4.2 Risk Management of Gedung Sate as a Cultural Heritage

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1. Introduction

Bandung is one of historical cities in Indonesia occupied by the Dutch Colonial for more than three centuries. From the 16th until 18th century, the city was initially functioned as a small trading town where it can be axis for economic activity in West Java region. This city is located at the South East of Batavia, the capital of the nation at that period. In this time period, the colonial government expanded their agriculture plantation, especially tea and quinine, and mine materials extraction in several places around West Java, such as Lembang, Pangalengan, Garut, and etc. Along with the rapid development of trading activities, the colonial government of Dutch East Indies started to plan and develop Bandung further in the early 20th century as the center of colonial government, especially for economic, administrative, and military activities (Voskuil, 2007). From this point, many developments of buildings and infrastructure, such as settlements, public facilities, banks, government office buildings, water drainage, and etc., took place to facilitate European people working in agriculture sector around Bandung area. As a result, the principles of physical urban development of Bandung City adopted the European Neo-Classical architecture style.

The early design of Bandung was aimed to be a city of 500,000 inhabitants. Nowadays, Bandung is one of largest metropolitan city in Indonesia where it becomes the capital city West Java Province. According to the latest statistical data of Bandung, the city has expanded which makes it the center of social and economic activities for approximately 2.4 million inhabitants (Badan Pusat Statistik Bandung, 2013). After Indonesian independence in 1945, Bandung has encountered massive transformation and urbanization, from small trading town into a dense 16,000 people/km2 metropolitan area. Structural, urban land use and social changes took place due to high spatial demands for housing, transportation, workplaces, and other urban amenities. Consequently, this urbanscape changes affected the cultural heritage buildings in the old town constructed earlier during Dutch colonization era. Many of them are either used for or transformed into modern buildings and vital urban functions, including office buildings, banks, malls, shops, retail stores, and houses for workers, military offices, and other supporting facilities to accommodate the current needs. The recent development approach was mostly followed by inadequate planning control and ambiguous development efforts. Such developments often neglect not only the heterogeneity of historical city structures and the remaining urban heritages, but also their preservation efforts (Ignasia, 2008). This condition makes existing urban heritage more vulnerable and becomes risky to any natural hazards threats.

Due to its location, Bandung is prone to various natural hazard threats. Geologically, Bandung sits in a basin of alluvial sediments produced sby active volcanoes and plates in western part of Java Island. The extent of the basin is about 23,000 km^2 and located at a highland plateau of 650-700 m sea above sea level rise. There is an active fault located about 20 km north of Bandung, well known as the Lembang Fault, making Bandung City prone to severe earthquake impacts (Sagala et al 2012). One other main hazard is Mount Tangkuban Parahu, located about 20 km north of Bandung which can be source of volcanic hazards possibly striking the city, such as lahar and ash-fall. The excessive and uncontrolled land use change in the north part of Bandung, where is the conservation are for water catchment, and land subsidence in the southern part, where Citarum River watershed exists, create higher occurrences of flood in Bandung (Abidin et al., 2013). The city's density also make it vulnerable to many fire risk events, about 100-150 fire incidents occur in the city (Sagala et al 2014). Considering this condition, there is an urgent need to protect and preserve urban structures and functions from any possible severe disaster, in particular vulnerable

urban heritage buildings which are now used for critical function, such as conservation and socio-economic activities.

2. Studied Area for Disaster Risk Management Planning

This study selected Gedung Sate building as study area for disaster risk management planning. Located in the center part of Bandung, Gedung Sate is one of well-known historical heritage buildings in Bandung and it becomes landmark of the city. Its construction took from 1920 to 1924 designed by a Dutch architect, Ir. J. Gerber. He intended to set it as the main building of other 24 planned buildings for new site location of Dutch colonization office in Indonesia. However, there were only three of them -including Gedung Sate- completed successfully before the project stopped because of European economic crisis in 1930. Afterwards, it was used by Department of Public Works of Dutch East Indies until the independence of Indonesia in 1945. Then, Ministry of Public Works of Indonesia replaced its function as one of its branch offices in West Java area until 1980. Today, it is used for the office of Governor of West Java Province (Fig. 1).

