CURRENT STATUS, IMPORTANCE AND DEVELOPMENT TRENDS OF URBAN GREENING

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Abstract
According to the United Nations (UN), the planet has been intensively urbanized over the past dozen years, with almost 55% of the planet's population now residing in city territories, and this ratio is estimated to grow to nearly 68% by 2050. This growing process of settlement and fast urbanization generates tremendous issues in terms of hygiene, welfare and ecology, and lifts fear regarding the sustainable development of towns or urban areas globally. For this matter, urban greenery and other open spaces around the globe are getting such essential naturally, climatically, economically and socially. Moreover, a reasonable allocation of urban green open spaces with a good standard and high quality of supports determine the originality of cities and towns on a global scale. Ensuring symbolic natural, climatic, social and mental necessities, urban green open spaces replenish city dwellers existence along with new senses as well as feelings and develop the characteristic of lifestyle as the main element of urban sustainability or resilience. In addition, the objective of this scientific article is to provide an overview of the theme «Urban Green Open Space around the Globe» with an emphasis on the current status, importance and development trends from the point of view of sustainable development.[1]

Keywords: urban sustainability, green area, open space, global practice

ТЕКУЩЕЕ СОСТОЯНИЕ, ЗНАЧЕНИЕ И ТЕНДЕНЦИИ РАЗВИТИЯ ГОРОДСКОГО ОЗЕЛЕНЕНИЯ

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Аннотация
По данным Организации Объединенных Наций (ООН) наша планета интенсивно урбанизировалась за последние десять лет и почти 55% населения сейчас проживает на городских территориях, по оценкам экспертов это соотношение вырастет почти до 68% к 2050 году. Быстрый процесс урбанизации порождает огромные проблемы с точки зрения экологии, гигиены и комфорта проживания, а также вызывает опасения относительно устойчивого развития городских территорий в мире. В этом отношении повышается роль зеленых зон и рекреационных пространств города, значение которых становятся более важным в климатическим, экономическим и социальным аспектах его функционирования. Более того, разумное внедрение в городскую структуру открытых «зеленых» пространств с высоким качеством исполнения и оптимальными эксплуатационными характеристиками, определяет самобытность поселений. Обеспечивая природные, климатические, социальные и знаково-символические потребности жителей, городские зеленые открытые пространства наполняют жизнь горожан новыми чувствами, а также развивают характеристики образа жизни как основного элемента городской устойчивости или жизнестойкости. Задача данной научной статьи – поставить проблему формирования комплексного зеленого каркаса рекреационных зон, лесных угодий, городов и поселений

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и дать обобщенный взгляд на тему «Городское зеленое открытое пространство вокруг земного шара» с акцентом на текущее состояние, важность и тенденции развития с точки зрения глобальных перспектив устойчивого развития.[2]

Ключевые слова: устойчивое развитие городов, зеленая зона, открытое пространство, мировая практика

1. Introduction

Globally, the process of urbanization has been a distinctive tendency over the last several centuries and it is also intended that nearly 7 billion populations of the globe will dwell in city regions by 2050. [4] Due to this extensive urbanization, maximum city areas around the globe face a large number of natural – climatic and social problems like extreme temperatures, floods, cyclones, heavy rainfall, storms, water logging, miserable air quality as well as water and sound pollution etc, that destroy the city growth and overall urban sustainability. Too many previous studies show that the availability of green open spaces can significantly reduce these challenges in an urban environment and ensure a pleasant setting for inhabitants. Moreover, the mental health of urban dwellers has also become a serious factor in preserving the social and ecological characteristics of the city. [6] Besides, other analysts suggest that an urban area should have at the minimum 9 m^2 of green open space for each city inhabitant along with a perfect urban green open space amount of 50 m^2 per head. [1] Numerous experts remark that urban greening and other open spaces can energize cities in the sense of ecological, public, and financial advantages. [6] Therefore, globally, the prudent allocation and preservation of urban green open spaces is a key policy for exploiting urban sustainability.

