GREEN URBAN WATERFRONT MANAGEMENT CASE OF SOLO, INDONESIA

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ABSTRACT

Solo is a city located in Central Java, Indonesia with 501.650 inhabitants in 2011. It hosted in 2010 the Asia Pacific Ministerial Conference on Housing & Urban Development (APMCHUD) as big events for this city. Besides APMCHUD is an award for Solo urban renewed images since 2005 which one of them is urban waterfront revitalization.
Applying the Lourenço meta-analysis for urban growth areas which is specific in urban waterfront management, a better apprehension of the sequence of interdependencies that exist can be addressed to expand the concepts of redevelopment of urban areas. It can be done within a continuum process associated to planning and investment cycles. The applicability of the proposed model is tested by comparing the idealized evolution to the observed urban waterfront in Solo, for a period of eight years, from 2005 to 2013. This enables the discussion of conceptual issues related to the legitimizing of LCA and the present contribution. Although the complete cycle is not yet observable, it is possible to confirm that the relevant nature of this tool allows for an earlier awareness of the cycle progression anomalies and, therefore, a potentially better adjustment between observed and ideal behaviors, if these anomalies are monitored and addressed.
This paper will address Solo profile and planning process, major outcomes due to urban waterfront applicability of LCA models and framework for the sustainable management.

Keywords: *Life Cycle Analysis, green urban waterfront management, Solo*

ABSTRAK

Solo adalah sebuah kota di Provinsi Jawa Timur, Indonesia dengan 501.650 penduduk di tahun 2011. Pada tahun 2010 diselenggarakan Asia Pacific Ministerial Conference on Housing & Urban Development (APMCHUD) sebagai even besar di kota ini. Disamping itu APMCHUD adalah penghargaan bagi Solo sejak 2005 dimana salah satunya adalah revitalisasi urban waterfront. Menerapkan meta-analisis Lou-

renço untuk daerah pertumbuhan perkotaan yang spesifik dalam manajemen urban waterfront, sebuah ketakutan yang lebih baik dari urutan saling ketergantungan yang ada dapat diatasi untuk memperluas konsep pembangunan kembali daerah perkotaan. Hal ini dapat dilakukan dalam proses kontinum terkait dengan perencanaan dan siklus investasi. Penerapan model yang diusulkan diuji dengan membandingkan evolusi ideal terhadap urban waterfront yang diamati di Solo, selama delapan tahun, dari tahun 2005 sampai 2013. Hal ini memungkinkan pembahasan isu-isu konseptual yang berkaitan dengan legitimasi dari LCA dan kontribusi saat ini. Meskipun siklus lengkap belum diamati, adalah mungkin untuk mengkonfirmasi bahwa sifat yang relevan dari alat ini memungkinkan untuk kesa-daran awal dari anomali perkembangan siklus dan, oleh karena itu, penyesuaian berpotensi lebih baik antara perilaku yang diamati dan ideal, jika anomali ini dipantau dan ditangani.

Makalah ini akan membahas profil Solo dan proses perencanaan, hasil utama akibat penerapan urban waterfront model LCA dan kerangka kerja untuk pengelolaan berkelanjutan.

Kata Kunci: *Analisa Siklus Hidup, manajemen* urban waterfront *hijau, Solo*

INTRODUCTION

Life cycle analysis (LCA) is a graphical tool to represent a succession of phases in a long period of time. The applicability of LCA urban growth area for urban expansion was introduced by Lourenço in 2003. She developed a meta-analysis for urban growth areas applied in seven urban areas of Portugal. Presented by three curves of planning, action, and living, it is a bi-dimensional graph which represents the intensity of the cycle and time period dimensions.

Nowadays, some cities compete for the quality of life which represented by green areas. It is very important in urban planning to provide public space for citizens and to get the fresh air. One of the opposite properties of green area is water as a refreshing element of life in green areas and a restraint for urban function (Jormola, 2008). Some cities which are passed by rivers or have surface water resources have already had advantages for providing this element.

Urban waterfront in 20th century became spread all over the world especially in USA and Europe. There are some succeed projects and bring the new urban image for the city, such as in Spain, Italy, and Portugal. Since the remarkable results are noticed, some cities in Asia, try to do so. Unfortunately, in the development phase, some ruptures and neglected projects happened before the optimal profit is fruitful by citizens.

Since waterfront revitalization needs investments, it is important to keep it sustain. This project needs to be well-managed and monitored. An improvement of LCA observation to monitor the urban waterfront projects is proposed. This enables the discussion of conceptual issues related to the legitimizing of LCA and the present contribution. It is also possible to confirm that the relevant nature of this tool allows for an earlier awareness of the cycle progression anomalies.

THEORY / RESEARCH METHODS

Life Cycle Analysis for Urban Development

Life cycle is a graphical tool that represents phases over a long period of time. It is represented in exponential or logistic s-curves, which are slow at the beginning, undergo acceleration, then slowing down and at the end, saturation. Mostly used in biology, industry, production, as well as, in economics and politics which have a strong relation with the welfare of people in terms of spatial and time frames such as environment and urban areas.

