

PROMOTING SISTER CITY CONCEPT FOR SUSTAINABLE AND RESILIENT CITIES: INDONESIAN CITIES IN THE FACE OF CLIMATE CHANGE

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ABSTRACT

Indonesia has many large cities such as Jakarta, Bandung, Medan, Surabaya and Balikpapan with a more dynamic trend of urbanization, increasing economic growth and activity, rapid population growth, and dense populations. As a result, complex activities of people in urban areas need space and this leads to environmental degradation, such as deforestation practices and poorly constructed houses in the flood plain. To prevent this in the future, developing country like Indonesia need benchmarking from developed countries. This study used qualitative approach that aims to exploration and to identify the scope of the twin cities policy cooperation and climate change adaptation concepts at the legal level and identifying the relationship between them. So far, the construction of inter-city usually has a partnership with cities abroad, including the sister city concept. Sister city practice could certainly be used by the widest modeled cities in Indonesia in the good practice development. Jakarta and Bandung (Indonesia)'s regional cooperation should not only focus on its economic achievements but also reflect on the other aspects of domestic and international affairs that do not necessarily require huge reserves to address. While there remain obstacles to regional cooperation, the culture of pragmatism within Indonesia has the potential to allow the region to effectively cooperate on most issues, especially addressing climate change, the effects of which all countries are experiencing. Sister city can adopt to resilience characteristics of the sister city if the other cities have similar threat and perhaps carry out similar approaches.

Keywords: Bandung, Climate change, Jakarta, Sister city.

INTRODUCTION

Urban areas in developing countries have been largely exposed to the impacts of climate change due to the hazardous position and dynamic and increasing vulnerabilities. Increasing vulnerabilities are characterized by dense large population, rapid economic growth, and land use conversions. High land use conversions are examples of uncontrolled urban development and therefore they have become the main drivers that cause environmental degradation (Beatley, 2009; Birkmann et al., 2010; Hanson et al., 2011). On the other side, climate induced hazard events (sea level rise, extreme weather events, coastal flooding, landslides) have shown increasing in term of intensity while irregular in term of its pattern and frequency. (Coumou and Rahmstorf, 2012; Hansen, 2010; Jongman et al., 2012).

Prior to hazard occurrences, urban capacities need to be increased. These can be through good planning and urban management practices, such as the land use policies and controls, provision of urban infrastructure capacity to climate risks, increase of government capacity and resident awareness of climate-related hazards. Without these actions, impacts will be tremendous. (Beatley, 2009; Castan Broto and Bulkeley 2013).

Indonesia has many large growing cities with a more dynamic trend of urbanization, increasing economic growth and activity, rapid population growth, and dense populations such as Jakarta, Bandung, Medan, Surabaya and Balikpapan (Jones, 2002). Recent studies by McKinsey (2012) show that recent acceleration growth rate occurred at medium sized cities of Indonesia.

There has been a large rate of urbanization in Indonesia. Early 1980s, there was only about 22 percent of population living in urban area, while in 2005, 43 percent of Indonesia's population inhabit the city (Tang, 2013). As a result, complex activities of people in urban areas need space and this leads to environmental degradation, such as deforestation practices and poorly constructed houses in the flood plain.

For example, major flooding events in Jakarta in 2002, 2007 and 2013, is the impact of changes in large-scale land use of forested areas for residential and industrial upstream Bogor in the last two decades (Sagala et al 2013a). Land use conversion in some parts of wetlands areas in Indonesia contributes to the occurrence of floodings, which can be observed in Palembang (Sagala et al 2013b).

To prevent the increased climate-hazard risk in the future, it is essential for developing countries like Indonesia to have some benchmarks. The benchmark for developing urban resilience can learn from initiatives and programs that have been implemented in developed countries. So far the collaboration among cities are facilitated through sister city concept (Tjandradewi and Marcotullio, 2009). Sister City Twinning is often also called the twin city, where inter-city cooperation be widespread, formally agreed and long-term sister city. In this concept, any issue can be a theme of cooperation, even environmental and disasters management. However, the field of environment and disaster research agreement has not been done.