This study focuses primarily on the specifications of current urban green open spaces for each inhabitant in different cities, the problems of assessment and use of urban green open areas, the importance of urban green open spaces in the context of natural – climatic and social aspects, the typology of WHO (world Health Organization) recommended urban green open spaces and ideal modern compact cities with urban green open spaces as part of the ecosystem in the global practice. At last, this paper discusses a number of policies for providing green open spaces in a dense urban setting around the globe.

2. Problem identification and research methods

The article is devoted to the ecological crisis, in particular the problem of urbanization growth, building compaction, lack of landscaping, which leads to the shallowing of rivers and reservoirs, a decrease in air humidity, an increase in air temperature in urban areas, a deterioration in the climate and comfort of cities.

This work is predominantly relying on secondary information resources, such as several experimental scientific papers, journals and different websites, which are commonly used to provide reliable data. Analysis of green areas per city dweller in different countries, comparative study, and analysis of the decline and growth of greening in cities, qualitative transformation of landscaping structures, forecasting the situation in this direction is very valuable in research and finding a solution to this problem and is certainly relevant.

[2] **Для цитирования:** Монти К М И Текущее состояние, значение и тенденции развития городского озеленения // Architecture and Modern Information Technologies. – 2021. – №1(54). – С. 145–155. – URL: https://marhi.ru/AMIT/2021/1kvart21/PDF/09_monty.pdf
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Scientific novelty is a detailed study of the processes of decreasing and increasing greening of cities around the world, illustrating the positive and negative environmental consequences of growth and reduction of green areas.

3. Results and discussion

3.1. Current status of urban green open spaces around the globe

3.1.1. Urban green open spaces for each inhabitant in different cities

Various recognized associations across the globe recommend different lowest standards of open green spaces for an urban atmosphere, such as, the World Health Organization (WHO) offers at the minimum 9 m^2 of open green area for each city resident. In contrast, another internationally recognized association called 'Energy and Environmental Design Leadership for Neighbourhood Design (LEED ND)' offers at least 20 square metres for each population unit in cities. Globally, the availability of green open spaces in urban environments differs depending on the degree of scaling. In a number of various towns, such as Beijing, Hong Kong, Buenos Aires, Chennai, Jakarta, Barcelona, Mexico city, Tokyo and Delhi have green open spaces significantly fewer than the suggested 9 square metres set by the World Health Organization. On the contrary, towns for instance Seoul, Madrid, Jaipur, Toronto, Paris, Chandigarh, Rotterdam, New York, Curitiba, Bangalore and Santiago have greater than what 'World Health Organization' offers. [7] Fig.1 below demonstrates the urban green open spaces for each inhabitant in different cities around the globe.

