

The Role of Public Spaces in Disaster Mitigation-Based Urban Planning in Southeast Asia and East Asia

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Abstract

The continent of Asia is one of the continents crossed by the Pacific Ring of Fire (Ring of Fire). The Pacific Ring of Fire is an area that experiences frequent earthquakes and volcanic eruptions that burn the Pacific Ocean basin. The Pacific Ring of Fire causes the countries it passes through to experience frequent disasters. Various ways have been done to anticipate disasters by countries in Southeast Asia and East Asia. This research will move forward by deepening the possibilities of the form of conceptualization and the contributable potential of public space to be included as a fundamental part of disaster-based urban planning, especially in countries in the Southeast Asia and East Asia. This study uses descriptive analysis techniques because descriptive research is a simple analytical model and very easy to apply. This study also uses qualitative analysis because researchers want to interpret and describe non-numeric data. The Southeast Asia and East Asia Regions were chosen as the research location, namely the countries in these regions have similarities in terms of geographical location, traversed by the Pacific Ring of Fire. The source of data in this research is secondary data in the form of additional data such as literature data, documents related to data needed in further research. The instrument in this study was a computer device. Most of the conceptualization of public space in several countries in Southeast Asia and East Asia has implemented a disaster mitigation system. The use of public space in Southeast Asia and East Asia is more in the use of green open spaces for catchment areas and gathering places as well as mitigation in accordance with the characteristics of disasters that often occur in each country. The potential that can be contributed from disaster mitigation-based urban planning can prevent and reduce the impact of the disaster itself.

Keywords: Public Space, Urban Planning, Disaster Mitigation, Southeast Asia, East Asia

1. Introduction

Asia is one of the continents traversed by the Pacific Ring of Fire. The Pacific Ring of Fire is a region characterized by frequent earthquakes and volcanic eruptions that encircles the Pacific Ocean basin. This area takes the shape of a horseshoe and spans approximately 40,550 km. The Pacific Ring of Fire extends from Southeast Asia through East Asia to the Americas, making this continent prone to earthquakes, volcanic eruptions, and other related hazards. The Ring of Fire encompasses a chain of underwater volcanoes and earthquake-prone zones along the edges of the Pacific Ocean. Within the Ring of Fire, there are over 450 active volcanoes. Being located within the Ring of Fire, Indonesia is a region susceptible to earthquakes. According to the Meteorology, Climatology, and Geophysics Agency (BMKG), Indonesia is located in a seismic-prone region due to the convergence of three tectonic plates: the Indo-Australian Plate, the Eurasian Plate, and the Pacific Plate. Along with Indonesia, the Philippines is another country traversed by the Pacific Ring of Fire, producing it susceptible to earthquakes, volcanic eruptions, and even typhoons. These

archipelagic nations are located at the boundaries of major tectonic plates, with a significant portion of their territories falling within the "typhoon belt" of the world.

Japan is a country that harbors approximately 200 volcanoes, around 60 of which are active. It possesses immense earthquake and disaster potential due to its location atop four major tectonic plates known as tectonic plates. Approximately 90 percent of all global earthquakes and 80 percent of the largest ones occur along the Ring of Fire (Kompasiana.com, 2016). Japan experiences about 1,500 earthquakes annually. The catastrophic Great Kanto Earthquake of 1923, which claimed the lives of over 100,000 individuals in the Tokyo vicinity, is now honored as National Disaster Prevention Day. Moreover, Japan is susceptible to floods and tsunamis.

Various countries have executed different measures to anticipate and mitigate disasters. One of the practices that involve public spaces as disaster mitigation areas are observed in Japan, where the government has constructed evacuation towers in Nakano 5-Chome. These two-story steel-framed structures, standing over six meters above ground level, can accommodate up to 300 people as refugees from tsunami disasters. In the Philippines, according to the National Disaster Risk Reduction and Management Council (NDRRMC), as reported by Philstar, a total of 63,769 families or 250,036 people affected by Typhoon Ompong (Mangkut) were evacuated to designated evacuation centers in Metro Manila, Calabarzon, Mimaropa, Cordillera, Ilocos, Cagayan Valley, and Central Luzon. In the context of the non-natural disaster of the COVID-19 pandemic, China has constructed non-permanent hospitals in public spaces, such as plazas in the city of Shijiazhuang, to facilitate the isolation and quarantine of COVID-19-affected patients (BBC, 2021). Likewise, the government of Myanmar has effectively utilized its public spaces in Yangon to distribute oxygen supplies to the community (Bonasir, 2021).