Sister City is a cooperation between cities that can be widespread, formally agreed and built on long term basis. Sister City scheme began in 1951, later developed in the United States (1956), and Indonesia itself started to be applied formally in 1993. Despite the fact limited long before it had begun in Indonesia, for example, the City of London with Braunschweig, Germany who signed the MoU sister city partnership in June 1960, and the Fort Worth, USA in April 1990.

Villers (2009) stated that the sister city partnership is driven by the forces of globalization with the aim to learn and improve competitiveness. Use of the scheme Sister City more often for economic development cooperation between the two cities. Bontenbal and van Lindert (2009), Tjandradewi and Marcotullio (2009) explains that decentralization and globalization have prompted increased attention and the capacity of local government in Indonesia in good governance as a prerequisite for development, as well as the broader its

cooperation. Both of these encourage the development cooperation instrument which is used as a sister city to city and community to help each other in managing the city and meet the needs by means of sharing knowledge, resources, technology, and expertise between cities.

Tjandradewi (2006) address 3 factors that have been responsible for advances in trans-national and sub-national relationship development. First, rapidly growing cities in the developing world are in need of help and are actively seeking it. Local authorities have sought partnership arrangements with counterparts in developed countries with the hope of technical know-how and skills transfer (Hewitt, 1999; Hosaka, 1993; Kearns & Ronan, 2000). Second, globalization has offered opportunities for developing countries and cities to share vital information amongst themselves and their citizens, such advanced information technologies, global flows, including people, information and knowledge. Third, decentralization and new forms of intra-governmental relationships between local and national governments have provided conducive environments for cross-border local cooperation.

With current issues, city to city concept need to address some development issues such disaster, climate change mitigation and adaptation. Cities depend on the effective and reliable operation of infrastructure systems to deliver energy, mobility, water, sanitation, shelter, information, emergency response and other critical services. Across the globe, governments, business and communities are seeing an ever-increasing frequency of extreme weather-related events. These events are playing out against a backdrop of global population growth and urbanization.

Cities need more resilient. Resilience reflects a city's ability to persevere in the face of emergency, to continue its core mission despite daunting challenges. The concept also extends beyond disaster preparedness. Resilience is becoming part of the criteria companies take into consideration when determining where to invest or locate operations. And in today's global economy cities are competing for people as well as companies. Resilience should be a positive selling-point that cities volunteer to attract the best and the brightest, just as they might promote their liveability scores, vibrant arts scene or new transportation investments.

Resilience is the ability of people, communities and institutions to prepare for, withstand and bounce back more rapidly from acute shocks and chronic stresses. Catastrophe is not always preventable, but the degree of destruction and devastation can be mitigated, and as the leaders of Pune, and other cities, are recognizing, building resilience is also a key economic development strategy. The benefits can be seen in the city's budget lines, its economy and in greater opportunity for its residents.

Another approach cities can take to realize the resilience dividend is to catalyse the marketplace for resilient innovations and technologies. Due to rising sea levels and other impacts of climate change, hundreds of cities globally will be clamoring for resilience products, innovations and technologies. And, with the power to sharing knowledge how to improve and make the city more resilient, sister city network has the opportunity to enhance their cooperation agreement. Sister city can adopt to resilience characteristics of the sister city if the other cities have similar threat and perhaps carry out similar approaches.

In Indonesia, 47 municipalities of all 33 provinces have had Sister City partnership. The main objective of Sister City program between cities in Indonesia and cities in developed countries is to accelerate economic development in cooperation between the two cities. The question in this paper is to what extent the sister city concept could help Indonesian City, in this case Jakarta and Bandung City to be a resilient city. And when the sister city concept can help us to make the city more resilient, can we develop a sister city with a city that faces similar threats with our cities in Indonesia.