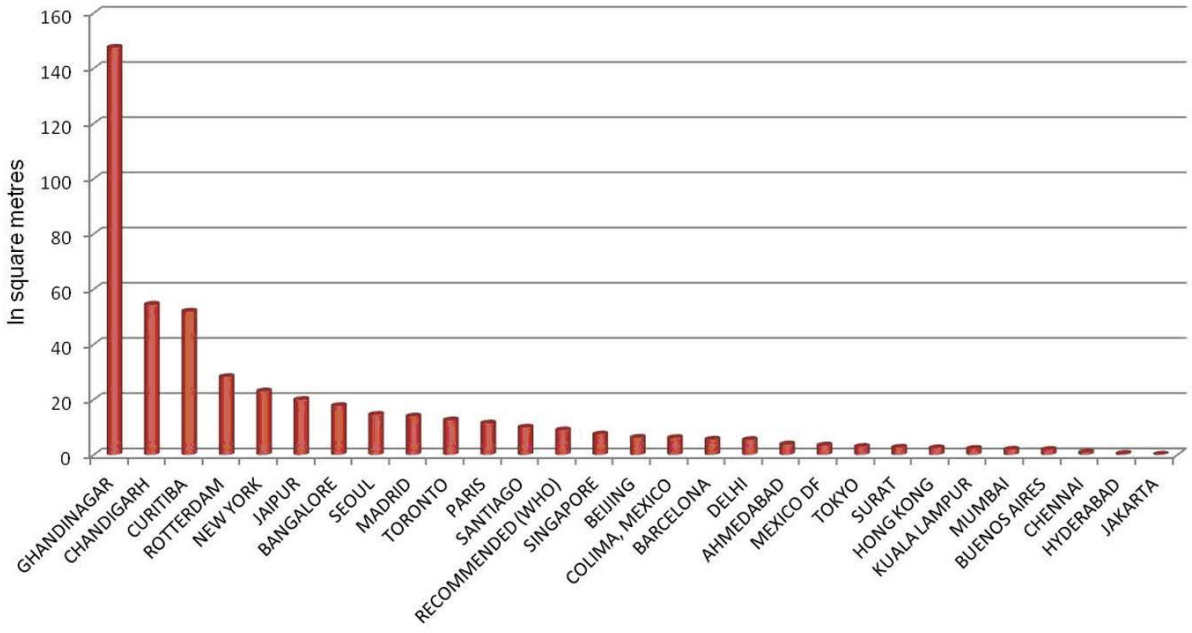

Fig. 1. Urban green open spaces for each inhabitant in different cities around the globe [7]

3.1.2. Problems of assessment and use of urban green open spaces in the global practice

Table 1. Clarification of the problems of assessment and use of urban green open spaces in the global practice [5] [3]

1. Difficulties of managing urban green open spaces in the sense of applying imperfect information:	Managing open urban green spaces needs relevant information on city green open areas. The ability of urban green open areas to ensure advantages to city inhabitants rely on if they are monitored as a combined framework of city green facilities either as detached isles that drop in accordance with the duty of various interested parties
2. Increasing, operating and ensuring the ecological advantages of urban green open spaces:	At this moment, urban green open spaces bring huge ecological advantages and can produce a much higher assistance to reduction the effects of forthcoming climate change, that are now underestimated. For instances, strengthening air as well as thermal characteristics through producing cooling system actions and decreasing CO_2 radiations; avoiding flood via sewerage and thunderstorm effluent and facilitating biological diversity etc
3. Limitation of budgetary allocations:	In developing countries, budgetary allocations for urban gardens, parks, playgrounds and other green areas are generally small with fighting additional impacts. So, ongoing monetary impacts may also change the characteristic of urban green open spaces. However, urban gardens, parks and other green areas suggest wide advantages in an extensive variety of areas; the budgetary allocations are still limited to a single origin
4. Productive (cost-effective) study:	Now, there are not enough reliable productive (cost-effective) research instruments that are advanced much to cover dimensions of the privileges of parks and green open spaces although this is quite significant to possess reliable methods to assist the top cases in order to remain to justify endowment in green open areas. That is why methods of evaluation of urban green open areas should be prepared by scientists, legislators as well as other experts
5. Secured financing or subsidy for parks, playgrounds and gardens:	Currently, due to the need of territory for habitation or dwelling with limited subsidy, regional authorities can eliminate vulnerable parks, playgrounds, gardens and other green open spaces in order to increase secured financing or subsidy for the improvement and preservation of the residual green open areas
6. Transformation of urban green open spaces and enlightenment as well as assessment of their regional and culturological use:	Gardens, parks and other green spaces are typically seen as a culturological tool, however their utilization is very hard to assess although there are some smarter innovative methods. For example, when and why, who utilizes these green open spaces, and what they hold and who owns them etc. A green open space city map can address these challenges, and through this method, neighbourhoods and local legislators can produce effective utilization of the available green open spaces in the region