Therefore, disaster mitigation-based urban planning is crucial in the spatial arrangement context in 21st-century cities. With the increasing global temperature, rising sea levels, occurrences of tsunamis, floods, landslides, hurricanes, viruses, and other hazards, the role of urban spatial planning that equips alternative solutions to diminish the consequence of disasters becomes increasingly critical (Mulyadi, 2021). The effective utilization of public spaces is closely related to adaptability and responsiveness, particularly in response to altering community needs, environmental disasters, and emergencies such as pandemics (Nadlifah, 2021). However, the decision to incorporate public spaces in disaster mitigation-based urban planning is based on the understanding that these spatial elements are easily accessible to both the government and the general public (Husein & Onasis, 2017). The regulation of these spaces often rests with local authorities or specific community groups. Building upon the background information, the researchers seek to investigate how public spaces are conceptualized and utilized in the context of disaster mitigation-based urban planning in East and Southeast Asian countries.

2. Theoretical Framework

2.1 Public Space

The concept of public space entails a shared area where the community engages in routine and functional activities that bind them together, both in their daily lives and during periodic celebrations (Carr, 1992 in Iswara et al., 2020). Throughout history, public spaces have played a crucial role as sites for people to encounter, gather, and interact, serving various purposes such as religious, commercial, and governance-related activities. Historically, diverse typologies of public open spaces have evolved with diverse types and characteristics, including public parks, squares and plazas, memorial parks, markets, streets, playgrounds, community open spaces, greenways and parkways, atriums/indoor markets, and waterfronts. Furthermore, according to urban design theory by Shirvani (1985) in (Risidian et al., 2020), there are elements that encompass land use, building form and massing, circulation and parking, open space, pedestrian pathways, activity support, signage, and preservation.

Private Owned Public Space (POPS) refers to urban spaces that result from a trade-off between local government, landowners, or private developers. Landowners are granted rights to construct larger buildings

than permitted by existing development control regulations or receive tax incentives. In exchange, developers are obliged to provide publicly accessible spaces or other facilities. These spaces remain located on private property but must be accessible to the public and available for use by all community members at any time. Another form of POPS involves the preservation of existing spaces. If a landowner agrees to maintain an open space within the city instead of developing the land and agreeing to open it to the public, they are eligible for tax benefits (Kien To, 2018).

2.2 Conceptualization of Public Space Based on Planned Mitigation

Public space refers to tangible spaces that materialized in 17th and 18th-century Europe, such as coffeehouses and salons, where individuals gathered as a collective public and engaged in rational and egalitarian discussions on various topics, particularly on the organization and governance of communal life between citizens and the government. Within these discussions, citizens expressed their interests to converge into a common or public interest (Habermas, 1989). This notion of public space carries a political function, as expounded by Budi Hardiman (2009: 11), as "a realm of communication for citizens to vigilantly oversee the functioning of governance." The ideal public space refers to the bourgeois Habermasian notion of public space, whereas the liberal public space alludes to the degraded or deteriorated state of the ideal public space.

As a theoretical reference for integrating disaster mitigation with the public policy cycle, the writer selected the policy cycle theory (David Easton in Arnout et al., 2014: 63). In brief, the policy cycle theory is a simplified model of the public policy process that originated from Lasswell. Lasswell proposed that the policy process consists of seven stages: intelligence, promotion, formulation, invocation, implementation, termination, and appraisal. Furthermore, Easton's policy cycle theory considers the policy stages as a challenge of clarifying and incorporating issues into the agenda, followed by policy formulation, adoption, implementation, and ultimately, repeated evaluation, forming a cyclic process. The cyclic nature of the policy cycle highlights the feedback loop between policy outputs and inputs, ensuring an ongoing and continuous public policy process.

2.3 Disaster Mitigation in the Planning Process

Disasters and their aftermath can have substantial adverse effects on both the economic and social aspects of a community, disrupting development endeavors and impeding progress. Conversely, disaster management, particularly in the context of recovery, presents a prospect for policymakers and governments to reevaluate development priorities and allocate significant resources toward long-term economic reconstruction post-disaster. The relationship between disasters and development is inherently dynamic, and the resulting implications, whether positive or negative, are contingent upon the unique social and cultural characteristics of the local community, as well as the effectiveness of disaster management and development capacities.

