

Neighborhood Eco-Park and approach to reduce environmental pollution in intensive urban areas

Nasiri Amir Gholamreza¹

Azerbaijan University of Architecture and Construction, Azerbaijan, Baku
amir.architect82@gmail.com

Abstract. Since the city's healthy parks host urban ecosystem services, they can play an important role in the sustainable development of cities as green reserves of the city's lands. Neighborhood eco-parks with a comprehensive set of sustainability measures such as environmentally friendly plant species, reducing waste production by recycling in the environment, using clean energy and local materials, priority in the expansion of public transport, sidewalks and bike paths compared to the usual neighborhood parks, have a high power to establish ecological balance in crowded urban areas. Today, urban development and lack of attention to its structural features is such that by upsetting the balance between natural distribution and the issue of urban green spots, the formation of a powerful and integrated eco-texture of resistant vegetation with its living organisms in the city's environmental network especially in compact areas, it has faced serious disorders. It can be concluded that neighborhood ecoparks with the help of sustainable environmental requirements, can strengthen any part of the production cycle of consumption and decomposition in their green network and by establishing a stable balance between all three structures of the environmental network compared to conventional parks urban, will have the ability to reduce environmental stresses and repair the ecological network in compact areas.

Keywords: sustainable environmental behavior, neighborhood eco-park, ecological balance, dense urban areas, urban neighborhood parks

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Эко-парки и методы снижения загрязнения окружающей среды в густонаселенных городских районах

Насири Эмир Гуламреза¹

Азербайджанский Архитектурно-Строительный Университет, Баку, Азербайджан
amir.architect82@gmail.com

Аннотация. Поскольку в городских парках используются услуги городской экосистемы, они могут играть важную роль в устойчивом развитии городов в качестве городских зеленых оазисов. Районные экопарки с комплексным набором мер по обеспечению устойчивости, таких как экологически безопасные виды растений, сокращение производства отходов за счет утилизации в окружающей среде, использование чистой

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энергии и местных материалов, расширение общественного транспорта, тротуаров и велосипедных дорожек по сравнению с обычными парками района, имеют высокую способность установить экологический баланс в перенаселенных городских районах. Сегодня городское развитие и недостаточное внимание к его структурным особенностям таковы, что нарушен баланс между естественными процессами и проблемой городских зеленых зон. Отсутствие мощной и интегрированной эко-структуры устойчивой растительности с ее живыми организмами в экологической сети города, особенно в компактных районах, привело к серьезным проблемам развития городов. Соседствующие с городскими районами эко-парки могут улучшить любую стадию производственного цикла потребления и утилизации веществ на своей территории и, установив стабильный баланс между всеми тремя структурами экологической сети по сравнению с обычными городскими парками, будут иметь возможность снижать экологическую нагрузку и восстанавливать экологическую компоненту в компактных районах.

Ключевые слова: устойчивый экологический характер, районные эко-парки, экологический баланс, плотно населенные городские районы, городские парки

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Introduction

The city is a living and dynamic system of which parks and green spaces are a part and due to its effective role in reducing urban density, creating guidance routes, completing and improving the functioning of educational, cultural, residential facilities, as well as land storage for development. The future of the city has a special and important place in urban planning. From an environmental point of view, urban green space, a relatively large space consisting of plants with a forest structure and has a certain environmental and ecological efficiency and is suitable for the environmental conditions prevailing in the city [8]. Therefore, whenever there is a need for urban green space in cities that want to cultivate and develop the culture of development in themselves and cross the border of appearance and reach depth and be properly understood, the logic of design will dictate that a balance be struck between the inanimate and the physical. Today, sustainability means maximizing the balance and long-term maintenance of social, financial and natural capital. That is why sustainable urbanization and its sustainable development seek to promote the health of social, economic and environmental systems in cities and other developed areas [3].

In another definition, they propose sustainable development to show solutions to physical, social and economic mortal patterns, which could range from issues such as the destruction of natural resources the destruction of bio-organization, global pollution and climate change to overpopulation, prevent injustice and low quality of life of present and future human beings. Thus, sustainable development is a transformation to meet today's need without destroying the ability of the next generation to meet their needs [11]. Extensive research shows that healthy urban parks host ecosystem services in cities and contribute significantly to various aspects of sustainability.