Lourenço (2003) defined the urbanized areas in an analogy with the framework of predictions heuristics of the quasi-model of Holton. She noticed that effectively, Holton broke the attractiveness of mining for gold and the discovery of a new field continuing his analogy with the gold rush. As a result, a utopian model of planning cycles which consists of three curves: planning, action, and living (Figure 1) was proposed by her as an ideal behavior of a plan-process. She noticed that the behavior of the knowledge-based graphic could theoretically explains her model as: base curve of planning represented by the curve of participation in the fundamental knowledge, associated actions represented by logistic curve of fundamental research and living curve represented by applied knowledge curve. This model and the likely evolution of the gold rush were associated with an almost metaphoric mathematical model that relies on a graphical representation with an explicit visualization. This same scheme was applied to analyze and forecast the race to urbanization.

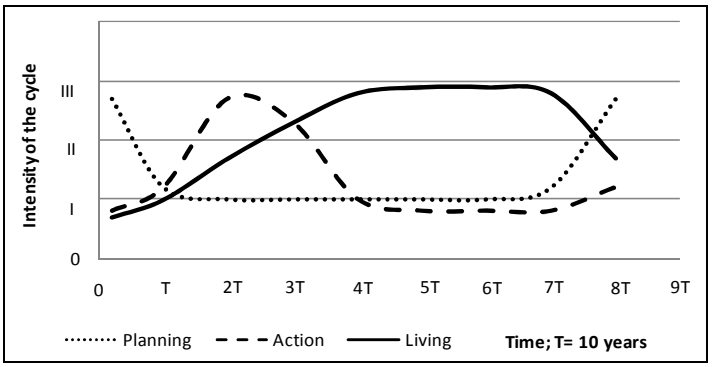

Figure 1. Ideal Behavior of a Plan-Process: Lourenço's Model
Source: Lourenço, 2003a

Lourenço´s model theoretically considered that during the first ten years there is an intensive planning, which will gradually decrease until reaching a minimum value, after two decades. The intensity level of the actions will increase and present a higher ratio in the second decade, and should reach a peak at the end of this period. Regarding to the intensity of the living, it is considered that the intensity has the same or slower increase ratio than the curve of the actions, requiring forty years to reach its maximum precisely when the measure of the curve reaches its minimum. At the end of the twenty or thirty years, corresponding to sixty or seventy years after

the beginning of a planning cycle, the intensity of the living begins to decrease rapidly, while the intensity of planning increases very quickly.

The development of this model for the urban waterfront has been examined by Lourenço (2010) with the case study of Lisbon waterfront area (Figure 2). It was an abundant and polluted area in the waterfront of Lisbon which changed in to new urban image during the short time. The plan process of this area shows the similar behavior plan process with Lourenço's ideal behavior except the time dimension. She analyzed that the short time needed might be due to the big events.

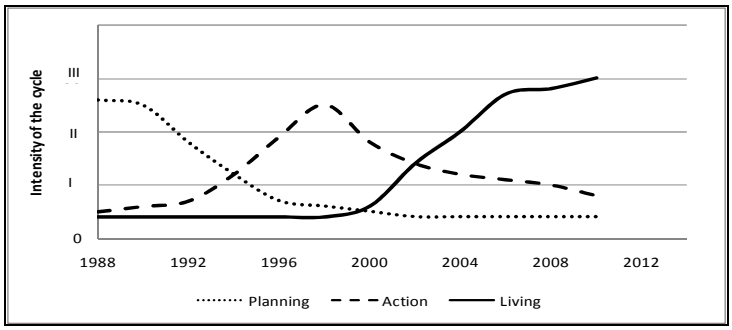

Figure 2. Behavior of Nation's Park Plan-Process in Lisbon
Source: Lourenço (2010)

In 2013, Astuti studied the most influenced factors that influence the behavior of urban waterfront plan-process (Figure 3). Through those factors the behavior of urban waterfront can be drawn. This graphic will help the municipality to do assessment for the urban waterfront project if it is going up or rupture. The benchmarking analysis for the cases study of five cities did in southern European through Life Cycle Analysis for urban development. It found that Bilbao, Genoa and Lisbon are successful cities with the waterfront revitalization projects. The behavior of plan-process happened in very high intensity. It is found that to finish the projects the City Hall combined it with big events or flagship projects. Nowadays the living is still continuing in high intensity concentrate in the waterfront area as the major new urban image of the city. For Porto & Viana, the cycle was completed in high intensity (level III). They were in a same national projects namely POLIS project and has strong connected with city center & major urban renewal. For Aveiro rupture was happened in the beginning (due to the environment focus) although at the end, it shows development (Astuti, 2013).

Urban Waterfront

Urban waterfront is an area along river, coast, and lake area. Coastal Zone Management Act (1972) defines the term of urban waterfront as port which consists of any developed area that is densely populated and is being used for, or has been used for: urban residential, recreational, commercial, shipping, or industrial purposes. Since the going up and down situation of the city and urban waterfront, a redevelopment

of this area recently in 20th century happened in several cities included medium-sized and small cities.