Disasters have the potential to not only create new expansion opportunities but also to disrupt ongoing or planned development projects in a region. In essence, they can be both drivers and impediments to urban progress. Hence, it is crucial to consider disaster and development in tandem when formulating and implementing policies and procedures for local disaster risk reduction. Embracing this perspective, disasters can propose a chance to minimize future disruptions to development by reducing community vulnerability and reinforcing preparedness and mitigation measures.

3. Research Method

The research design was descriptive qualitative research. In conducting this research, the researchers focused on finding and describing the conceptualization and contributable use of public space in the context of urban planning based on disaster mitigation in East and Southeast Asian countries. The data collection employed in conducting this research were secondary data. These usage techniques are aimed at gaining the data to answer the research problems. Analysis of the research data employed inductive analysis for its easier

to describe. What is meant by inductive data analysis according to the qualitative paradigm is the analysis of specific data from the data sources into units followed by categorization. This method is carried out by concluding that it starts from a specific understanding of cases in the form of a general conclusion.

4. Result and Discussion

A. Conceptualization of Public Space in Disaster Mitigation-Based Urban Planning in East Asian and Southeast Asian Countries

a. Banda Aceh, Indonesia

Indonesia is well-known for its countless active volcanoes and its location within the Pacific Ring of Fire. Budiwati (2010) claims that Indonesia, being an archipelagic nation, is located in a high-risk disaster zone. Geologically, it lies between the oceanic plates (Pacific and Indian) and the continental plates (Asia and Australia). Banda Aceh stands as one of the cities that faced the most severe consequences of the 2004 Indian Ocean Tsunami. In specific locations, the run-up mode of the tsunami wave reached remarkable heights, reaching 49.43 meters in Bukit Ritieng-Leupung and 34.8 meters in Lhok Nga (Hibayama et al., 2005; Tsuji et al., 2006, as cited in Banda Aceh City Government, 2019). The tsunami inundation in Banda Aceh extended 3 to 4.5 kilometers inland, provoking extensive destruction to nearly half of the city's territory. As a livable city, Banda Aceh should be able to provide public spaces for its citizens. These public spaces serve as vital venues for social interaction among the city's citizens. With its 9 districts and 90 villages, Banda Aceh thrives in various sectors such as trade, services, tourism, education, and healthcare. Being a prevalent destination for both domestic and international tourists, the availability of public spaces adds to the allure for visitors (Banda Aceh City Government, 2020).

Banda Aceh has produced significant progress in providing accessible and vibrant public spaces that cater to the conditions of its residents. These spaces not only promote public activities but also offer convenience and aesthetic appeal. They serve as social gathering points where individuals can interact and bring visitors along during their visits. Some notable samples of these public spaces include the Green Open Spaces (Ruang Terbuka Hijau): Taman Sari and Kids Rock, Tsunami Educational Park, Bustanussalatin Nursery Park, Putroe Phang Park, Ulee-Lheu Park and Beach, Krueng Neng/Gampong Surin Park, Kuala/Gampong Jawa Beach, BNI Tibang City Forest, Blang Padang Field, and the riverside areas across Banda Aceh. These are just a few examples, as there are many more public spaces scattered throughout the city. Figure 1 illustrates the Masterplan of Green Open Spaces in Banda Aceh, showcasing the city's commitment to constructing well-designed and functional public spaces.



Figure 1. The Green Open Space Master Plan in Banda Aceh

Source: Department of Public Works and Spatial Planning of Banda Aceh

According to Law No. 26 of 2007 on Spatial Planning, Article 28 stipulates that the provisions of regional spatial planning for regencies, as stated in Article 25, Article 26, and Article 27, shall apply *mutatis mutandis* to spatial planning for cities. However, in addition to the details outlined in Article 26, paragraph

(1), one crucial aspect is the inclusion of plans for the provision and utilization of green open spaces. To address urban environmental degradation effectively, it is critical to implement appropriate and functional green open spaces. These areas serve as the city's lungs, playing a vital role in providing clean air, producing oxygen (O₂), absorbing pollutants, and serving as natural water infiltration zones. Their multifaceted functions are irreplaceable (Bahri et al., 2012). Blang Padang Field in Banda Aceh City serves as a tourist zone and public space usage for recreational activities, sports, vending, national ceremonies, religious activities, and military events. It is referred to as a green public open space because it is a shared area utilized by the community for individual and group activities. A high-quality public open space meets the needs, protects the rights, and provides significance to the visitors who engage with it.



