

FACTORS INFLUENCING THE AVAILABILITY OF GREEN OPEN SPACE IN EAST SURABAYA

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ABSTRACT

Air pollution in Surabaya is the greatest and urgent issue to be solved. East Surabaya has the largest CO₂ emissions from housing activity compared to other Surabaya regions. One of the ways to naturally absorb CO₂ is to provide adequate green open space. Public green open spaces in East Surabaya amounted to only 2.37% of the total land area. The objectives of this study is to know the availability of Green open spaces and factors influencing it's availability in East Surabaya, compare to area of formal housing and kampung. Descriptive analysis is used to explain the availability of Green open space. Content analysis is used in this research to find the factors influence availability of green open spaces. The result shows that East Surabaya has 644.42 ha green open space or only 7.14%. The result also shows that factors influence the availability of green open spaces in East Surabaya are different between formal housing and kampung. Some factors related to the policy and social aspects that influence the availability of green open space in both East Surabaya kampung and formal housing. Those factors are: the allocation of green open space in spatial planning; forestation program; basic green coefficient; incentives and disincentives; supervision and control of landuse; community participation; the influence of community leaders; public awareness; communities; reward in forestation programs; facilitators; and the diversity of greening innovation. Meanwhile, some factors such as the limited land, the housing density, the changes in land use, and the limited fund has only influence in kampung. Factors of coordination between government agencies and developers and also the concept offered by developers have only influence in formal housing.

Keywords: *availability, factor, green open space*

ABSTRAK

Polusi udara di Surabaya adalah masalah terbesar dan mendesak untuk diselesaikan. Surabaya Timur memiliki emisi CO₂ terbesar dari aktivitas perumahan

dibandingkan dengan daerah Surabaya yang lain. Salah satu cara yang tepat untuk menyerap CO₂ secara alami adalah dengan menyediakan ruang terbuka hijau yang memadai. Ruang terbuka hijau publik di Surabaya Timur hanya sebesar 2,37% dari total luas lahan. Tujuan dari penelitian ini adalah untuk mengetahui ketersediaan ruang terbuka hijau dan faktor-faktor yang mempengaruhi ketersediaan tersebut di Surabaya Timur, dibandingkan dengan kawasan perumahan formal dan kampung. Analisis deskriptif digunakan untuk menjelaskan ketersediaan ruang terbuka hijau. Analisis isi digunakan dalam penelitian ini untuk menemukan faktor-faktor yang mempengaruhi ketersediaan ruang terbuka hijau. Hasil penelitian menunjukkan bahwa Surabaya Timur memiliki 644,42 ha ruang terbuka hijau atau hanya 7,14%. Hasil penelitian juga menunjukkan bahwa faktor yang mempengaruhi ketersediaan ruang terbuka hijau di Surabaya Timur berbeda antara perumahan formal dan kampung. Beberapa faktor berhubungan dengan kebijakan dan aspek-aspek sosial yang mempengaruhi ketersediaan ruang terbuka hijau di Surabaya Timur baik kampung maupun perumahan formal. Faktor-faktor tersebut adalah: alokasi ruang terbuka hijau dalam perencanaan tata ruang; Program penghijauan; koefisien dasar hijau; insentif dan disinsentif; pengawasan dan pengendalian tata guna lahan; partisipasi masyarakat; pengaruh tokoh masyarakat; kesadaran masyarakat; masyarakat; penghargaan dalam program reboisasi; fasilitator; dan keragaman inovasi penghijauan. Sementara itu, beberapa faktor seperti keterbatasan lahan, kepadatan perumahan, perubahan tata guna lahan, dan terbatasnya dana hanya memiliki pengaruh di kampung. Faktor koordinasi antara instansi pemerintah dan pengembang dan juga konsep yang ditawarkan oleh pengembang hanya memiliki pengaruh dalam perumahan formal.

Kata kunci: *ketersediaan, faktor, ruang terbuka hijau*

INTRODUCTION

Air pollution in Surabaya is the greatest and urgent issue to be solved (Environmental Agency of Surabaya, 2011). Based on the research by Pradiptyas (2011), Widyanadiari (2011), and Rachmawati (2011), it is said that East Surabaya has the largest carbon dioxide emissions from settlements activity compared to other Surabaya regions. Its carbon dioxide level reach 172.832,40 tons CO₂/year. Plants can reduce carbon dioxide concentration by absorbing carbon dioxide during the day (Li, 2010). One of the great ways to naturally absorb carbon dioxide is to provide adequate green open space (Joga and Ismaun, 2011). Joga and Ismaun (2011) also stated that green open space is an area / region that contain natural elements and structures which can perform the ecological processes, such as air pollution control, climate amelioration, water control system, and so on.

