Study on Implementation of Green City Concept in the Suburbs of Semarang City based on Landuse

Teguh Prihanto[1], Saratri Wilonoyudho[1] and Wahid Akhsin Budi Nur Sidiq[2]
[1]*Study Program of Architecture, Faculty of Engineering, Universitas Negeri Semarang (UNNES)*
[2]*Study Program of Regional Survey and Mapping, Faculty of Social Science, Universitas Negeri Semarang (UNNES)*

Keywords: Green city, Semarang, Suburbs.

Abstract: Semarang city is in the highest position in the regional sphere of Central Java which still grows in the socio-economic sector of settlements which tends to push the function of the city towards the suburbs. The suburbs which have mountainous topography conditions in Higher Areas of Semarang City have strategic value. With this condition, Semarang City is vulnerable to the impacts of climate change. One effort to anticipate climate change is to implement the development of a green city concept based on a balance between urban development and environmental sustainability. The specific purpose of the study is to examine the implementation of the green city concept towards the development based on landuse in Higher Areas of Semarang City. Research locations are in Banyumanik and Gunungpati Sub-districts. By using exploratory research methods in collecting and analyzing data, Banyumanik has 49% building area and 51% open space area. In other hand, Gunungpati has 22.1% building area and 77.9% open space area. The results of the research show that Banyumanik has Banyumanik has a higher agglomeration rate of Semarang City compared to Gunungpati, and has a risk of environmental vulnerability.

1 INTRODUCTION

Generally, the development of landuse in of Semarang City which tends to be uncontrolled has a lot of negative effects on the environment. More broadly add to the impact of global climate change. The results of a vulnerability study show that the phenomenon of climate change has occurred. Temperature increases are expected to occur so as to increase rainfall especially during the rainy season. On the other hand, rising temperatures also induce an increase in sea level. These two impacts increase the incidence of flooding and inundation in coastal areas, and also the degradation of land carrying capacity resulting in landslides in mountainous areas (Higher area of Semarang City). As a center of economic and population concentration, the Semarang City is vulnerable to the impacts of climate change. Green open spaces, water sources, and catchment areas are very limited so that if there is a change in rainfall, the risk becomes greater.

One effort to anticipate climate change is to implement the development of the concept of a green city, which is known as an ecological city or a healthy city. It has an understanding of the balance between the development of the city and environmental sustainability. A healthy city also means a safe, comfortable, clean and healthy city condition to inhabit its population by optimizing the potential through empowering community forums, facilitated by related sectors and in sync with city planning. To be able to make it happen, it takes effort from each individual member of the community and all stakeholders. With the application of the concept of a green city, urban environmental crises can be avoided, as is the case in large cities and metropolitan areas that have experienced urban obesity. Urban development with this environmentally friendly concept, generally contributes greatly to the reduction of the impacts of global climate change and specifically provides the carrying capacity of the suburbs of Semarang City over those that have a conservation function.

1.1 Structure and Development of City

The elements that influence the development of the city are the geographical condition, site, city function, city history and culture and the stages of urban development (Branch, 1985). Geographical

Prihanto, T., Wilonoyudho, S. and Akhsin Budi Nur Sidiq, W.
Study on Implementation of Green City Concept in the Suburbs of Semarang City based on Landuse.
DOI: 10.5220/0009008201840189
In *Proceedings of the 7th Engineering International Conference on Education, Concept and Application on Green Technology (EIC 2018)*, pages 184-189
ISBN: 978-989-758-411-4

conditions and sites affect the function and physical form of the city. The function carried out by the city will show its existence, while the history and culture of the city will influence the character and nature of the city.

Kevin Lynch (1971) suggests that now is a period of rapid growth and various institutions, including university campuses, hospitals, government units and cultural centers

1.2 Landuse Policy of Semarang City

Based on the Regional Spatial Plan of Semarang City (Rencana Tata Ruang Wilayah / RTRW 2011 - 2031, the main function of the location of the sub-district area which is the scope of the research are:

- Banyumanik Sub-district (± 2,509 ha) is included in BWK VII (the boundary of city area / Batas Wilayah Kota), the main function is: military special area
- Gunungpati Sub-district (± 5,399 ha) is included in BWK VIII, the main function is: higher education area.

