better "Pusat Pemindahan Sementara" (PPS)	19	16.7
Prepare Flood Mitigation Plan	10	8.8
Improving Flood Management System	8	7.0
Make Regular Monitoring	8	7.0
Deepening the Klang River	3	2.6
Total	114	100.0

RECOMMENDATIONS

The flood disaster experienced at Taman Seri Muda calls for prompt corrective measures to be implemented to relieve its residents from physical and financial losses associated with the disaster. The first measure should be to enhance the drainage infrastructure in Taman Sri Muda is crucial to manage surface runoff during heavy rainfall and mitigate flood risks effectively. The focus should be on improving and

expanding the existing drainage systems, considering factors like capacity, potential bottlenecks, and vulnerable areas. Professionally designed and maintained drains will facilitate the efficient flow of water away from residential areas, reducing the risk of floods.

Secondly, it is essential to enhance the functionality of flood dams in Taman Sri Muda to ensure effective flood management. To achieve this, comprehensive engineering assessments and improvements should be undertaken to ensure that the flood dams can accommodate increased water flow during heavy rainfall events. Regular maintenance and monitoring should be implemented to keep the flood dams in optimal condition and to identify and address any potential issues promptly. Additionally, integrating advanced technologies, such as real-time monitoring systems and automated floodgate controls, can enhance the efficiency of flood dam operations and response times.

Another important measure involves implementing early flood warning systems in Taman Sri Muda to enhance flood preparedness and response. Early warning systems utilise a network of sensors, rainfall gauges, and water level monitoring stations strategically placed in flood-prone areas to detect changes in water levels and weather patterns. When a potential flood event is detected, automated alerts, such as text messages, sirens, or mobile applications, are sent to residents and local authorities, providing timely information, and allowing sufficient time for preparation and evacuation if necessary.

CONCLUSION

Floods can cause widespread damage to infrastructure, homes, and livelihoods. They can displace families, disrupt essential services, and often lead to tragic loss of life. The occurrence of flooding events and property loss highlight the significance of effective flood prevention measures on the affected areas. These flood prevention measures and flood control mechanisms emphasise the necessity of strengthening drainage infrastructure, early flood warnings, enhancing the functionality of flood dams, and other relevant environmental measures. Findings from this study highlight the need of people, authorities, and local government working together to solve the flood challenges and enhance resilience and safety in Taman Sri Muda. By considering these valuable opinions and suggestions, authorities and stakeholders can work with residents to develop a comprehensive flood mitigation plan, implement infrastructure improvements, and foster community-based initiatives to build a more resilient and flood-resistant Taman Sri Muda.

REFERENCES

- Avram, E. (2021). Characteristics of The Floods in Pechea Village, Galati County. *Risks and Catastrophes Journal*, 105-119.
- Bibi, T., Reddythta, D., & Kebebew, A. (2023). Assessment of the drainage systems performance in response to future scenarios and flood mitigation measures using stormwater management model. *City and Environment Interactions*. <https://doi.org/10.1016/j.cacint.2023.100111>
- Bose, I. and Navera, U. (2017) Flood Maps and Bank Shifting of Dharla River in Bangladesh. *Journal of Geoscience and Environment Protection*, 5, 109-122. doi: 10.4236/gep.2017.59008.
- Department of Water and Sanitation, (2006), Fenomena Banjir Di Malaysia, Transportation, <https://www.water.gov.my/jps/resources/auto%20download%20images/584130f686b1d.pdf>
- Jabatan Pengairan dan Saliran Selangor 13 April (2023), Pengurusan Banjir, Water Selangor Government. <http://water.selangor.gov.my/index.php/ms/staf-jpss/sistem-idiary-jps-selangor/root/maklumat-jabatan/fungsi-jabatan/pengurusan-banjir>
- Javadinejad, S. (2022). Causes and consequences of floods: flash floods, urban floods, river floods and coastal floods. *Resources Environment and Information Engineering*, 4(1), 173-183. <https://doi.org/10.25082/REIE.2022.01.002>
- Mohd Yunus Yakkub & Mohamad Naufal Mohamad Idris, (19 Disember, 2021). *Banjir Buruk di Lembah Klang*. <https://www.kosmo.com.my/2021/12/19/banjir-buruk-di-lembah-klang/>
- Poesen, J. and Hooke, J. (1997) Erosion, Flooding and Channel Management in Mediterranean Environments of Southern Europe. *Progress in Physical Geography*, 21, 157-199. <http://dx.doi.org/10.1177/030913339702100201>
- Rendi C, and Liauw F, October, (2022), Mengubah Fenomena Banjir Menjadi Sebuah Pemberian, Vol. 4, No. 2. *Jurnal Sains, Teknologi, Urban, Perancangan, Arsitektur*. <https://journal.untar.ac.id/index.php/jstupa/article/view/22222>

Surat kami : 700-KPK (PRP.UP.1/20/1)

Tarikh : 20 Januari 2023

Prof. Madya Dr. Nur Hisham Ibrahim
Rektor
Universiti Teknologi MARA
Cawangan Perak



Tuan,

**PERMOHONAN KELULUSAN MEMUAT NAIK PENERBITAN UiTM CAWANGAN PERAK
MELALUI REPOSITORI INSTITUSI UiTM (IR)**

Perkara di atas adalah dirujuk.

2. Adalah dimaklumkan bahawa pihak kami ingin memohon kelulusan tuan untuk mengimbas (*digitize*) dan memuat naik semua jenis penerbitan di bawah UiTM Cawangan Perak melalui Repositori Institusi UiTM, PTAR.

3. Tujuan permohonan ini adalah bagi membolehkan akses yang lebih meluas oleh pengguna perpustakaan terhadap semua maklumat yang terkandung di dalam penerbitan melalui laman Web PTAR UiTM Cawangan Perak.

Kelulusan daripada pihak tuan dalam perkara ini amat dihargai.

Sekian, terima kasih.

“BERKHIDMAT UNTUK NEGARA”

Saya yang menjalankan amanah,

SITI BASRIYAH SHAIK BAHARUDIN
Timbalan Ketua Pustakawan

nar

Setuju.

27.1.2023

PROF. MADYA DR. NUR HISHAM IBRAHIM
REKTOR
UNIVERSITI TEKNOLOGI MARA
CAWANGAN PERAK
KAMPUS SERI ISKANDAR