INEQ
Indoor Environmental Quality and Green Building
INEQ 1(1): 49–55
ISSN 3062-8989

Institute for Advanced Science, Social and Sustainable Future
MORALITY BEFORE KNOWLEDGE

Green open spaces: climate mitigation of climate change in Indonesia

Fadilatur Rahmi Agus[1], Yunita Ismail[1*]
[1] *Environmental Engineering, Engineering Faculty, President University;, Bekasi, Jawa Barat, 10430, Indonesia;*
*Correspondence: yunitaismail@president.ac.id

Received Date: November, 2023 Accepted Date: January, 2024

ABSTRACT
Introduction: The provision of microclimate for young people is an important prerequisite for outdoor thermal comfort in urban communities. The microclimate consists of four elements: air temperature, humidity, wind speed and solar radiation. The City Green area consists of urban landscape, urban forest green, urban recreational green, sports green and garden green. The green open spaces are classified according to the state of the region, not according to the shape or structure of the vegetation. The green land is intended to maintain land availability as a catchment area. **Methods:** in this study the authors tried to use a systematic literature review method. This method tries to collect existing literature and articles which are then reviewed to look for potential green open spaces as a solution to addressing microclimates. **Finding:** In the early 1990s, the United Nations Framework Convention on Climate Change (UNFCCC) was established as the body to address global warming: mitigation and adaptation. Mitigation involves finding ways to slow, control or absorb greenhouse gas emissions from forests or other carbon "sinks". In response to global warming and climate change, the Government of Indonesia enacted Law No. 26 in 2007. Law No. 05/PRT/M/2008 on Spatial Planning and the Guidelines of the Minister of Public Works on the Provision and Use of Green Open Space in Urban Areas stipulate that green open space is defined as space that extends/expands and/or clusters, which is more open for human use, and is a place for plants to grow, both naturally and intentionally planted. **Conclusion:** Benefits of green space include supporting the health, welfare and safety of urban residents. Green spaces can also promote the production of natural resources, prevent natural disasters, protect the environment, promote health and safety, and promote entertainment activities and map development.

KEYWORDS: green space; RTH; climate change; urban communities.

1. Introduction

The provision of microclimate for young people is an important prerequisite for outdoor thermal comfort in urban communities. The microclimate consists of four elements: air temperature, humidity, wind speed and solar radiation. The green spaces (RTH) allow the community to create a pleasant climate. The microclimate depends on the water surface, the type of tree, the degree of packaging of the place and the construction area around the green area. Not only does the thermal radiation of topographic elements, floor surfaces, 3D objects and certain objects influence the climate, but also small climatic factors such as temperature, humidity, sun exposure and wind are crucial. micro(Idham, 2016). According to the Agency for Spatial Planning (2008), vegetation is all plants that exist in a region or are introduced from outside. According to Obi (2014), vegetation plays an important role in the city's microclimate measures. Plant protection is active not only in reducing soil temperature and controlling wind speed but also in treating cooling effects through absorption processes and thermal fibre phenomena. The sunflowers are thick and

Cite This Article:
Agus, F. R. (2024). Climate Change: Utilization of Ruang Terbuka Hijau as a Microclimate Mitigation in Indonesia. *Indoor Environmental Quality and Green Building*, *1*(1), 49-55. https://doi.org/10.61511/ineq.v1i1.2024.853

the leaves that block the light are thin, and the plants in the leaves or branches that slow down wind or rain show that the improved quality of the urban environment is beneficial (Irwan, 2008).

The growing population from year to year is one of the causes of climate change, and the rapid and uncontrolled population density in some urban areas increases the need for space to accept these benefits. The increasing demand for space, in particular the demand for settlements and built areas, affects the quality of the environment. With the design of space plans that cannot prevent the transformation of land into urban areas, green spaces (RTHs) are increasingly threatened and cities' activities are becoming increasingly uncomfortable. According to Chafid Fandelli (2004), the City Green Open Space is part of urban planning and has a protected function. The City Green area consists of urban landscape, urban forest green, urban recreational green, sports green and garden green. The green open spaces are classified according to the state of the region, not according to the shape or structure of the vegetation. The green land is intended to maintain land availability as a catchment area.

2. Methods

In This Study The Authors Tried To Use A Systematic Literature Review Method. This Method Tries To Collect Existing Literature And Articles Which Are Then Reviewed To Look For Potential Green Open Spaces As A Solution To Addressing Microclimates.