According to CZMA (1972), waterfront revitalization is a process that begins with the desires of a community to improve its waterfront. That proceeds through a series of planning steps and public review to adoption of a waterfront plan. Implementation of the plan, involves public and private actions, investment decisions, and developments (CZMA, 1972). Its revitalization influenced the urban development which is associated with the degradation of rivers. The new urban waterfront territory nowadays can be identified at least four functional areas: public, natural, working and redeveloping (NYCDCP, 2002 in Jankovska, 2009).

Centre for Cities on Water in Venice conducted 'The 10 Principles for the Sustainable Development of Urban Waterfronts'. It constructed the strongest elements of the urban waterfront transformation process (Giovinazzi and Morretti, 2009). Those principles are: secure the quality of water and the environment, waterfronts are part of the existing urban fabric, the historic identity gives character, mixed use is a priority, public access is a prerequisite, planning in public private partnerships speeds the process, public participation is an element of sustainability, waterfronts are long term projects, revitalization is an ongoing process, and waterfronts profit from international networking.

Basu (2011) described the urban parameters of public space in relation to the waterfront and relationship between the waterfront public space, water body and the city by case study of Barcelona and Lisbon waterfront revitalization projects through nine parameters. Those are: urban aesthetic and architectonic quality, public amenities, physical connection and barriers, visual connections, water accessibility, safety, uses and functionalities, recreation and leisure, integration.

The planning process of new urban image of green urban waterfront helps the city more sustainable. It is successfully change the face of the city centre of the metropolitan city of Baku. It is an example of an historic city as a medieval town which alongside to the waterfront of Caspian Sea. The green core city of Baku nowadays becomes a new city attraction especially for the tourists. Some of cultural events most of the time held to make the waterfront more livable (Huseynov, 2011).

Green City

Green City was introduced by Le Corbusier et.al. as the latest urban design trends. It consists of eight components: green planning and design, green open space, green waste, green transportation, green water, green energy, green building and green community.

It is a cross sector relationships between several ministries in Indonesia. Under policy of Indonesian Public Works Ministry, a program of green city development has involved 60 cities and regencies in Indonesia to implements the program. The program promotes implementation of urban park and green areas as part of green open space. This program opens opportunity for flower farmers to contribute in the green city implementation under policy of Indonesian Agricultural Ministry.

Through policy of green city development, the city should provide 30% of green areas in the entire city. The program is part of vision which mentioned in In-

donesian Regulation no. 26/2007 about green urban planning and design. It Is successfully implemented by Singapore which has 8.000 m^2 of green open space for 1000 citizens. It is respectively achieved by Indonesian Cities as part of public service programs to provide a high quality of living.

Sustainable Urban Development

Sustainable urban development has been written so many times since the Brundtland Report (1987). It consists of three dimensions: economic, social, and environment. It has significant influence on planning and policy at the local level. Afterwards, the communities have adopted sustainability as a goal in comprehensive plans and other planning activities.

Nowadays, sustainable planning and management has diverse definitions ranging from "deep green" ecological fundamentalism to: energy conservation issues, serious principles of social equity (inter, intra-generational, and gender), environmental economics, and economic sustainability. Kammeier (2003) proposed the resume of sustainable development coped with big events management as a pragmatic manner as seriously "green" to some extent, socially equitable (at present and with regard to the near future), and economically prudent. The emphasis is on economic value added, employment effect and 'city image'.

The regeneration of waterfronts was concluded by Giovinazzi and Moretti (2009), as representing an extraordinary opportunity for cohesion and for stitching the territory together. Water as a collective legacy can play a central role and become the engine for sustainable development through recreating the relationship between spaces, uses, and visions. Afterwards, it will build a dialogue between spatial organization, port, and city functions and their economic and social aspects.

Research Methods

The model consists of three curves: planning, action and living. The factors influence the behaviors are:

1. The intensity of planning is indicated by the presentation of urban strategy, planning frameworks, directives, planning proposals, new bodies, urban development visions which have relation with waterfront projects.
2. The intensity of action is indicated by the number of urban development through infrastructures construction, public participation, mount of investment which has relation with waterfront projects.
3. The intensity of living is indicated by the number of people living in the city and the economic and social activities surround the waterfront area.

Figure 3 shows the flow work of this methodology which is revisited from Lourenço (2003) and Alvares (2008). The factors will be checked if it is present or not present in order to determine the intensity of each phase (low, medium, high). The graphic portrayed is quasi-dynamic model for urban waterfront planning process.