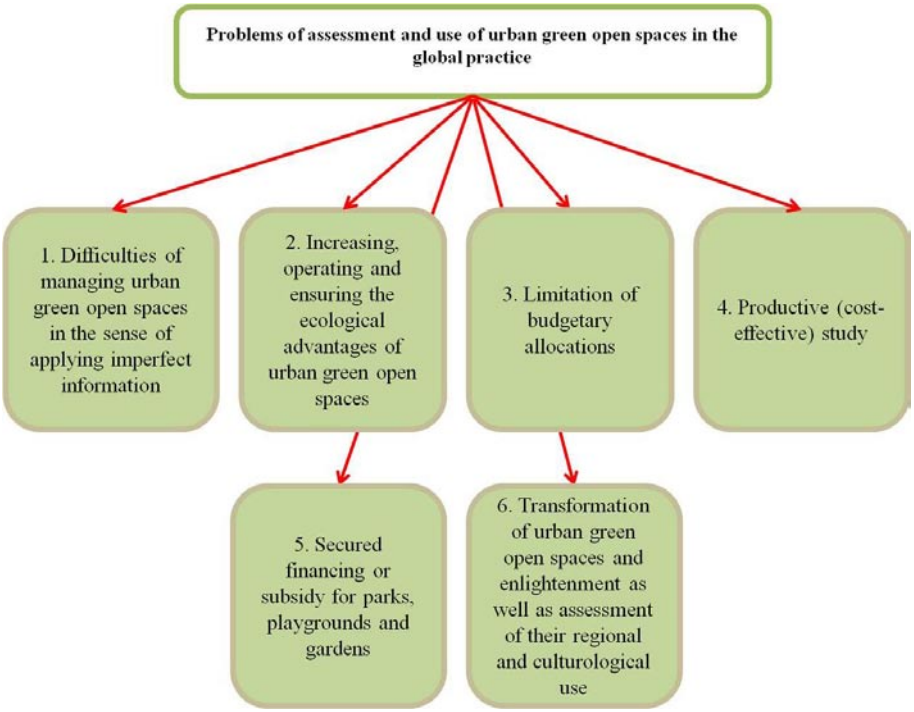

Fig. 2. Problems of assessment and use of urban green open spaces in the global practice

3.2. Importance of urban green open spaces around the globe in the context of natural – climatic and social aspects

Green areas, wetlands and other open spaces bring immense privileges to urban sustainability in terms of environmental, commercial as well as social justice dimensions [6]. Benefits of urban greenery, wetlands and open spaces around the globe in the context of natural – climatic aspects – are shown in Tab. 2 and at Fig. 3 (see below).

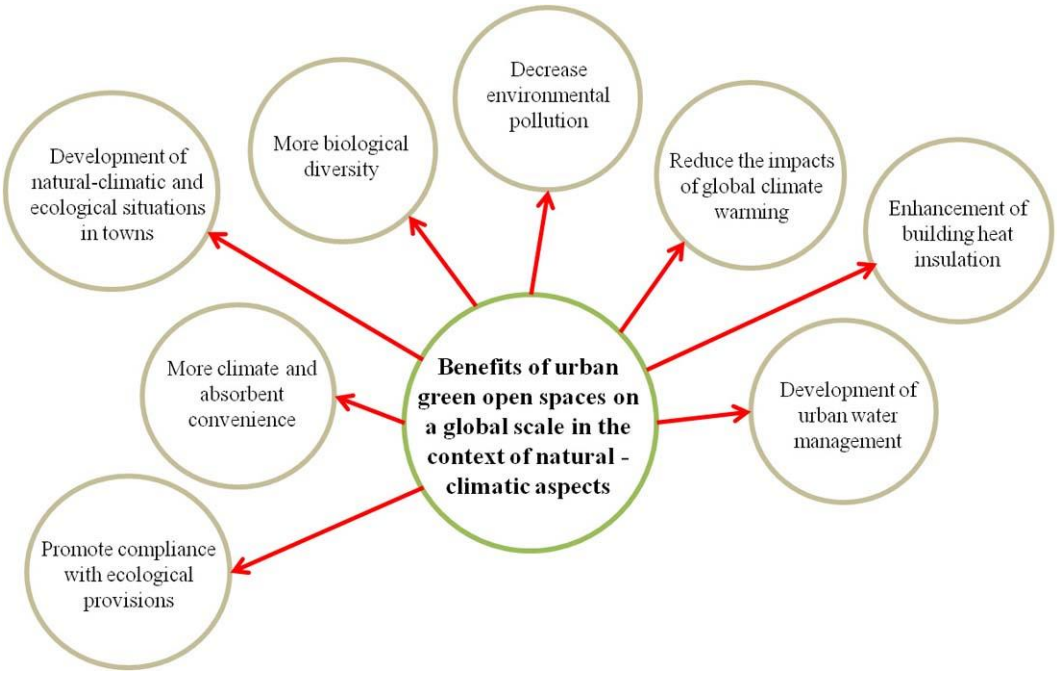

Fig. 3. Benefits of urban green open spaces on a global scale in the context of natural-climatic aspects

