The Limited Urban Green Open Spaces for Jakarta: for Establishing Cleaner, Healthier and more Comfortable City

E.K.M. Nazech* and Y. Latief
Department of Civil Engineering, University of Indonesia, Depok 16424, Indonesia
*Corresponding author. Fax: +62217270028 Email: elkhobar@eng.ui.ac.id

ABSTRACT

The urban areas are warmer than surrounding areas due in part to the abundance of rooftops and paved surfaces. As hot air builds and rises into the atmosphere, cooler air is drawn in from green open spaces which surround the city. This air is kept relatively cleaner and cooler by the urban open spaces and greenbelts it flows through. The street tree corridors, small woodland patches in parks, open spaces and backyards all act together to purify air as the "lungs of the city." Vegetation traps the particulate matter of airborne pollutants; leaves can effectively absorb ozone and sulfur dioxide; and all plants consume carbon dioxide. The open spaces and vegetated areas in urban areas keep in helping moderate climate. These areas are important for the reduction of glare, maintaining cooler air temperatures, and reducing heat load on buildings. It also keeps the urban areas clean, healthy and more comfortable to live. In Jakarta, the green open space is very limited; the government has done several attempts in changing this condition. But due to the high demand on commercial and residential areas many of the available open space has been transformed into built areas. The urban forest located in Universitas Indonesia limited open spaces is hoped to contribute in mitigating the adverse impacts of dense urban areas in Jakarta. Maintaining the urban forest and other green open spaces in Jakarta is a must for the role of water conservation and recreation area, and to reduce global climate change and urban air pollution.

Keywords: global climate change, open space, urban.

1. INTRODUCTION

Nowadays, the world is facing the problem of degrading environment quality due to the excessive pollution, flora and fauna extinction, global climate change, high dependency on fuel fossil, and the extreme change in urban land use. Urban green open space is now needed to overcome all those problems; the open spaces are important to reduce pollutant load and noise, prevent global climate change, and improve ground water reservoir. Green open space plays an important environmental role in preserving the city health.

2. THE ROLE OF OPEN SPACE

2.1 Open Space as Lungs of the City

Urban area, filled with tall buildings, rooftops, and paved surfaces, absorbs more heat compared to the surrounding areas. As the hot air builds and rises in to the atmosphere, cooler air is drawn in from the green open space which surrounds the city. This air is kept relatively cleaner and cooler by the open spaces and greenbelts it flows through. The street tree corridors, small woodland patches in parks, open spaces, and backyards all act together to purify air as the "lungs of the city". Vegetation traps the particulate matter airborne pollutants, leaves can effectively absorb ozone and carbon dioxide, and all plants consume carbon dioxide. A study in St. Louis has estimated that the amount of trees needed to absorb the 462,000 tonnes sulphur dioxides annually released from the city is 50 million trees, which is equal to 5% of the city total area. The reduction of air pollutant will caused less health problems, which will also minimize the health treatment cost in urban areas.

2.2 Reduction of Flood Risks

The wide usage of paved surfaces has changes the land usage and reduces the rainwater absorption into the ground and to the groundwater reservoir. This can also increase the abundance of rainwater volume into surface flow. If the drainage system is designed based on a limited close land then it will cause water to form puddle, even flood. Ideally every open space transformation into paved surface has to include a sufficient absorption space in the form of well, canals or open space. The open space will act to reduce the flood debit and increase the groundwater reservoir. If the transformation continues without sufficient absorption space and improvement of drainage system, it will certainly brings lots of other problems like the high budget system repair, flood management project, flood insurance, and flood disaster management.

2.3 Climate Change

Several studies in big cities throughout the world have shown the importance of open spaces and vegetation areas in maintaining the climate stability. These open spaces are important for reducing glare, maintaining cooler air temperatures, and reducing heat load on buildings. Trees play important role in limiting the effect of strong wind in outdoor areas and for heating purposes in indoor areas. Open space also functioned in moderating the extreme weather changes; it has been proven that the summer temperature in vegetated areas is several degrees lower compared to the surrounding built areas.

2.4 Noise Pollution

The Federal Highway Administration (FHA) study showed that trees, hedges, and greenbelts can reduce the total sound decibels if located in a position between the highway and the residential and/or commercial areas. For example, 30 m wide greenbelts with 13.5 m height can reduce half of the total highway noises. Three m wide hedges with 1.8 m height will reduce 40% of the sound of the lawnmower on the other side of the hedges. The sound of leaf rustles, water flows, and birds will also provide sound alternatives to overcome the traffic and urban machines noises.

2.5 Wildlife Habitat

Green open space is home to various wildlife populations, birds and squirrels are commonly seen in the open spaces located near the city. The wildlife long term fecundity in the conservation areas and other unbuilt areas in the city depends on the availability of migration path that connected the areas with rural open spaces. Conservation of suitable wildlife migration path will protect and renew the current wildlife population. The presence of wildlife can also enrich human and give them a chance for education purpose and environmental conservation effort.

2.6 Recreation

Most of the city's inhabitant values the chance of recreation in the open spaces and woodlands and parks in the city. The chance of recreation is important to improve the people's quality of life and also offered a good chance for business and commercialization. Several studies had reported that the availability access for recreation, whether actively or passively, will give good benefit for someone's physical and mental condition.