3. Results and Discussion

The existence of green and open spaces in urban areas is crucial. In addition to ecological functions, green open space is also a space for residents to connect and rest. In addition, the presence of green open spaces includes urban planning functions, the economic function of carbon dioxide absorption (CO2), temperature reductions caused by shady plants, watersheds and noise reductions. Since the introduction of local autonomy, it has led to the physical development of the entire Indonesian city. At the same time, the natural state of the earth has further deteriorated as a result of global warming. Ecosystems and sustainability are serious problems not only for the Indonesian people but also for the international community.

With the spread of buildings, we cannot avoid the importance of green spaces for the lives of urban residents, but on the other hand, these developments are often overlooked and even close to natural green spaces. We often see urban parks that destroy the environment, lead to ecological imbalances, and of course, accelerate global warming and affect human health. Not to mention the air pollution that makes it hard for us to breathe. For example, when a car travels along a highway, carbon compounds also rise into the air. Carbon compounds composed of CO (carbon monoxide), HC (carbon hydride) and NOx (nitrogen oxide) penetrate the air and are inhaled by people. Unfortunately, these compounds are often very unfriendly and unhealthy. Millions of toxins are inhaled into our bodies and stored.

3.1 Microclimate

The microclimate is one of the main requirements of urban communities to create thermal outdoor comfort. The microclimate is the criterion for determining thermal well-being consisting of four components: air temperature, humidity, wind speed and solar radiation. Open green spaces (RTHs) are an opportunity to create a pleasant microclimate in the community. The microclimate varies from region to region. It depends on the surface of the water pipe, the type of wood, the water level of the running surface and the construction surface around the open green. Microclimate factors such as temperature, humidity, sunlight or wind strongly influence the surrounding climatic conditions and also

affect other topographic factors, the soil surface, three-dimensional and specific objects. 2016). According to the Landesamt für Raumordnung (2008), vegetation in the region as a whole is available or is imported from outside. According to Obi (2014), plants play an important role in the city's microclimate strategy.
Microclimate elements:

a. Air temperature, temperature refer to the heat and cold measured by the thermometer. The most used temperature unit is 0 degrees Celsius. People in the tropics feel comfortable at temperatures between 27 and 280 degrees Celsius.
b. Humidity is the amount of steam present in the air. Relative humidity produces water droplets in the range of 0-100%, dry air 0%, and saturated air 100%.
c. According to Handoko (1995), the temperature is closely related to the sun's radiation. During the day, the radiation warms the upper part first, then falls to the forest floor and eventually falls to the forest. The cooling at night begins with a heat loss crown relationship than other forests. The forest surface is an active radioactive surface.

3.2 Green open space

Public space can be divided into several typologies, including:

a. External public space, this type of public space is generally a form of external (public) space that everyone can access, such as urban parks, squares, and pedestrian roads.
b. Internal public spaces, this type of public space is freely accessible in the form of public facilities managed by the state, regardless of post offices, police, hospitals and other public institutions.
c. Public spaces inside and outside public spaces are a form of private public institutions that residents must follow, such as department stores, discotheques, and restaurants.

The following are the main components in the arrangement of City Green Open Spaces that must be met:

a. Trees with criteria for the shape of the canopy (canopy), a balance between the size of the trunk and the canopy.
b. Expanse of grass.
c. Flowering shrubs, namely short trees with a variety of flower colors.
d. Shade tree type vegetation with high sensitivity and able to absorb lead. 5. Vegetation that has a scent and smell to reduce air pollution.
e. Use of safe and non-hazardous vegetation types.
f. There are adequate supporting facilities and infrastructure for green open spaces so as to be able to meet the needs and accommodate community activities.

Prevention programme should address the greater concept of health promotion, substance abuse in general (Notoatmodjo, 2012). Massive penetration of social media becomes a momentum to develop proper prevention programme. Since the regulation of online drug distribution is still absent, the existence of online media needs to be used also as a means of promotion. However, a breakthrough in the dissemination of information needs to be adapted to the target or the receiver of information.

3.3 Utilization of green open space

According to (Directorate General of Spatial Planning Department of Public Works, 2008) shows that the purpose of forming green open spaces is Beauty (canopy, stands, guides, guards, fillers, and mats), reduce air pollution, reduce noise, improve microclimate, support life systems and comfort, Protection, erosion prevention and storm barrier , Education, fun, health, social interaction, Supporting macro ecosystems, ventilation and unifying urban space , Spatial, visual, audial and thermal comfort and economic value, Community services and urban environmental buffers, tourism nature, forest product production, ecosystem balance.

