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Implementation Analysis of Green City Concept in Malang - Indonesia

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Abstract: Malang is the second largest city in East Java after Surabaya. In general, the problems in Malang are similar to those in other big cities in Indonesia. Although urbanization is especially important for economic growth, it results in the degradation of environmental quality and promotes flooding, congestion, urban infrastructure problems, and slums. The tendency of the built-up area of Malang to increase faster, along with the population growth and development expansion, indicates that the city will surpass the region's holding capacity sooner than it should. Such conditions create an uncomfortable living environment. One way to make the city more comfortable, safe and in harmony with nature is to apply the green city (GC) concept. The purpose of this study is to analyse and evaluate the implementation of the GC concept in Malang. This research employs the gap analysis method, which compares the ideal GC conditions with the actual conditions in Malang. The results indicate that of the eight GC indicators, Malang focuses on three: green planning and design, green open space, and green community. Building construction comprises the lowest score of 0%, while the highest score is green open space indicator with 50%.

1. INTRODUCTION

Issues of Green Open Space (GOS) in most cities around the world are primarily concerned with decreasing quality and quantity of green urban features, which is an important global issue, an issue that also includes green infrastructure, urban biodiversity conservation, urban health, as well as other aspects that support green cities. (Hostetler, Allen, & Meurk, 2011; Qureshi, Hasan Kazmi, & Breuste, 2010; Schäffler & Swilling, 2013). Urban environment preservation is key to conservation; Therefore, city residents need to understand the importance of environmental preservation to drive sustainability. The problems in Malang are more or less the same as in other big cities in Indonesia, namely an increase in urbanization, a decrease in GOS, a lack of environmentally friendly buildings, and a waste management system that is not centred around the zero-waste concept, congestion and pollution, worsening groundwater quality, increasing use of fossil energy, and low community participation. Currently, the Malang

Government is striving to make its city grow sustainably (Development Planning Agency of Malang City, 2014).

The concept of the Green City (GC) is an attempt to preserve the environment by developing part of a city's surroundings into natural green fields to create cohesiveness between nature and urban lifestyles (Ernawi, 2008). In the GC Handbook of the Ministry of Public Works (Ministry of Public Works Directorate General of Spatial Planning of Republic of Indonesia, 2013), the following eight GC attributes are outlined:

1. Green planning and design,
2. Increasing quantity and quality of GOS,
3. Green building implementation,
4. Green waste,
5. Development of a green transportation system,
6. Green water,
7. Energy utilization efficiency and green environment, and
8. Green community.

Six attributes (green open space, green transportation, green building, green energy, green water, and green waste) are intertwined, and must be integrated into the planning and design of a city. The ideals of this GC can be realized if the entire urban community is involved in realizing the GC.

The purpose of this study is to identify and analyse the development of a city, and to further evaluate the implementation of the GC concept in Malang. By applying this concept, it is expected that the development of Malang will be sustainable, in order to improve the quality of the environment and improve the comfort of the city's residents. Thus, this study will contribute to the resources of the local government in developing and implementing the GC.

This study is limited to: (a) Observations of the actual conditions in Malang at the present time (the observed aspects refer to the GC indicators), and (b) A review of the implementation of the GC concept based on a conducted gap analysis to determine what indicators have already been applied in Malang.

2. LITERATURE REVIEW

2.1 Green city towards a sustainable city

Wildsimth (2009) also refers to the GC concept as the sustainable city or eco-city. According to Mori and Christodoulou (2012), GC is a sustainable city in which development is based on an analysis of the current generation to improve the city for future generations. Rushayati (2012) has defined the concept of a GC based on the following efforts:

1. Land use arrangement that takes into account the needs of a GOS, and comfortable settlements and areas with accessible transportation,
2. Attention to environmentally friendly transportation,
3. Rehabilitation of damaged urban environments,
4. Support for reforestation,
5. Dissemination of waste recycling,
6. Establishment of social justice by providing opportunities for women and people with disabilities,
7. Economic growth encouragement based on ecology,
8. Utilization of natural resources, and

9. Environmental awareness enhancement through environmental education activities.

Meanwhile, according to Fatimah (2012), the following eight GC attributes must be fulfilled:

1. Green planning and design,
2. Green open space,
3. Green community,
4. Green building,
5. Green waste,
6. Green energy,
7. Green water, and
8. Green transportation / infrastructure.