Figure 2. Blang Padang Field in Banda Aceh City

Source: IDN Times (2021)

According to Law No. 26 of 2007 concerning Spatial Planning, point (c) states that besides green open spaces, there are plans for the provision and utilization of pedestrian infrastructure, public transportation, informal sector activities, and disaster detection spaces, which are needed to fulfill the function of urban areas as centers of socio-economic services and regional growth. One example of such infrastructure is highways and mosques. A renowned landmark is the Baiturrahman Grand Mosque, a significant heritage of the Aceh Kingdom, symbolizing religion, culture, and the resilience of the Acehnese. Constructed in 1612 AD by Sultan Iskandar Muda, the ruler of Aceh from 1607 to 1636, the mosque endured numerous challenges, including being targeted and burned by the Dutch. Remarkably, it withstood the catastrophic tsunami in 2004, showcasing its resilience and spiritual significance (Kompasiana.com, 2016). The Baiturrahman Grand Mosque maintains significant reverence among Muslims and stands as a symbol of hope and resilience, being the only mosque that survived the devastating tsunami in 2004. The image of the Baiturrahman Mosque can be seen in the following figure.



Figure 3. Baiturrahman Mosque

Source: Taufan Mustafa (2019)

b. The Philippines

The Philippines stands as one of the most disaster-prone nations in Southeast Asia, owing to its geographical location along the volatile Pacific Ring of Fire and Typhoon Belt. Consequently, the country, particularly Guiuan City in Eastern Samar Province, frequently experiences seismic tremors and is buffeted by an average of 20 tropical cyclones annually. Recognizing the inherent vulnerability and exposure to both natural and human-induced perils, the Philippine government has aligned itself with other nations in a steadfast commitment to implement the Sendai Framework for Disaster Risk Reduction (SFDRR) on a global scale, alongside active participation in the ASEAN Agreement on Disaster Management and Emergency Response, at both global and regional levels. The SFDRR, officially adopted amid the Third United Nations World Conference on Disaster Risk Reduction in March 2015, places significant emphasis on the imperative of investing in comprehensive disaster risk reduction (DRR) measures to bolster societal resilience. Such measures encompass a broad spectrum of strategies, ranging from physical infrastructure enhancements to non-structural interventions, aimed at fortifying the resilience of individuals, communities, and their invaluable assets (Boasso Marco & Lotta Sylwander, 2016).

According to Philippine Civil Law (RA 386, Article 420), two sorts of properties fall under public ownership. The first category includes properties intended for public use, such as roads, canals, rivers, ports, bridges, and other identical structures constructed by the State. The second category includes properties that belong to the State, not intended for public use, but rather for public services or national development, such as public buildings, infrastructure, and other assets. According to Trancik (1986), as cited in Nugroho et al. (2017), urban planning is the process of organizing the spaces within a city to create order, beauty, and a sense of reassurance. There are numerous spaces available for public use, including roads (including areas for vehicular traffic, bicycle lanes, and pedestrian walkways or crossings), sidewalks and footpaths, bridges, open spaces such as parks (including green parks, pocket parks, national parks, and protected parks), plazas, and playgrounds. Public infrastructure such as hospitals, schools, community centers, places of worship, public transportation stations (including train stations, waiting areas, and passenger lounges), ports, buildings, and other public works, also fall within this realm. However, A road is defined as "any highway or public space that has been dedicated or given to the public for public use," according to the National Building Code (RA 6541). Parks and playgrounds are listed as necessities for human settlement, as stated in Batas Pambansa 220 (Regulation III, Section 5B).



Figure 4. Marikina City, The Philippines

Source: Jean Palma (2018)

Additionally, one of the most captivating public spaces in the Philippines is in the heart of Bacolod City. Myriad activities take place in front of the city hall, including Zumba, massages, strolling around the lake, flying kites, dining, running, sports, family bonding, and much more. Some examples of public spaces in the Philippines are as follows: Sirungan ha Guiuan, Guiuan Children's Park, Sulangan Mangrove Park, Sun and Sand Beach Park, Barangay 04 Children's Park, Minasangay Island Ecological Park, Cansarigan Reef Fish Sanctuary, Immaculate Conception Church, St. Lorenzo Ruiz de Manila Parish Church, Guiuan