Table 2. Interpreting the benefits of urban green open spaces on a global scale in the context of natural – climatic aspects [10] [11]

1. Promote compliance with ecological provisions:	The EU (European Union) as well as its city authorities already has understood the demand to provide the availability of greening, wetlands and other open spaces inside the territory of the cities to enhance ecological situations as well as the welfare of city dwellers. So in 2013, they established 'Green infrastructure: Strengthening Europe's Natural Capital' to stimulate the latest design developments and generate greater spontaneous regions for urban sustainability
2. More climate and absorbent convenience:	On the one hand, the availability of green areas, wetlands and other open spaces in city development planning as well as premises, support to mitigate climate change through decreasing the temperature in the city by 1°C. On the other hand, urban green rooftops and vertical walls decrease noise level and thermal insulation of houses in the city up to 3 dB and 8 dB
3. Development of natural-climatic and ecological situations in towns:	Currently, several problems that most towns around the globe struggle with are atmospheric pollution and excessive heat in different seasons of the year. One of the tools for solving these problems is covering urban greening. They go a long way towards improving the development of natural-climatic and ecological situations in towns in various forms, for example, environmentally friendly green roofs perform as a radiator for CO_2 which is accountable for today's climate change
4. More biological diversity:	Distribution of urban greening promotes to the development of the latest cover of the city's biological diversity with seedling that establish natural environment for various living nature species
5. Decrease environmental pollution:	The usual issue of various cities around the globe is environmental pollution, and seedlings located on the rooftops of buildings serve as a process of cleaning up this environmental pollution
6. Reduce the impacts of global climate warming:	Ascending heats, increased series of higher heat waves, rainfall as well as the distribution of illnesses are the several impacts of the horrific global warming in various towns around the globe. But producing of the latest "City Greening Ecological System" can reduce these effects that are straight harmful for the well-being of city inhabitants
7.Enhancement of building heat insulation:	Using of green rooftops can provide city dwellers with cooler temperatures during the summer periods, as well as, conversely, more warmer temperatures during the cooler periods
8. Development of urban water management:	Green rooftops could soak the city's rainwater. Moreover, open urban wetlands decrease the possibilities of floods inside the city as well as refine wastewater and by this way, enhance the quality level of water

Benefits of urban greenery, wetlands and open spaces around the globe in the context of social aspects are shown in Tab. 3 and at Fig. 4 (see below).

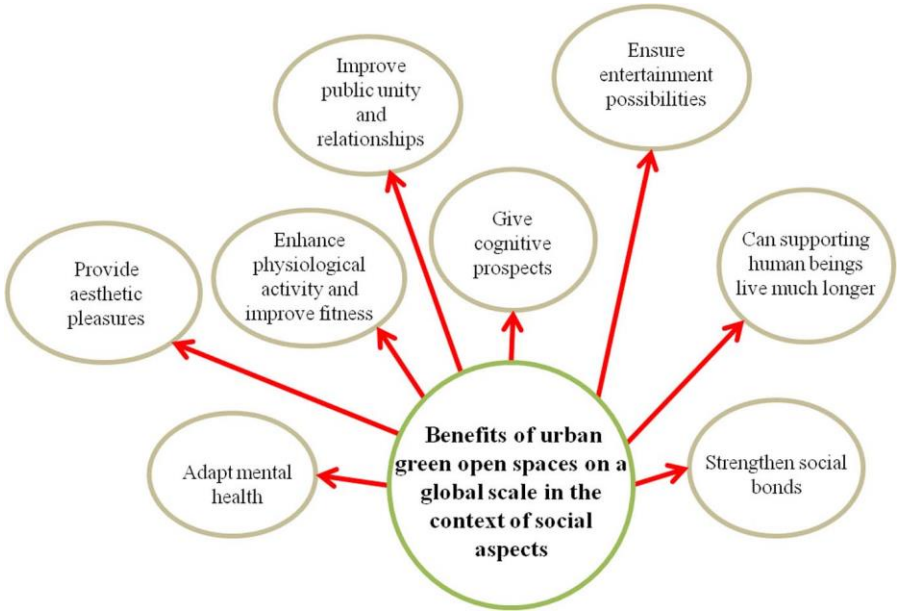

Fig. 4. Benefits of urban green open spaces on a global scale in the context of social aspects