In urban development that is not based on the sustainability of urban ecology, the problems of urban heat island effects escalate. Based on Wang (2009), research on urban green space system planning has found that urban environmental problems in China are due to errors at the planning level. One way to achieve GC is to apply sustainable development based on green growth. The concept of development based on green growth, according to Rushayati (2012), is implemented based on the following five pillars:

1. Economic growth,
2. Improvement of social conditions,
3. Conservation of biodiversity and environmental services,
4. Adaptability to climate change, and
5. Reduction of greenhouse gas emissions.

Elander et al. (2005) have further found that GC policies can be applied to cities in Sweden (Stockholm, Goteborg, Malmo, and Orebro). Cities in Sweden are currently facing a decrease in GOS areas. In general, these four cities already have green planning systems, have implemented green development, established regulations and hired personnel to support the implementation of green development, even though each city has different policy variations (Elander et al., 2005).

The city government of Guangzhou, China has also adopted the concept of GC (Rushayati, 2012). To achieve a GC, Guangzhou ,as a city of interest, moved to increase its GOS from 37.36 km² in 1978 to 83.5 km² in 1999. However, this policy was not effective at overcoming the problem of urban heat islands, because the preferred green spaces consist of gardens with a wide range of flowering plants. Based on the research of Weng and Yang (2004), it is suggested that policy be improved to further develop urban forests instead, because these are more effective and efficient at overcoming urban heat island effects. To achieve such outcomes, the government must improve policy for effective urban heat island control.

2.2 The role of Green Open Space

Many studies on GOS have been conducted in relation to the priority of various previously evaluated factors, such as vegetation density, temperature, humidity, population density, land price, and public services (Harahap, 2015; Humaida, Prasetyo, & Rushayati, 2016; Jiao et al., 2015; Malek, Mariapan, & Rahman, 2015). However, it is also important to consider the role of GOS as a public space from which city residents can benefit from the provision of ‘green lungs’, or fresh air, social interaction, and amenities (Cho, Poudyal, & Roberts, 2008; Khotdee, Singhirunnusorn, & Sahachaisaeree, 2012; Subadyo, A Tutut, Tutuko, & Cahyani, 2018).

According to Brack's (2002) report in Rushayati (2012), since 1990 the Canberra municipal government has adopted a massive planting policy

(400,000 tree seeds). More than 50% of Canberra's urban forests are evergreen, and the government also employed Decision Information System for Managing Urban Trees (DISMUT) decision-making models to be used as guidelines for Canberra municipal forest management. Using the DISMUT model, it is possible to estimate the benefits of urban forest management from air pollution mitigation and carbon sequestration by urban forests, so that the advantages of decreasing energy consumption for air cooling (AC) and winter heating can be calculated accordingly.

A study conducted by Alcoforado et al. (2009) noted that, to overcome urban heat island (UHI) effects and urban air-conditioning arrangements, the Lisbon City government developed environmental management guidelines based on built land density, the roughness of the city surface, and topography. The city of Lisbon was thus arranged based on the following:

1. Prevent the increase of built land in the valley area,
2. Restrict the ratio of building height (H) to road width (D) to no more than 1:1,
3. Maximize the development of open green spaces,
4. In building renovation, use light colours as well as materials with low thermal absorption,
5. Build urban ventilation paths in the form of green lines along the road and around the city frontiers, and
6. Prevent the erection of high buildings parallel to the shore that would otherwise provide air cooling via the penetration of airflow from the coast.