Christian Fellowship, Our Mother of Perpetual Help Church, Sts. Peter and Paul Chapel, St. John the Baptist Church, Our Lady of the Most Holy Rosary Church, St. Anthony of Padua Parish Sulangan, San Antonio de Padua Chapel - Brgy. San Antonio, Roman Catholic Church, Our Lady of Salvation Chapel Camparang.

c. Japan

The Japanese archipelago spans over a vast expanse of 3,000 km, surrounded by boundless seas. With its uneven terrain and extensive mountain ranges covering about 75% of the entire land area, Japan is characterized by numerous steep slopes. Located along the Pacific Ring of Fire, the Japanese archipelago spans from the sub-arctic zone in the north to the sub-tropical zone in the south. As such, Japan reaps abundant geographical and topographical benefits, relishing the bountiful splendors of seasonal transformations and natural riches. Tokyo, ranked as the 9th most densely populated city in the world, epitomizes the intermingling of urban spaces driven by its dense population. This population density compels residents of Japan, particularly those in Tokyo, to embrace a lifestyle centered on public spaces.

Public activities take place in shrines and sacred sites, but more importantly, they unfold on the streets. The streets serve as the backdrop for events, festivals, and daily life activities. Consequently, the planning laws or zoning regulations in Japan's urban development history have been ambiguous (Kien To, 2018). Tokyo and several other Japanese cities have successfully connected formal and static infrastructure and the built urban environment with more informal services in everyday life and special events, such as festivals. The strategy of recognizing the temporality of spatial usage verifies highly valuable of adapting to the ever-changing built environment during globalization. For instance, the iconic Shibuya Scramble Crossing, known as the busiest intersection in the world, is sometimes employed for large-scale events like New Year's countdown or Halloween celebrations.



Figure 5. Shibuya Crossing

Source: Liputan6.com, 2023

Particular public spaces in Japan are constructed through a collaboration between the government and private entities, a system commonly referred to as Private Public Partnership (PPP) or Privately Owned Public Space (POPS). The traditional Japanese planning system has long been characterized by its uniformity, standardization, and top-down approach. However, upon closer scrutiny, it becomes apparent that zoning incentives and the provision of POPS exhibit notable variations among different cities, such as Osaka, Kyoto, Yokohama, Tokyo, and Sapporo. Nevertheless, throughout the 2000s, the efficacy of zoning incentives seems to have waned in numerous Japanese cities, owing to challenges like population decline and the weakening of local economies. In Sapporo, a meticulously planned city with extensive public spaces such as parks, wide promenades, and sidewalks, planners approach zoning incentives with heightened scrutiny. Given the long and snowy winter season, numerous well-known POPS in the city center take the form of innovative underground malls that seamlessly complement the abundant convenience spaces. These

underground malls serve as vital connections between subterranean levels and street-level access, with their design and locations meticulously controlled according to district plans. Additionally, planners realize the limitations of zoning incentives and employ authoritative power and negotiation tools to ensure superior design quality.

Kashiwa-no-ha, one of the immense urban development projects in the Greater Tokyo Area, is an expansive urban area covering 273 hectares currently under construction in Kashiwa City, Chiba Prefecture. In December 2011, the Japanese government designated Kashiwa-no-ha to develop a "Comprehensive Special Zone for Regional Revitalization," intending to revitalize the Greater Tokyo Area and establish a visionary urban enclave. The grand vision for Kashiwa-no-ha is to become a global exemplar of urban development, incorporating the latest trends in urbanism, such as smart cities, innovation, creativity, livability, resilience, and, ultimately, sustainability. To further illustrate the location, a comprehensive map of the Kashiwa No Ha Smart Center is presented below.

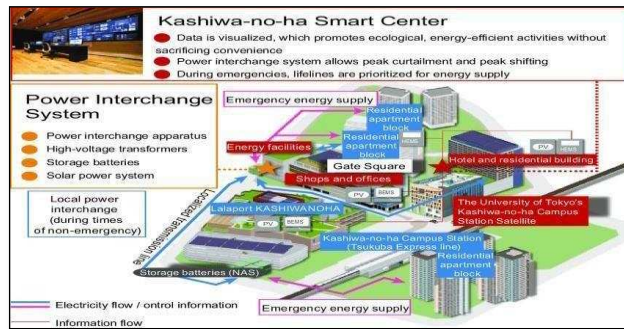


Figure 6. Kashiwa No Ha Smart Center Maps
Source: Hitachi (2018)