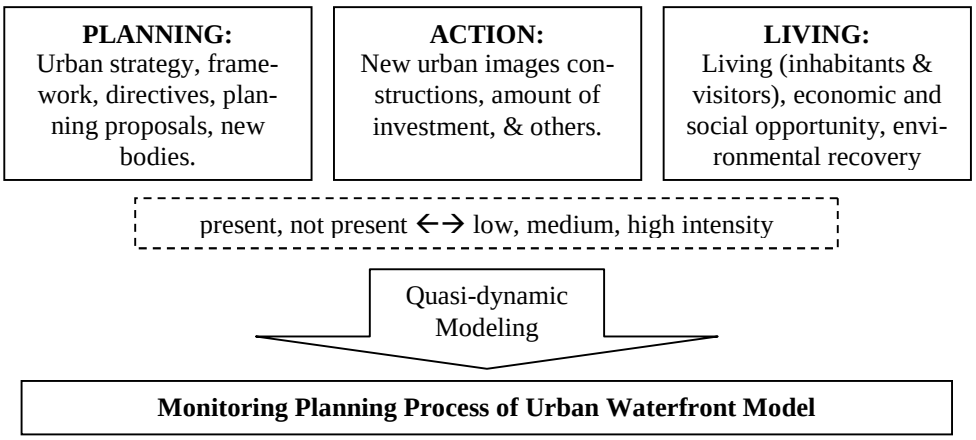

Figure 3. The Flow Work of the Model
Source: Astuti (2013)

When the city wants to revitalize its waterfront area, it might be a new approach for the city planning. It might bring a success result, when people can enjoy the waterfront area and get the feel of waterfront city or it might be fail. The hypothesis of this research is stated to achieve the research objective. In order to find the most influence and success key factors for the projects sustain, the hypotheses are: Planning: does the urban waterfront become the focus of the city planning? Action: does the project persistence in the design proposal?, Living: does the urban waterfront touch social, culture and economic of the people activities? The plan-process framework can be drawn on the Figure 4 below.

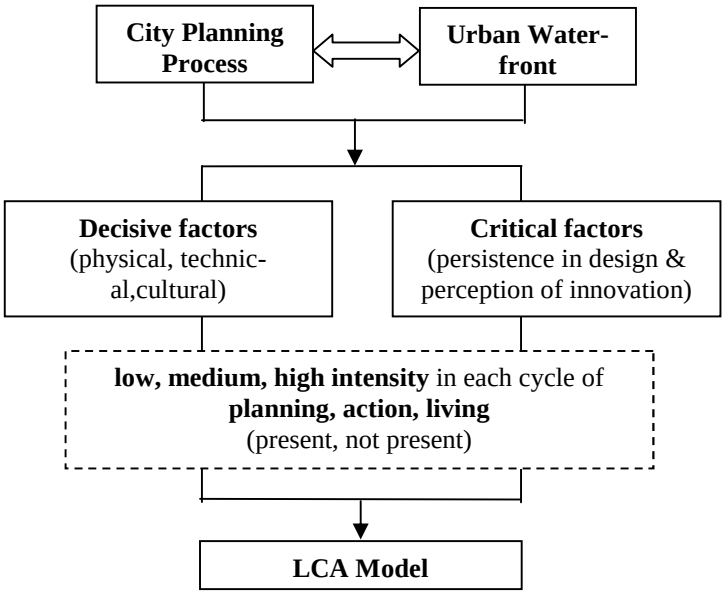

Figure 4. The Plan-Process Framework of LCA Model
Source: Astuti (2013)

RESULTS AND DISCUSSION

Solo Urban Waterfront

Solo is a small-medium sized city on 44 km^2 area. It has 501.650 inhabitants in 2011. It is located in Central Java Province Indonesia, 477 km east of the capital city, Jakarta (Figure 5). Officially known as Surakarta, this city has been built since 1745 as an autonomous monarchy. Then, after Indonesia independence in 1945, it was integrated in the Indonesian territory.

Figure 5. Location of Solo

The vision of this city is Solo as cultural city based on trading, services, education, tourism, and sports. To empower this mission, Solo has its branding: "Solo, The Spirit of Java''. Since 2005, Solo has done several urban renewals such as: city walk building to provide an environmental friendly pedestrian, heritage buildings conservation, and new open green space areas. Those programs have been intertwined with special big events which can leverage the emerging of Solo sustainable management (Lourenco and Astuti, 2011). To commemorate the success projects of Solo urban development, in 2010, Solo hosted the Asia Pacific Ministerial Conference on Housing and urban Development (APMCHUD).

Geographically, Solo has flowed by several rivers. The big one is Bengawan Solo River. The others are: *Kali Jenes, Kali Anyar, Kali Gajah Putih, Kali Pepe Hilir, Kali Wingko, Kali Boro, Kali Pelem Wulung, and Kali Tanggul.* Unfortunately those rivers are suffered of slum areas. Solo which attracts people to do urbanize forces them to occupy river banks since it is an abundant land. As the results, the river as the city greenery potency could not be enjoyed by the citizens.

During 2008-2012, after hard working to implement the program, Solo has three urban waterfront areas. Those are Bengawan Solo River in Pucang Sawit called Solo Urban Forest, Kali Anyar, Mojosongo, Jebres, called *Taman Sekartaji*, and Kali Anyar, Sumber, Banjarsari, called *Taman Air Tirtonadi* (Figure 6).