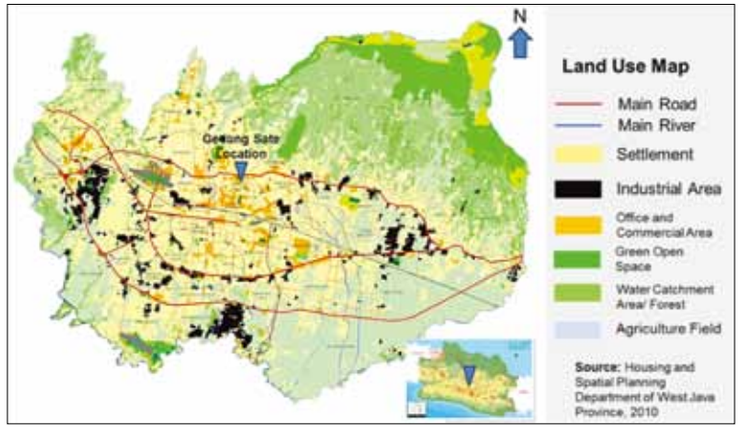

Fig. 1 Study Area Location in Bandung Metropolitan Area, Indonesia

There has been no major change of its construction structures, construction materials, and architectural design since its establishment. Gedung Sate is four stories building influenced by the combination of architectural style: European Renaissance, Indian (Hinduism Temple), Chinese (Pagoda), Islamic (Mosque), and Indonesian (Sundanese traditional buildings). It has a unique decoration of satay stick consisting six fruit ornaments on the top of its roof which the name of Gedung Sate comes from. The construction materials were limestone, andesite rock, bricks, and ironwood. The building was constructed by reinforced concrete technology making it resists to earthquake. Gedung Sate was built on 27.000 m^2 of land space, 10.000 m^2 of built area and consisting of basement 3.000 m^2, first floor 4.000 m^2, second floor 3.000 m^2, and tower floor 205 m^2. Nowadays, Gedung Sate is surrounded mainly by commercial service as well as private and government office use while middle-income residence with European classic architectural style can be found in the south part of the buildings.

The building has been hit by several major earthquakes, such as Tasikmalaya Earthquake 2009 (7.3 Richter scale), Pangandaran Earthquake 2006 (6.8 Richter scale), and Yogyakarta Earthquake 2009 (5.9 Richter scale). Volcanic ash fall produced by volcanic eruptions in West Java region also struck the building and disrupted activities inside the building, such as Mount Tangkuban Parahu (1929), Mount Galunggung (1980), and Mount Merapi (2010). In recent years, the surrounding area of Gedung Sate is frequently flooded due to drainage problems. However, no substantial damage and losses to Gedung Sate due to those events was reported (Fig. 2).

Fig. 2 Gedung Sate When Constructed (1924) and Gedung Sate Today (2014)

3. Main attributes and values of the Study Site

Based on from observation, in-depth interview with building management spoke person, and existing literature, the main attributes and values of Gedung Sate can be categorized as described in table 1 below. One attribute can also involve more than one value, such as the Satay and Pagoda tower. It has architectural value that gives a unique architectural style combination between Indonesia and Chinese style which are rare to be found in Indonesia. In the other side, it contains of social value that has become the symbol of the province (Table 1).

Table 1 Main Attribute of Gedung Sate

Attribute	Type	Associated Value	Picture
Satay and Pagoda Tower	Immovable Tangible Cultural	**Architectural:** the Pagoda Tower is one of its kind in Indonesia. Social: The first building that used this shape of tower and therefore it has become the symbol of the province.	
Collection	Movable Intangible Cultural	**Cultural:** It has several collection of West Java Province, from old weapons, fabrics, puppets. Social: Visitors can come to see this place and learn about the cultures of West Java (Sundanese) People. However, only few visitors know this place.	
Wooden Wall	Immovable Tangible Cultural	**Architectural:** Wooden wall adds the historical value of the building makes the building looks beautiful	
Library	Movable Intangible Cultural	**Cultural:** Old archives and documents of West Java Province, such as books, maps and photos Social: Visitors can come to see this place and learn about the history of West Java Provinces	

Bell	Movable Tangible Cultural	**Architectural,** the bell is quite unique and rarely existed in Indonesia. The material is from mix of Copper and Iron. **Social:** this is one of the attractions that people want to see when they visit Gedung Sate.	
Basement Corridor	Immovable Intangible Archi-tectural	**Architectural:** Old european, renaissance style **Social:** Visitors can come to see this place and learn about Old Dutch Architecture.	

