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Opportunity for Sister City Application to Support Resilience City

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Abstract

Indonesia has many large 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. As a result, complex activities of people in urban areas need space and this need led to environmental degradation, such as deforestation practices and poorly constructed houses in the flood plain. To prevent this in the future, it is essential for developing countries like Indonesia to have benchmarks. The benchmark for developing countries could derive from developed countries. So far the construction of inter-city usually has a partnership with cities abroad, including the sister city concept. Sister city practice could be used by cities in Indonesia for good practice development. Jakarta and Bandung (Indonesia)'s regional cooperation should not only focus on its economic achievements but also reflect on other aspects as well such as domestic and international affairs that do not necessarily require huge reserves to address. While there remain obstacles for 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: sister city, climate change, Jakarta, Bandung

1. 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 a dense and large population, rapid economic growth, and land use conversions. High land use conversions are examples of uncontrolled urban development and have become the main drivers that cause environmental degradation (Beatley, 2009; Birkmann et al., 2010; Hanson et al, 2011). On the other hand, 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 it's 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 done 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 overwhelming. (Beatley, 2009; Castan Broto and Bulkeley 2013).

Indonesia has many large growing cities with a more dynamic trend of urbanization marked by 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% of population living in urban area, while in 2005, 43% of Indonesia's population inhabit the city (Tang, 2013). As a result, complex activities of people in urban areas need space and this need led 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 which was converted into residential and industrial area in the upstream of Bogor

in the last two decades (Sagala et al 2013a). Similarly, landuse conversion in wetlands areas of some parts of Indonesia contributes to the occurrence of floodings, which can be observed in Palembang (Sagala et al 2013b).

To prevent this in the future, it is essential for developing countries like Indonesia to have some benchmarks. The benchmark for developing urban resilience can be learnt from initiatives and programs that have been implemented at developed countries. So far the collaboration among cities is facilitated through sister city concept (Tjandradewi and Marcotullio, 2009). Sister City concept or Twinning or often also called the twin city, is an inter-city cooperation, which is formally agreed and bonds as a long-term sister city. In this concept, any issue can be a theme of cooperation, including environmental and disaster issues. However, the field of environment and disaster research agreement has not been done.

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 between the two cities in cooperation. The question in this paper is to which extent the sister city concept can help the city becoming a resilient city. And when the sister city concept can make the city more resilient, can the similar cooperation is made between the cities in Indonesia? Jakarta and Bandung were chosen in this paper because Jakarta represents a giant and shore city while Bandung represents a metropolitan, mainland, and hilly city. In addition, the city of Jakarta and Bandung itself has a sister city cooperation more than others cities in Indonesia. Jakarta itself has 49 sister city and Bandung has 25 Sister City cooperation. Therefore, this context will help the other 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 an alternative adaptation and mitigation measure. Then the methodology and data sources used in this paper are described. Next the findings will be discussed with reference to the theoretical background and case studies. Finally, the paper suggests some conclusions and policy implications for sister city in developing countries in order to be a resistant and resilient city in facing climate change risks.

2. Methodology

The approach used in this study is a qualitative and quantitative approach that aims to exploration. This study aims 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 the two cities with extensive 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.



Figure 1. Jakarta and Bandung City Position

3. Sister and Resilience Concept

Sister City is 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). In Indonesia sister city concept was started to be applied formally in 1993. Sister city concept had begun long before it was initiated 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. The scheme of Sister City was used 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 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 three factors which could advance the trans-national and sub-national relationship development. First, rapidly growing cities in the developing world which are in need of help should be actively seeking for it. Local authorities have sought partnership arrangements with counterparts in developed countries with the hope of technical know-how and skills transfer (Hewitt, 1998; 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 as 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 to be 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 livability scores, vibrant arts scene or new transportation investments.

Resilience is the ability of the 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 that cities could do to enhance resilience dividend is to catalyze 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. For instance, most design and construction firms in the Netherlands are growing their business based on their expertise in facing centuries of floods. The same success is waiting for those who can develop

a more resilient operating system, technologies to capture big data and resilient urban design innovations.