Public spaces based on disaster mitigation are classified into two types: (1) Structural mitigation involves minimizing disasters through the construction of various physical infrastructure and the use of technological approaches, such as the creation of specialized canals for flood prevention, volcano activity detection devices, earthquake-resistant buildings, and Early Warning Systems used to predict tsunami waves, and (2) Non-structural mitigation, which focuses on reducing the impact of disasters (Faturahman, 2018). The giant seawall in Noda, Iwate Prefecture, Japan, serves as a public space dedicated to tsunami disaster management. Designed as a structural mitigation measure, it aims to prevent a recurrence of the devastating tsunami that struck Japan in 2011. Apart from its primary role in tsunami prevention, the seawall is frequently utilized as a recreational space for leisure activities, such as relaxation and fishing.

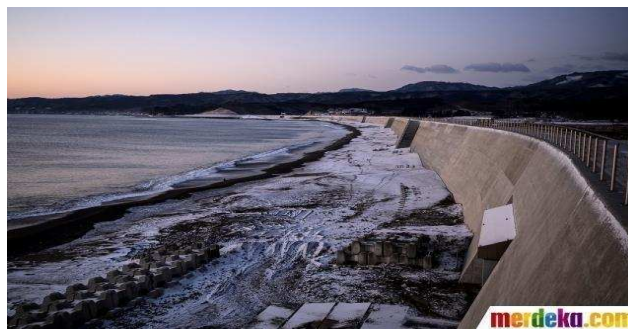


Figure 8. Seawall in Noda, Japan
Source: merdeka.com, 2023

Escape buildings, also known as high-rise buildings for emergency situations, are privately owned structures, such as office buildings, hospitals, apartments, and others, that serve as evacuation shelters during natural disasters like tsunamis. These buildings are designed with robust structural integrity and multiple floors to facilitate the evacuation of individuals to the highest levels. Escape buildings fall under the category of non-structural mitigation, which focuses on reducing the impact of disasters, in addition to the physical measures associated with structural mitigation, specifically in the case of tsunami disasters (Faturahman, 2018).



Figure 9. Escape Building in Japan

Source: merdeka.com, 2023

B. The contributable Potential of Public Space in Supporting Disaster Mitigation-Based Urban Planning in East Asia and Southeast Asia

a. Banda Aceh, Indonesia

The Banda Aceh Outer Ring Road (BORR) is a highway project planned by the Banda Aceh City Government to mitigate natural disasters such as tsunamis and flash floods. BORR is designed as a circular highway that will be constructed in Banda Aceh and Aceh Besar. The construction of this highway serves not only as a disaster mitigation measure but also aims to address traffic congestion. The route of BORR has significant tourism potential, as it links the coastline with economic centers. The direct effect of infrastructure on the economy is an increase in output through enhanced infrastructure. Besides, the indirect effect is that the construction of infrastructure will stimulate economic activities, contributing to capital growth for both the private sector and the government, as well as providing employment opportunities, resulting in increased output (Maemunah, 2015).

The Banda Aceh Outer Ring Road (BORR) will traverse several essential areas, including Ulee Lheue Port, Lampulo Ocean Fishery Port, and will be seamlessly connected to the toll, Krueng Raya Port, and SIM Airport. Apart from serving as a vital disaster detection route for the local community, the BORR promises numerous benefits. When the tsunami occurs in Banda Aceh, it will serve as a crucial evacuation pathway. Along its trajectory, the highway is expected to stimulate the emergence of new economic hubs, featuring a wide array of commercial, culinary, hospitality, and other economic activities. Moreover, the transportation network within Banda Aceh will experience enhanced connectivity, facilitating smoother move and interaction between different regions (Banda Aceh Public Works and Spatial Planning Agency, 2021).

Considering the 2004 tsunami disaster in Banda Aceh, Baiturrahman mosque stood powerful as one of the sacred places that remained intact amidst the devastating impact. It made the mosque a refuge for people amid the disaster and a post-disaster evacuation site. Given the significant number of individuals seeking shelter in mosques during times of calamity, it is essential to consider mosques as spaces for disaster mitigation. The government can examine redesigning the mosque structures in Banda Aceh and other zones to align with disaster mitigation principles.

b. Philippines

Being located in the typhoon belt, the Philippines is highly prone to destructive typhoons. The country encounters the threat of approximately 20 storms each year, with five of them possessing devastating capabilities that can drive widespread destruction. In October 2016, the nation was struck by Super Typhoon Haima, one of the most destructive typhoons to hit the Philippines. It had sustained winds of 225 km/h and gusts reaching 315 km/h. Locally known as Typhoon "Lawin," it swept through several provinces in the northern part of the country, including Cagayan, Isabela, Kalinga, Abra, and Apayao. The typhoon affected nearly 5 million people, claimed the lives of 7,000 individuals, and provoked severe damage. Its strong winds had a significant effect on agriculture and education, with an estimated 10 million people in the northern part of Luzon Island being affected by the typhoon's devastation (Arumdriya Murwani, 2015).