The Green Space functioned according to the policy of the Directorate General of Spatial Planning of the Ministry of Public Works in 2007:

a. The bioecological (physical) function is to purchase green space as part of air circulation (urban waste) and to ensure shade, oxygen generator, storm water absorption, animal habitat, medium atmosphere, absorption (treatment) and wind resistance.
b. The social economy (productivity) and cultural functions describe the cultural expression of a region. "Green Open Spaces" is a place for communication, entertainment, education and research on urban identity.
c. Urban ecosystems can produce oxygen, bloom plants, produce fruits and beautiful leaves, and be part of agriculture and forestry.
d. The aesthetic function is to increase comfort and to beautify the urban environment in microcosm: the official site, all residential and macro-urban areas, and stimulate the creativity and productivity of urban residents. It can also be active or passive entertainment, such as games, sports or other socialization activities that generate both a "balance between physical and psychological life". It is possible to create a harmonious and balanced atmosphere between various buildings, the urban forest road infrastructure, the urban park, the agricultural urban park, the architectural park, the road green and the railway.

Benefits of Green Open Space According to Permendagri No. 1 of 2007 concerning Urban Green Open Space Arrangement, the benefits of open space are as follows:

a. Providing freshness, comfort, and beauty of the environment.
b. Provide a clean and healthy environment for city dwellers.
c. Gives results in the form of wood products, leaves, flowers, and fruit.

According to the PERMEN 2008 PRT/M, Guideline for Provision and Utilization of the Guideline of Urban Area, the benefits of green open space can be indirectly divided into direct benefits (i.e., fast, typified), physical comfort (shade, fresh), demand and conservation of biodiversity or biodiversity. The benefits of green open spaces are to support the health, welfare and safety of urban residents. Green open spaces also compensate for the protection of natural disasters, environmental protection, health and safety, recreational activities and the control of the production of natural resources developed.

4. Conclusions

The benefits of Green Open Space, according to Permendagri No. 1 Year 2007 on Green Open Space Arrangement in Urban Areas, are based on the provision of freshness, comfort and ecological beauty; a clean and healthy environment for city dwellers; and the return of wood products, leaves, flowers and fruits. Perm PU No. 5/PRT/M of 2008 "Guidelines on the Provision and Use of Urban Green Space" categorized the advantages of green space into direct benefits (fast and practical benefits) based on its function, such as materials (wood, leaves, flowers), physical comfort (eyes, freshness), desires, and desires. And there are indirect advantages (organ or type) such as water resource protection and biodiversity protection. Benefits of green space include supporting the health, welfare and safety of urban residents. Green spaces can also promote the production of natural resources, prevent natural disasters, protect the environment, promote health and safety, and promote entertainment activities and map development.

Acknowledgement

Thank you to god almighty for the health provided so that this article can be completed, thank you to my parents who always providea good port soup for me and many thanks to my lecturer who taught me with a good explanation and also for giving this task so that my knowledge of Climate Change: Utilization of Ruang Terbuka Hijau as a Microclimate Mitigation in indonesia.

Author Contribution

All authors contributed to the research.

Funding

This research received no external funding.

Ethical Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data Availability Statement

Not applicable.

Conflicts of Interest

The authors declare no conflict of interest.

References

Aguspriyanti, C. D. (2021). Green Corridors: Potensi Peningkatan Ruang Terbuka Hijau Publik Ramah di Kota Padat (Studi Kasus Kota Malang). *Jurnal Arsitektur ZONASI*, 4(2), 234-345. https://doi.org/10.17509/jaz.v4i2.33439

Alifia, N., & Purnomo, Y. (2016). Identifikasi letak dan jenis ruang terbuka hijau di kawasan permukiman perkotaan. *Langkau Betang: Jurnal Arsitektur*, 3(2), 25-35. http://dx.doi.org/10.26418/lantang.v3i2.18329

Amin, S. F. A. (2018). Analisis Pemanfaatan Ruang Terbuka Hijau Pada Pemukiman Padat di Kecamatan Rappocini Kota Makassar. *Jurnal Linears*, 1(1), 43-47. https://doi.org/10.26618/j-linears.v1i1.1321

Aprillia, K. F., Lie, T., & Saputra, C. (2020). Karakteristik desain ruang terbuka hijau pada sempadan sungai perkotaan. *ARTEKS: Jurnal Teknik Arsitektur*, 5(2), 235-244. https://doi.org/10.30822/arteks.v5i2.394

Astaman, S. N. R., Idajati, H., & Firmansyah, F. (2019). Identifikasi sebaran dan karakteristik ruang terbuka hijau publik di Kota Pekanbaru. *Jurnal Penataan Ruang*, 14(2), 56-60.