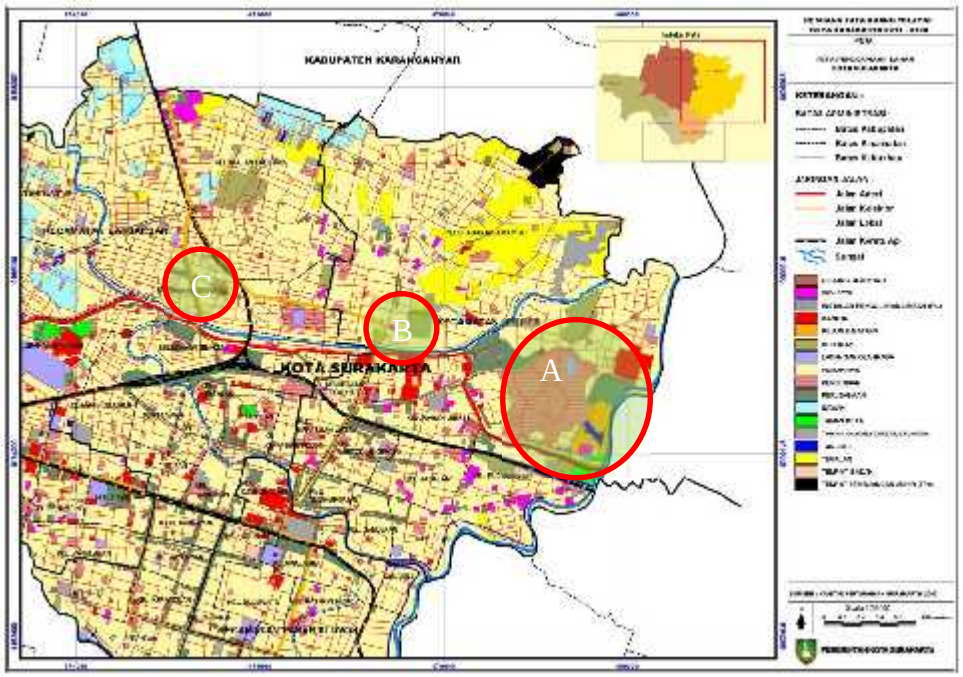

Figure 6. The Location of Solo Urban Waterfront on Solo Land Use Map 2010
A. Solo Urban Forest, B. Taman Sekartaji, C. Taman Air Tirtonadi
Source: Surakarta Municipality, 2011

Solo Urban Forest

Before 2010, Bengawan Solo river bank in Pucang Sawit was a squatter and slum area. Low-income people from the villages occupied this abundant area. It is about 1.571 inhabitants stayed there and faced yearly flooding (Figure 7).

The river bank is a danger area and supposed to be green as waterway of the flood. Through persuasive approach, the municipality tried to relocate people to the saver areas. The municipality provided a better place and helped them to have their own lands and houses which are very expensive for them. The municipality assisted people by giving soft loan; IDR 12 million (US$ 1.300) for land purchasing, IDR 18 million (US$ 1.900) for public facilities, and IDR 8,5 million (US$ 1.900) for housing. The budget was from national budget and local budget.

After the river bank freed from the slum, it was changed to be an *urban forest.* It was planned for about three hectares area along 750 m (Figure 8). For the first step it has been already built for 200 m length and 5-30 m width in 2010 as part of APMCHUD event. This project is called as the first urban forest which needs investment of IDR 290 million (US$ 30.500). This green area allows the river bank gets back its natural function for water catchment area. It will be a nice waterfront area where people can enjoy afternoon by doing fishing or leisure outdoor activities. This urban forest projects are continued until four projects. The thirdly first projects had been completed in 2012 and had changed the face of the river bank.

Figure 7. Slum Area on The Bengawan Solo River Bank Pucang Sawit
Source: Surakarta Municipality (2009) in Agustiananda (2011)

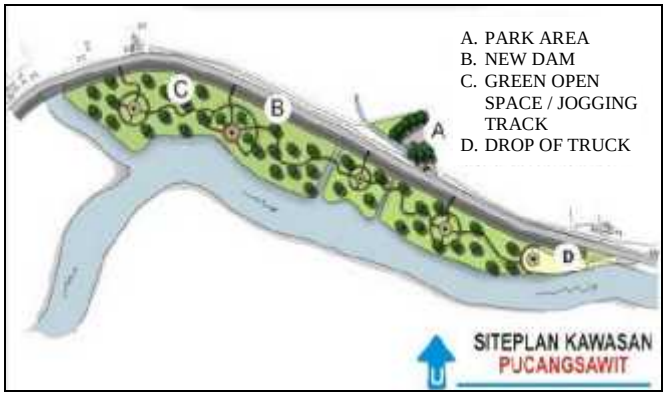

Figure 8. Site Plan of The Solo Urban Forest
Source: Surakarta Municipality (2010)

Unfortunately in the beginning of 2013, flood came and destroyed the urban forest. The park was full of mud and need to be recovered. The problem was the municipality did not ready to face this situation. The municipality did not allocate maintenance budgets. As the results, the condition of the built urban forest got suffered (Figure 9).

Figure 9. Solo Urban Forest Before and After Flood 2013
Source: Septiyaning, I. (2013)

The idea of the program is to have a green area and to mark the area as the land of the municipality. It is important to make this area live which can avoid an illegal owning by the people. This project is very important to supply public green and open space area. It also leverages Solo to have waterfront area which normally hard to be had by Indonesian municipality.