Source: Field Observation (2014), Interview (2014), and Regional Secretariat of West Java Province (2012)

4. Vulnerability and Potential Impact of the Study Site

Vulnerability assessment is conducted to determine areas that are vulnerable to natural (and/or human induced) hazards that will most likely be damaged and need to be redeveloped after a disaster. It involves three categories of vulnerability, including physical, social, and economic. Later, it can be used as consideration to target which structures, components and infrastructure of the buildings should be restored back to pre-disaster condition or which ones should be modified through construction practices, local disaster management mechanism or design practice to reduce future hazard impacts.

Physically, Gedung Sate has several vulnerability components. In term of the whole physical condition of the buildings, it consists of some materials which are combustible, such as wooden wall materials, wooden-made roof, textile-made curtain and wooden-made furniture. Mostly, rooms in Gedung Sate, such library and government officers' room are used to store valuable collection, such as government documents or archives, old collection (books, maps, paintings, and documents), etc. The tower is also made from combination of wood and copper, prone to fire and earthquake.

There are some social and economic vulnerability indicators that are considered as potential source of tangible and intangible impacts after disaster events. It is estimated that 1,122 people (data taken in 2013) working in the building are at risk in case of hazard occurrence during the day. Tourists can be potential loss since they are free to visit Gedung Sate during working hours. It is difficult to monitor them in the building because there is lack of mechanism to monitor and protect them in case of hazard occurrence during their visit. Valuable items inside the building can be potential loss in term of social and economic vulnerability, such as government documents or archives, computers, old collections (books, maps, paintings, and documents), furniture, and etc. Nearly 1,122 public servants cannot work and public service is stopped for temporary time when potential hazards occur.

It is also important to take into account the vulnerability of physical environment near Gedung Sate. There are some settlements near Gedung Sate that can be vulnerable to fire. As observed by Sagala et al (2014), Bandung has experienced large number of fire events.

5. Existing Disaster Management in the Study Site

The building management officers of Gedung Sate arrange evacuation plan in order to prepare actions required for people inside the building during emergency time. They have created evacuation maps inside buildings equipped by evacuation direction signage in each corridor of the building. They also set three parking lots in eastern, western, and northern part of the building as meeting points for evacuation. The head of building security is responsible to turn on siren and lead evacuation during emergency time. The public servants also have been trained once in a simulation drill for fire and earthquake in 2008. Although the building seems to be well-prepared for evacuation, however, according to observation results, there are still shortcomings that have to be considered. First, the evacuation map is not displayed on any spot inside the building. Secondly, the evacuation direction signage is too small to be recognized and to be read.

The building has some equipment built for monitoring any source of possible security and hazard threats over time. It is equipped by CCTV (Closed Circuit Television) equipment in several spots of the building. Since it is used by the public authority of West Java who has responsible to inform to public any natural hazard occurrence in the region, such as volcanic and seismic activities, it has also monitoring equipment linked to monitoring system set by national agencies who responsible to generate hazards occurrences information. Both are set in a room inside the building where security officers work.

To prevent from fire risk, the building management officers have prepared several fire protection tools. They provide fire extinguishers in each room as well as corridors and two firefighting vehicles parked in the south parking area. Nevertheless, the building is still not well-equipped by full fire protection tools to deal with larger fire occurrence inside, such as fire sprinklers and hydrant system. The existing hydrant system has been embedded in the building construction since its establishment but now it does not work functionally due to old technology left by Dutch colonial government. Today, it becomes one of displays shown for increasing tourism attraction.

