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The 4th International Seminar on Sustainable Urban Development

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Preface

First of all, praise be to Allah, the Cherisher and Sustainer of the world, for His blessing for all of us. He who has provided us a chance so that we could be here. On behalf of the Organizing Committee, it is our great pleasure to welcome you to **the 4th International Seminar on Sustainable Urban Development (ISoSUD) 2017**, held by Faculty of Landscape Architecture and Environmental Technology, Universitas Trisakti, Jakarta, Indonesia at Hotel Ciputra. To the academicians, our colleagues from overseas universities, guests, participants, students, please accept our gratitude, warm welcome and appreciation.

Let me deeply express a special appreciation to the speakers:

- 1) Assoc. Prof. Dr. Nada Khaleefah M. A. Alrikabi from Environmental & Urban Planner, Center of Urban and Regional Planning for Post Graduate Studies, Baghdad University, Iraq
- 2) Dr. Yusnani Mohd Yusof from Urban Planning, Affordable City, Universiti Brunei Darussalam
- 3) Prof. Dr. Pasi Lehmusluoto, from Department of Limnology and Environment Protection, University of Helsinki, Finlandia
- 4) Prof. Dr. Mohd. Razman Salim, from Department of Environmental Engineering, Faculty of Civil Engineering, Universiti Teknologi Malaysia, Malaysia

Achieving the SDGs requires of governments, private sector, civil society and citizens alie to make sure we leave a better planet for future generations. All 17 Goals interconnect, meaning success in one goal affects success for others. In short word, this is the greatest chance we have to improve life for future generations. Some of the goals that in major issue of **4th International Seminar on Sustainable Urban Development** are:

- Goals No. 6: Clean Water and Sanitation
- Goals No. 7: Affordable and Clean Energy
- Goals No. 11: Sustainable Cities and Communities
- Goals No. 13: Climate Action
- Goals No. 14: Life Below Water
- Goals No. 15: Life on Land

The seminar gathers eminent speakers and scholars that are engaged in Sustainable Urban Development field. The theme for this event is:

THE SUSTAINABLE DEVELOPMENT GOALS: IMPROVE LIFE FOR FUTURE GENERATION

The sub-themes of the seminar include, but not limited to :

- 1) Ecological Disaster Mitigation and Adaptation
- 2) Urban Environemntal Management
- 3) Environmental Technology

This year, the committee received over than 150 papers both in oral or poster presentation from 15 universities in Indonesia and from UK, Japan, Malaysia, Italy, and Iraq as well. Selected papers will be proposed to be published in IOP Publisher Conferences Series: Earth and Environmental Science, indexing by Scopus and Thomson Reuters. Other selected papers will



be published in National Journal accredited by Ministry of Research and Higher Education of Indonesia, i.e: Aceh International Journal of Science and Technology published by Universitas Syiahkuala, Aceh and Jurnal Reaktor published by Universitas Diponegoro, Semarang.

We are very grateful to Rector of Universitas Trisakti-Jakarta, Dean of Faculty of Landscape Architecture and Environmental Technology, Head of Environmental Engineering Department, Head of Landscape Architecture Department, Head of Urban and Regional Planning Department, the members of Advisory board, the members of Steering committee, Peer Reviewers, and Organizing committee that very supported and helpful within the preparations and conduction this seminar. Our grateful deliver as well to Association of Experts in Sanitary Engineering (TP) and Environmental Engineering (TL), IATPI (Ikatan Ahli Teknik Penyehatan dan Teknik Lingkungan), for their support to the seminar. Our appreciation is also for all the participants who have actively written excellent research papers. It is desired to have a sustainable seminar to be continuously held in the future times, as we are challenged to make a sustainable building and environment for a sophisticated life. Last but not least, we would like to express our gratitude to all the session chairs, reviewers, participants, institutions for their contribution to 4th ISoSUD 2017.

We believe that this event will be able to facilitate a good networking among researchers, scientists, engineers and practitioners of with common interest especially in sharing the latest research results, ideas, development and applications in the Sustainable Urban Development. We hope you enjoy the seminar and find this experience inspiring and helpful in your professional field. We look forward to seeing you at our upcoming seminar in the next 3 years on 5th ISoSUD 2020.

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All papers published in this volume of *IOP Conference Series: Earth and Environmental Science* have been peer reviewed through processes administered by the proceedings Editors. Reviews were conducted by expert referees to the professional and scientific standards expected of a proceedings journal published by IOP Publishing.