Similarly, riverside areas also face problems regarding controlling GOS for settlements located near river banks. Such areas also require special designs for city residents (Tutuko, Subagijo, & Aini, 2018). Accordingly, Wikantiyoso and Tutuko (2013) have mentioned that the Green City planning practice in Surabaya should monitor development of coastal areas in anticipation of applying GC design concepts. Indeed, cities with a very complex ecosystem, consisting of natural, socio-cultural, and economic subsystems, play an important role in the planning and management of GOS.

In Indonesia, the legal basis for the realization of GC are: (1) Law No. 26 of 2007 on Spatial Planning; (2) Law No. 28 of 2002 concerning Buildings; (3) Law No. 6 of 1994 on Ratification of the United Nations Framework Convention on Climate Change; (4) Government Regulation No. 15 of 2010 concerning the Implementation of Spatial Planning and (5) Presidential Regulation No. 61 of 2011 on RAN Greenhouse Gases.

3. METHOD

To analyse the implementation of the GC concept in Malang, a field survey was conducted, measuring against eight GC indicators. The stages of the method include creating an inventory, analysis, and evaluation. Inventory was taken by collecting all necessary data, both primary and secondary. The analysis was accomplished by formulating the ideal GC concept based on the results of the conducted desktop study and identifying the existing condition of Malang using descriptive gap analysis..

Based on the GC concept indicator, the following data is presented in Table 1.

Table 1. Green City Concept Indicator Scoring

GC Indicator	Scoring				
	Score = 0	**Score = 1**	**Score = 2**	**Score = 3**	**Score = 4**
Green Planning and Design **Green Open Space** **Green Building** **Green Waste** **Green Water** **Green Energy** **Green Community**	There are no plans, not listed on the National Spatial Planning and no implementation.	Have direction and application, but they have not been listed in the National Spatial Planning and the percentage of conformity with the concept standard is 25%.	Have a plan & application of the concepts listed on the National spatial planning, but the percentage of conformity with the concept standard is 50%, so the problem has not been resolved.	Have a plan for developing & implementing the concept stated in the National spatial planning, but integration has not been optimal, it has a percentage of conformity with the concept standard of 75%, so the problem has not been resolved.	Have a plan for developing & optimizing the application of the concepts listed in the National spatial planning and integration is optimal (100% conformity to the standard concept) so that the problem can be resolved.

Furthermore, in the evaluation stage, the achievement scores against the eight GC indicators are assessed. A score of 0, 1, 2, 3, or 4 was assigned to each implementation model of the eight existing GC indicators. Assessment of each indicator was conducted following the formula:

Total Application Score (X_t) = $X_1 + X_2 + ... + X_n$. ……(1)

Maximum score (X_{max}) = number of implementation models multiplied by maximum point scoring……..(2)

X_1 = percentage form of indicator 1

Xn = percentage of the implementation of the n^{th} indicator

Xt = the value of applying the total form of application of each indicator

After scoring the implementation model of each indicator to determine its level of achievement in Malang, the next step was to determine the percentage of each indicator (X_t / X_{max} multiplied by 100). Once each score was assigned, the indicators that had been applied well in the city of Malang could be identified. Hence, it was then possible to identify what appropriate treatment or plan should be undertaken to create an ideal GC in Malang.

4. RESULTS

The results of the implementation of the GC concept in Malang began by first conducting studies on the physical attributes and land use, and subsequently implementing GC indicator concepts in Malang.

4.1 Physical Attributes and Land Use

Malang is a popular tourist destination in East Java for its climate and nature. Geographically, Malang is located at 112.06 ° - 112.07 ° East Longitude, 7.06 °- 8.02 ° South Latitude. The total width of Malang is 110.06 km². Malang is located 440–667 meters above sea level. Malang is flanked by several mountains: Mount Kawi and Panderman, Mount Arjuno, and Mount Semeru. The rivers that flow through Malang are the Brantas, Amprong and Bango rivers.