Dwihatmojo, R. (2016). Ruang terbuka hijau yang semakin terpinggirkan. Dalam http://www.bakosurtanal.go.id/assets/download/artikel/BIGRuangTerbukaHijauyangSema kinTerpinggirkan.pdf, diakses tanggal, 4.

Legionosuko, T., Madjid, M. A., Asmoro, N., & Samudro, E. G. (2019). Posisi dan strategi indonesia dalam menghadapi perubahan iklim guna mendukung ketahanan nasional. *Jurnal Ketahanan Nasional*, 25(3), 295-312. https://doi.org/10.22146/jkn.50907

Lubis, A. R., & Sulistyarso, H. (2018). Strategi Peningkatan Efektivitas Ruang Terbuka Hijau Di Perumahan Wisma Gunun Anyar Surabaya. *Jurnal Teknik ITS*, 7(1), C1-C4. 10.12962/j23373539.v7i1.28924

Mala, Y. P., Kalangi, J. I., & Saroinsong, F. B. (2019). pengaruh ruang terbuka hijau terhadap iklim mikro dan kenyamanan termal pada 3 lokasi di Kota Manado. *Eugenia*, 24(2), 52-63. https://doi.org/10.35791/eug.24.2.2018.22658

Monoarfa, R. V., Moniaga, I., & Tarore, R. C. (2017). Evaluasi Ketersediaan Ruang Terbuka Hijau dalam Mewujudkan Kota Hijau (P2KH). *SPASIAL*, 4(1), 113- 124. https://doi.org/10.35793/sp.v4i1.15461

Ningtyas, T. (2019). Pemanfaatan Ruang Terbuka Hijau (RTH) Publik. *Jurnal Ilmiah Manajemen Publik dan Kebijakan Sosial*, 3(1). https://doi.org/10.25139/jmnegara.v3i1.1898

Nurliah, N., & Tajuddin, M. S. (2021). Analisis Tata Kelola Ruang Terbuka Hijau Terhadap Pembangunan Kota di Kabupaten Majene. *MITZAL (Demokrasi, Komunikasi dan Budaya): Jurnal Ilmu Pemerintahan dan Ilmu Komunikasi*, 5(1), 71-52. http://dx.doi.org/10.35329/mitzal.v5i1.1852

Pambudi, B. P., & Tambunan, M. P. (2021). Evaluasi Kesesuaian Lahan Ruang Terbuka Hijau terhadap RTRW Kota Bekasi. *Media Komunikasi Geografi*, 22(2), 183-194. 10.23887/mkg.v22i2.38729

Purwantiasning, A. W. (2017). Optimalisasi Fungsi Ruang Terbuka Hijau Dengan Melihat Pola Sebaran Pengunjung Studi Kasus: Taman Tabebuya, Jagakarsa. *Nature: National Academic Journal of Architecture*, 4(2), 121-127. https://doi.org/10.24252/nature.v4i2a4

Ramadhani, F. P., & Hubeis, A. V. S. (2020). Analisis Gender dalam Upaya Adaptasi dan Mitigasi Perubahan Iklim. *Jurnal Sains Komunikasi dan Pengembangan Masyarakat [JSKPM]*, 4(2), 155-166. https://doi.org/10.29244/jskpm.4.2.155-166

Ramadhan, F., & Osly, P. J. (2019). Analisis ketersediaan ruang terbuka hijau dan kecukupannya di Kota Depok. *Jurnal Infrastruktur*, 5(1), 7-11.

Rushayati, S. B., Hermawan, R., Setiawan, Y., Wijayanto, A. K., Prasetyo, L. B., & Permatasari, P. A. (2020). Pengaruh Pola Pemanfaatan Ruang Terbuka Hijau terhadap Dinamika Perubahan Kualitas Udara Akibat Pandemi Covid-19. *Jurnal Pengelolaan Sumberdaya Alam dan Lingkungan (Journal of Natural Resources and Environmental Management)*, 10(4), 559-567. http://dx.doi.org/10.29244/jpsl.10.4.559-567