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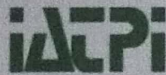
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CERTIFICATE

This is to certify that

DR. MARIA IMMACULATA RIRIK WINANDARI

Has participated the Fourth International Seminar on Sustainable Urban Development

as **PRESENTER**

9th August 2017, Jakarta, Indonesia

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Public open space for disaster mitigation in Tangerang housing estates

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Public open space for disaster mitigation in Tangerang housing estates

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Abstract. Public open space in housing estates plays an important role particularly in disaster mitigation. In some housing, there are indications of shape and use of space changes post-handover to local government. The aim of this study is to explore the relationship between public open space condition and management related to disaster mitigation in Tangerang housing estates. Multiple case study method is used to analyse of 2 housing cases. Aspects of access and boundaries were used to evaluate the cases. The results showed that gated community housing type should have more than 1 access to facilitate evacuation by considering the farthest unit to the housing gate. This is necessary to provide open spaces that are easily accessible from all units as the first evacuation site during and post disaster.

Keywords: disaster, mitigation, public open space

1. Introduction

Indonesia is a disaster-prone country. According to world risk report 2016 [1], Indonesia was at 36th rank with 10.24% world risk index which is improved 2 levels compared to 2 years ago. Referring to this report, Indonesian exposure is in the very high risk [1]. This Exposure relates to natural disaster such as earthquakes, storms, droughts, floods, and sea level rise. Based on BNPB, there are 148.4 million people living in areas prone to earthquakes, 5 million in tsunami-prone areas, 1.2 million in volcanic eruption areas, 63.7 million in flood-prone areas, and 40.9 million in areas prone to landslides [2]. Indonesian Disaster Data and Information shows that the highest mortality caused by earthquake, tsunami, and eruption [3]. These condition need to be anticipated to reduce loss of life and property by providing public open spaces in housing estates.

Several research and paper on open spaces related to disaster mitigation has been done. Based on previous researches, public open spaces in housing estates functioned as green place, protective green belt, and disaster evacuation place [4], [7]. Those spaces were the first evacuation place when disaster strikes. There were several studies about the use of open space related to flooding disaster [5], to earthquake disaster [6], to tsunami [7], to disaster resilience [8]. Related to researched by [19], during floods, streets serve as boat evacuation route while square that should be located on higher ground serving as place for rescue camps, medical facilities, and dropping of supplies. On the contrary, open spaces with limited vegetation become a refuge from fire during fire.

Researchers [6] evaluated characteristics of urban open space in Tehran as places for the relief operation and crisis management during disaster incidence. Researcher [7] evaluated green open space in Banda Aceh post disaster reconstruction. Both previous studies explored cases directly at the studies area. On the contrary, Researchers [8] explored the potential uses of public open spaces for disaster



resilience through literature analysis. Based on library search, open space studies related to flood and fire in Tangerang have been no found.

Tangerang is a part of Banten Province, the fourth highest population density in Indonesia [9]. As seen in Figure 1, this area is vulnerable to disaster. This condition requires housing estates management in Tangerang to mitigate the disaster possibility. Stated by Vice Governor of Banten, Banten province is vulnerable to 14 types of disasters with fire and flooding as the most frequent disaster [10]. This study explored the role of open space for mitigation in housing estates. In this study, public open space condition in Tangerang housing estates evaluated to disaster mitigation especially flooding and fire.