Therefore, one of the symbols of sustainable urban development can be the construction of buildings and parks in the city in accordance with ecological indicators, where as far as possible the criteria and criteria of sustainable development are observed. It should be noted that observing the principles of sustainable development leads to savings in production and reduction of municipal waste, reuse and recycle them, energy saving, utilization of local materials in the construction of parks, prioritize public transportation patterns, walking and cycling in urban planning, Utilization of solar and wind energy in design, wastewater recycling

of parks in reducing various environmental pollution, and by its nature, microclimate cooling, it will increase economic mobility and highlight local cultural identity, as a result of these factors, ecological tranquility of park users, it will lead to a healthier life and a better social connection in cities. However, degraded inadequate and undesirable urban parks can conflict with sustainability efforts [2].

For this reason assessing the sustainability of urban parks and their ability to contribute to the development of sustainable urbanization requires an understanding of the geographical, social and historical context of built cities. Therefore, due to dissatisfaction with the current situation in the design of urban green spaces as an important part of the city, we should think about creating green spaces that have high ecological efficiency, especially significant bioclimatic effects in compact urban areas and in other words, green parks that, while affecting the ecological balance in the urban environment, can be used as leisure spaces in urban neighborhoods [7].

Ecological concepts and their nature in an ecological neighborhood park, refers to a comprehensive and integrated set of measures to establish coordination, balance and equilibrium between the elements of the park for sustainable development. This means that it will not only pay attention to environmentally friendly plant species, it also aims at recycling waste and saving energy, and so on, and it can be said that ecological indicators have wide dimensions such as environmental variables, Energy use variable, variables of use of local and indigenous materials in the construction of facilities and equipment, variety of plant species and especially species adapted to local environmental conditions, the relative combination of artificial and natural phenomena and the general view of the neighborhood park will be included [16].

Materials and methods

Evaluation indicators of ecological parks.

The indicators considered for the ecological design of parks in this research are divided into three main categories:

- Physical and ecological design;
- Environmental;
- Cultural and educational.

The main axes below, the sections of each of them and the requirements and standards that must be considered by the designers in each of the sub-sections, Planners and builders of ecological parks has been specified. It is worth mentioning that the indicators used in this section are among the topics of environmental design and energy [1].

Present findings to examine ecological indicators in the park

According to the definition of Eco-park and its indicators, attention to issues such as recycling, Energy production and its optimal consumption, Wastewater recycling and reuse in the park water consumption cycle, Attention to plant species compatible with natural conditions and the environment of the region and the application of ecological design principles in the construction of buildings, Passages, Children's play spaces and parking lots and in the end pay attention to educational and social issues, Local culture is one of the most important issues that should be considered in the construction of an ecological park [20].

Evaluation indicators of ecological parks

a. Physical and ecological design: Requirements and standards of buildings

Ecological necessities to be considered in the design of buildings in ecological parks, includes things like reducing energy consumption, use of natural ventilation, Economics of the building, Supply of electricity through solar cells and wind turbines, Hot water supply through

solar water heaters, Use of recyclable materials, Thermal insulation of buildings in the body and floor. Use double wall openings, treatment of building wastewater for non-potable purposes, collecting rainwater from the roofs and surfaces involved and using them in relief water, pools and ponds, Design of dry and fertilizer toilets. Complete recycling of building waste. Geometry compatible with nature and the use of organic forms. Use natural sunlight during the day, Reduce the use of non-renewable fossil and wood resources [5].

Requirements and standards of passages. Human communication with nature and proper integration of passages with natural spaces through the design of spiral passages between natural spaces, Use of local and natural materials for flooring and permeable design of flooring, etc [9].

Parking requirements and standards. Location of parking lots away from the main space of the park, flooring to absorb water and moisture, design of bicycle parking near the main buildings and encourage the culture of cycling and sports and so on [10].

Requirements and standards for children's play space. Standardization and observance of safety principles, use toys with high quality raw materials, Observance of human proportions in equipment, Flooring with shock absorbing materials, Locate the play area next to the trees, Proper lighting at night and connecting children with the green space of trees and water by placing their play space in the vicinity of these spaces and so on [8].

b. Environmental

Energy requirements and standards. Electricity supply through solar cell or wind generator, Supply of non-potable water through recycling of wastewater and rainwater, Connection of sub-structures with appropriate technology.