On November 8, 2013, Super Typhoon Yolanda (internationally known as Haiyan) made its first landfall in Guiuan. The city bore the brunt of the typhoon's full effect and suffered severe devastation. In comeback, efforts to reduce disaster risks and strengthen the city's resilience have been heightened in Guiuan (Rapppler.com, 2016). The establishment of a community pilot evacuation center was the first in a network of evacuation centers in Eastern Samar, established through a partnership between UNICEF and IOM. The project was funded by Fuji TV, a Japanese television station. This multi-purpose evacuation center will provide a safe shelter for up to 350 people amid a disaster. It will also serve as a space for community gatherings and youth activities. The structure is designed to withstand Category 5 winds and an 8.0 magnitude earthquake, combining international best practices in disaster-resilient design for mass evacuation centers with locally available construction technology and materials. This design concept allows for the replication of the structure in various locations throughout the Philippines. Additionally, the facility includes a playground that can be utilized as a child-friendly space amid emergency situations, along with two vibrant murals constructed by children and local artists from Guiuan.

Apart from Guiuan, parks in the Philippines have also been developed with disaster mitigation in mind. These parks serve as ideal assemblage points during times of calamity, particularly amid earthquakes. One notable model is the Plaza Rizal Area, a park dedicated to the national hero, Dr. Jose Rizal. This location is renowned as a recreational and public discussion center, as well as a popular spot for picnics, relaxation, and leisure activities. Another significant park is the Nueva Caceres University area, which encompasses vast open spaces and is associated with one of the city's prominent universities. Besides, the Jesse M. Robredo Coliseum, the largest indoor sports arena in Southern Luzon, is also considered a potential gathering point. In their study, Adhitya et al. (2022) identified these public spaces in Naga City, including the Plaza Rizal Area, Nueva Caceres University area, and Jesse M. Robredo Coliseum, as highly promising areas for disaster mitigation based on syntactic analysis employing syntax methodology. Mapping disaster-prone areas play a pivotal role in capturing essential information and facilitating effective urban public management.

c. Japan

In Japan, there are several public spaces built with disaster mitigation in mind. These include the construction of seawalls, the development of secondary levees, tsunami evacuation towers, tsunami evacuation routes, temporary tsunami evacuation zones, tsunami evacuation buildings, and the establishment of crucial sectors such as hospitals in elevated spots that are still within evacuation routes. These measures aim to ensure the safety of these sectors from the impact of disasters, allowing them to promptly assist injured victims.

At that time, Japan had invested in the construction of seawalls as a means of wave mitigation. Unfortunately, the walls, designed to withstand waves up to 8 meters in height, proved insufficient when the tsunami struck in 2011, with wave heights reaching 12 to 15 meters.

The tsunami waves, surpassing the height of the seawall, penetrated the city located behind it. A subsequent issue emerged as the high level of trust in the seawall ironically triggered a false sense of security. In the aftermath of the earthquake, most residents in the surrounding area failed to evacuate to

higher ground or seek refuge at Temporary Evacuation Sites (TES). Moreover, many remained stationary, refusing to move elsewhere. The sequence of events unfolded with the initial tsunami wave, towering at 28.7 meters, breaching the 10-meter-high seawall and engulfing both homes and individuals who had not evacuated. Subsequently, the phenomenon of an "air tsunami" surfaced, where the water that was supposed to recede to the sea after hitting the land became trapped by the seawall itself. Consequently, the seawater inundated residential houses and remained stagnant for an extended period. The exact number of casualties in these flooded areas is undefined, but it is believed to have resulted in a significant loss of life. The case of the Taro City Great Wall gained noteworthy attention due to the lessons learned from it. These lessons compelled Japanese academics and government officials to reanalyze their approach.