Both regions in the plan of the spatial pattern have a function as a protected area, which provides protection for the subordinate's area. This is based on the location of the region in the higher area of Semarang City. This area also has slopes above 40% (forty percent) which has a function as water catchment areas. The plan for water catchment areas includes: (1) rehabilitation of water catchment areas that have been deforested through reforestation; and (2) utilization of space in water catchment areas for forest functions.

1.3 Green City Concept

Cities in Indonesia suffer from a lack of green open space. In big cities like Jakarta, Surabaya, Bandung and Medan, green open space has decreased from 35% to an average of less than 10% of the current condition. In “Kota Hijau” (2012) it is stated that there are 8 criteria for green city concepts, including:

- Urban development must be in accordance with applicable law, including: disaster mitigation, spatial planning, and environmental protection and management
- The concept of Zero Waste (integrated waste management, nothing is wasted).
- The concept of Zero Run-Off (the water must be absorbed into the soil, the concept of eco-drainage).
- Green Infrastructure (available pedestrian and bicycle lanes).
- Green Transportation (use of mass transportation, environmentally friendly renewable fuel, encourage the use of non-motorized transportation - walking, cycling, delman / buggy / horse cart / pedicab etc.)
- Green Open Space (GOS) covering 30% of the city area (Public GOS 20%, Private GOS 10%)
- Green Building
- Community Participation (Green Community)

According to Basri (2008), one of the urban development planning and design solutions that can reduce the impact of environmental damage and maintain the survival of the urban environmental ecosystem in it is the concept of a green city. Criteria that can be used in the concept of a green city are green space, land use, circulation, infrastructure and public facilities. In terms of natural physical aspects, structuring of green systems and land use is considered to have feasibility for application. While physically made in the aspect of infrastructure and public facilities do not have the feasibility in the context of an independent city. Land use and green space that are relatively balanced and evenly distributed and supported by economic activities, employment and socio-politics are conducive to creating an independent and sustainable city. The above efforts can be realized by maintaining and rearranging the dominant green space, limited land use with mix use solutions, complementing the city's vital facilities and the conservation of the area and the recycling process of municipal waste..

1.4 Green City Development Program (Program Pengembangan Kota Hijau - P2KH)

Ekaputra, YD (2013) stated that the Green City Development Program was an activity initiated by the Ministry of Public Works c.q. The Directorate General of Spatial Planning, is one of the concrete steps taken by the central government together with the provincial government and the city / district government in fulfilling the provisions of the law of patial plan, especially related to the fulfillment of urban green open space, as well as addressing the challenges of climate change in Indonesia. P2KH is an innovation program for the realization of community-based urban green open space.

- Ideal Location Requirements for P2KH and GOS Planning :
  - Status of land owned by regional government
  - Ease of accessibility

- Proximity to the center of urban community activities, and can be used for the public
- Application for development in 1 (one) location with a minimum area of 5,000 m2 or in 2 (two) locations that are connected to a 'green' connecting corridor, for example bicycle paths, vegetation lines, or other forms)
- Green Space Composition (Softcape): Pavement (Hardscape) = min. 70%: max. 30%
- Use of environmentally friendly materials (it can be possible to absorb water)

- Green City attribute

P2KH is an initiative to create an inclusive and comprehensive green city to realize 8 (eight) green city attributes, which include: (1) Green planning and design; (2) Increasing the role of the community as a green community; (3) Availability of green open space; (4) Efficient energy consumption; (5) Effective water management; (6) Waste management with the principle of green waste; (7) Energy-efficient buildings or green buildings; (8) Application of sustainable transportation system (green transportation).

At the initiation stage, P2KH is focused on the realization of 3 (three) attributes, namely: urban planning and design that is environmentally friendly; embodiment of 30% green open space; and increasing the role of the community through the green community. The next stage is expected to be further expanded.