Table 3. Interpreting the benefits of urban green open spaces on a global scale in the context of social aspects [6] [9]

1. Adapt mental health:	Urban open green spaces are more desirable for rehabilitation impressions and mental comfort. Moreover, psychological exhaustion as well as assault can be managed and shortened in conducive surrounding
2. Provide aesthetic pleasures:	Urban greenery, wetlands and other open spaces can supply visible feelings of shades, forms, appearances, beeps etc., and these feelings diversify as a result of the changing periods, atmosphere
3. Enhance physiological activity and improve fitness:	Features and other qualities of urban open green areas can encourage residents of the city to take part greater in external events. In addition, physiological privileges and fitness can be obtained via numerous relationships along with urban green open settings
4. Improve public unity and relationships:	Urban green open spaces can foster public unity and relationships through participation and interaction among residents of the city. Besides, they can create as well as establish bonds among local city dwellers, enhancing society ties and meaning of originality
5. Give cognitive prospects:	Urban green open spaces can be visible as other study platforms for kids. Disclosure to the green area establishes a meaning of variety and promotes inventiveness as well as fiction that contribute efficiency of graduates in their grades
6. Ensure entertainment possibilities:	Urban green open spaces, such as communal public parks or gardens can ensure an urgent attitude towards nature as well as deliver joy to calm for local inhabitants. Furthermore, urban parks and other public green open spaces can supply a useful area for outings and leisure
7. Can sustain human life for a long time:	A research of "The Lancet Planetary Health" has discovered powerful confirmation that urban open green areas can sustain human life for a long time
8. Strengthen social bonds:	Urban open green areas can promote a clean and sustainable setting to strengthen social bonds. Public or social communication is greater likely to occur in the desired setting, rather than in other different locations

3.3. Development trends of urban green open spaces around the globe

3.3.1. Typology of WHO (World Health Organization) recommended urban green open spaces

The typology of WHO (World Health Organization) recommended urban green open spaces are determined as measures that considerably change the characteristic, volume and availability of urban green open areas (Tab. 4). Moreover, it can be carried out through the establishment of latest urban greenery and other open spaces either by altering the parameters as well as features of available ones.[8] According to WHO, urban green open spaces can be introduced at various dimensions in individual and social areas.

Table 4. Typology of WHO recommended urban green open spaces [8]

Urban green paths / passages for pedestrian traffic and bicycling
Urban grasslands / meadows / parks
Neighbourhood parks / gardens / school or college playgrounds
Easier exit / entrance to city forest parks as well as ecological living natural territories
Lower size urban green open areas like pocket parks / gardens as well as children's playfields
Urban open green areas on the side of streets, as well as flora or planting of obstacles beside roads / railway routes
Environmentally friendly green rooftops as well as vertical walls(facades)
Lakeshore paths / marine tracks connecting green along with “Blue Spaces” of the city

3.3.2. Ideal modern compact cities around the globe with urban green areas and open spaces as part of the ecosystem

One of the most perfect compact cities around the globe is Ljubljana (Slovenia) that received the title of "European Green Capital" in 2016, with nearly five hundred sixty meter square of urban green open spaces for each resident of the city as well as its every housing sites are situated in a radius of three hundred meter from social environmentally friendly green areas. Furthermore, past dozen years, the capital of Singapore has frequently been listed as an ideal instance of thriving «Biophilic City Development» that has gradually promoted a change in outlook from «A Garden City» to «A City in a Garden». On the other side, we can see another example as a trial of restoring the nature of towns along with non-local biological species in Dubai (UAE). This is a city which has really a shortage of water and that needs an incredibly large amount of conservation, sprinkling expenses and other supports. In addition, a sample of the «City Green Belt Biosphere Preserve» is displayed as a round ring on the middle urban district in Lucca, Italy (Fig. 5) [1].

a) b)

c) d)