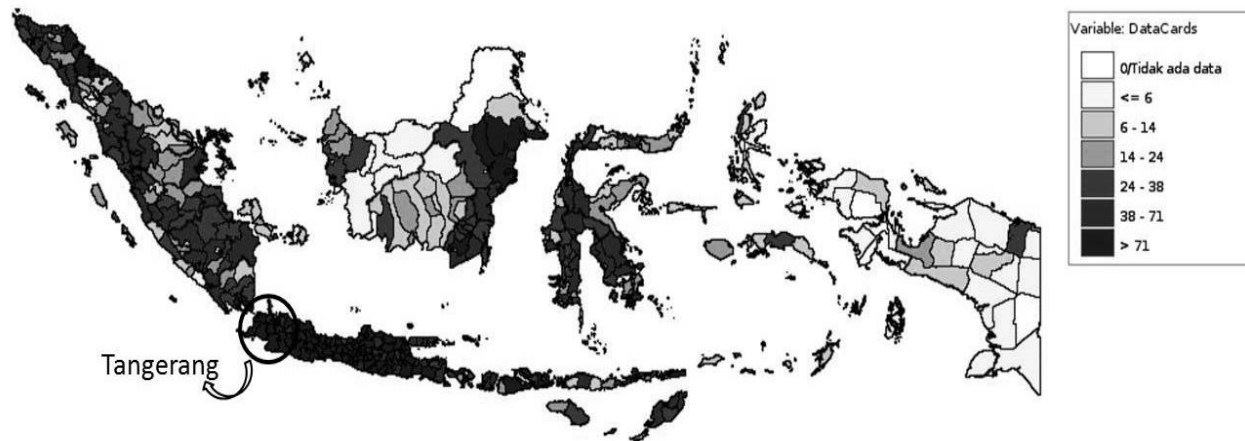


Figure 1. Distribution of disaster event per district 1815 – 2017 [3].

1.1 Open Space for Mitigation

Regulation [11] stated that open space in disaster prone area functioned as evacuation place. In line with the regulation, researchers [12] stated that open space has an important role in mitigation strategies to climate change. Based on Ministerial Decree [13], the open space that must be provided for every 250 people is Neighbourhood Park with 0.3 m²/population, parking area with 3% of the total area, and Neighbourhood Street with a width of 2 m - 5 m. In housing estate, open spaces must provide to accommodate those requirement. Both square (Neighbourhood Park or parking area) and street should be clean, accessible, and well maintained [13].

According to mitigation, open spaces network play an important role in rescuing to safer place. Regulation of the National Disaster Management Agency No 11/2008 stated that the indicators of post-disaster restoration are access availability to housing units and adequate open spaces [14]. Researcher [7] confirmed that open space network is useful for the rescue in a short time as well as for the victim evacuation. Referring to researcher [18], street as an important evacuation path requires sufficient wide for the escape route. Disaster mitigation will be more successful using community-based disaster mitigation programs. This is essential so that people are able to control the situation in the event of a disaster [18]. It should be noted that the capacity, location, and open space connections are affected by the type of open space. The space should be usable in times of emergency and in everyday life rather than special mitigation rooms [8].

2. Research Method

Multiple case study method is used to analyse open spaces related to disaster mitigation in 2 housing cases namely Bumi Serpong Damai estate (Case 1) and Gading Serpong estate (Case 2) that located in South Tangerang. Both housings were middle-high income housing estates. The observation unit is a cluster located in both housing estates. Literature review is used to explore the role and standards of open space required for disaster mitigation. The analysis includes 4 aspects consisting of type, access, location, and boundaries. These aspects were used to evaluate public open space conditions in all cases

related to disaster mitigation. The observation and interviews to the residents were conducted simultaneously. These activities have been done in sequence case after case.

2.1 Bumi Serpong Damai Estate and Gading Serpong Estate General Data

Bumi Serpong Damai Estate (Case 1) is located in Tangerang Municipality and South Tangerang Municipality. Most of these clusters areas are located in Serpong District, part of South Tangerang Municipality. Built around 1997 by Sinarmas Developer and Real Estate, this estate is developed on an area of approximately 6000 hectares [20]. This housing consists of several clusters one of which is Puspita Loka located in the middle of housing. One of Puspita Loka cluster that became the location observation is surrounded by main road and river that separate it with other clusters and located next to BSD City Park. This cluster has a grid pattern with half of units' arrangement from Northeast to Southwest and the other half from East to West.

Gading Serpong Estate (Case 2) is located in Tangerang Municipality. Built around 1993 by Summarecon and Keris Group, this housing was developed on an area of approximately 1500 hectares [21]. As in Case 1, this housing consists of several clusters. One of the clusters that became the location of this observation was the Aquamarine cluster. This cluster is part of Pondok Hijau Golf area that adjacent to the golf course and separated with other clusters by walls and street. This cluster has a grid pattern with units' arrangement from Northeast to Southwest.

3. Results and Discussion

Streets and squares in both cases are utilized by occupants in daily life and can be used during disaster. Based on researched by [8], this is in accordance with the use of space. This section describes housing and open spaces types, access, location, and boundaries. Based on the open space type, there are various types in both cases. Both cases consist of Neighbourhood Park and green housing boundaries. Besides these two types, Case 1 consists of river green barrier and street green barrier. In accordance with that researched [8], that various types of open spaces will affect the capacity and connection of space especially during a disaster, Case 1 is more responsive to disaster due to various types of open space. In addition to streets, Case 1 has river as an alternative evacuation route in flood time. The variety of open space types allows occupants to choose their most appropriate place during and after the disaster. Referring to Ministerial Decree [13], Case 1 has met the minimum standard that has not been fulfilled in Case 2. The fulfilment of open space minimum standards in Case 2 (clusters) is met through the provision of space in the housing scope.