The tree canopy area in Malang comprises 4% of the total area of Malang. In the urban ecosystem of Malang, urban land use comprises 51% (or 5609.9 ha) of the total urban area; the agricultural area is 22% (2420.9 ha); the open space is 4% (439.9 ha); the shrubs area is 1% (110 ha); the tree canopy is 4% (440 ha); and the bodies of water comprise 1%. Municipal land includes settlement areas, the Central Business District (CBD), industrial areas, and watertight land surface in the form of a road network (Subadyo, A. Tutut, 2014b).

Land use in Malang is dominated by built spaces (in the form of commercial land, settlements, planned housings, elite complexes, office buildings, industry, terminal, educational area) with a total area of 6,902,7 ha. Meanwhile, unbuilt land consists of waterways, botanical gardens, city farms, sports fields, river borders, public cemeteries, urban parks, neighbourhood parks, urban parks and recreational parks, barren open land, with a total area of 4,102.9 ha (Development Planning Agency of Malang City, 2014). The land use data demonstrates an inequality in land use that tends to consistently construct settlement buildings and other economic facilities (Figure 1).

The distribution of activities in the city of Malang is focused in the centre of the city. This can be observed from the dominance of the centre of Malang (located in the District of Klojen), as many activities such as trade and services, offices, government, and transportation facilities are all centralized in this area. The central delineation of Malang is around Tugu, which is surrounded by Tugu Street, Kertanegara Street, Pajajaran Street, Trunojoyo Street, Majapahit Street, Gajah Mada Street, and furthermore by Basuki Rahmat Street, Agung Suprapto Street, Panglima Sudirman Street, Gatot Subroto Street. The city centre functions as the centre of the city government, with Malang City Hall, Malang Regional Parliament Office (DPRD), Skodam V Hall, Tugu Park Hotel and Tugu Senior High School Complex, Railway Station Kota Baru and several other government offices as well as several public service offices and private offices (Subadyo, A. Tutut, 2014a).