This paper is divided into several sections. First, the introduction of how climate change issues and sister city concepts in urban cities could be one way of learning alternative climate change adaptation and

mitigation. The second part of this paper, some explanation is given relating to the methodology and data sources used in this paper. Then the findings will be discussed with reference to the theoretical background and case studies. Finally, the paper suggests some conclusions about learning from other city to strengthen the city resilience.

METHODS

This study used qualitative approach that aims to exploration and to identify the scope of the twin cities policy cooperation and climate change adaptation concepts at the legal level and identifying the relationship between them. The relationship obtained between these two components will provide an understanding of the development process framework of climate change adaptation.

Methods of data collection consisted of a survey of secondary and primary data. The primary data survey conducted through observation in Jakarta and Bandung. The selection of these two cities is due to their high vulnerability to climate change impacts and they are two largest sister city partnerships in Indonesia. This study uses content analysis to explore the Government's policy in managing the development and impacts of climate change. Data were used on top of other studies.

Jakarta and Bandung was chosen in this paper because Jakarta represents a giant and shore city while Bandung represents metropolitan, mainland, and hilly city. In addition, Jakarta and Bandung have a sister city more than other cities in Indonesia. Jakarta has 49 sister city and Bandung has 25 Sister City. This context of resilience through sister city concept will help the other cities in Indonesia.



Figure 1. Jakarta and Bandung City Position

RESULTS AND DISCUSSION

Twin city cooperation claims to be an effective tool in enhancing management capacities of participating authorities. Approximately 70% of the world's cities have been engaged in different forms of international cooperation, including sister city and friendship cities, and 68% of these linkages have been part of international associations (UNCHS, 2001).

But despite the effective partnership from other cities, Republic of Indonesia Ministry of Foreign Affairs claim that 20% with goes very well established, only 15% of the sister city partnership that well established and more than 65% almost no activities (Salam, 2004). This statistic shows that Indonesia's government does not seriously consider the concept of learning from twin cities.

Indonesian cities are under the threats of climate change impacts (floods, water scarcity, sea level rise). Indonesian cities also are not doing low carbon development (causing high emission).

The idea of sister cities also has several criticisms. One of the critics is about many relationships do not economically benefit the cities but the programs cost the cities money to run. The sister cities agreement

also are a tool used by politicians to gain political support. Despite these criticisms however, the sister city program has thrived around the world for its ability to link different cultures and geographic areas with each other.

Jakarta Sister City

Jakarta rank as the 11th biggest city in the world. It is located in the lowlands at an average elevation of 8 meters above sea level. Moreover, Jakarta is more vulnerable than most-it is a coastal city that is below the sea level.

A number of natural disasters have occurred regularly in Jakarta because of its city development and environmental degradation. The most frequent natural disaster is flooding that occurs every year and nearly impacted all districts of the city. Floods caused by rising sea levels are also common, especially in the northern part of Jakarta.



Figure 2. Distribution of Jakarta Sister Cities.

Note: exclude 13 sister cities with small islands characteristic
Source: Analysis, 2014

Studies conducted by Joseph and Francisco (2009) related to the impact of climate change indicate that the Central Jakarta and North Jakarta respectively ranked the first and second as the region most vulnerable to disasters in Southeast Asia.

As for man-made disaster, Jakarta is one of the cities with the highest pollution levels in the world. The major contributor of pollutants were vehicles and smokers, which contributed 686 864 tons of carbon per year in Jakarta. Pollution produced by exhaust fumes of motor vehicles contributed by 80% which made Jakarta ranked as the 3rd worst air pollution levels in the world after Mexico City (Mexico) and Bangkok (Thailand). Only 81 days in a year that Jakarta was free from air pollution (Kompas, 2013).

