

Challenges of Green Open Space (Its Roles, Forms and Functions) in the Era of Sustainable Development Goals

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Abstract

The acceleration of urban development in Indonesia is faced on increasingly diverse problems, especially with the conversion of land and Green Open Space (GOS) into built areas. Sustainable Development Goals (SDGs) in point 11 state about Sustainable Cities And Communities (City and Community Sustainability that build inclusive, quality, secure, resilient and sustainable cities and settlements). Therefore, affordability of access to green open space and the aspect of environmental damage is important to be observed together. Indonesian Law no. 26 of 2007 mandates 30% of the urban area tangible green space. The high intensity of changes in the use of green open space and urban land also inhibits the fulfillment of the mandate of the Act. It turns into bad implications for the environment and decreased quality of life. The integration of GOS in Urban Planning and Design in SDGs era in national scale, Government Regulation, Ministerial Regulation, provincial scale, as well as City/County Town scale in a comprehensive and sustainable manner is required, in order to maintain and improve the quality of the environment through the provision of adequate green open space. This paper is aimed to identify the roles, forms and functions of GOS in order to describe its implementation challenges.

Keywords: Green Open Space, Integrated Design of Green Open Space, Sustainable City

1. INTRODUCTION

Physical urban development tends to consume the Green Open Space (GOS) and make it as built area (Frankie Chiarly R., 2015). Urban development should incorporate environmental elements as a basis for consideration in the development of natural resources and the environment as a strategy of Sustainable Development Goals (SDGs) (Margareta MS., 2015). The quantity and quality of green open space is currently experiencing a very significant decrease and resulted in decreasing urban environmental quality affecting the various joints of urban life such as frequent flooding, increasing air pollution, and decreasing of people's productivity due to the limited space available for social interaction (Regulation of Public Works/Permen PU Number .05 Year 2008). In harmony with this (Minister of Home Affairs Regulation/Permendagri Number .01 Year 2007) that urban and urban development and growth accompanied by rapid land conversion, has created environmental damage that can degrade the carrying capacity of land in sustaining community life in urban

areas, so efforts are needed to maintain and improve environmental quality through adequate provision of green open space.



Figure 1: Flooding, Air Pollution, Water Pollution, Congestion is a classic urban problem. Urban improves the quality of the environment through adequate GOS provision.

Source : (Hendra R,2015)

(Law no. 26 Year 2007) on Spatial Planning emphatically mandates 30% of the city area of Green Open Space (GOS), 20% public GOS and 10% private GOS. The allocation of 30% of GOS is stipulated in the Regional Regulations (Regulation of Regions) on Spatial Plans of City and Spatial Plan of Regency. In the application comes the concept of 8 green city attributes, one of them, namely point No.3. Availability of Green Open Space (P2KH Activity Manual, 2017). These attributes to overcome environmental problems and global warming that have implications for urban settlement issues. This is in line with Margaret MS. (2015) the need to formulate policies for the management and development of green space to be able to improve the quality of urban life.

2. DISCUSSION

In this article discuss the journals on Implementation of GOS provision include: Integrated concepts of watershed development, accuracy of GOS location selection, Integrated GOS pedestrian system, green/ecological infrastructure development concept, basic concept of road corridor arrangement, basic concept of arrangement Vacant land within the city and the basic concept of arrangement of green open space in high-density settlements, as well as the concept of Decent City Children (KLA).

2.1. DEFINITION, FUNCTION AND THE RTH OF THE GOS

Definition of green open space (Regulation of Minister of Public Works No. 05 of 2008) GOS Urban area is part of open space or urban area filled with plants and plants to support ecological, social, cultural, economic and aesthetic benefits. Meanwhile, according to Dwi Suryadi N. and Ernady S. (2013) is a city with equilibrium ecosystem conditions so that its functions and benefits are sustainable. Similarly, Ingeried L.M. and Esli D.T. (2015) mentions the ongoing arrangement of green open space is a city that maintains the character of nature, the availability of clean water, fresh air, a comfortable microclimate, a place of recreation for the people, and diverse biodiversity. Similarly, Natalia Tanan and

Gede Budi S. (2015) conception of GOS development is interpreted as an effort to preserve the environment by developing a part of the city's environment into natural green fields in order to create cohesiveness between the natural living environment itself Human and artificial environment.

GOS, as revealed by Nadia Imansari and Parfi Khadiyanta (2015) has functions related to ecological, social, cultural and aesthetic aspects. The role of green space as a shade and lungs of the city as well as a center of interaction and community communication and adequate recreational facilities. According to Margareta MS (2015) GOS function is as the lungs of the city, which is one aspect of the ongoing recycling function, between carbon dioxide (CO₂) and oxygen (O₂) gases photosynthesis, especially in foliage. This green system works like a ventilation in the house/building.