The green area (including vegetation and mangroves) in Surabaya in the last ten years (2000-2009) has been reduced by 43.2 km² or 12.9% (Hasyim, 2011). Surabaya as metropolitan city should certainly pay attention to meet the needs of green open space so that the balance between built and unbuilt land can be reached. Through a good green open space planning, it can make Surabaya more sustainable.

Sustainable city must be comfortably livable, not only for the present generation, but also for future generations. According to the data from the Environment Agency, the green open spaces of Surabaya currently is 6460.38 hectares or about 19.5% from the total area of Surabaya (consist of protected areas, parks and green belts, urban forests, sports fields, and cemetery). According to the data from the 2008 State of Environment Report of Surabaya and the 2008 Spatial Planning of Surabaya's document, public green open space in East Surabaya is amounted to only 2.37% (consist of city parks, playgrounds, courts sport, cemeteries, and mangroves). An appropriate arrangement of green open space can improve the quality of the city's atmosphere, be an air refresher, lower the city temperature, sweep the surface dust, reduce levels of air pollution, and reduce noise (Hakim and Utomo, 2003). If the provision of green open space still does not meet the requirement, the various environmental problems will be encountered in this region. Therefore, it is necessary to study the factors that influencing the availability of green open space in East Surabaya.

THEORY / RESEARCH METHODS

Literature Review

The availability of green open space was influenced by several factors that can be known from literature and previous research. Aurelia (2010), Dinariana (2011), Brodhead (2009), and McDonald et al (2013) stated that the area of green open space is affected by population density and population growth. The population that growing is also affects the availability of green open space. It is because the housing need will also increase when the population is growing. Because the increasing population and need for land, area of green open space was reduced and its availability decreased. Limitation of the land factor expressed by Aurelia (2010), Olaleye et al (2013), and Dinariana (2011) is also revealed by Bieber (2007). They said that the increasing need for private area will make the land price grow higher. Joga (2013) is also revealed that the development of commercial areas also reduces the availability of green space area.

Fattah (2001), Muis (2005), Lestari (2007), and Olaleye et al (2013) stated that the most influential aspect of green open space existence is the economic aspect. Economic aspect consists of limited funds and the high price of land that affects the provision of green open space. Aurelia (2010) also adds the spatial planning policy aspect. Policy is an important factor determining the availability of green space because land use is regulated by government policy. Sihite & Isman (1997), Aurelia (2010), and Lestari (2007) stated that the policy from public authority on green open space is one of the factors that influencing the availability of green open space.

Green open space implementer's factor stated by Fattah (2001) is also agreed with the factors stated by the Lestari (2007). They state that surveillance, treatment, and the provision which has not been optimal are influencing the availability of green open space. In addition to the expert, Sihite & Isman (1997) and Olaleye et al (2013) also noted that institutional aspects also influencing the green open space availability.

Social aspects, such as community participation, independent community effort, the role of community leaders, and public awareness of green space importance also affect the availability of green space. Those social aspects were expressed by Sihite & Isman (1997), Lestari (2007), Olaleye et al (2013), Joga (2013), Ernawati & Silas (2013), and Prihatiningsh (2013).

Factors affecting the availability of green open space based on the literature are shown in Table 1 below. Literature studies drawn from theory and previous research.

Table 1. Factors Influencing the Availability of Green Open Spaces from Literatures and Previous Researches