According to the interview and observation activities, the building management officers has not considered yet mitigation and recovery planning that can be guidelines for actions taken before and after emergency phases. Currently, conservation and maintenance efforts are conducted annually but they are limited to beautify the buildings, such as (1) Repainting the walls or changing floor tiles, (2) Adding/fixing furniture for office purposes, and (3) Replacing the building parts when it is damaged or needed. There is no existing policy or efforts provided by the building management officers for mitigation, such as replacing combustible materials, protecting efforts to save important valuable collections, adding fire protection tools, etc. There is also no pumping or internal drainage system. There is still lack of guidance on how the building will be recovered because of disasters.

6. Hazards Forecast

Floods may occur during heavy rain situation since the drainage around the site is badly maintained. Even now, heavy rain could cause the flooding on the roads. There is probability that flooding occurs in the area and inundates the ground floor which has a library (old books, old maps), offices, building mechanics) since the building is located relatively lower than its northern area. There is no pumping system installed and any measure to tackle water coming in.

Fire can be ignited from come from any sources, such as external: settlements, other buildings, arson, etc. and internal: kitchen in basement, mechanics, and electricity. The surrounding of Gedung Sate is covered by high density settlements and office which can be source of fire spread. Gedung Sate is also risky to be targeted by arsons since its government office. Inner activities inside the building can ignite fire such as a fire accident in the kitchen and a short circuit by electronic utilization. Fire could start to ignite and burn wooden wall and combustible materialts in the basement. Fire could spread to the 1st floor where Governor's and office rooms on the 1st floor and 2nd floor are located as well as collection in the third floor. Flood and earthquake could be primary hazard that could generate fire from short circuit accident.

7. Proposed Flood and Fire Mitigation Measures

For mitigation measures, there are several strategies that should be considered and proposed as follows:

Operational measures

① Providing water tank that can store flood water and channel it to lower area.
② Installing water pumping system connected with water tank.
③ Assigned team for pumping maintenance and in case of flooding.
④ Assigned team for taking most valuable collection, such as maps and old books.
⑤ Providing active fire hydrant and sprinkler system that be used to fight the fire.
⑥ Assigned Building Disaster Management team for hydrant maintenance and in case of fire.
⑦ Calling for the police and firefighter team when needed.
⑧ Appointing an officer who is responsible for observing flood occurrence and switching off the electricity when needed.
⑨ Conducting flood and fire drill and assignment for public servants.
⑩ Involving local departments, such as Public Work, Archeology, Disaster Management Agency, Environmental Agency, etc., for protecting the building.
⑪ Drainage construction and maintenance.
⑫ Moving some valuable collection to the 3rd Floor.

Strategical measures

① Urban planning. The mitigation measures need to be integrated with the current urban planning so that the hazard and vulnerability elements from external can be eliminade beforehand. For example, there is a need to have a coherend between the need of accessibility to Gedung Sate to be accommodated in the urban planning and detailed urban planning and design.
② Local Enactment, Policy. Local enactment is needed to support the framework, strategy and budgetting. This serves as an umbrela for coordination among the stakeholders. Currently, Bandung already has a local act on cultural heritage preservation. National law on disaster management also exists. Nevertheless, the inclusion of cultural heritage on the disaster management at local level do not exist and need to be issued.

8. Proposed Emergency Responses

In order to have a functioning emergency response, there is a need to establish emergency response team. This team consist of stakeholders of all institutions from local level to national level. Currently, the integrated system that connects with a wider stakeholders is not available at Gedung Sate. On site, when there is a disaster, there will be emergency manager to take a role to initiate the emergency condition. The role of this person also as supervisor and vocal point with the larger system, such as external aid from the city. Considering the existing management system, there is a need for City Mayor that can play for major role to coordinate during the disaster. Its role can give significant command for deploying immediate resources needed to solve the problems. The proposed emergency response managerial organization is shown below. In order to prepare for any damage or loss estimation in the future, database inventory has to be conducted immediately. Database can be stored in digital format stored at cloud storage (on line) to make sure it is not affected for any damage if a disaster occurs (Fig. 3).