The GOS role According to Nadia Imansari, Parfi Khadiyanta. (2015) The urban GOS has an ecological role such as climate control, as a producer of oxygen, noise absorbers and also as a Visual Control by blocking the sun's glare or reflected light. The role of green space is socially cultural as a space of communication and social interaction for the community, recreational facilities, sports, education, even as a culinary center. GOS aesthetic role among them increase comfort, beautify the city environment, and stimulate creativity and productivity of citizens of the city.

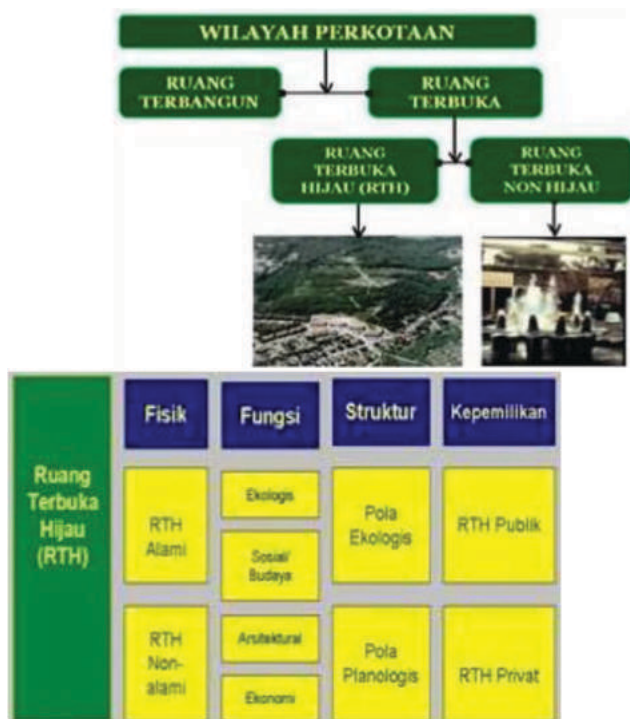


Figure 2: Physical Green Space Position, Function, Structure and Ownership in urban areas. Source: (John D.E., Margaretha Maria S., 2013)

The supply of green open space is part of global warming mitigation, so it is seen as one of the efforts to handle greenhouse gas emissions, especially CO₂, which is most implemented compared to other methods (Frankie Chiarly R., 2015).

2.2. BENCHMARKING OF GOS AVAILABILITY AND EXISTENCE

Efforts related to the improvement of the function of urban forest and urban parks as public open space is very necessary, by providing adequate facilities in addition to conducting more intensive supervision and management in maintaining the condition of public green space in order to always be in good condition (Nadia Imansari, Parfi Khadiyanta., 2015) . The presence of green space that is well managed with planned greening in accordance with the function and aesthetics of the city will be very influential in realizing a good city, harmonious, comfortable, beautiful and supportive of community life and serves as a means to create cleanliness, health, harmony and beauty of the environment.

Park City is a functioning social and aesthetic open space as a means of recreational activities, education or other activities, at the city level. Park city is aimed to serve residents of a city or part of the city area. The park serves a minimum of 480,000 residents with a minimum standard of 0.3 m² per city dweller. With a minimum park area of 144,000 m². This park can be shaped as green space (green field) equipped with recreational facilities and sports, and sports complex with a minimum of 90% -90% GOS. All these facilities are open to the public. A city park can create a Sense Of Human a Landmark, and become a community gathering point. In addition, the city park can also increase the value of the property and become the driver of the implementation of development. Park city should be an important component of successful city development or city (Nadia Imansari., Parfi Khadiyanta., 2015).

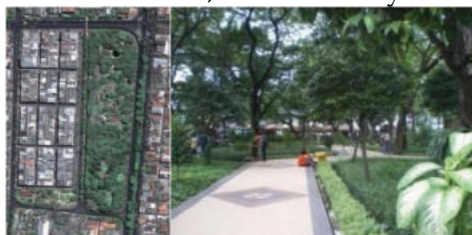


Figure 3: Aerial photographs and visual hue of Jl.Manyar nursery in Surabaya with private management will be better? Private Participation PT.SIP to be a manager of the municipal government that has the potential to become a conservation area that has ecological, educational, aesthetic, and recreational value.