Rahman, R., Effendi, H., Rusmana, I., Yulianda, F., & Wardiatno, Y. (2020). Pengelolaan ekosistem mangrove untuk ruang terbuka hijau sebagai mitigasi gas rumah kaca di kawasan Sungai Tallo Kota Makassar. *Jurnal Pengelolaan Sumberdaya Alam dan Lingkungan (Journal of Natural Resources and Environmental Management)*, 10(2), 320-328. https://doi.org/10.29244/jpsl.10.2.320-328

Sambur, R. C. (2021). Tata Kelola Ruang Terbuka Hijau Di Kota Manado. *Jurnal Politico*, 10(1). https://ejournal.unsrat.ac.id/v3/index.php/politico/article/view/31504

Santi, S., Belinda, S., & Rianty, H. (2019). Identifikasi iklim mikro dan kenyaman termal ruang terbuka hijau di Kendari. *NALARs*, 18(1), 23-34. https://doi.org/10.24853/nalars.18.1.23-34

Santoso, W. Y. (2015). Kebijakan nasional Indonesia dalam adaptasi dan mitigasi perubahan iklim. *Hasanuddin Law Review*, 1(3), 371-390. http://dx.doi.org/10.20956/halrev.v1i3.116

Saroinsong, F. B., Kalangi, J. I., & Babo, P. (2017). Redesain ruang terbuka hijau Kampus UNSRAT berdasarkan evaluasi kenyamanan termal dengan indeks disc. *Eugenia*, 23(2). https://doi.org/10.35791/eug.23.2.2017.16778

Selanno, F. M. (2020). *Sebaran, Luas Dan Potensi Tumbuhan Penyusun Ruang Terbuka Hijau (Rth) Kota Ambon Dalam Mitigasi Emisi Gas Karbondioksida (Co2)*. Doctoral Dissertation, Universitas Gadjah Mada.

Setiyawan, N., & Akbari, T. (2021). Analisis Proyeksi Perubahan Ruang Terbuka Hijau Publik Di Kota Cilegon Pada Tahun 2025. *Jurnal Lingkungan Dan Sumberdaya Alam (JURNALIS),* 4(1), 70-79.

Setyani, W., Sitorus, S. R. P., & Panuju, D. R. (2017). Analisis ruang terbuka hijau dan kecukupannya di Kota Depok. *Buletin Tanah dan Lahan*, 1(1), 121-127.

Suciyani, W. O. (2018). Analisis potensi pemanfaatan ruang terbuka hijau (RTH) kampus di politeknik negeri Bandung. *Jurnal planologi*, 15(1), 17-33. https://ejournal.unsrat.ac.id/v3/index.php/politico/article/view/31504

Sudarwani, M. M., & Ekaputra, Y. D. (2017). Kajian penambahan ruang terbuka hijau di kota Semarang. *Jurnal Teknik Sipil Dan Perencanaan*, 19(1), 47-56. https://doi.org/10.15294/jtsp.v19i1.10493

Utami, C. Analisa Kelayakan Rancangan Lansekap Ruang Terbuka Hijau (RTH) Sungai Mati Cisangkuy Berdasarkan Aspek Finansial. *Educational Building Jurnal Pendidikan Teknik Bangunan dan Sipil*, 3, 27-30. https://doi.org/10.24114/eb.v3i2.8254

Yogica, R. (2018). Kebijakan penanganan masalah perubahan iklim dengan strategi mitigasi dan adaptasi.

Yuliriyanto, R. (2020). *Analisis Lokasi Potensi Ruang Terbuka Hijau di Kecamatan Kota Kudus*, Doctoral Dissertation, Universitas Islam Sultan Agung Semarang.

Zubair, A. M., Tjaronge, E. H. M. W., ST M, E., & Ramli, E. M. I. (2017). Pengaruh Ketersediaan Ruang Terbuka Hijau Terhadap Iklim Mikro di Kota Makassar. *Jurnal Teknik Lingkungan*. https://core.ac.uk/download/pdf/77630754.pdf

Biographies of Author(s)

Fadilatur Rahmi AguS, Environmental Engineering, Engineering Faculty, President University

- Email: fadilatur.agus@student.president.ac.id
- ORCID: -
- Web of Science ResearcherID: -
- Scopus Author ID: -
- Homepage: -

Yunita Ismail, Environmental Engineering, Engineering Faculty, President University

- Email: yunitaismail@president.ac.id
- ORCID: 0000-0002-3297-8850
- Web of Science ResearcherID: GPF-8013-2022
- Scopus Author ID: 57205019607
- Homepage: https://sinta.kemdikbud.go.id/authors/profile/6068346