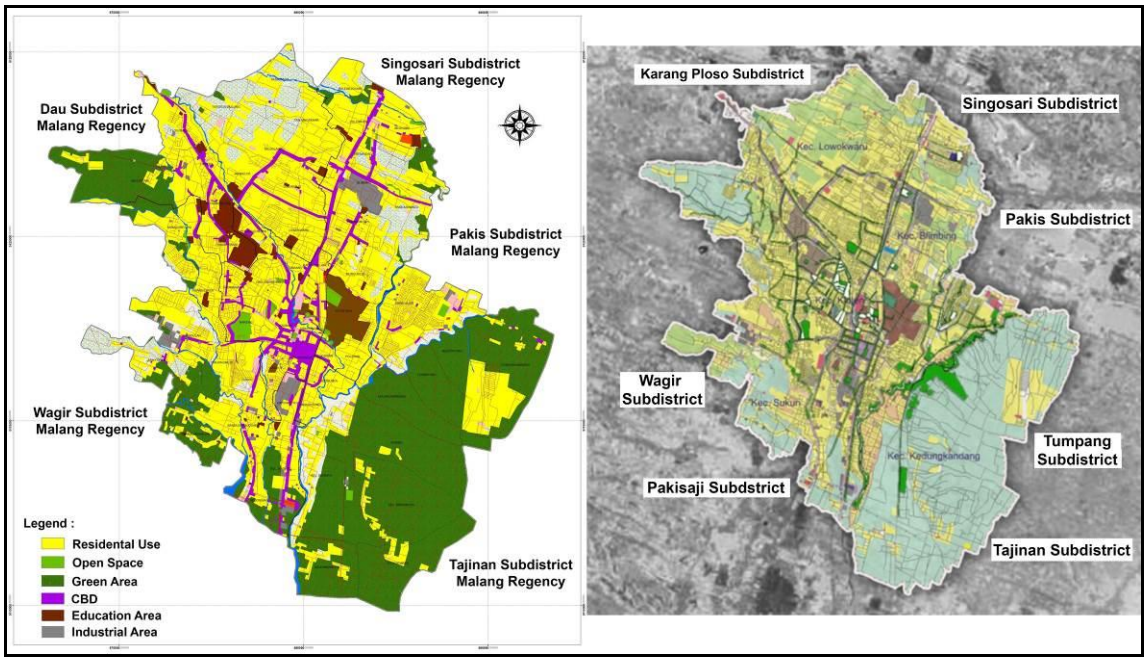

Figure 1. Land Use Map and Spatial Model of Ecosystem Development of Malang

4.2 Implementation of GC Concept Indicator in Malang

Based on an evaluation (green planning and design, GOS, green building, green waste, green transportation, green water, green energy, and green community), the implementation of the eight GC attributes in the city of Malang is described as follows:

4.2.1 Green Planning and Design

Currently, Malang already has some technical documents related to urban development, including Spatial Planning (SP), Spatial Detail Plan (SDP), Building and Environment Plan (BEP), Detail Engineering Design (DED), and the Masterplan of GOS. In its city planning, Malang focuses on spatial structures and spatial layouts. The achievement of green planning and a design indicator in Malang has only reached 10.25%. The details can be seen in Table 2. To achieve ideal conditions, it is necessary implement a mixed-use development model.

Table 2. Implementation of Green Planning and Design in Malang

Model	Evaluation	Score				
		0	1	2	3	4
Compact city	The development of Malang as a whole is still horizontal. There are still a few plans for horizontal and vertical buildings.	√				
Mixed Used	The development of property products (offices, residences, hotels) has been multifunctional, but has not yet met recognised standards; the Government has not planned the development of this concept.	√				
Pedestrian Area	Pedestrian orientation is still focused on pedestrian paths and has not been developed into the area.		√			
TOD	Plans to integrate the use of public		√			

Model	Evaluation	Score				
		0	1	2	3	4
	transportation have been initiated, but their implementation will not begin until 2017.					
Total implementation score						2
Maximal score						12
Percentage of Green Planning and Design implementation indicators						10.25%

4.2.2 Green Open Space (GOS)

By 2016, the existing GOS in Malang had not yet reached 30% of the area of Malang. However, the implementation of GOS indicators in Malang had reached above 50% (Table 3). Thus, the condition of GOS in Malang is adequate. Although the implementation of some models has not been fully realized or properly managed, all models have already been implemented. GOS requirements are based on the percentage of the area of Malang's total GOS 3,329.13 ha, of which 1,109.71 ha needs to be allocated to Private GOS, and 2,219.42 ha needs to be allocated Public Green Open Space (Subadyo, A. Tutut, 2014a).

The width target of 30% of the city area can gradually be achieved through a typical urban land allocation. The Malang Government is working on developing several models for the city's GOS, as well as on maintaining and improving existing GOS support facilities (Figure 2). In the future, the Malang Government must be able to maximize the development of GOS, in the form of urban forests (Malabar and Velodrome), by increasing the area of urban forests to meet the standard 10% of Malang's area.

Table 3. Implementation of GOS in Malang

Model	Evaluation	Score				
		0	1	2	3	4
Environmental Park	Until 2013, the repair and development of environmental parks had been undertaken, but the locations had not yet spread throughout all districts.			√		
City Park	Since 2012, the Malang Government has begun developing and improving the existing city parks in Malang, but the number of city parks that exist today is still lacking on a city-wide scale; Nevertheless, the city park area meets the standard requirements.			√		
GOS Green Line	GOS Green Line implementation is adequate enough in regard to GOS green road paths; However, the GOS green line of the river border has not been maximized nor properly managed.			√		
City Forest	Urban forest areas should at least comprise 10% of the city or the surrounding area, but the area of urban forest Malabar and Velodrome currently only reaches 1.00 ha.			√		
Urban Agriculture	The existing agriculture is a private farming area, and its allotment has already been shifted through development. According to data from DKP of Malang, the current urban			√		

	agricultural land of <100 ha. consists of rice fields					
Public Cemetery	Currently, public cemeteries are under the management of Malang DKP, including the Public Cemetery of Samaan Park and the Christian Cemetery.			√		
Total implementation score						12
Maximal score						24
Percentage of implementation of GOS indicator						50%