Indicators	Sihite&Isman (1997)	Fattah (2001)	Muis (2005)	Lestari (2007)	Aurelia (2010)	Dinariana (2011)	Olaleye et al (2013)	Joga (2013, 2009)	Brodhead (2009)	Mc Donald et al (2010)	Prihatiningsih et al (2013)	Ernawati & Silas (2013)
Immigrants	-	-	-	-	√	-	-	-	-	-	-	-
Population growth	-	-	-	-	-	√	-	-	-	√	-	-
Population density	-	-	-	-	√	-	-	-	√	-	-	-
Land limitation	-	-	-	√	-	√	√	-	-	-	-	-
Private land ownership	-	-	-	√	-	-	-	-	-	-	-	-
Health facilities	-	-	-	-	√	-	-	-	-	-	-	-
Education facilities	-	-	-	-	√	-	-	-	-	-	-	-
Surrounding environment	-	-	-	-	-	-	√	-	-	-	-	-
Housing density	-	-	-	-	-	-	√	-	-	-	-	-
Commercial areas	-	-	-	-	-	-	-	√	-	-	-	-
Changes in landuse function	-	-	-	√	-	-	-	-	-	-	-	-
Finance program	-	√	-	-	-	-	-	-	-	-	-	-
Land price	-	-	-	√	-	-	-	-	-	-	-	-
Economy	-	-	√	√	-	-	-	-	-	-	-	-
Limited funds	-	-	-	√	-	-	√	-	-	-	-	-
Vague concept	√	-	-	-	-	-	-	-	-	-	-	-
Allocation of green open space in spatial planning	-	-	-	√	√	-	-	-	-	-	-	-
Weak policy	-	-	-	-	-	-	√	-	-	-	-	-
Constantly changing of policy	-	-	-	-	-	-	√	-	-	-	-	-
Green Basic Coefficient	-	-	-	-	-	-	-	√	-	-	-	-
Incentives and disincentives	-	-	-	-	-	-	-	√	-	-	-	-
Coordination among agencies	√	-	-	-	-	-	-	-	-	-	-	-

Table 1. Continue

Indicators	Sihite&Isman (1997)	Fattah (2001)	Muis (2005)	Lestari (2007)	Aurelia (2010)	Dinariana (2011)	Olalaye et al (2013)	Joga (2013, 2009)	Brodhead (2009)	Mc Donald et al (2010)	Prihatiningsih et al (2013)	Ernawati & Silas (2013)
Coordination among agencies	√	-	-	-	-	-	-	-	-	-	-	-
Weak institutional and legal certainty of the open space area	√	-	-	-	-	-	-	-	-	-	-	-
Program executors	-	√	-	-	-	-	-	-	-	-	-	-
Supervision and control of land use	-	-	-	√	-	-	-	-	-	-	-	-
Political influence of government	-	-	-	-	-	-	√	-	-	-	-	-
Corruption	-	-	-	-	-	-	√	-	-	-	-	-
Lack of planning tools	-	-	-	-	-	-	√	-	-	-	-	-
The quality and quantity of government	-	-	-	-	-	-	√	-	-	-	-	-
Coordination between government agencies and developers	-	-	-	-	-	-	√	-	-	-	-	-
Concept offered by developers	-	-	-	-	-	-	-	√	-	-	-	-
Community participation	√	-	-	-	-	-	-	√	-	-	√	-
Public awareness	√	-	-	√	-	-	-	√	-	-	-	-
The influence of community leaders	-	-	-	-	-	-	√	-	-	-	-	√

Research Methods

This research conducted by exploratory paradigm to find or obtain a new thing. The purpose from this descriptive study is to create a description or overview of situation or event, explain the relationships between phenomena, as well as the meaning and implications from a problem to be solved. The availability of green open space in this study was identified by overlaying the digital image of Landsat 8, secondary data from Surabaya Government, and field survey. This research used descriptive methods to explain the availability of green open space in East Surabaya.

Qualitative analysis is used to analyze the factors that affect the availability of green open space. An in-depth interview is used to explore the stakeholder views about factors influencing the availability of green open spaces in East Surabaya. This study tries to seek the views of stakeholders or assessment related to the provi-

sion of green open space in East Surabaya. Based on the identification process, relevant stakeholders interviewed were Department of Planning and Development of Surabaya; Department of Hygiene and Gardening of Surabaya; Department of Public Works and Spatial Planning of Surabaya; Environmental Agency of Surabaya; housing developer in East Surabaya; Real Estate Indonesia (REI) of East Java; spatial expert; environmental expert; formal housing community leaders; kampung community leaders; and Tunas Hijau Community. The results of the interview were analyzed using content analysis to find the factors.

RESULTS AND DISCUSSION

The availability of Green Open Space

Figure 1 shows the area of East Surabaya. It includes seven districts such as Tambaksari, Gubeng, Mulyorejo, Sukolilo, Rungkut, Tenggilis Mejoyo, and Gunung Anyar district.