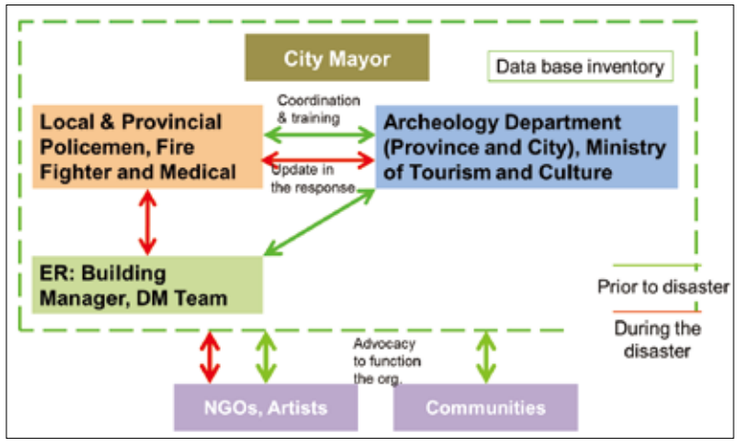

Fig. 3 Emergency responses organization chart

For emergency plan, the following standard operating procedure:

① After a fire alarm sounds
② Call Emergency Response Team
③ Office Manager check fire panel to determine the location and call the nearest person to assess the need to evacuate the building.
④ Office Manager verifies if evacuation is needed.
⑤ Every room must be checked to ensure that all people safely exit.
⑥ Reassure visitors will be safely evacuated.
⑦ Everyone leaving the building must meet in the temporary evacuation shelter.
⑧ Manager ensures all employees are accounted for.
⑨ Once everyone is evacuated, the building is not to be re-entered.
⑩ In case of fire, call: 113 for fire, call 022-7800166 for police and Ambulance 118.
⑪ Fire truck/fire fighters come from the south east of the City.
⑫ Paramedic to take care injured people because of smoke, fire, and injury.
⑬ Police will close surrounding roads to avoid chaos and crowds to see the scene.

9. Recovery Planning

As a disaster sometimes unavoidable, it is important to make a recovery planning before hand. In this proposal, three terms of recovery planning are proposed.

Short Term:

- **Baseline Rule:** Restore to the condition when it was built in 1920, with the approached taken by Dutch Architects. Consult with building plan
- **Team Organization:** Activate the team organization, divide the tasks, and make a plan of recovery in term of technique, materials and budget
- **Material and Storage.** Store the movable items at a designated place. Used old materials that are still good

Medium Term:

- **Clean Up & Preparation for Construction:** Clean up of the area (takes about 3 months). Construction of wall to start the construction work.
- **Structure.** Reconstruction of the structure (1 – 1.5 years).
- **Roof.** Used the same or similar materials with and ability to withstand fire for about 10' (6 months)
- **Painting.** Painting with normal color (1 month)
- **Installment of disaster mitigation tools** to protect the building. (Conducted while making the construction → Collaboration Public Work and Fire Fighting Dept). 8 Fire extinguisher at each floor. Water Sprinkler that covers all the floor. Fire hydrant. Water storage. Disaster Drill with DM team and also all officers

Long Term:

- Integration with Development Planning so that other emerging threats will not increase the risks to the sites.
- Infrastructure provision that supports the DM system in the CH building. Provision of back up system in case of the main infrastructure is collapsed.
- Taking notes of all lessons learned about the recovery process.
- Consider and make a plan for other types of disasters: earthquakes, volcanic eruptions.
- Securing financial sources for damage of CH in the City, either through local budget or collaboration with private sources.
- Strengthening coordination and training with other line departments to take CH into considerations in term of their sectoral planning and developments.

10. Conclusion

This paper shows the importance of considering cultural heritage in the disaster management systems. The current system has not treated cultural heritage as important entities and specific in the disaster management systems. This situation is still common in Indonesia. Therefore, this paper lays out some important references for Indonesian cases of cultural heritage disaster management. In Bandung City, where the case study is selected, there are about 100 heritage buildings that are prone to many disasters. Further analysis on how preparation to deal in building resilience to these sites and buildings are needed urgently.

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