In the Solo urban planning until 2030, this river bank is the biggest green area which will be tried to be recovered by the municipality (Figure 10). It is part of Solo efforts to implement Indonesian Regulation 26/2007 about urban planning and Ministry Home Affairs Regulation 1/2007 about urban green area.

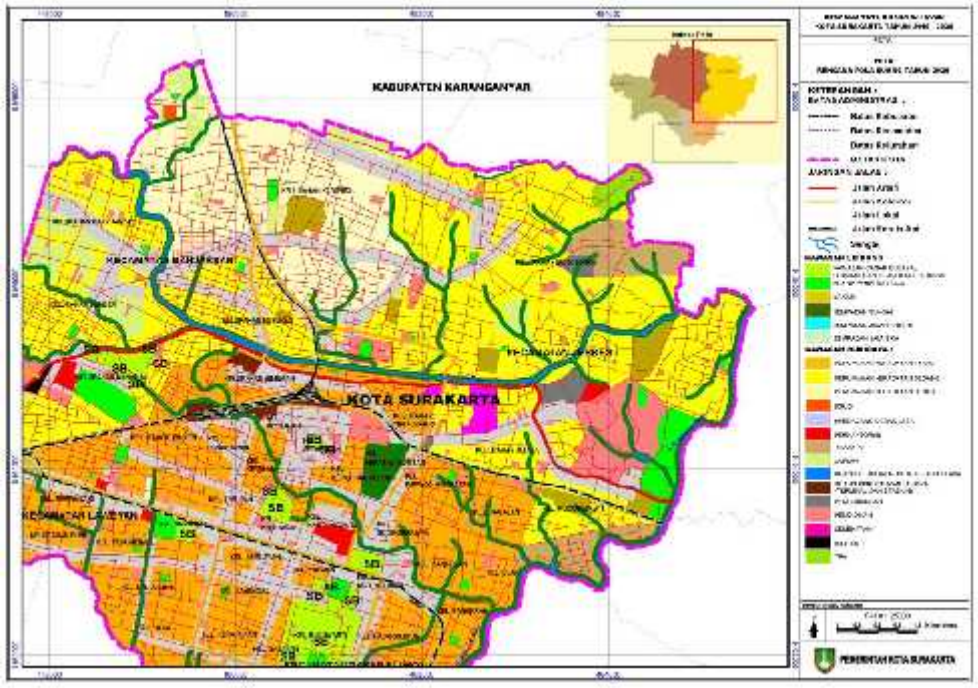

Figure 10. Solo Land-Use Planning Map 2030
Source: Surakarta Municipality, 2011

Sekartaji Park

Sekartaji Park is another urban waterfront project in Solo. It is located on the Kali Anyar river bank. Previously, it was illegal buildings built on the river bank. Afterwards, it becomes a new urban image of the city waterfront (Figure 11).

Figure 11. Kali Anyar River Bank Conditions Before the Project
Source: Surakarta Municipality, 2011

The green open space had been planned to change the face of this area (Figure 12). It is about 1200 m length. The first stage and second stage have been completed for about 700 m length. To put more attractions the park has theme as part of Javanese legend, names 'Timun Emas'. It will give entertaining phase for the people who visit.

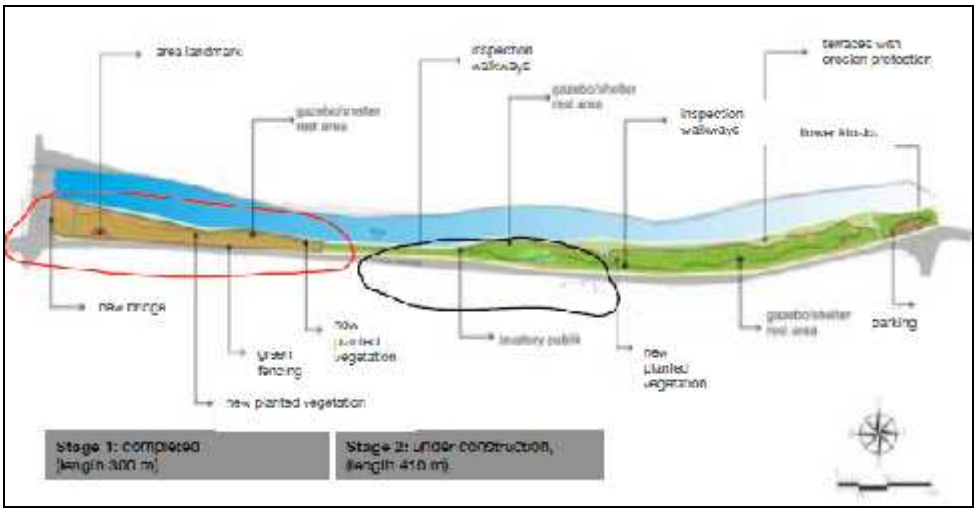

Figure 12. Kali Anyar River Bank Site Plan Map
Source: Surakarta Municipality, 2011

The park nowadays can be enjoyed by the citizens through the green area an open jogging track. Nowadays the plants have been grown and make the area fresher (Figure 13).