In terms of access, both cases are gated housing type surrounded by high fences with 24-hours security guard. This condition reinforced our previous study which stated that most middle-high estates would have a restricted access entrance gate [15]. The difference between the two lies in the amount of housings access. Case 1 has 2 accesses with 24-hour guard that can be daily traversed and 2 others access that only opened at certain events. On the contrary, Case 2 has single access with 24-hour guard (Figure 2 and Figure 3). The street width in both cases already meets the minimum standards referring to researcher [18] even wider than the requirements stated in Ministerial Decree [13]. These conditions facilitate the evacuation vehicles access when disaster comes. The distance from the furthest unit to the housing gate is approximately 160 m in Case 1 whereas in Case 2 approximately 440 m. Referring to researcher's [7] statement, the occupants in Case 2 had longer time to rescue and evacuate than the Case 1 during a disaster emergency. According to Ministerial Regulation No. 8, year 2008, the distance of open space as the first evacuation place is more adequate in Case 1 than in Case 2. The distance from the furthest unit to the nearest open space in Case 1 is approximately 90 m while in Case 2 is approximately 279 m. When the fire or flood comes, the nearest open space is needed as a buffer as well as a place to put goods and tents.

Based on location, in Case 1, Neighbourhood Parks is scattered in several places with mostly triangular shapes surrounded by house units. In Case 2, there is only one Neighbourhood Park located in the middle of the housing. Scattered parks make it easier for residents to reach a refuge place from their units. In housing scope (in Case 2), the golf course that located next to the cluster provides residents an alternative place for refuge especially during fire. Provision of more and scattered open spaces in the housing serves as a refuge place during disaster. Viewed from ground level, all parks in

both cases are in a slightly higher place from the street. Referring to researched by [19], this condition has not qualified as a temporary evacuation site in case of flooding. Open space network in both cases showed that linkage among park, street, and river in Case 1 has a clear path that connects between open spaces and residential entrances.

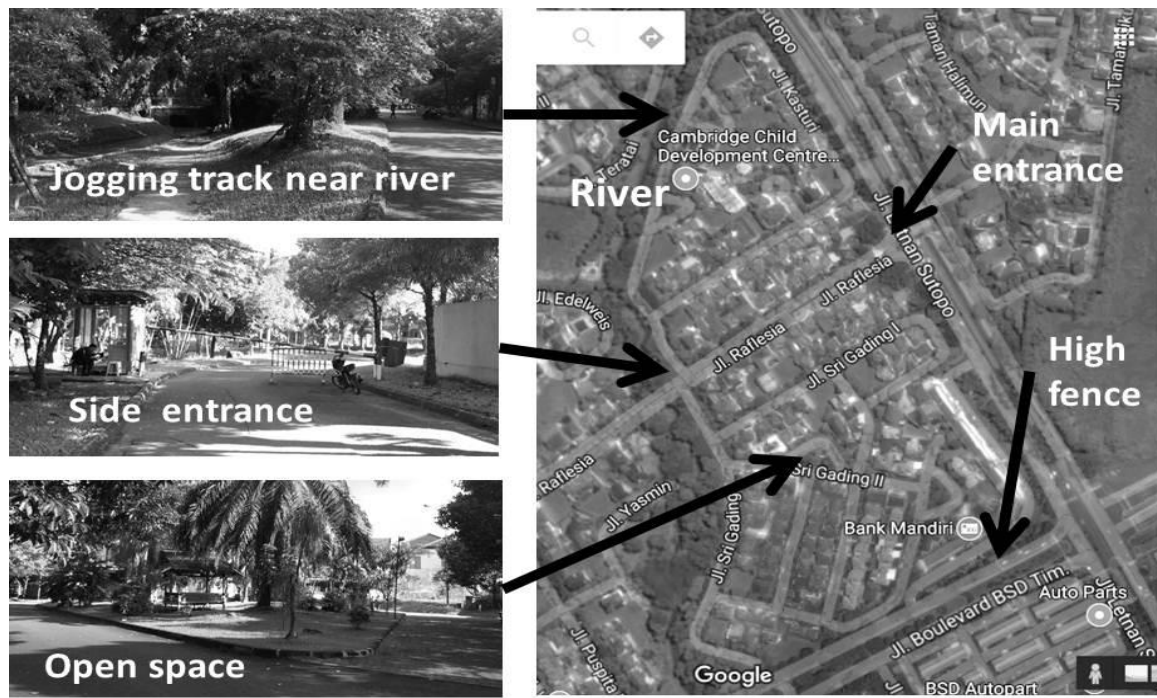


Figure 2. First case with double access and high fence [3].