Source: (Wanda W.C., I Ketut C., 2010)

Forest City ideally has an area in a 2500 m² minimal stretch. The purpose of city forest management is to support the city environment that serves to

improve and maintain the microclimate and aesthetic value, absorb water, create balance and harmony of the physical environment of the city, and support the conservation and protection of biodiversity. The urban forest structure can consist of two-tiered city forest, which only has tree planting communities and grasses or storied urban forests that have plant communities in addition to trees and grasses, there are also bushes and ground cover with irregular spacing (Nadia Imansari., Parfi Khadiyanta., 2015).



Figure 4: Surabaya City Forest incorporated with Seed Garden jl. Manyar has a higher vegetation density to strengthen its character, as well as a recreational park also functions as a city lung-patu
Source: (Wanda W.C., I Ketut C., 2010)

Fulfillment of green areas strived as a medium of alignment of the trend of degradation of clean and healthy air. With the availability of adequate green open space is expected to reduce the level of urban air pollution, as well as a rainwater absorption media that ultimately serves as a media to prevent flood hazard. Implementation of this program is done through the preparation of conservation area plan and control over the implementation of land use and critical land conservation. (Noor Hamidah., Tatau W.G., Mahdi S., 2015).

The proportion of urban green space requirement in one region may be different from other areas even in one urban area, thus further study is needed to formulate more integrated method of calculation based on population (Widyastri A.R., Budi F., Agus R.S., 2012).

2.3. GUIDELINES OF GOS PLANNING

GOS is a container that can accommodate certain activities / activities of the environmental residents either individually or in groups (Margareta MS., 2015). According to him, green city attributes are components that must be applied to the green space, so that inclusive and comprehensive can provide benefits as a public space that is optimal enough for a large enough community. GOS currently has an increasingly complex role and functionality. There are several opinions related to the role and function.



Figure 5: Arrangement of Sampang Area Ex.Pasar Kota Semarang which is converted to RTH. Youth Park Concept Park, Main Plaza, Pedestrian Lane, Gazebo, Shelter, Bicycle Parking Area, Service Building, Toilet, Sculpture and Fountain, and Solar Cell for Pedestrian, Pedestrian Lighting and WIFI Facilities.

Source: (Margareta MS, 2015)

According to Amiany., Elis S.R., Rony S.S., (2012) there are 4 (four) types of GOS based on its ownership consisting:

1. GOS yard such as (yard of houses, office yard, shops, place of business and roof garden building).



Figure 6: RTH House of the house that is arranged and beautiful with children's play facilities

Source: (Dwi D, 2012)

2. GOS parks and urban forest such as neighbourhood park (Taman Rukun Tetangga,

Taman Rukun Warga, Taman Kelurahan, Kecamatan Park, City Park, City Forest).



Figure 7: Cibeunying Park is a Garden Space in Bandung City that is still awake

Source: (Dwi SN., Ernady S, 2013)

3. GOS green line roads are road and median islands roads, pedestrian paths and spaces Under the overpass.



Figure 8: Cikapayang Strip Park is Green Ground RTH in Bandung Wetan by utilizing space under overpass as visual softener. This is an alternative solution to the limitations of urban green space provision.

Source: (Dwi SN., Ernady S, 2013)

4. GOS of certain functions is GOS railway boundary, green grid of electricity grid High tide,
GOS boundary river, GOS boundary coast, GOS security
Raw water / springs, and funeral GOS.

According to Margareta MS. (2015) the types of GOS are distinguished as follows:

1. Open space in living environment : (a.) Open Space As a source of production such as forestry, agriculture, animal husbandry, mineral production and others, (b.) Open space as a protection against natural and human resources, for example Nature reserves such as forests, marine / water life, cultural and historic areas.(c.) Open space for health, well-being and comfort, eg garden environment, city parks and others.
2. Open space viewed from activities divided into: (a.) Active open space is an open space that invites elements of activity In it, such as plaza, sports field, playground and others. (b.) Passive open space is an open space in which there is no activity Humans among others; Greening / gardening as a source of environmental air.



Figure 9: The Garden Facade of Taman Sampangan Semarang applies the concept of Green City Development Program (P2KH). The orientation of the Garden overlooks the Kaligarang River (Waterfront), by placing the Main Plaza as the "Ending Destination"

Source: (Margareta MS, 2015)

3. . Open space in terms of its shape is divided into: (a.) Elongated shape; Open space on the elongated shape is generally only has boundaries on its side, such as roads, rivers and others. (b.) Shaped Sticking; Open space shaped sticking out in general that Has boundaries around it, eg field, roundabout and others.
4. Open space viewed from its nature can be divided into: (a.) Open space environment ie open space contained in an environment and its general nature. (b.) Open space by building walls and courtyard building yard General and personal in accordance with its building functions.