There are a couple of twin cities out of 49 cities that have the same characteristics as Jakarta, such as Tokyo and Rotterdam. This downtown city served the most suitable sister city to Jakarta, especially in providing examples to cope with disasters and build lessons resilient city.

Bandung Sister City

Bandung, the capital of West Java province, located about 180 kilometers (110 mi) southeast of Jakarta, is the third largest city in Indonesia. Its elevation is 768 meters above sea level and is surrounded by up to 2,400 m high Late Tertiary and Quaternary volcanic terrain (Kaars and Dam, 1955). The 400 km² flat of central Bandung plain is situated in the middle of 2,340.88 km² wide of the Bandung Basin; the basin comprises Bandung, the Cimahi city, part of Bandung Regency, part of West Bandung Regency, and part of Sumedang Regency (Wangsaatmaja et al, at, 2006).

Bandung is one area in West Java which is potentially affected by the earthquake. There are several sources of earthquakes that could potentially pose a threat to the Bandung city such as Lembang Fault, Subduction Java, Baribis Fault and Cimandiri Fault. The impact of the earthquake will be aggravated by the intensity of activity and very high population in the city of Bandung.



Figure 3. Distribution of Bandung Sister Cities
Source: Analysis, 2014

Bandung also goes into the red zone with declining ground water conditions. Population growth and the more advanced societies increase the need for water. Surface water and rain water quality is bad. 49 rivers that flow in Bandung, classified as critical caused by natural cycle of rain as a supplier of the highest water volume, uninterrupted. Due to the critical river basin has indicated a number of sedimentation.

With population growth and high density, Bandung listed prone to fires. 1624 fires from 2000 to 2010 with 48% of the location of fire occurred in the settlement area (Fire Department Bandung city 2011). Each year, there are about 162 events with material losses reach Rp. 21 billion per year (Sagala et al, 2014).

Bandung has 29 Twin Cities, but only 2 of 29 City which has the same characteristics. Cities that have the same characteristics and have the same problems and can be copied is Suwon City and for disaster management is Kyoto City.

How effective the current city to city network.

However, beyond the forms of cooperation that have been done with all cities, resilience concept is still out of the cooperation theme for agreement between cities.

The cooperation with the city in the Netherlands has been established since 1986 and then enhanced by forming the twin cities in the period 2005-2007 in the field of administrative services and city management. on February 2011 to continue the sister city cooperation between Jakarta and Rotterdam, which is implemented in the period from 2008 to 2010 to continue until 2012 the focus of cooperation in flood management aims to get feedback of how the Dutch managed to deal with flooding as well.

Since the twin city partnership agreement was signed in Jakarta-Seoul 1984, both cities have agreed to strengthen cooperation with the student exchange opportunities, strengthen the economy by opening up business opportunities tourism aspect.

Bandung cooperation agreement with the Suwon, South Korea signed in 1997 contained evidence of this agreement in the form of monuments. Priority cooperation by the two cities is in the fields of education, economics, arts and culture and tourism.

There are some major cities in the world that has a similar geography and complex problems such as Jakarta and Bandung, but more advanced in terms of handling the disaster. With the growing impact of climate change experienced in cities in Indonesia as well as the fiscal condition of the small areas in Indonesia which can capitalize upon the concept of design and management are less expensive with a sister city agreement. It can also help in reduction the transaction cost for the idea for resilience, design, management.

Jakarta 's best potential sister city to learning about Resilience City

Jakarta city focuses for resilience city are flood-proof city and low carbon-growth development. These concept can be adopt and learn

from Jakarta current sister city, Rotterdam in Netherland and Seoul in South Korea.

1. Rotterdam: Building better flood management

The city center is located on the northern bank of the Nieuwe Maas, although recent urban development has extended the center to parts of southern Rotterdam. Large parts of the Rotterdam are below sea level. For instance, the Prins Alexander Polder in the northeast of Rotterdam extends 6 meters below sea level, or rather below Normal Amsterdam's Peil (NAP) or 'Amsterdam Ordnance Datum'. The lowest point in the Netherlands (6.76 meters below NAP) is situated just to the east of Rotterdam, in the municipality of Nieuwerkerk aan den IJssel (Wikipedia, 2014).