With the power to share knowledge in 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 of the similar threat faced and thus, perhaps carry out similar approaches.

4. Result 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, Indonesian Ministry of Foreign Affairs claimed that only 20% of the partnership goes very well established, 15% of was well established and more than 65% almost have no activities (Salam, 2004). This statistic shows that the government in Indonesia do not consider seriously 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 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 (Reuters, 2012).

There are a couple of twin cities out of 49 cities that have the same characteristics as Jakarta. Two of them are city of Tokyo and Rotterdam. This down-town 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, 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.

Bandung itself also goes into the red zone with declining ground water conditions. Population growth and the more advanced societies increase the need for water. On the other hand, surface water and rain water quality is bad. Forty-nine rivers that flow in Bandung, classified as critical due to interruptions of the natural cycle of rain as a supplier of the highest water volume. In addition, the rivers were marked by high sedimentation.

With population growth and high density, Bandung is prone to fires. The number of fire incidents reached 1.624 events 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).



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

Bandung has 29 Twin Cities, but only 2 of 29 City which has the same characteristics. The city that has the same characteristics as well as similar challenges is Suwon City; as 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 city, 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 are 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

In order to increase her resiliency, Jakarta should focus on flood-proof management and low carbon-growth development. These concept can be adopted and learnt from Jakarta current sister city, which are 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 to the center part of southern Rotterdam. Large part of the Rotterdam city is 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)). The dykes of Rotterdam, which are home to 40,000 residents, was build by the multi-layered safety principle.

Another 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 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 the building is constructed and equipped could create a broader range of measures. Permanent flood protection is the goal. To protect Rotterdam's inner-dyke areas, flood prevention is critical. Again, a tailor-made approach is necessary to be able to integrate spatial planning into the dyke maintenance plans (C40, n d (b)).

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 ('Maasvlakte 2') 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. –In addition, Rotterdam is learning about the effects of climate change on safety and the most effective strategy for 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.



Figure 4. Comparison between Rotterdam Plan and Jakarta Plan

Source: (a) www.edbr.nl, (b) www.ayogitabisa.com

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 (Michell, 2013).

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 being a carbon friendly city.

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

There are two focuses that Bandung needs to improve in order to develop their resilience city, water management and multi disaster management. These managements can be found in Suwon City in South Korea and City of Kyoto in Japan. The reasons for selecting this city are the similarity of the cities' characteristic, such as geography, growth trends, and disaster challenges.

- *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 have 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 disrupt ion 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 for disaster prevention effect by rainwater tanks.

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).

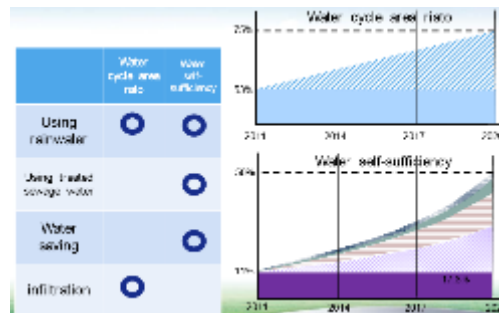


Figure 5. Water Management Plan Effect in Suwon City
Source: Chunghyun, P. and Han, M. 2013

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)..

- *Kyoto: Plan for multi disaster impact*

Kyoto City does not have any form of cooperation with Bandung in the Twin Cities scheme. 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 which 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



Bandung Landscape

Figure 6. 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.