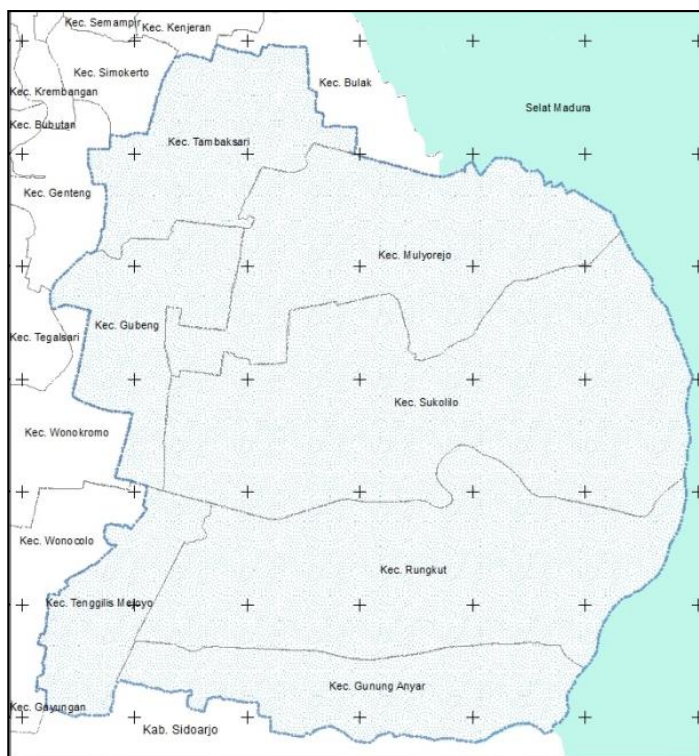


Figure 1. The Administrative Area of East Surabaya
Source: City Planning Agency of Surabaya, 2013

The availability of green open space in this study was identified by analyzing the digital image classification. Through supervised image classification analysis, all

pixels in the Landsat 8 bands image are grouped according to the research needs. In this study, the vegetation is grouped into two classes, trees and shrubs (Figure 2). In supervised classification analysis, ground truth is done to determine the image accuracy with the existing conditions.

Identification of the availability of green open space is also equipped with Department of Hygiene and Garden of Surabaya's data and primary surveys. This is done to complement the green open spaces of data which is not detected by the satellite images of Landsat 8.



Figure 2. The shrub and trees in East Surabaya
Source: field survey, 2014

Based on the data collection, there are 644.42 ha green area in East Surabaya. That green open space is only 7.14% of the area of East Surabaya or only 9020.41 hectares. In detail, Table 2 shows the green open space area in East Surabaya based on the vegetation types.

Table 2. The Green Area of East Surabaya Based on the Vegetation Types

No	Vegetation Type	Area (hectares)	Percentage (%)
1	Mangrove	441.98	68
2	Tree	197.95	31
3	Shrub	4.49	1
	Total	644.42	100

Source: writer, 2014

Based on identification, 68% of vegetation on green open spaces in East Surabaya is mangrove. However, mangrove vegetation is only found in the coastal areas, which are Gunung Anyar, Mulyorejo, Rungkut, and Sukolilo district. The area of each green open space in every district in East Surabaya can be seen in the Table 3.

District Mulyorejo, Rungkut, and Sukolilo have much larger green area than the other districts. This is because they have mangrove forests area. While the other district is only has green open space from public and private green open space such as parks and cemetery. From the percentage of green open space located in the residential region, trees were identified larger (98%) than shrub. This is because most of the shrubs are under the shade of nearby trees. Therefore, most of the shrub on Landsat satellite imagery was identified as tree.

Table 3. The Green Area of East Surabaya in Each District

District	Vegetation Area (hectare)			Total (hectare)
	Tree	Shrub	Mangrove	
Gubeng	12,47	0	0	12,47
GunungAnyar	12,16	0,40	42,90	55,46
Mulyorejo	51,78	0,06	155,82	207,66
Rungkut	17,04	0	107,86	124,90
Sukolilo	67,95	3,53	135,39	206,87
Tambaksari	22,74	0,06	0	22,80
TenggilisMejoyo	13,82	0,44	0	14,26
Total	197,95	4,49	441,98	644,42