Open space is formed because it is influenced by several factors both by the natural environment itself and the artificial environment. These factors are elements that can influence the space through the expression of its elemental properties to some extent. The GOS elements are:

1. Hard Materials such as buildings, fences, pedestrian, and garden furniture
2. Soft Material such as plants, water and so on.



Figure 10: Fence, pedestrian, furniture, and Gazebo Facility, Shelter in Taman Sampangan. The existence of the Park is integrated with the River, where the River Sempadan is utilized as a City Park, which in addition serves as the Utilization of Green Open Space (GOS) Sempadan Sungai, also useful as Public Open Space
 Source: (Margareta MS, 2015)

Public spaces by their nature are divided into:

1. Common enclosed space, located within the building.
2. Public open space, located outside the building, used by everyone and Multifunctional (street, pedestrian, environmental park, plaza, sports field, park City, recreation park, etc.
3. Special open space, utilized for limited activities and special needs (Residential garden, ceremonial field park, airfield area, area Military training) (Margareta MS., 2015)

Based on the layout of the GOS City can be prostrate:

1. Coastal Open Space,
2. River Flood Plain,
3. Freeway open-air space (Greenways), and
4. Open space safety area of accident danger at the end of the runway air.

GOS in a city includes:

1. GOS Macro, such as agricultural area, fishery, protection forest, urban forest and Airport security base.

2. GOS Medium, such as the area of the park (City Park), sports facilities, public cemetery.
3. GOS Micro, ie open land that exist in every residential area Provided in public facilities such as a play ground (Play Ground), garden Environment (Community Park), and sports field. (Margareta MS., 2015)



Figure 11: Micro GOS in the form of Play Ground and Community Park. Taman Sampangan Semarang functioning Economically Rekreatif and Social for the community around which is dominated by Housing and Settlement Area
Source: (Margareta MS, 2015)

2.4. IMPLEMENTATION OF GOS PLANNING

Development of Kahayan River Basin The city of Palangkaraya into GOS is one of the alternative development of nature tourism and environmental conservation of the city that has a natural potential that is very supportive with the richness of the green area. The concept of integrated area planning is expected to balance between the alignment of vegetation and the existence of environmental ecology with the development of urban infrastructure, so that will achieve the goal of applying the concept of sustainable development. (Noor Hamidah., Tatau W.G., Mahdi S., 2015)



Figure 12: Preservation Efforts of Kahayan River Basin Palangkaraya into GOS The ability of the river to change the landscape, so there are differences in the characteristic areas of the river, and can support tourism activities by displaying a recreational area relying on nature tourism with the concept of planning GOS
Source: (Noor h., Tatau wg., Mahdi s., 2015)

The appropriate location of the green space will determine the optimum green spatial arrangement in urban areas. Green open space planning is attempted to take into account the distribution or location of green open space. The determination of the suitability of the location of public open space development in sub-district of Palu west and east hammer is based on slope, land use, population density, accessibility and supporting facilities (Andi Chairul A., 2015).

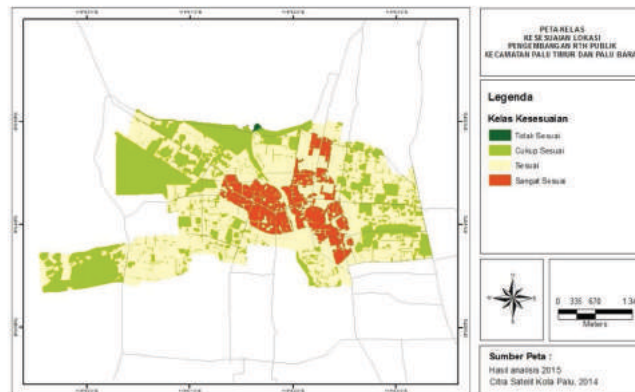


Figure 13: Conformity Determination of the green space location also determines the optimum GOS. Geographic Information System Method (GIS). A system that organizes devices and data, and can utilize storage systems, processing, and data analysis simultaneously, so that information can be obtained related to spatial or spatial aspects

Source: (Andi Chairul A., 2015)

The presence of green space integrated with pedestrian paths creates a micro-environment that makes pedestrians feel comfortable. In addition to facilitating the movement of pedestrians, the pedestrian path is also the attraction of the city to visit kesuatu part of the area within the area. This facility allows for passive and active social interaction and provides opportunities for recreation. Comfort for pedestrians is formed because the GOS balances temperatures, humidity, vegetation and vehicle emissions, including noise and an annoying visual environment (Natalia Tanan., Gede Budi S., 2015).