At present, the concept of a green city is seen as appropriate in guarding the growth of Semarang City, especially in the higher area of Semarang City. So the question that underlies this research is "How far is the implementation of the green city concept towards the development of the higher area of Semarang City?"

2 RESEARCH METHODOLOGY

This study uses exploratory methods used in collecting and analyzing data. Explorative research aims to explore and understand information and the reality of the phenomenon under study and become the center of attention because it is still little known (Kuntjojo, 2009). Exploratory methods are carried out based on facts that are seen as specific, then mapping and categorizing. This method is also supported by field research to strengthen analysis. In this study the exploratory method is intended to see the development of the spatial area of research by identifying the use of space in an ecological perspective.

The research material is Banyumanik and Gunungpati Sub-district Areas. This area is located in urban fringe area of Semarang City with the supporting function of the Semarang City Area below as a conservation area. Of the two sub-districts, some urban areas will be taken as a sample of research data that can describe the physical condition of regional development.

Figure 1: Location of research.

3 RESULTS

3.1 Overview of Banyumanik Sub-district

Banyumanik Sub-district has an area of 2,509,084 Ha. Generally, the topography of the Banyumanik region is hilly and partly sloping. In terms of access, Banyumanik Sub-district has become a strategic pathway because it connects Semarang City Region and the regions in central and southern Central Java (direction to Solo or Magelang / Temanggung). Besides that, the Semarang - Banyumanik toll road is also quite strategic. The main trigger for regional growth is the strategic path for business development in the trade and services sector. This growth also responds to the insistence of the core city which is no longer able to sustain land needs for trade and service facilities. Based on Regional Regulation No. 05 of 2004 concerning the RTRW of Semarang City, Banyumanik Sub-district is included in BWK VII with functions:

- Settlement
- Offices
- Trade and services
- Military Special Areas

- Mixed trade and services, settlements;
- Conservation
- Transportation.

Figure 2: Banyumanik Sub-district.

3.2 Overview of Gunungpati Sub-district

Gunungpati Sub-district has an area of 5,399,085 ha. The physical condition of hilly topography with varying land heights in almost all regions. Viewed by access to transportation, the Gunungpati area is difficult to reach due to the steep and steep terrain. The existence of Universitas Negeri Semarang (UNNES) in Sekaran Village, to some extent triggered the growth of the region. On the other hand, growth is also supported by the presence of areas that connect between Semarang City and Semarang Regency and Kendal Regency. Based on Regional Regulation No. 05 of 2004 concerning Semarang City Spatial Planning (RTRW), Gunungpati District is included in BWK VIII (City Area Section) with functions as:

- Conservation
- Agriculture
- Higher Education
- Tourism / Recreation
- Mixed trade and services, settlements
- Settlements.
- 3.3 Landuse of Research Area

Figure 3: Gunungpati Sub-district.

The dominant land use in the research area was the building of settlements and vegetation cover or green open space, with residential buildings in Banyumanik Sub-district wider (1,149.01 Ha) or around 38.07% of the total area compared to Gunungpati Sub-district with an area of 874.79 Ha or around 16.20% of the area. The high percentage of residential buildings in Banyumanik Sub-districts is due to the fact that the region has a very strategic location, supported by a complete and adequate means of supporting life infrastructure and the presence of several public buildings such as Universities (UNDIP and Polines), Hospitals and several other buildings that make the area it has had a fairly rapid development in recent years.

The relatively flat topography in most of the regions makes more and more potential land for the development of built land. Generally, residential buildings in the two sub-districts have two dominant patterns, extending along the road and clustered in a densely populated settlement and boarding house, while the pattern of residential buildings in Gunungpati Sub-district is more patterned along the road, but also seen in groups regions such as in Sekaran Village. In addition to the limited life support facilities, a relatively undulating topography also affects the development of residential buildings in the region. Table 1 presents the types of land use at the research area.

Table 1: Landuse of Banyumanik and Gunungpati Sub-district.