Source: writer, 2014

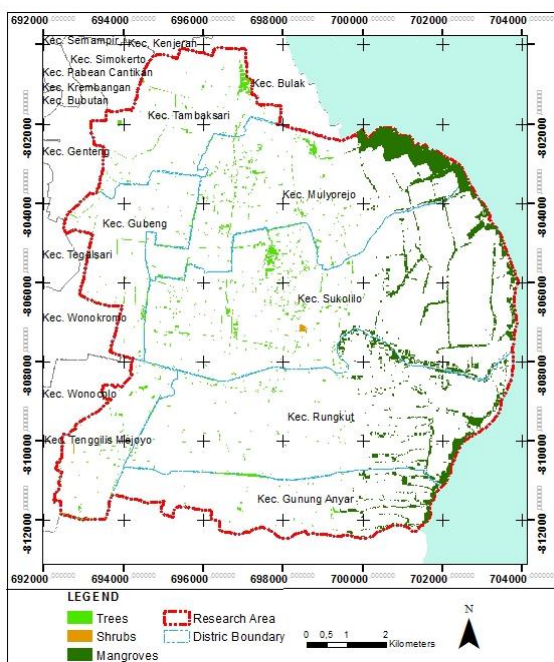


Figure 3. The Green Open Space in East Surabaya

Source: author, 2014

For the benefit of air pollution absorption, needed green open space spread evenly. As seen on Figure 3, most of the green open space in East Surabaya is only available in coastal areas only. Meanwhile in areas with a high density of buildings, they do not have enough green open space yet. We also have seen that in housing area, there is still lack of green open space. Therefore, further analysis is done to determine the factors that affect the availability of green open space in East Surabaya.

Factors Influence the Availability of Green Open Space

Factors influence the availability of green open space was obtained through in-depth interviews with stakeholders. These factors were asked regarding two types of housing, the formal housing and kampung. These factors also asked to the stakeholders based on the existing conditions in the study area. Through in-depth interview, it can be known that there are some factors that confirmed to be influencing green open space availability.

The results of these interviews were analyzed using content analysis techniques (Table 4). Through content analysis, the factors obtained by researchers through a literature review can be confirmed and explored if there are other factors based on stakeholders' opinion.

Table 4. The Content Analysis of Factors Influence the Availability of Green Open Space

No.	Factors	Kampung		Formal Housing	
		Nodes	Confirmation	Nodes	Confirmation
1	Population density	3	Not Confirmed	3	Not Confirmed
2	Population growth	2	Not Confirmed	2	Not Confirmed
3	Limited land	13	Confirmed	4	Not Confirmed
4	Housing density	12	Confirmed	-	Not Confirmed
5	Commercial areas	2	Not Confirmed	-	Not Confirmed
6	Changes in land use function	15	Confirmed	-	Not Confirmed
7	Limited funds	5	Confirmed	-	Not Confirmed
8	Price of land	3	Not Confirmed	2	Not Confirmed
9	The allocation of green open space in spatial planning	27	Confirmed	13	Confirmed
10	Reforestation/green program	23	Confirmed	23	Confirmed
11	Green Basic Coefficient	18	Confirmed	18	Confirmed
12	Incentives and disincentives	7	Confirmed	7	Confirmed
13	Coordination between government agencies and developers	-	Not Confirmed	23	Confirmed
14	Concept offered by developers	-	Not Confirmed	28	Confirmed
15	Supervision and control of land use	7	Confirmed	15	Confirmed
16	The quality and quantity of government	6	Not Confirmed	8	Not Confirmed
17	Political influence of government	2	Not Confirmed	1	Not Confirmed
18	Community participation	28	Confirmed	18	Confirmed
19	The influence of community leaders	12	Confirmed	6	Confirmed
20	Public awareness	26	Confirmed	31	Confirmed
21	Communities	21	Confirmed	16	Confirmed
22	Reward in green/reforestation programs	6	Confirmed	6	Confirmed
23	Facilitators	7	Confirmed	7	Confirmed
24	The diversity of greening innovation	9	Confirmed	9	Confirmed

The following is a summary description of the stakeholders based on the results of in-depth interviews:

1. Population density

Population density aspect assessed by stakeholders that influencing the availability of green open space, although not directly. However, population density, which can have an impact on the housing density, will be overcome by the vertical development so that they would not affect the provision of green open space. Population density is also has no direct impact on the availability of green open space in the formal housing because the number of houses had been arranged through the site plan from the beginning of development.

2. Population growth

Population growth in Surabaya can affect the availability of green open space because it may increase the housing need. If space utilization is not controlled, the rapid population growth will increase the need for housing and reduces the proportion of green open space in the future. However, if the land use can be regulated and controlled, the population growth will not affect the availability of green open space. Population growth has no effect on the availability of open space in formal housing. It is because of the site plan submission must provide a green open space consistent with applicable regulations.

3. Limited land

Limited land assessed that influencing green open space availability by all stakeholders, particularly for the kampung. Limitations of land make it difficult to provide land for green open space in kampung. While in formal housing, limited land is not a factor in the availability of green open space. This is because the allocation of green open space has been arranged through the site plan submitted by the developer. In the proposed site plan, the developer is required to provide open space in accordance with applicable regulations.