Figure 14: Integrated pedestrian path with green space at Jakarta park. The allocation of space required for the development of walking modes can reduce the need for space for its development in urban areas

Source: (Natalia T., Gede BS., 2015)

Strategies for development of green open space based on green / ecological infrastructure must be integrated with the Spatial Plan (RTRW) and reflected in the structure and spatial pattern. So the urban green space network with various types and functions into infrastructure systems for the balance of urban ecosystems (Ingeried L.M., Esli D.T., 2015).

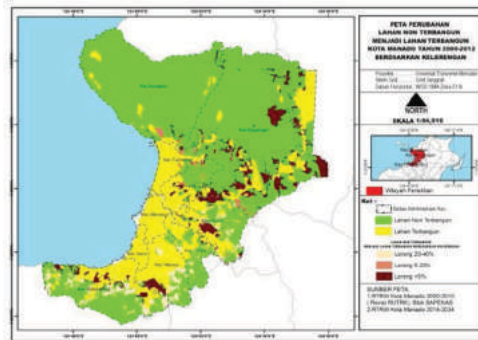


Figure 15: Integrated green space-based GOS structure and pattern with RTRW Manado City as the main component of space formation.
Source: (Ingeried LM., Esli DK., 2015)

The basic concept of arrangement of porong road corridor is to create green open space of functional road corridor in improving micro climate, reducing noise and pollution, comfortable and esthetic. Porong road corridor conceptualized to be a green line that can provide comfort to users with the provision of vehicle circulation paths and pedestrian circulation path. By utilizing the vacant land around the track, it will be conceptualized an environmental park with the function of reducing the negative impact of traffic direction on the environment, improving the aesthetic quality and can be functioned as a Rest Area for users of the track and the surrounding community. (Mochamad IF., AAG.Agung R., 2014)



Figure 16: The 'Functional' concept is applied to the GOS arrangement of the Porong Highway Corridor. Into a green channel that can provide comfort to users with the provision of vehicle circulation paths and pedestrian circulation paths. dihadirkan a characteristic or landmark on any landscaping materials that can explain or describe the identity of a region.
Source: (Mochamad IF., AAG.Agung R., 2014)

Utilization of vacant land within the city is an effort to improve and utilize an area that is not optimal or in the area of the city that is not strategic

towards the better and orderly, this is an effort to improve the quality of RTH (Hibnu M., 2013)



Figure 17: Utilization of vacant land to RTH in Taman Terantang Sukamara Tangerang. Garden facilities with city vegetation / forest, plaza, sculpture, water elements, parking spaces, street vendors (street vendors), jogging tracks, and pedestrian paths.
Source: (Hibnu M .., 2013)

The concept of GOS development in high density settlements in Human Settlement is directed towards achieving the Nature and Society (community) elements in each of the GOS typologies that are formed. One form of GOS development concept is done by optimizing the land through planting media in the form of potted plants (Indah Susilowati., Nurini., 2013)



Figure 18: The concept of green open space arrangement in the densely populated area of Surakarta optimizes the land through planting media of plant pots
Source: (Indah Susilowati., Nurini., 2013)

The paradigm of urban spatial development towards the concept of Decent City Children (KLA) should be considered in the spatial development policy. (Dhini D., 2012)



Figure 19: Taman Ganesha Bandung City is expected to apply the concept of Decent City Children. This park actually has the potential to be used by all ages, but the physical elements that exist, does not allow children's activities to develop according to age category. Children who come in this park, just accompany parents of morning sports
Source: (Dhini D., 2012)

3. CONCLUSION

Alternative efforts to maintain and improve the quality of the environment through the provision of adequate green open space can be: Accuracy of the concept of structuring River Basin area by utilizing the ecology of the area as an GOS assets and tourist areas. Accurate selection of zoning taking into account the distribution and location of green space. The integrated pedestrian path system with GOS creates a micro-environment that makes pedestrians feel comfortable. The concept of green space-based green / ecological infrastructure is reflected in its structure, pattern, type and function into an infrastructure system for the balance of urban ecosystems. The basic concept of structuring the "*functional*" road corridor in improving microclimate, reducing noise and pollution, comfortable and esthetic. The basic concept of the arrangement of vacant land within the city by utilizing an area that is not optimal or in the area within the city that is not strategic towards the better and orderly. The basic concept of arrangement of green open space in high-density settlements by optimizing the land through planting media in the form of plant pots. As well as the concept of Decent City Children (KLA) with specific organisms with specific characters for child development. The above is the basis for consideration in the design of integrated and sustainable urban GOS planning and design, in accordance with the Green Open Space Challenges, Roles, Form and Functions in Sustainable Development Goals (SDGs).

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