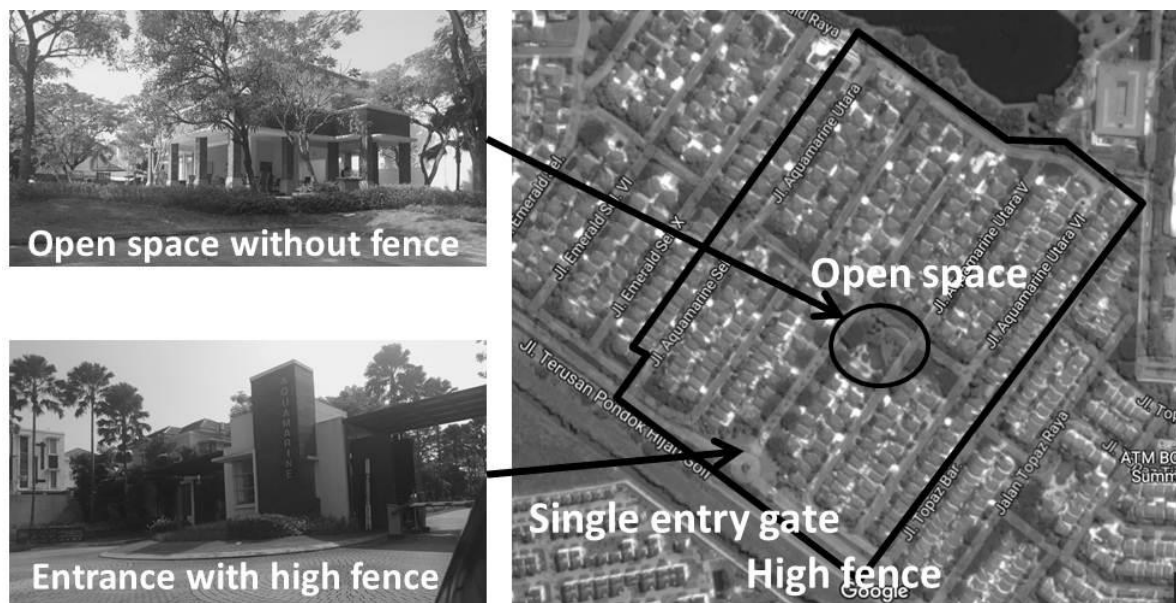


Figure 3. Second case with single access and high fence [3].

In relation to boundaries, open spaces in both cases have no divider to the street or to surrounding unit. When disaster strikes, those open spaces can easily accessible by occupants. Open spaces with no barrier in both cases facilitate resident access during disaster evacuation. Park territory is characterized by ground level that is reinforced by paving blocks around the park. These level differences are clearly

seen in Case 2 with almost 50 cm height difference. Associated with fires, a more open space with few trees is much safer than the lush spaces. In Case 1, lush trees along the river may lead to a higher possible spread of fires. The more open the space, the better they reduce the possibility of fire spreading. Open spaces condition in both cases qualified Ministerial decree [13] that should be clean [16], accessible, and well maintained [17]. The occupant's involvement in both cases limited to open space management and construction related to daily life not entered disaster mitigation. Referring to researcher [18], community-based disaster mitigation programs need to be done to control the situation during disaster.

4. Conclusion

Learning from both cases that were middle-high gated housing type, there are 3 things to note related to disaster mitigation especially during floods and fires. First, gated community housing should consider the easily housing access. Housing should have more than 1 access although it can only be passed at a certain time. Secondly, the distance of the farthest unit to the housing gate should be considered to facilitate and accelerate the evacuation process. Thirdly, providing open spaces that is easily accessible from all units as the first evacuation site during and post disaster is necessary in housing estate. Scattered parks in several places gives greater possibilities for occupants as a refuge place rather than centralized park.

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