Figure 10. The Devastation Caused by the 2011 Tsunami

Source: Kiuchi (2019)

Although the presence of the Great Seawall presents a dualistic situation, it is undeniable that its existence has significantly reduced the loss of life from tsunamis. The wall serves as a vital barrier, providing individuals with a precious opportunity to escape the immediate impact of the swiftly approaching tsunami. It is indeed a positive aspect that people have faith in this protective structure. However, it is crucial to acknowledge that current technology does not yet possess the ability accurately predict the occurrence and magnitude of a major earthquake well in advance. The existing technology can only provide real-time assessments of earthquake intensity and the potential for a tsunami seconds after a disaster surface.

Currently, a seawall spanning almost 400 km has been erected along the northeastern coastline, aiming to reduce wave energy and provide additional time for the evacuation of victims of future tsunami disasters. The Japanese government has allocated \$12 million to repair and construct seawalls, which now stand at an impressive height of 14.7 meters in certain areas, with foundations reaching a depth of 25 meters. However, as the seawalls continue to rise in height, concerns regarding the potential repercussions of tsunamis have also emerged. According to researchers, when a tsunami occurs, the seawall works as a barrier, similar to a dam, and generates a much stronger current than a breached seawall would. In addition to constructing seawalls, there are several ideas for tsunami disaster mitigation in Japan. One of them is the development of tsunami mitigation parks that combine green elements such as trees or hills with wave breakers along the coastline.

Kuroshio City, being highly susceptible to earthquakes and tsunamis, poses a challenge for its residents to feel safe and at ease amidst the natural hazards. To address this concern, the Kuroshio City government has taken the initiative by constructing a Tsunami Evacuation Tower. This development has effectively instilled a sense of tranquility among the local community, enabling them to reside and establish roots in the city with greater peace of mind. Moreover, Kuroshio City boasts unique attractions and natural beauty, making it an appealing destination for tourists. The presence of the Tsunami Evacuation Tower not only

provides a secure environment for residents but also enhances the confidence of tourists by ensuring they can explore and enjoy the city's offerings with a heightened sense of safety in the face of potential disasters.



Figure 10. Tsunami Evacuation Tower in Kuroshio City

Source: Trip Advisor, 2019

5. Conclusion

In several countries in East Asia and Southeast Asia, the conceptualization of public spaces has largely incorporated disaster mitigation systems. These disaster mitigation efforts are tailored to the unique geographical conditions and characteristics of each country's disasters. It is worth noting that the development of public spaces in this region is not solely driven by governmental entities but also involves active participation from private or corporate sectors. This collaborative approach, typically known as Private Public Partnership (PPP) or Privately Owned Public Space (POPS), is instrumental in fostering resilient and safe public spaces. The potential contribution of disaster mitigation-based public spaces in this research is evident in several countries in East and Southeast Asia, including Indonesia, the Philippines, and Japan.

The potential contributions of disaster-mitigation-based public spaces in East and Southeast Asia, as highlighted in this research, are exemplified by the case of Banda Aceh. The implementation of the Banda Aceh Outer Ring Road (BORR) by the local government has not only enhanced the tourism potential of the surrounding areas but has also stimulated economic growth. Besides, the utilization of mosques as religious and communal spaces has proven to be instrumental in disaster mitigation efforts. The existence of Baiturrahman mosque, which remained intact during the devastating Aceh Tsunami in 2004, has instilled a sense of security and consolation among the community, causing mosques to be a preferred gathering place during times of calamity.

The potential contributions of seawall construction in Japan lie in their function as wave barriers. Japan has implemented sea walls as protective structures against waves. However, the initial designs, which aimed to withstand waves up to 8 meters high, proved inadequate during the tsunami that occurred in 2011, which reached heights of 12 to 15 meters. In response, a nearly 400 km-long seawall has been constructed along the northeast coast of Japan. Its aim is to decrease wave energy and provide additional evacuation time for tsunami victims in future disasters. The Japanese government has allocated \$12 million to improve and construct seawalls, which now stand at a height of 14.7 meters and have foundations reaching a depth of 25 meters in various areas.

The Philippines has the capacity to produce significant contributions to disaster mitigation through the development of public spaces. One illustrative case is Guiuan, which was heavily impacted when Super Typhoon Yolanda (internationally known as Haiyan) made its initial landfall on November 8, 2013. However, Guiuan's presence now catalyzes enhanced disaster risk reduction and the fortification of the city's resilience.

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