Rotterdam continues to work towards a climate-proof city (C40, n d (a)). A tailor-made solution which is created for a particular area is the starting point in this respect. In the areas of Rotterdam outside the dykes, which are home to 40,000 residents, the multi-layered safety principle is paramount.

As well as robust measures to avoid flooding, such as raising the levels of land, flood-proofing measures for buildings and outside areas, or disaster management, could also be opted for in order to reduce risks (C40, n d (a)). This could be done, for example, by building on stilts or creating floating buildings ('flood proof' building) or by building embankments for dykes. Changing the way in which we construct and equip our buildings creates a broader range of measures. Permanent flood protection is the goal. To protect Rotterdam's inner-dyke areas, flood prevention is paramount. Again, a tailor-made approach is necessary to be able to integrate spatial planning into the dyke maintenance plans (C40, n d (b)).



a. Rotterdam Multi-layer Protection Against Flooding



b. Jakarta Shore without proper Flood Countermeasure

Figure 4. Comparison between Rotterdam Plan and Jakarta Plan
Source: (a) www.edbr.nl, (b) www.ayogitabisa.com

The Port of Rotterdam is of vital economic importance for Rotterdam and the Netherlands as a whole. Most of the 12,000 ha of port area has been developed on elevated land at an average height of about 3-4 m above mean sea level, and a new area is being developed at 5 m above mean sea level. Large parts of the port area are protected by the Maeslant Storm Surge Barrier. This barrier, however, was designed for a maximum sea level rise of 50 cm.

Rotterdam Climate Proof aims to make Rotterdam fully climate-proof by 2025 as well as achieve a 50% reduction of CO₂ emissions by 2025 as compared to 1990. One of the program focuses on flood management - Rotterdam would like to learn what effects climate change will have on safety and determine which strategy deserves preference in maintaining an acceptable level of flood protection.

Rotterdam aims to develop into and present itself on a national and international level as a leading center for water knowledge and climate change expertise. Investments in climate solutions will enhance the attractiveness of the city and port for residents, companies, and knowledge institutes. At the same time, innovations and knowledge are developed, implemented, and marketed as an export product.

The agreement comes under the Jakarta-Rotterdam Minute of Agreement (MoA) in the water management sector for period of 2013-2015. The agreement will look at the operational management of mud-dredging equipment and knowledge exchange in flood handling master plan preparations. The cooperation will focus on two things, human resources capacity building in the management of integrated urban water resources management through training programs and the exchange of information and knowledge about threats and strategic issues faced by delta cities (Mitchell, 2013). This program can drive the resilience level of Jakarta getting better.

2. Seoul: Primate City and for low carbon development.

Green growth is a new policy paradigm for Asia and the Pacific that emphasizes ecologically sustainable economic progress and fosters low-carbon, socially-inclusive development. Its four pillars include sustainable production and consumption, green businesses, sustainable infrastructure, and fiscal incentives and reforms. "Growing green" means implementing more eco-efficient and profitable production, producing less pollution and waste in the process, and prioritizing the environment as essential to long-term social and economic development goals.

Seoul is the first city in Korea to establish and announce the Master Plan for Low Carbon Green Growth, which is a long-term green policy that provides a blueprint for Seoul to transform itself into a low-carbon green city 20 years later.

Korea, which has had the highest growth rate of greenhouse gas emissions in the OECD area since 1990, adopted an ambitious Green Growth Strategy in 2009. It aims at reducing emissions by 30% by 2020 relative to a "business as usual" scenario, implying a 4% cut from the 2005 level (C40, n d (b)).