Fig. 5. Ideal modern compact cities around the globe with urban green areas and open spaces as part of the ecosystem. a) Ljubljana, Slovenia; b) Singapore; c) Dubai, UAE; d) Lucca, Italy [1]

3.3.3. Policies for providing green open spaces in a dense urban setting around the world

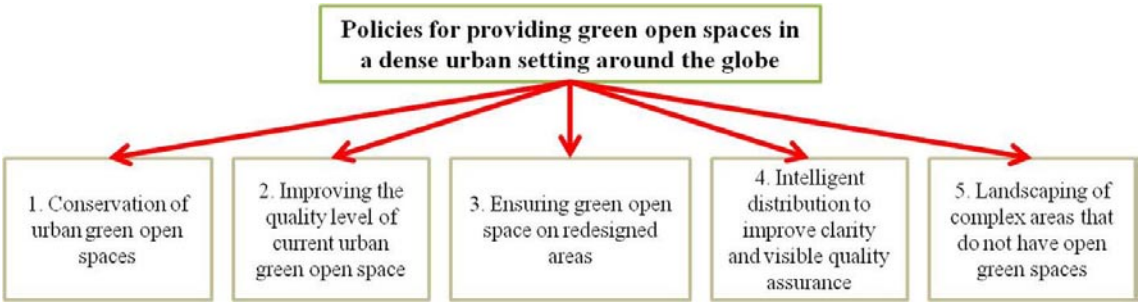

Fig. 6. Policies for providing green open spaces in a dense urban setting around the world

Table 5. Characteristic of green open space policies in a dense urban setting around the world [2]

1. Conservation of urban green open spaces:	Conservation of available urban greenery and other open space is frequently recommended as the primary alternative for spectacular green area development, particularly in densely populated towns around the globe
2. Improving the quality level of current urban green open space:	Improving the quality level of current urban green open space in terms of entertainment as well as the biological diversity prospect is considered as a new significant point of view
3. Ensuring green open space on redesigned areas:	Green open space must be created in the reconstructed areas with new green open zone plans using construction site layouts modified prior to the final development scheme
4. Intelligent distribution to improve clarity and visible quality assurance:	Clarity as well as visible quality assurance of urban green open spaces can be improved through intelligent distributions. This is never just the amount of green areas that affect the understanding of an ecological town. Nevertheless, it shows in what way urban green spaces are allocated and located inside the town
5. Landscaping of complex areas that do not have open green spaces:	Places where there is no green area, for example very tight roads, can be more eco-friendly or green when the required attempt is approved like landscaping

4. Conclusion

The process of urbanization is leading to a growth in the ratio of the population size residing in towns around the globe and this urbanity lifestyle restricts address to natural habitat as well as could enhance impact to specific environmental and climatically threats like heat wave, thunderstorms, tornadoes, drought, air pollution, noise and heavy rainfall etc. A numerous urban regions globally are struggling with rising force from a growing vast population size, fund constraints and the emerging consequences of global warming. Therefore, these difficulties should be taken into account everywhere, especially in all urban areas on a global scale, so that they can ensure more rewarding sustainable conditions. In addition, urban greening and further ecological methods suggest advanced perspectives to improve the characteristic of the city environments and increase regional sustainability with strengthening stable way of life of city dwellers.

Green rooftops, meadows, neighbourhood parks, gardens, playgrounds and other green paths or passages, etc. in social and individual sites are the main element of these methods. Hence, this is inevitable to provide more available social urban green spaces for every city resident around the globe, with an equal and reasonable allocation. Moreover, forecasting the balance of landscaping and building as well as considering the current situation, the author proposes options for transforming cities and the urban environment, where it is impossible to increase the territories of the green environment of cities (terraces, vertical gardening of architecture, reconstruction, gardening of sports field, pedestrian crossings, etc.) what is the practical value of the study.

Sources of illustrations

Table 1-5. Created by the author.
Figure 1. Based on the materials of the site. Available at: https://healthbridge.ca/images/uploads/library/dhaka-park-report_final.pdf
Figure 2-4. Created by the author.
Figure 5. Based on the materials of the site. Available at: https://www.mdpi.com/1660-4601/15/10/2180
Figure 6. Created by the author.

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