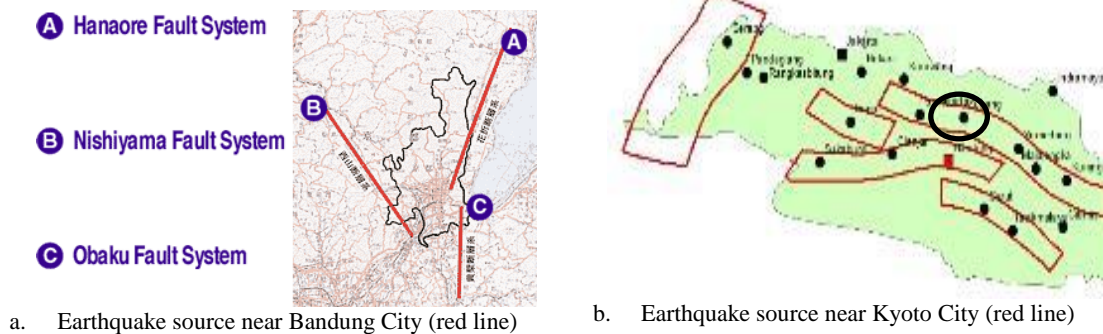


Figure 7. Kyoto and Bandung Similar Earthquake Sources

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

In Kyoto City, incident of fire also become a critical threat. One of main reason is the building material of the historic and traditional houses used is easily burned. Fire could occur at 98 points in Kyoto City (Toyoda, 2014). For fire management, the Kyoto government established several actions. The main actions were retrofitting historic city and houses with fire-proof. Retrofitting historic city was done without altering the urban structure. The countermeasure is combination between hard and soft measures. The second countermeasure is strengthening the community. The government established 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 training of the residents living nearby the heritages sites so as to protect the sites with skills such as extinguishing fire. This group also participates in the making of disaster map.

In both landscape and height regulation, two main boundaries are set. There is urbanization promotion area within the historical urban area. The restriction varies depending on the locations. The building in low-rise urban area is limited with height up to 10m 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 the height could reach until 31m.

Conclusively, there are several lessons-learned that can be adopted for the case of Bandung. First, the urgency to preserve river watershed area and second, is the harmonization between cultural heritage and scenic natural assets through land use zoning. It will improve the quality of the environment and reduce disaster risks..

5. Conclusion and Recommendation

The cooperation with cities abroad undertook by the City of Jakarta and Bandung has already existed. There are some opportunities to increase resilience of cities through establishing cooperation. There is a sister city that has similar characteristics and face the same challenges. Jakarta and Bandung (Indonesia)'s regional cooperation should not only focus on economic achievements but also on the other aspects of domestic and international affairs that do not necessarily require huge reserves to address. These areas of significance requires active commitment as follows: encouraging a lively civil society, openness towards engaging with countries that have tumultuous relationships in the past and addressing environmental issues that transcend boundaries of state. Here are some things that can be learned from the current and the potential sister cities of Jakarta and Bandung city.

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 in order do a good business and thus 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 concentrate on expanding distribution of new/renewable energy, building retrofit projects and energy saving policies customized to Seoul.

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 of 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 by the government which have strong commitment 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

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 sister city if the other cities have similar threat and perhaps similar method.

Any governmental policies to establish resilience city may remain ineffective if the policy of inclusion is limited to the level of state-to-state cooperation. Multi actors should be included at all policy levels for 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.

Reference

- Beatley, T., 2009. Planning for coastal resilience: best practices for calamitous times. Island Press.
- Birkmann, J., Garschagen, M., Kraas, F. and Quang, N., 2010. Adaptive urban governance: new challenges for the second generation of urban adaptation strategies to climate change. Sustainability Science, 5(2): 185-206.
- Hanson et al, 2011