Open space that were planned and organized as public parks in the city area functioned as a social interaction room, stress release place, and sport activity area for the whole citizen. City Park gives positive effects for children; it can be used for camping and hiking activity, while artist can use its scenery for his paintings. A park with pool, pond, or lake can serves as fishing site or other water activity site. Moreover, the connection between men and nature is now considered as an important factor in making a person's character. Outward bound activity teaches everyone from teenagers to executives about discipline, self motivation, and team cooperation.

2.7 Preserving open space is an integral aspect in sustainable urban development

Sustainable future planning means to include all development aspects from a wider and more interconnected point of view. Urban planning must be done on community and city scale and not based on residential scale. The

sustainable development concept and smart growth are important in developing the suitable plan for a city growth. The balance between the development and conservation must be reached to obtain a better citizen life quality. In the other hand, urban open spaces can act as an evacuation and mitigation site for earthquake and other disasters.

Conservation of open spaces is important for sustainable development plan. The open space design is vital in ensuring long term life quality. An observation in developed countries revealed that residential area that attracts the buyer's interest more is the one who had access to the city parks, play parks, greenbelts, and green open spaces. The open space not only offered recreational chance for the citizen but also ensured that natural processes like animal migration and hydrological flows will keep fully functioned. The open space also serves as water reservoir areas, a costly and technologically advanced role to implement without the presence of the open space.
The open space conservation is no longer can be avoided. The cost and benefit of the development and conservation of open space is the keys in determining the rightful investation choice. The cost needed to protect the natural system and urban open spaces maybe high, but the cost of the unavailability of the open space maybe higher.

3. GREEN OPEN SPACE IN JAKARTA

The availability of open space in urban areas throughout Indonesia is a must, as mandated in the Law of Republic of Indonesia no. 26 year 2007 about Land usage and the Rule of the Internal Affairs Minister no. 1 year 2007 about Urban Area Green Open Space Usage. Therefore, all the City government must regard both laws in designing, developing and building their cities.
In Jakarta, the green open space is managed by several units; there are the Park Unit, Agriculture Unit, Forestry Unit and Mortuary Unit. Each of the unit has its own organization, rules, plans, developments, managements, funds and human resources. Therefore the coordination between the units is relatively weak due to the difference in plans and programs.

The presence of green open spaces in Jakarta is threatened by several factors including:

- Investors that sees open space as unproductive areas and want to change it to better economical values
- City government that support the investors, by changing land usage for city income
- The tremendous urbanization flow enforcing the transformation of open space into residential and commercial area
- Low citizen awareness on the open space, some of the them even use the space as garbage dump site
- Lack of government role in managing and controlling the available open spaces.

4. UNIVERSITY OF INDONESIA URBAN FOREST

Urban forest located in Universitas Indonesia has 128 ha areas covering 111 ha of Green Crown open space, 17 ha of water bodies and 64 ha in the form of other greenbelts. The ecological value of the urban forest is its capability in absorbing various pollutants. The increase number of carbon dioxide, lead, nitrous oxide, and ozone resulted from city activities can be controlled by the trees in the urban forest. The increasing carbon dioxide level can be nullified by photosynthesis process. Tree foliage with the help of chlorophyll and water and ray of sun will synthesize carbohydrate and oxygen from carbon dioxide. While the leaves and cambium can also act to absorb lead, nitrous oxide, other pollutants.

For the future, it is a challenge for us all to fulfill all the requirements stated in The Laws about open spaces. It is necessary to build a strong policy in open space management together with a valid institution. There is also needs to socialize the importance of the available open space for the citizen. Sufficient fund for open space management must also be available together with the appropriate technology for conserving the plants in Indonesia.

The urban forest located in Universitas Indonesia limited open spaces is hoped to contribute in mitigating the adverse impacts of dense urban areas in Jakarta. Maintaining the urban forest and other green open spaces in Jakarta is a must for the role of water conservation and recreation area, and to reduce global climate change and urban air pollution.

5. CONCLUSION

There are several available efforts to maintain urban open space in Jakarta such as increasing the function of urban open spaces as a public recreation area. Another way is by encouraging the public and community participation in order to develop and keep the planned urban open space. The government should also increase its role in controlling and maintaining the available open spaces. Urban forest management in University of Indonesia is expected to be a good alternative in dealing with the limited urban open space.

6. REFERENCES

Jorgensen, E. (1977) Vegetation Needs and Concerns in Urban Areas. The Forestry Chronicle.

Krugman, S.L. (1978) Wind Breaks and Shelterbelts for an Improvement Urban Movement. World Forestry Congress VIII, Jakarta, Indonesia.

Lynch, K. & Hack, G. (1984) Site Planning. The MIT Press: Cambridge.

Parlupi, B. (2006) Ruang Terbuka Hijau sebagai Pengendali Polusi Udara. In: Jakarta Kota Polusi, Menggugat Hak atas Udara Bersih (Muhammad A. & Nurbianto, B., eds.), pg 8-10. Penerbit Pustaka LP3ES Indonesia: Jakarta.

Rubenstein, H. (1979) A Guide to Site and Environmental Planning. 2nd ed. A Wiley-Interscience Publication: New York.

Supriyatna, Y. (2006) Jakarta Krisis Koridor Hijau. In: Jakarta Kota Polusi, Menggugat Hak atas Udara Bersih (Muhammad A. & Nurbianto, B., eds.), pg 3-7. Penerbit Pustaka LP3ES Indonesia: Jakarta.