4. Housing density

In the kampung, housing density assessed to be affecting the availability of green open space. This leads to limited space which can be used as green open space in the kampung. According to Department of Public Works and Spatial Planning of Surabaya, housing density is not an influential factor in the provision of green open space in the formal housing. This is because the developers already have to meet the Certificate of City Planning of Surabaya, which contains information such as land use and building use, intensity of space using, as well as other technical requirements.

5. Commercial area

There are several stakeholders who stated that the commercial area affects the availability of green open space because it would take the land that should be enabled for green open space. However, several other stakeholders such as the stakeholder of Development Planning Agency of Surabaya and Department of Public Works and Spatial Planning of Surabaya stated that the commercial area development do not affect the availability of green open space. It is because the allotment of land for commercial and green open space region have been determined. So it will not take the land defined as green open space. In formal housing, commercial areas also do not affect the availability of green open space.

This is because there has been a green basic standard that must be met prior to applying for building permit.

6. Changes in land use function

Changes in land use functions influencing the availability of green open space. However, the function of this land is already controlled by the government through policies to meet the needs of standardized green open space by 30%. Currently, Surabaya government actually makes the coastal areas for conservation function. Those conservation areas will increase the availability of green open space in Surabaya.

Changes in land use function have no effect on the availability of green open space in the formal housing. This is because the land in formal housing in accordance with the site plan must be submitted when applying for a development license. In addition, infrastructure, facilities, and utilities owned by formal housing must be submitted to the government since the beginning so it cannot change the function.

7. Limited funds

In public green open space financing, Surabaya government allocates budget funds for the provision and maintenance of public open space, so it does not affect the availability of public green open space in the study area. As for private green open space in the kampung, the lower middle economic people do tend to have limited funds to provide green open space. But in fact it can be anticipated with a diversity of plant species that are more affordable for people and plants that can provide economic benefits later.

The limitation of the funds is also not a factor influence the availability of green open space in formal housing, because according to East Java Real Estate Indonesia (REI) and Department of Public Works and Spatial Planning of Surabaya, green open space which is one of the Infrastructure, Facilities, and Utilities must be provided by the developer. If not provided, then the government will not issue their residential building permits.

8. Land price

The price of land does not affect the provision of green open space. Government allocates funds for the provision of open space which has been planned in the layout plan. In terms of society, according to some stakeholders, it also had no effect because it depends on community awareness. The price of land does not affect the provision of green open space in the formal housing because developers already have to provide open space as part of the Infrastructure, Facilities, and Utilities to be provided.

9. The allocation of green open space in spatial planning

The green open space allocation in the layout plan assessed to be affecting the availability of green open space in both kampung and formal housing. This is because the allocation is the basis for the use of space and building permit issuance. According to the spatial and environmental experts, government policy is an absolute. The government has the power to regulate the availability of green open space in layout plan, so government policy is the critical point in provision of open space.

10. Reforestation/greening program

The presence of greening programs conducted by the Surabaya City Government makes people motivated to carry out reforestation. Program undertaken by the government (such as a clean and green program), besides trying to increase green space, also aims to increase public awareness of the importance of greening their neighborhoods. Not only the government's program, but also community / environmental organizations' program can encourage people to carry out forestation. These programs have also been shown to increase the public awareness because people feel better comfort after their environment looks greener. Furthermore, these types of programs and diversity programs also affect the public's enthusiasm for the program. Therefore, it is also necessary to make an innovation or creativity on the programs offered so that people do not get bored and wants to participate in forestation programs.

11. Green Basic Coefficient

Policy on green basic coefficient assessed to be influential in the provision of green open space. In formal housing, green basic coefficient rules binding the developer to apply for a residential development permit. This rule goes into Surabaya City Regulation No. 7 of 2010 on Infrastructure, Facilities and Utilities at Industrial Area, Commerce, Housing and Settlement. While in the kampung, green basic coefficient is also binding when applying a building permit.

12. Incentives and disincentives

Incentives and disincentives assessed to be factors affecting the availability of green open space. East Surabaya until now has not had rules governing incentives and disincentives associated green open space.