- Bontenbal and van Lindert. 2009. Transnational City to City Cooperation: Issues Arising from Theory and Practice. *Habitat International*, 33: 131-226
- Castán Broto, V. and Bulkeley, H., 2013. A survey of urban climate change experiments in 100 cities. *Global environmental change*, 23(1): 92-102.
- City of Kyoto. 2004. *Geography of Kyoto City*.
- C40 (a). n d, Rotterdam Climate Change Adaptation Strategy. <http://www.deltacities.com/cities/rotterdam/climate-change-adaptation>
- C40 (b). n d, —Seoul to become a Global Climate-friendly City by 2030l, www.c40cities.org/docs/ccap-seoul-131109.pdf.
- Chunghyun, P. and Han, M. 2013. Development of Indices for Integrated Urban Water Management in Urban Planning.
- Geology Agency. 2010. Map of Earthquake Center in West Java. Ministry of Energy and Mineral Resources.
- Han, M. 2012. Smart Water Portfolio and Rainwater Revolution: From Drain City to Rain City – A Case Study of Korea. European Union Conference. Austria
- Hansen, H.S., 2010. Modelling the future coastal zone urban development as implied by the IPCC SRES and assessing the impact from sea level rise. *Landscape and Urban Planning*, 98(3–4): 141-149.
- Hanson, S., Nicholls, R., Ranger, N., Hallegatte, S., Corfee-Morlot, J., Herweijer, C. and Chateau, J., 2011. A Global Ranking.
- Jones, G.W., 2002. Southeast Asian Urbanization and The Growth of Mega-Urban Region. *Journal of Population Research*, 19(2): 119 -136.
- Kaars, W and Dam, M. 1995. A 135,000-year record of vegetational and climatic change from the Bandung area, West-Java, Indonesia". *Palaeogeography, Palaeoclimatology, Palaeoecology* 117 (1–2): 55–72. Doi: 10.1016/0031-0182(94)00121-N.
- Kyoto City Fire Department. 2002. Will happen if a big earthquake hits Kyoto? <http://www.city.kyoto.jp/shobo/bomanual/english/page1.html>
- McKinsey Global Institute. 2012. The Archipelago economy: Unleashing Indonesia's Potential.
- Mitchell, N. 2013. Jakarta and Rotterdam to Cooperate on Flood Handling, <http://cities-today.com/2013/11/jakarta-and-rotterdam-to-cooperate-on-flood-handling/>.
- Sagala, S., Lassa, J., Yasaditama, H. and Hudalah, D. The evolution of risk and vulnerability in Greater Jakarta: contesting government policy, Working Paper, Institute for Resource Governance and Social Change.
- Sagala, S., Dodon, Wimbardana, R. and Lutfiana, D. (2013): *Alih Fungsi Lahan Rawa dan Kebijakan Pengurangan Risiko Bencana Banjir: Studi Kasus Kota Palembang*. Edited by Herryal Anwar, LIPI.
- Sagala, S., Wimbardana, R. and Pratama, F. (2014): *Perilaku Dan Kesiapsiagaan Terkait Kebakaran Pada Penghuni Permukiman Padat Kota Bandung*.
- Salam, Usmar. (2004). *Dinamika Kerjasama Internasional Provinsi di Indonesia dengan Luar Negeri*. Makalah Lokakarya Cara Penanganan Kerjasama Internasional. 7.
- SEA. n d. Seoul to become a Global Climate-Friendly City by 2030: Reduce Carbon by 40%, Create 1 million Green jobs.
- Suwon City Population statistic. 2014, <https://stat.suwon.go.kr/sub/present/Population.asp>
- Tang, Z., 2013. The Great Migration: Rural-Urban Migration in China and Indonesia. *Canadian Studies in Population*, 39(3-4): 129-130.

Tjandradewi, B. and Marcotullio, P. 2009. City-to-city networks: Asian perspectives on key elements and areas for success. *Habitat International*, 33: 165–172.

Toyoda, Y. 2014. Introduction to Disaster Management for Urban Cultural Heritage and Traditional Architecture in Kyoto. 1st Collaborative Workshop. Bangkok

Rotterdam Climate Initiative. 2012. Rotterdam Climate Change Adaptation Strategy. Rotterdam Climate Initiative

Villiers, J. C. (2009). Success factors and the city-to-city partnership management process—from strategy to alliance capability. *Habitat International*, 33 (2): 149-156.

Wangsaatmaja, S. Sutadian, A. and Maria A.N. Prasetiati. 2006. Groundwater Resource Management in Bandung. Sustainable Groundwater Management in Asian Cities. Institute for Global Environmental Strategies.

Wikipedia. 2014. Rotterdam. <http://en.wikipedia.org/wiki/Rotterdam#Geography>



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