The Strategy also includes a Five-Year Plan with public spending of 2% of GDP per year to promote green growth. Korea is planning to establish a carbon price through a cap-and-trade emissions trading scheme. Such an approach, combined with a carbon tax in sectors not covered by the scheme, is necessary to reduce emissions in a cost-effective manner and foster innovation in green technology. In addition, each sector should face the same electricity price based on production costs to promote efficient energy use. Given market failures, the government has a role to play in green R&D, particularly for basic research, in fostering green finance and in developing renewable energy resources.

Seoul will accelerate its efforts to create green-growth city. The Seoul Metropolitan Government will make best use of the most appropriate infrastructures in the city including world best technologies such as IT (Information Technology), NT (Nano Technology), and BT (Bio Technology), talented human resources, and densely located venture startups in order to develop 10 major green technologies suitable for Seoul, create 1 million green jobs and establish a green market of 170 billion USD in scale (SEA, n d).

Seoul is planning to invest around 2 million USD (an average of 100 million USD annually, 20,000 USD per technology) in R&D by 2030 to establish a foundation for research and development of each green

technology stated above and to provide systematical financial support (SEA, n.d.).

The energy generation and consumption structures in Seoul show that most of the energy used in the city is produced from outside whereas only 0.4% of total energy consumed is generated within the city (C40 (n.d.)). Given that more than 90% of GHG is emitted from buildings and transportation sector rather than from businesses including manufacture sector, the Seoul city government will concentrate on expanding distribution of new/renewable energy, building retrofit projects and energy saving policies customized to Seoul.

Conclusively, there are several lessons-learned that can be adopted for the case of Jakarta. First, the urgency of flood management and long term plan for building flood infrastructure. Second, plan to improve the quality of the environment and reduce the pollution. The massive development of Jakarta should be carbon friendly.

Bandung's best potential sister city to learning about Resilience City

There are two focuses that Bandung needs to improve to develop their resilience city, water management and multi disaster management. Lessons in this management can be found in Suwon City in South Korea and City of Kyoto in Japan. The reasons for selecting this city is the similarity of conditions of geography, growth trends, and faced disaster and Management of a method that allows for adoption.

1. Suwon: Integrated water management

Suwon is a city of history, culture, and technology (similar with Bandung city) and has basin topography with high north and low south and with 14 water resources: 7 rivers & 7 reservoirs. Suwon has forest resources including Mt. Gwanggyo (Suwon City Website, 2014). Suwon City has Green belt ratio up to 32, 4 % of its land and urbanized zone up to 42, 5 %.

Suwon city is metropolitan city with population in 2013 up to 1,170,878 people and with density is about 8,975.2/km² (Suwon City Website, 2014). This city is considered as foreign destination. The population of Suwon is increasing, but the domestic population is falling.

In recent years, the frequency of heavy precipitation caused by climate change due to urbanization and the increase in impervious surfaces bring about excess of the design capacity of the sewer flooding low-lying areas, such as the cause of the damage. Suwon city in is offering multi-purpose decentralized rainwater management as a new deal for overcoming the limits of the existing storm drain system. Decentralized rainwater management is to manage rainwater in various locations within the watershed to install small-scale rainwater storage tank away from the existing system such as the centralized rainwater management.

In 2009, Suwon embarked on the "Rain City" project to improve the water circular system and prevent disruption by impermeable layers, and to install rain storage and infiltration systems in buildings and forests. By doing so, it plans to increase its water self-sufficiency level to 50% by 2030 (Chunghyun, P. and Han, M. 2013).

Suwon City Plan for improvement water self-sufficiency is consist of 3 main plans: install the rainwater harvesting system, reuse treated wastewater, and install the water saving toilet and faucet. This plan is also can be used for disaster prevention effect by rainwater.

The water management that Suwon city created is waffle type management, which main principle is do the best management for each unit in the city and apply for other unit, which have same characteristic in the city (similar the decentralized system).