Requirements and standards for plants and animals. Maintain the life cycle, application of native plants, wildlife conservation, minimal planting of foreign species, planting medicinal plants and providing seeds for birds.

Environmental pollution requirements and standards. Decreasing air pollution, audio, the traffic, use the green wall and waterfall wall between the park and the freeway to reduce noise pollution, use dense trees to reduce air pollution and noise pollution [2].

Recycling and wastewater requirements and standard. Wastewater recycling and use of dry and composting toilets, reuse of tap water in the irrigation system, separation, recycling 100% of waste and turning it into compost, Place colored bins to separate the three types of waste, metals, plastic, paper through the people [13].

Fertilizer production requirements and standards. Use of fertilizer and composting machines to produce waste to the fertilizer required by the park, using composting techniques and dry and fertilizer toilets to produce fertilizer, economic self-sufficiency.

Water consumption requirements and standards. Rainwater collection using new techniques, collecting floor water in parking spaces and passages, Treatment and reuse of wastewater and use of proper irrigation systems [10].

c. Cultural and educational

Paying attention to the needs and desires of the audience of the designed spaces: Provide environmental education; Provide leisure time; Creating the right connection between humans and the environment [5]; Examining examples of ecological park construction records in the world.

In this discussion, the implemented examples of ecological parks are discussed. In this discussion, the implemented examples of ecological parks are discussed. And by studying the designs and analyzing them, to their most important goals as an ecological park, as well as to the spaces and activities in the park and related activity groups, it is summarized in Tables (1) and (2).

Table 1. Review of goals and functions of Hartberg Ecological Park (fig. 1) (author)

Hartberg Eco-park	Targets	Spaces and activities in the park	Related activity groups
<p>Location: Hartberg eco- park is a commercial park in the Styria region of Austria.</p> <p>Area: 15 hectares.</p> <p>Hartberg Eco Park was first established in 1996.</p> <p>The park was built by Stadtwerke Company.</p>	<ol style="list-style-type: none"> 1. Improve access to information. 2. Improve environmental efficiency. 3. Raising public awareness 4. Increase the use of clean technology. 5. Increasing the use of elements of ecological structure. 6. Increase the use of renewable resources. 7. Reduce resource consumption. 	<ol style="list-style-type: none"> 1. Ecological Industrial Park. 2. Exploration exhibition and amusement park. 3. Center for Applied Research. 4. Guide project and display of commercial goods for everyone. 5. Artificial environment. 6. Ecological education. 7. Employment. 8. Energy. 9. Renewable 	<ol style="list-style-type: none"> 1. Research 2. Educational (environmental education). 3. Leisure and entertainment



Fig. 1. Hartberg Ecological park

Table 2. Review of goals and functions of Xochimilco Ecological park (fig. 2) (author)

Xochimilco park	Targets	Spaces and activities the park	Related activity groups
<p>Location: Mexico city.</p> <p>Area: Agricola pantitlan, the xochimilco ecological park is located southeast of Mexico city. 165 hectares.</p> <p>Xochimilco Eco Park was established in 1996.</p> <p>Designed by the federal government.</p> <p>project title: Environmental rescue.</p>	<ol style="list-style-type: none"> 1. natural ecological. 2. separation of human activities and natural uses. 3. local communication to increase biological richness. 4. use of native vegetation. 5. operation and protection. 6. ecological balance. 7. cultural ecology. 8. participation and monitoring. 9. economic sustainability 	<ol style="list-style-type: none"> 1. playgrounds. 2. sidewalks. 3. florist. 4. botanical garden. 5. ecological center and research center. 6. dedicating parts to natural processes, recreational and educational. 7. protection of pristine natural landscapes. 8. open spaces, semi-open and educational signs 	<ol style="list-style-type: none"> 1. research 2. educational (environmental education) 3. sports. 4. faraghti, entertainment. 5. protection.