13. Coordination between government agencies and developers

Coordination between agencies and developers assessed to be effecting on the availability of green open space in formal housing by all stakeholders. Currently, developers are required to perform administrative Infrastructure, Facilities, and Utilities submission to the municipal government since the beginning of the necessary residential development permits. So that, after construction is completed or has reached 50%, the infrastructure, facilities, and utilities must be submitted to the municipal government

14. Concept offered by developers

The concept offered by developers should refer to local regulations. Through the site plan submitted by the developer, the government evaluates whether it has been passed the policy or not. The concept is approved and permits issued when site plan fit the rules. Currently, according to East Java REI, with increasing public awareness of the importance of green open space, consumer tastes began to switch towards residential housing that provides adequate green open space. It encourages developers to provide adequate green open space in their housing development concept.

15. Supervision and control of land use

Surabaya Government implemented more anticipation system in terms of land use. Control of land use is regulated through land use plans as the basis for the issuance of licenses. Supervision and control of landuse in formal housing is also set from the beginning of the necessary permits. For example, the green open space as part of the Infrastructure, Facilities, and Utilities policy. Green open

space should be submitted to the municipal government since the beginning (administrative) and then handed over to the municipal government upon completion. That way, the government can control the use of green open space in formal housing.

16. The quality and quantity of government staff

The quantity and quality of government officials not directly affect the availability of green open space. However, these factors can influence policy formulation or decision-making related to urban spatial planning in formal housing and settlements

17. The effect of the government's political

According to stakeholders, political influence is not allowed to influence public policy. Political influence of the government is also not visible in East Surabaya.

18. Community participation

Public participation does not only affect their participation in the early green open space provision, but also the sustainability of the private and public green open spaces. According to Development Planning Agency of Surabaya, public participation does not only affect in kampung, but also in formal housing. Although green open space in formal housing should have been included in the Infrastructure, Facilities, and Utilities policy that will be submitted to the government, but there are some old developers who have not submitted its infrastructure, facilities, and utilities. In cases like this, community efforts are very influential in asking the City Government to maintain the infrastructure, facilities, and utilities.

19. The influence of community leaders

Community leaders assessed to be affecting on the provision of green open space by some stakeholders. The influence of community leaders can get to the surrounding community if the community has seen that the efforts made by community leaders are beneficial. The community leaders also start with greening in their own house, and then just pass it on to others in the surrounding communities.

20. Public awareness

All stakeholders interviewed stated that awareness is affecting the provision of green open space in the neighborhood. This applies to formal housing and kampung. This public awareness can encourage people to start greening their own homes to the surrounding environment.

According to East Java REI, in formal housing, public awareness of the importance of green open space has prompted consumers to look for residential housing that provides adequate green open space. It encourages developers to provide more green open space than the minimum standards that must be met and even highlight the provision of adequate green open space in the housing concept.

21. Communities

There are groups in society that contribute to the green movement (Department of Hygiene and Gardening of Surabaya, 2014). Community groups are influential in the provision of open space such as woman associations and Tunas Hijau

environmental organizations. Communities in this society are moving to make the program, implementing, and overseeing the greening programs.

In addition to 21 factors from the study of theory, at the time of in-depth interviews, acquired several new factors that assessed to be affecting the availability of green open space in the study area. The new factors are:

1. Reward in green/forestation programs

Community participation in forestation programs also cannot be separated from the rewards given in the program. Based on interviews with Tunas Hijau environmental community, equipment / material rewards which is useful for the daily activities of the community will be more attractive. In addition to rewards in goods, people in the study area are also attracted by non-material rewards such as awards and a visit from the mayor. Although it is not a material reward, but the pride of the community that the environment was awarded in forestation programs also attract the public to participate in a forestation program.

2. Facilitators

Implementation of greening programs involving community needs facilitator to support the community from pre-program to post-program. The facilitators assist people from pre-program to post-program. The facilitators are important for community assistance in implementation of the program and provide insights to the community about the program.

3. The diversity of greening innovation.

The willingness of the community in the provision of green open space in their own homes or lots in the neighborhood is also influenced by their knowledge of the diversity of innovation that they can apply for forestation/greening programs. It is also related to the greening program in their neighborhood. People are more interested in greening suggested if the greening innovation is easy to be implemented independently or can be done in small groups of people.

Table 5 is a synthesis of the results of interviews with stakeholders regarding the factors that affect the availability of green open space in East Surabaya.