Figure 13. Part of Taman Sekartaji in 2010 (left) and 2012 (right)
Source: Surakarta Municipality, 2011

In 2011, the municipality built small flower market in front of the Taman Sekartaji. It is part of City planning to accommodate informal vendors who previously occupied the land. By serving them a comfortable market, the municipality will get local income beside their commitment to be involved in the maintenance of the park. In 2012, when the Mayor did *Mider Praja*, means informal inspection in Taman Sekartaji, the Mayor asked the people who stayed in that district to help the municipality to maintain the park. In 2013, the municipality plans to enlarge the park. It has been allocated for about 1,4 billion IDR to build the other side of this area. It is about 186 m length in the south side and 132 m in the north side. It will have a stage to hold events or performances. The theme of this side will be adopted from the Javanese legend names 'Karna Tanding'.

Tirtonadi Water Park

The spot of Kali Anyar which can be enjoyed by people is in Tirtonadi. It closes to the municipality bus station. By having this spot, it will be a welcoming gate for people from around when visit Solo.

The history of this area was a cultural place. In the previous time, people had spontaneous traditional performance art as part of people culture. This situation had changed since illegal buildings occupied this area.

The municipality afterward paid attention to this area and planned to transform it to be a park. The idea is to protect the river bank from illegal owning, have more green area, and give new urban image. The spirit of cultural spot has been accommodated by providing a stage (Figure 14).

In 2011, a performance art by 170 artists was held in this park (Figure 15). Respectively every year there will be a big performance held in this park through people involving. It is important to make the urban waterfront more livable and sustain.

Figure 14. Illustration of Taman Air Tirtonadi (left) and Built (right)
Source: Surakarta Municipality, 2011

Figure 15. Art Performance
in Taman Air Tirtonadi

Solo Urban Waterfront Sustainable Management

The management of Solo Urban waterfront faced many problems. Destroyed by the flood and not well maintained park are some of the problems. The people surrounds the park also have not involved in the development of the waterfront. It is a successful project to provide Solo with new urban image and new face for the urban waterfront. However it needs a lot of works.

In 2010, the municipality should allocate 2 billion IDR for green open space program. In 2011 it increased to 2,8 billion IDR (see Table 1). In 2012, it becomes 5,4 billion IDR, for about ten percentage of total budget of environment council.

Table 1. The Budget for Green Open Space Program 2010-2011

No	Bodies	2010 (IDR)	2011 (IDR)
1	Urban Planning Council	400.000.000,00	-
2	Village	115. 000.000,00	91.800.000,00
3	Park and Cleaning Council	1.200. 000.000,00	1.935.275.000,00
4	District	9. 000.000,00	374.542.000,00
5	Environmental Council	325. 000.000,00	325.000.000,00
	TOTAL	2.049. 000.000,00	2.726.617.000,00

Since it is a hard work to maintain the urban waterfront, some innovations have been made by the municipality. For instance in 2012, through an event, the Mayor asked the leader of the villages to maintain *Taman Sekartaji* and built flowers market in front of the park and asked the vendors to involve in the park maintenance.

To make river as part of the city, since 2011 there were several events held by the municipality. Recorded six events to promote river conservation are held, those are:

1. 27/2/2011 *Gunungan Charity Boat Race*
2. 19/3/2011 *Tirtonadi Festival in the Taman Air Tirtonadi*
3. 20/11/2011 *Bengawan Solo Gethek Festival*
4. 19/2/2012 *Gunungan Charity Boat Race*
5. 11/11/2012 *Bengawan Solo Gethek Festival*
6. 24/2/2013 *Gunungan Charity Boat Race*

Those events not only promote tourism activity for the people but also to attract visitors to come and enjoy the park.

The existence of the urban waterfront creates greenery in the city. It supports the ecological system in the city mainly the river environment which supposed to be free from illegal occupancy. It supports the city to provide a better quality of life for the citizens. In 2012 about 12% green open space has already had by the city including the urban waterfront areas.

Through this program, the municipality not only gets the revitalized park but also helps people to have their own land and formalize the illegal vendors. By having this program, which the objective is to gain welfare for the people and increase the quality of life of the city, the municipality will get more advantages. For instance, urban waterfront area will become a new attraction of the city to be offered to the visitors. When visitors come and enjoy the city, they will spend some money which means local income. The same situation when the municipality formalized the informal vendors in *Taman Sekartaji* area. It will be a local income for the municipality.

LCA Model of Solo Urban Waterfront

The behaviour of Solo urban waterfront plan-process will be drawn through those three study cases (see Table 2). The planning stage is influenced by urban strategy, framework, directives, planning proposals, and new bodies. The action stage is influenced by new urban images constructions and amount of investments. The living stage is influenced by inhabitants and visitor number, economic and social opportunity, and environmental recovery.