The integrated water management plan in Suwon city shows significant result. The Suwon City is able to reuse their local water up to 11 % (Han, 2012).

2. Kyoto: Plan for multi disaster impact

Kyoto City has not had a form of cooperation with Bandung in the Twin Cities. However, looking at the form of the earthquake threat and the existing development trends, Bandung City should consider

developing this cooperation to be able to learn and mimic the exact concept and can be adopted in Bandung.

Kyoto is located in a valley, part of the Yamashiro (or Kyoto) Basin, in the eastern part of the mountainous region known as the Tamba highlands. The Yamashiro Basin is surrounded on three sides by mountains known as Higashiyama, Kitayama and Nishiyama, with a height just above 1,000 meters above sea level (City of Kyoto, 2004).

The environmental condition of Kyoto is known as "Sanshi-suimei" or translated as "Purple Mountain and Clean Water". Accordingly, those natural assets are protected and harmonized with the built-up development. In order to allow such harmonization to take place, Kyoto formulated landscape regulation and height regulation (building codes). One of the features of this landscape regulation is the designation of landscape promotion districts, including those along the riversides, mountains, and within the city. There are several aesthetic landscape districts which combine historical heritage, historical landscape preservation, and community scenic betterment district.



Kyoto City Landscape

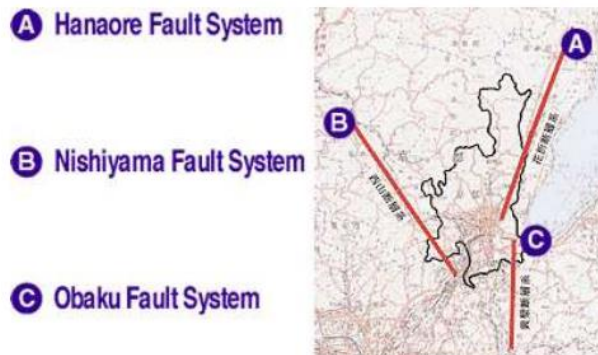


Figure 5. Similar City Landscape between Kyoto and Bandung Landscape

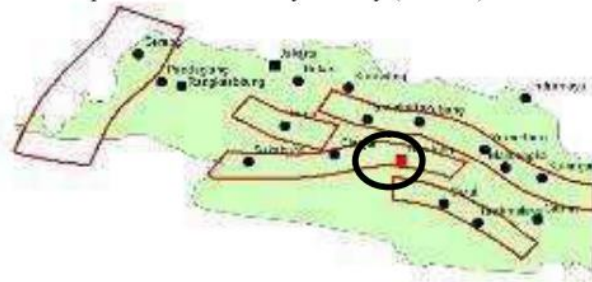
Experts have investigated Kyoto and the immediate surrounding area for active fault lines and determine that fault lines that were inactive over the past hundreds of thousands of years, can become active again. Several hypothetical situations based on tectonic movements in three fault systems (the Nishiyama, Hanaore and Obaku fault systems) would result in inland earthquakes. A certain degree of activity in the Nankai Trough would result in a major offshore earthquake. If movement was to occur along any one of these faults, the epicenter would be located directly under Kyoto and potentially result in major devastation in the city. Obviously, improved measures for disaster prevention are important.

In Kyoto City, fire also becomes one critical threat. One of main reason is the historic and traditional houses are using material that easily bum. Fire would occur at 98 points in Kyoto City (Toyoda, 2014). For fire management, the Kyoto government establishes several actions. The main actions were retrofitting historic city and houses with fire-proof. Retrofitting historic city was done without change the urban structure. They combination of the countermeasure is between hard and soft measures. The second countermeasure is strengthened the community. The government establishes community groups such Volunteer fire corps, Community-based disaster mitigation group and Citizen's Fire Rescue Organization for Cultural Heritage. This community grow each year and up to now, more than 140,000 group

established (Toyoda, 2014). This community promotes residents living nearby heritages to be trained to protect the heritages, such as extinguishing fire. This group also participates in participatory disaster map making.