Table 5. Factors Influence the Availability of Green Open Space in East Surabaya Kampung and Formal Housing

Kampung	Formal Housing
-	Coordination between government agencies and developers
-	Concept offered by developers
Limited land	-
Housing density	-
Changes in land use function	-
Limited funds	-
The allocation of green open space in spatial planning	
Reforestation/green program	
Basic Green Coefficient	
Incentives and disincentives	
Supervision and control of land use	

Table 5. Continue

Kampung	Formal Housing
	Community participation
	The influence of community leaders
	Communities
	Reward in green/reforestation programs
	Facilitators
	The diversity of greening innovation

Source: author, 2014

Factors influence the availability of green open spaces in East Surabaya is different between formal housing and kampung. There are some factors that only influence in kampung such as the limited land, housing density, changes in land use function, and limited funds. In East Surabaya’s kampung, those factors become a problem for the society. They can’t provide an adequate green open space because of those factors. Figure 4 shows the housing density in formal housing and kampung of East Surabaya. The average housing density in East Surabaya’s kampung is about 66 unit/ha.

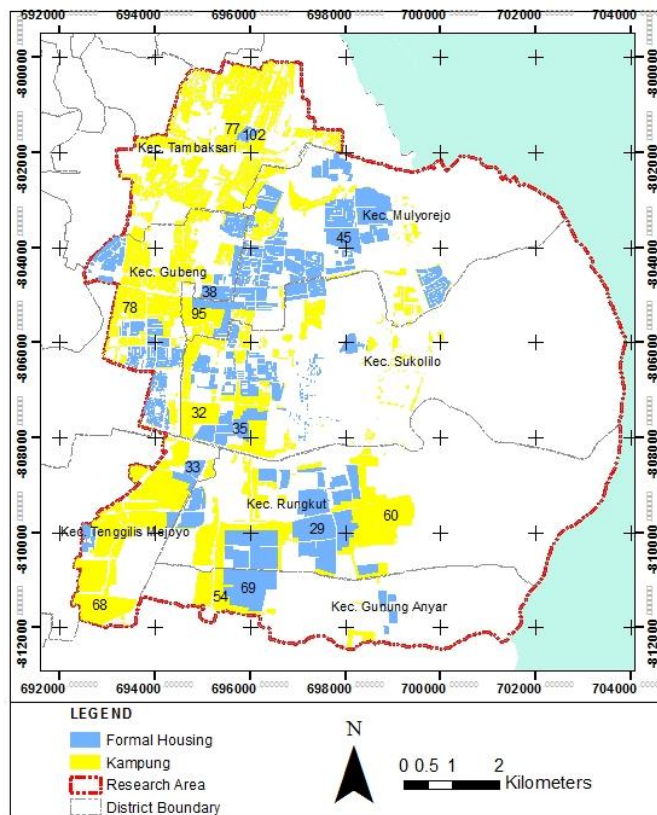


Figure 4. The Housing Density in East Surabaya
Source: author, 2014

Meanwhile in the formal housing, the factors influence is related to the developers, such as coordination between government and developer and the concept offered by developers. In East Surabaya, there are some developers which provide adequate green open space in their formal housing. They have applied the green concept in their property design. But still there are a lot of properties which only provide the green open space merged with the other facilities, not as a green open space facility itself.

Some factors related to the policy and social aspects that influence the availability of green open space in both East Surabaya kampung and formal housing. Those factors are: the allocation of green open space in spatial planning; reforestation/green program; basic green coefficient; incentives and disincentives; supervision and control of land use; community participation; the influence of community leaders; public awareness; communities; reward in green/reforestation programs; facilitators; and the diversity of greening innovation.

CONCLUSIONS

Based on the research, we can conclude that the availability of green open space in East Surabaya reach 7.14% of its region area. District Mulyorejo, Rungkut, and Sukolilo have much larger green area than the other districts. This is because they have mangrove forests area. There are some factors influence the availability of the green open spaces. The factors is different between formal housing and kampung. Factors influence in all housing type in East Surabaya including social aspects, institution aspects, and policy aspects. Factors influence the availability of green open space in East Surabaya in both kampung and formal housing are:

1. The allocation of green open space in spatial planning
2. Reforestation/green program
3. Basic Green Coefficient
4. Incentives and disincentives
5. Supervision and control of land use
6. Community participation
7. The influence of community leaders
8. Public awareness
9. Communities
10. Reward in green/reforestation programs
11. Facilitators
12. The diversity of greening innovation

Some factors such as the limited land, the housing density, the changes in land use function, and the limited funds only influence the availability of green open space in kampung. There also factors that only influence in formal housing. Those factors are the coordination between government agencies and developers and also the concept offered by developers. Those factors can become references to provide adequate green open spaces in East Surabaya.

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