No	Landuse	Banyumanik Subdistrict		Gunungpati Subdistrict	
		Area (Ha)	%	Area (Ha)	%
1	Settlement	1.149,01	38,07	874,79	16,20
2	Industrial Area	47,86	1,91	1,88	0,03
3	Government Office Area	57,01	2,27	49,47	0,91
4	Worship Building	2,78	0,11	9,56	0,17
5	Ponds / Pool	5,88	0,23	4,82	0,08
6	Farm Field	483,41	11,30	839,05	15,54
7	Cemetery	7,99	0,32	3,16	0,33
8	Rice Field	132,97	5,30	937,46	17,36
9	Open Space	296,32	11,81	150,20	2,78
10	River	7,49	0,30	26,07	0,48
11	Vegetation	825,49	24,93	2.474,98	45,84
12	Square	86,50	3,45	27,64	0,51
	Jumlah	2.509,00	100	5.399,08	100

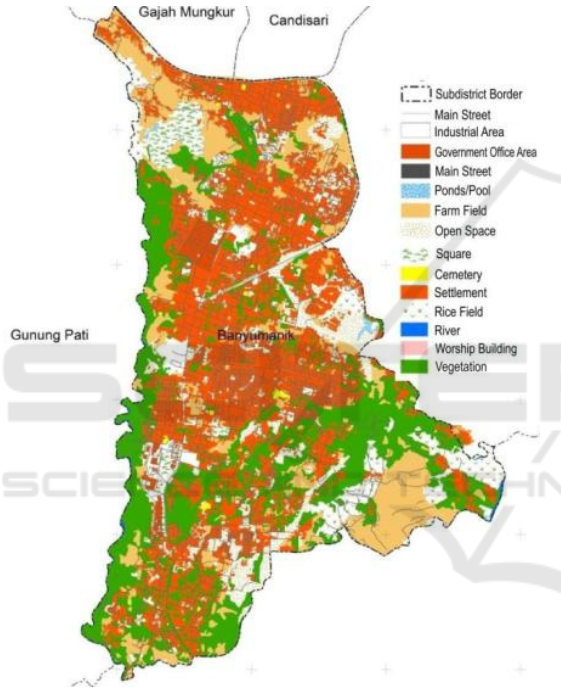

Figure 4: Landuse of Banyumanik Sub-district.

Furthermore, the second largest area of land use is vegetation cover / green open space, and the vegetation included in this class includes mixed gardens, public GOS, private GOS and forest areas. Based on the results of the interpretation of the largest vegetation cover / green open space in Gunungpati Sub-district, 2,474.98 Ha or about 45.84% of the total area, the vegetation cover and green open space in the other two sub-districts have an area that is almost equal to below 30% an area. Still maintained vegetation / green space in Gunungpati Sub-district is caused that most of the area is a protected area with a fairly steep slope so that it is not easily converted into built land. The area of vegetation in this area is the main support of green open space in the Semarang City with the Mijen Sub-district as a counterweight to the microclimate and oxygen source of the population. However, when viewed from the spatial pattern, the distribution of vegetation / green space in the area is not evenly distributed with a clustered pattern so that there are not a few areas with densely populated settlements but have low vegetation cover such as in Sekaran Village.

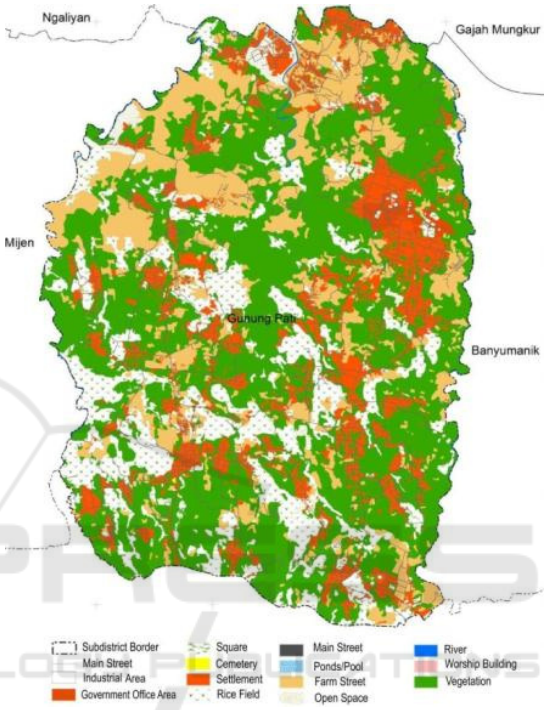

Figure 5: Landuse of Gunungpati Sub-district.