Table 2. The Resume Data of Solo Urban Waterfront Behavior Plan-process

Year	Conditions	Planning	Action	Living
2001	Solo Local Regulation 10/2001 about Solo Vision	Urban strategy		
2002	-			
2003	-			
2004	-			
2005	-			
2006	Surakarta Local Regulation 2/2006 about urban green area.	Urban strategy		
2007	Indonesian Regulation 26/2007 about urban land use planning	Urban strategy		
2008	Construction of Taman Sekartaji and Taman Air Tirtonadi 12 February 2008: Launching of Taman Air Tirtonadi		0,5 ha and 1 ha area	
2009	20 February 2009: Launching of Taman Sekartaji			
2010	Relocation of 1.571 inhabitants from Bengawan Solo river bank to the safer areas		Relocation of slum area and Solo Urban Forest for about 0,15 ha	
2011	Construction of Solo Urban Forest Construction of small flower markets in front of Taman Sekartaji			Festivals
2012	Construction of Solo Urban Forest		Solo Urban Forest for about 0,62 ha	Festivals
2013	Planning of construction of Solo Urban Forest IV (pending)		Planned for 0,5 ha	Festivals

From the data above, the condition of urban waterfront in Solo can be drawn on the bi-dimensional graphic of Lourenço's model. The behaviour can be compared to the Lourenço's ideal behaviour model. It can be justified weather the cycle mirror the ideal model or not. If the cycle shows going up it means the cycle is in the high intensity of it shows going down it means ruptured or decreasing symptoms that supposed to be the city awareness.

Long term data series is might be the most difficulties part of this analysis. That's why this analysis can be done through qualitative and quantitative analysis. The justification of the intensity level of each phase can be done if the parameters are presented or not presented. If it presented a progressive phase of the cycle is shown. The quantitative data will empower the analysis when the progression of number is shown or not.

The behaviour of Solo urban waterfront plan-process can be drawn in to the graphic of plan-process showed in the Figure 16.

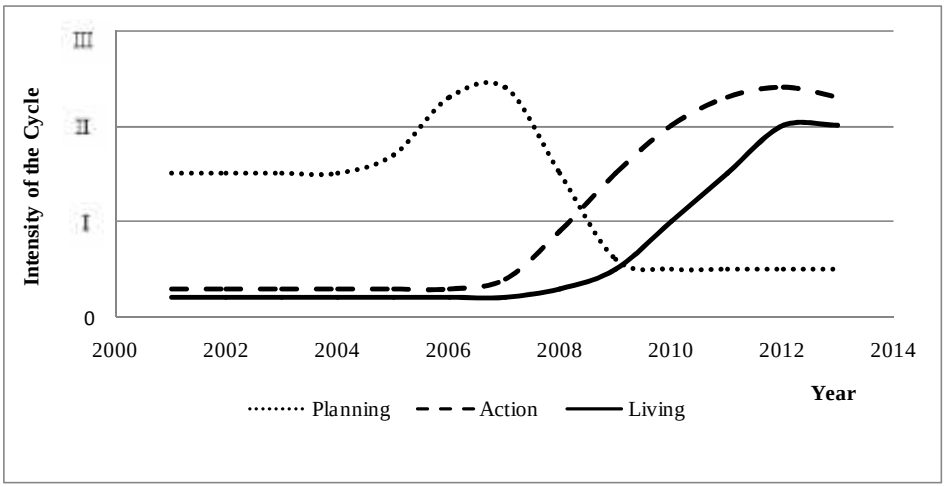

Figure 16. The Behaviour Plan-Process of Solo Urban Waterfront

It shows that high intensity of planning happened since 2001 and coped by the Solo Municipality in 2006. It is followed by high intensity of action until today and the living condition. The cycle for today shows progressive process. However incentive monitoring should be done to maintain this achievement.

CONCLUSIONS

Green city is an approach to push municipalities to be more concern to the city environmental. It is one of sustainable management pillars which believes will bring a better quality of live in the city. Indonesian government requires the cities to have at least 30% green area of total of the city area. Recorded 60 cities joined to the commitment to build the green city included Solo in Central Java.

One of the urban greenery potency in Solo is river. It has for about nine rivers flowed in the city. However, the river banks most of the time become a problem area with social and environmental issues. Since it is a potency of the city to have more green area, the municipality decided to revitalize the river bank areas to become urban waterfront as new urban images for the city. During 2008-2012 recorded that Solo has three urban waterfronts in front of the river. It contributes to the green area in Solo for about 5 ha which has had 12% (529 ha) of green area in 2012.

The behavior plan-process of three Solo urban waterfront areas; those are Solo urban forest for about 3 ha, Taman sekartaji and Taman Air tirtonadi for about 1,5 ha shows that the green planning policy have been started since 2006 and it achieves the higher intensity in 2007 when it became national policy. Intensive action happened in 2008-2012 although some lack of maintenance appeared around those four years. High maintenance cost might be one of the difficulties of keep the waterfront

sustain. However, the municipality always put more efforts every year to achieve the target of the green areas.

The management of Solo urban waterfront areas still needs to be monitored. Since the rupture or decline symptoms has not met in the life cycle analysis as the assessment during 2001-2013, the challenges that should be faced by the municipality are more than the expectation.

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