Figure 2. Corridor Ijen Boulevard as townscape and icon of Malang

4.2.3 Green Building

Until 2015, a green building indicator had not been implemented in Malang, and no detailed guidelines had been mentioned in the SP, SDP, BEP regulations or any other regulations. The evaluation result of a green building implementation indicator in Malang is 0%. Thus, this indicator is still in the planning stages, and has not yet been realized (Table 4). As the national legal framework is mandated, green building development in Malang should be performed based on the standard established by the Green Building Council Indonesia (GBCI), for both government and private buildings, and applied to new buildings and old buildings (Green Building Council Indonesia, 2012). The existing architecture in Malang (city garden with colonial architecture) should still be used as a reference in the development of green buildings. Furthermore, green building concepts can be applied to office buildings and residential buildings constructed by several developers.

Table 4. Implementation of Green Building in Malang

Model	**Evaluation**	**Score**				
		0	**1**	**2**	**3**	**4**
Development and implementation of green building	Currently, the city of Malang does not have a green building. The focus of the Malang Government is in establishing and creating a suitable green building by supervising the construction of a Malang city building, however this has not yet been recorded in GBCI with any green building ownership certification.	√				
Total implementation score						0
Maximal score						4

Percentage of Green Building indicator implementation	0%

4.2.4 Green Waste

The garbage problem in Malang is caused by the existence of several garbage piles as well as the use of a conventional waste-disposal method (open dumping) as the final waste disposal site; while the waste management system at the household level is also quite bad (Figure 3). To overcome the city's garbage problem, the Malang Government needs to educate citizens on the roles of water and grass of canals in road medians or on green paths as providing bioretention services. The implementation of a green waste indicator in Malang is currently only at 30.15% (Table 5). Thus, some effort has been made to develop an urban waste management plan. The Malang Government considers green waste a main priority (Ministry of Environment of the Republic of Indonesia, 2011).

Table 5. Implementation of Green Waste in Malang

Model	**Evaluation**	**Score**				
		0	**1**	**2**	**3**	**4**
Implementation of the 3R concept	The 3R system has been implemented by community members who care about the environment, as well as at some polling stations. The newly implemented 3R concept is limited to re-use and recycling purposes, while the reduction in the use of goods that will result in waste has not been maximally applied.			√		
Sorting (Garbage Bank)	Currently, this is only implemented on a small-scale, and is mostly driven by local communities; It lacks government support.		√			
Liquid Waste Treatment	Currently, the sewage system in Malang is still flawed, with wastewater being disposed of directly into sewer-like drainage. One solution is to apply the concept of phytoremediation.		√			
Waste Processing in Final Disposal	Currently, waste processing in the Supit Urang Disposal Place of Malang is still conventional (utilizing the open dumping method), so that garbage piles up at the final disposal place; It is necessary to improve the method applied at the disposal site of Supit Urang by employing a sanitary landfill method.		√			
Total Implementation score						5
Maximal score						16
Percentage of Green Waste indicator implementation						30,.15%

Figure 3. Illustration of waste processing at Supit Urang Final Disposal Site

4.2.5 Green Energy

Solar energy is not suitable for Malang due to the city's high rainfall, which could cause severe damage to the panels. Therefore, the government needs to develop an alternative energy source from, for example, waste, water, or plants. The city's waste and sizable rivers (Brantas, Amprong) can be utilized as energy resources to reduce the garbage problem. Waste management needs to be developed further on a household level by using a sanitary landfill system. The implementation of a green energy indicator in Malang has reached 17.50%. Specific details are stated in Table 6. A green energy model that has been applied in Malang involves the energy generated from garbage and solar energy (limited to city garden lights).