In Banyumanik Sub-district, the area is relatively low when compared to the total area, vegetation cover / GOS is 24.93%. Generally, vegetation / GOS consists of urban forest, citypark, road border and mixed gardens with elongated patterns. Referring to Law No. 26 of 2007 concerning Spatial Planning, it can be concluded that vegetation cover / GOS that meets minimum broad standards is found in Gunungpati Sub-district with an area of more than 30%.

4 CONCLUSION

The results of the research show that Banyumanik has Banyumanik has a higher agglomeration rate of Semarang City compared to Gunungpati, and has a risk of environmental vulnerability.

As an area that is more urban and with a high density level, Banyumanik Sub-district requires structuring towards the concept of a green city. The steps that need to be taken include: integrated waste management, the adoption of the concept of eco-training, provision of pedestrian paths and bicycle lanes, optimization of idle land as urban GOS, encouraging the greening of private GOS, and the application of green buildings in accordance with standards. These efforts are expected to reduce the city's burden due to environmental degradation as a impacts of the city's development.

On the other hand, although Gunungpati Subdistrict is characterized by rural areas, in its development it tends to override aspects of regional planning that have a green city concept. Environmental degradation at urban development points has begun, from building density, drainage problems and inadequate urban infrastructure. Efforts to implement the concept of a green city must also be implemented properly. In addition, efforts to overcome the adverse effects of increasing green land clearing for new residential and business areas. Land revitalization is absolutely necessary to prevent the threat of disasters, such as: floods, landslides, droughts and extreme climate change.

REFERENCES

Basri, A., 2008. *Konsep kota hijau (kota hijau) sebagai model perencanaan kota baru pesisir: Studi kasus kawasan Sasa sebagai embrio pengembangan Kota Ternate*, Master Thesis, S2 Teknik Arsitektur, Universitas Gadjah Mada, Indonesia.

Branch, M. C., 1996. *Perencanaan Kota komprehensif (Pengantar dan Penjelasan),* Gadjahmada University Press, Yogyakarta, Indonesia.

Ekaputra, Y. D., 2013. *Implikasi Program Pengembangan Kota hijau (P2KH) Terhadap Pemenuhan Luasan Ruang Terbuka Hijau (RTH) Perkotaan*. Semarang: Prosiding SNST ke-4 Tahun 2013, Fakultas Teknik Universitas Wahid Hasyim Semarang, Indonesia.

Kota hijau, 2012. *Kota hijau Sebagai Solusi Pengembangan Kota di Indonesia*. acuired from webite: http://greencityriau.com

Lynch, K., 1971. *Site Planning,* 2nd Edition, The Massachusetts Insitute of Technology, Cambridge, Massachusets, and London.

Kirmanto, D., Ernawi, I. S. & Djakapermana, R. D., 2012. "Indonesia Kota hijau Development Program: an Urban Reform", The 48th ISOCARP Congress, Perm, Rusia.

Kuntjojo. 2009. Metodologi Penelitian. Diktat. Kediri. Web:Http:// *ebekunt.files.wordpress.com/2009/04/ metodologi- **penelitian**.pdf*

Peraturan Kawasan Kota Semarang No. 14 Tahun 2011. *Rencana Tata Ruang Wilayah Kota Semarang Tahun 2011 – 2031*, Indonesia.

Prihanto, T., 2012. *Kajian Perubahan Spasial Kawasan Pinggiran Kota Semarang Ditinjau Dari Rencana Pembangunan Jangka Menengah Daerah (RPJMD) Tahun 2010 – 2015*. Penelitian Dasar: Universitas Negeri Semarang, Indonesia.