a. Earthquake source near Kyoto City (red line)



b. Earthquake source near Bandung City (red line)

Figure 6. Kyoto and Bandung Similar Earthquake Sources

Source: a. Kyoto City Fire Department (2002) b. Sengara, dkk (1990) in Putranianto (2004)

Table 1. Lesson Learn from Jakarta Sister City

Rotterdam	Seoul
<ul style="list-style-type: none"> Planning ahead and long term plan (first flood control build in 1980 and finish in 1997) Strong commitment from the government to execute long term project Innovative solutions Multifunctional design flood control A tailor-made approach is necessary to be able to integrate spatial planning into the dyke maintenance plans. Rotterdam sees climate change adaptation as a selling point. Local companies involved in building the futuristic solutions report doing good business selling their expertise to other cities. 	<ul style="list-style-type: none"> Establish a long-term green policy that provides a blueprint for Seoul to transform itself into a low-carbon green city 20 years later. Strong commitment from the government to execute long term project Spending of 2% of GDP per year to promote green growth. Invest in R&D for technology for improving low carbon development The Seoul city government concentrates on expanding distribution of new/renewable energy, building retrofit projects and energy saving policies customized to Seoul.

In landscape and height regulation, two main boundaries are set. They are urbanization promotion area within the historical urban area. The restriction varies depending on the locations such low-rise urban area with height up to 10 m so that it can exist in harmony with the hilly and mountain sides. To fit with the Kyoto-machiya houses, in the city center, the building height should not exceed 15m, while in the commercial district 31m. Some of the lesson-learned that can be adopted are the urgency to preserve river watershed area and harmonization between cultural heritage and scenic natural assets through land use zoning. It will improve the quality of the environment and reduce disaster risks.

Table 2. Lesson Learn from Bandung Sister City

Suwon	Kyoto*
<ul style="list-style-type: none"> Acknowledge the current global water issues and act to solve. Improvement water self-sufficiency The concept of handling problems made adjusted to the characteristics of natural (has many rivers and high rainfall) Strong commitment from the government to execute long term project Harmonization between cultural heritage and scenic natural assets through land use zoning 	<ul style="list-style-type: none"> Restriction landscape and height regulation (varies depending on the locations) The concept of handling problems made adjusted to the characteristics of natural strong commitment from the government to execute long term project Harmonization between cultural heritage and scenic natural assets through land use zoning Spatial plan for multi disaster risk Community become main actor for supporting the city more resilience

*proposed sister city

Conclusively, there are several lessons-learned that can be adopted for the case of Jakarta and Bandung City. Here are some things that can be learned from the current and the potential sister cities of Jakarta and Bandung city.

CONCLUSION

The cooperation undertaken by the City of Jakarta and Bandung already exists to some cities abroad. While there remain obstacles to regional cooperation, Jakarta and Bandung City has the potential to allow the region to effectively cooperate on most issues, especially addressing climate change, the effects of which all countries are experiencing.

Jakarta and Bandung City cooperation should not only focus on its economic achievements but also reflect on the other aspects of domestic and international affairs that do not necessarily require huge reserves to address. These areas of significance include a serious commitment to addressing environmental issues such climate change impact that transcend state boundaries.

Develop the network with a sister city should has the characteristics and face the same disaster, but instead built cooperation in the field of climate change. Jakarta sister city with Rotterdam and Seoul, Bandung network with Suwon and Kyoto can very effective because the characteristics. This sister city network also can adopt the adaptation and strategies method.

This cooperation can share knowledge about adaptation option and strategies to improve the resilience. Also, multi actors should be included at all policy levels climate change mitigation and adaptation strategies. Such a partnership may be the answer to questions regarding issues of policy and implementation gaps. Promoting the sharing of experiences, peer learning and mutual support to replicate good practices is one of key concept for making our cities more resilient.

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