Table 6. Implementation of Green Energy in Malang

Model	Evaluation	Score			
		0	1	2	3
Solar Energy	Not yet spread and new implementation is limited to solar lights on highways.		√		
Waste Energy	Currently, the use of waste energy in Malang is still under construction. The concept of waste-to-energy is planned to be implemented at waste disposals in all districts			√	
Plant Energy	Currently, there is a lack of knowledge about the importance of plants as an alternative energy source in Malang.	√			
Wind Energy	Wind power as alternative energy source cannot be applied in the area of Malang, because of the physical characteristics of the region.	√			
Water Energy	Due to the limited facilities and infrastructure, the city of Malang has not maximized the existence of the Brantas and Amprong rivers.	√			
Total implementation score					3
Maximal score					15
Percentage of Green Energy indicator implementation					17.5%

4.2.6 Green Transportation

Since 2013, the Malang Government has improved pedestrian paths and constructed bicycle lanes (Figure 4). In 2015, when developing the green transportation indicator, the Malang Government began focusing on non-motorized transportation (NMT). The development of non-motor transport concerns the ease with which pedestrians can travel on foot and by bicycle. The implementation of this concept must be supported by the construction of facilities and infrastructure that are both comfortable and safe, as well as an uninterrupted corridor for bike paths and pedestrian paths supplied with street furniture and shelters. The implementation of the green transportation indicator in Malang is currently at 37.25% (Table 7). With only 1% growth in road infrastructure per year, the development of NMT facilities and the socialization of the HOV concept is a priority. In addition, emissions tests on public transportation in Malang are needed, and emission standards must be enforced for motor vehicles.

Table 7. Implementation of Green Transportation in Malang

Model	Evaluation	Score				
		0	1	2	3	4
Pedestrian path	Most of the main roads in Malang have pedestrian paths, but the problem is that they are not ideally supported with infrastructure facilities; Thus, the paths are unsafe and uncomfortable for pedestrians.			√		
Bicycle path	Currently, Malang is planning to develop NMT (non-motorized transportation facilities). The initial stage of bicycle path development starts from Jaksa Suprapto Street, Ijen Street, Semeru Street and Kawi Street.		√			
Public Transport	The Malang Government is currently improving the system of public transportation by integrating all existing modes (taxi, school bus, and rail network) and improving the supporting facilities.			√		
High Occupancy Vehicle	The concept of HOV (ride sharing) began to be developed by certain communities, although it is not especially popular in Malang.		√			
Total implementation score						6
Maximal score						16
Percentage of Green Transportation indicator implementation						37.25 %

Figure 4. The pedestrian way in Malang

4.2.7 Green Water

Water problems in Malang are currently managed by digging *Biopori* Infiltration Holes (BIH) and building absorption wells to manage rainwater runoff (Figure 5). Although this is not well done with maximum results, the implementation of the green water indicator in Malang has reached 22.50% (Table 8). This score reveals that the application of the green water model has not been well realized in Malang. With regards to the city's current state, which is characterised by relatively high rainfall, Malang should apply the concept of Low Impact Development (LID) to address rainfall runoff problems. The application of the BIH concept must also be encouraged, and citizens should be incentivized to implement it in their yards. The LID concept needs to be furthered in Malang for the city to better manage urban rainwater, since Malang experiences a relatively high annual rainfall.

Table 8. Implementation of Green Water in Malang

Model	Evaluation	Score				
		0	1	2	3	4
BIH	The Malang Government has started to build BIH in some villages, and BIH building reached over 1,000 holes in 2015. However, this number is still not comparable with the city of Malang. Thus, the BIH concept can be developed into a city-scale bioretention.		√			
Urban Rainwater Management	With the absence of land and the strong understanding of the LID concept, the implementation of this concept can be maximized considering the potential intensity of rain in Malang.		√			
Total implementation score						2
Maximal score						6
Percentage of Green Water indicator implementation						22.50 %

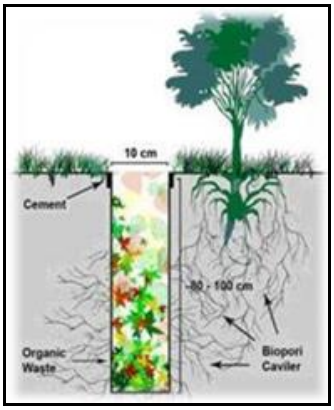

Figure 5. Biopori Infiltration Holes Illustration

4.2.8 Green Community

The Malang City Government has been trying to invite the green community to play an active role in every green program. Community involvement in every government activity can be increased by providing incentives to the community, who will thus more likely become active drivers of environmental conservation.

The existing green community in Malang has the ability to develop GC. Implementation of the green community indicator in Malang has reached 32.50% (Table 9); this means that the implementation of the green community model has been realized quite well, although it has not currently, maximally implemented (Figure 6).

Figure 6. Green Community Activities in Malang

Table 9. Implementation of Green Community in Malang

Model	**Evaluation**	**Score**				
		0	**1**	**2**	**3**	**4**
Society Participation	The response of the general society in the green activities proclaimed by the government and the community is quite good, but there is a lack of mediation/intermediaries for the community to hold discussions with the government. Public hearings are needed.		√			
Citizens community	Community residents in Malang are good enough at socializing. A number of community residents have also practised green action to conserve the environment and actively cooperate with the government to build a sustainable city.		√			
Total implementation score						2
Maximal score						6
Percentage of implementation of Green Community indicator						32.5 %

5. DISCUSSION

The Malang Government currently has a development plan in regard to the implementation of the eight GC indicators. The implementation of GC indicators is applied in addition to new referrals and plans. Based on an evaluation of the implementation of each indicator, it is possible to assess Malang's success with applying and developing the concept of GC. The percentage results obtained from the implementation of each GC indicator/attribute in Malang can be seen in Table 10 below.

Table 10. Implementation of GC Attribute in Malang

GC Indicators	Ideal Implementation Criteria	Percentage
Green Planning and Design	Compact City Mixed Use Development Pedestrian Area Transit Oriented Development (TOD)	10.25 %
GOS	Environmental park City Park GOS Green Line Road and River Border City Forest Urban Agriculture Public Cemetery	50.00 %
Green Building	Development and Implementation of green building (energy efficiency and environmental quality in the building)	0.00%
Green Waste	Implementation of 3R Concept Sorting (Garbage Bank) Liquid Waste Treatment Waste Processing in TPA	30.15 %
Green Transportation	Pedestrian Path Bicycle Path Integration of Public Transportation High Occupancy Vehicle (HOV)	37.25 %
Green Water	Biopore Infiltration Holes Low Impact Development (LID)	22.50 %
Green Energy	Solar Energy and Waste Energy Plant Energy Wind power Hydropower	17.50 %
Green Community	Society participation Citizen Community	32.50 %

6. CONCLUSION

Based on the results of the evaluation, the implementation of the eight GC indicators has not yet reached 100% in Malang. Currently, the city of Malang is still in its development stage.

The implementation of the green building indicator received the lowest score, at 0%, while the highest score was observed for the implementation of the GOS indicator, at 50%. The green building indicator was assigned the lowest score because it is still only a long-term plan, and has not been implemented whatsoever. Meanwhile, the GOS indicator was assigned a fairly high score due to the fact that Malang was originally built as Garden City, and therefore includes many open green public spaces.

Malang primarily focuses on three GC indicators (green planning and design indicators, GOS, and green community indicators). The implementation of the other five indicators has been initiated. Currently, the Malang Government is attempting to implement the green waste and green transportation indicators to address urban problems in Malang, such as garbage management and problems with mass transportation.

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