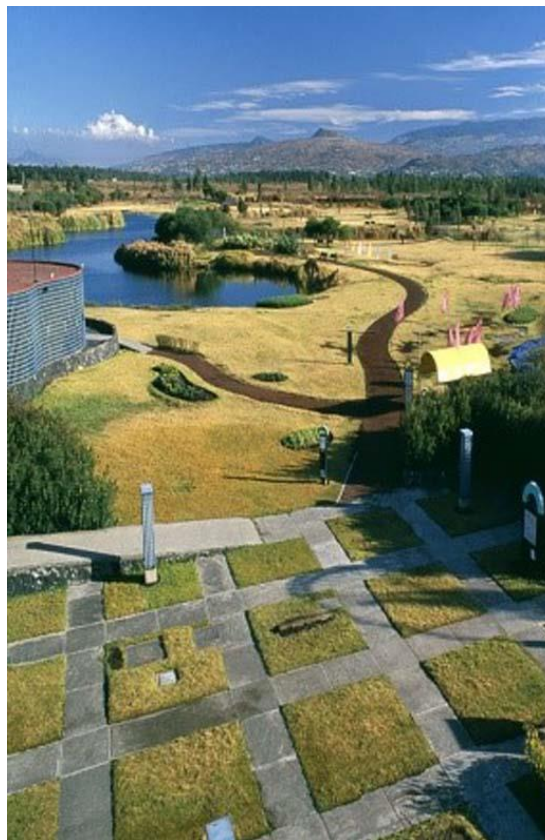


Fig. 2. Xachimilco ecological park

Results

Today it is increasingly focused on the need for more intensive development in urban areas, on the concept of compact city with high density, and the growing trend of environmental threats in these areas, and the instability of related urban ecosystems, has raised questions about the key role of green spaces in this model. In recent years, with studies conducted in the field of urban green space management, the need to create green space and, by its nature, greater environmental well-being in cities, the need to build neighborhood eco-parks in polluted and dense urban areas to reduce tensions is of particular importance. So here need to know that to achieve our desired outcome of the subject matter, discuss the necessity of neighborhood eco-parks in compact urban environments from two separate and distinct sections.

Part 1: Proportional distribution pattern of neighborhood eco-parks in compact urban areas

The dilemma of the familiar name of most cities in the world today is the existence of green spaces that do not keep pace with the growth of areas under construction or built. Because the mosaic of the urban green space network is drawn in such a way that it is part of these patterns of distribution of urban green spots of natural origin and the product of natural processes remaining in cities and the other part of this distribution should be done by the artificial environment and man-made activities [6].

Unfortunately, the pressure of urban development and the lack of attention to planning features of its structure has been so great that it upset the balance between natural and artificial distribution. These green spots put the city in a position to not be able to build and form a cohesive and green texture with a cover of diverse plants and living organisms in the ecological network [15]. This maximum pressure was enough to put the cities in such a difficult situation that in order to compensate for their shortage in supplying and distributing as many landscapes and green parks as possible, they had to crush one of their most valuable assets, which is the big green ecological spots are to be. The same challenge in the city's environmental network led to the victimization of large green spots. Small spots with low ecological values appear in urban areas, this is due to the lack of proportion to the neighboring green spots and by their improper distribution and placement among the dense residential fabric that had already been built, finally, they create unstable environments in cities [19].

Accordingly, to minimize such challenges, Construction of neighborhood eco-parks with related benefits and services, Part of these small urban green spots should be such that the rational distribution of these echoes, according to the geographical context of each part of urban areas. This type of positive orientation in the management of urban green spaces can cause the penetration of small spots such as neighborhood eco-parks into the dense texture of residential areas and reduce the high level of compaction in these urban stress areas [17]. It should be noted that the amount of density in space has an inverse relationship with the amount of human activity in that space Excessive density will also make the living environment unfavorable.

So, the idea of using neighborhood eco-parks as a balancing green space among the intertwined space of residential areas of the city, it can help reduce this dense and undesirable tissue in these areas and as useful elements in the service of raising the quality of social relations, Lack of degradation of human relations and an obstacle to the alienation of urban relations [13].

Part 2: Comparison of ecological parks of eco-parks with ordinary urban parks

Because cities as an artificial ecosystem are built by human activities and sustained by natural support systems, it will be able to survive through ecological processes. Therefore, it is necessary to pay attention to how the natural forests function as a real model of sustainability

in nature it can guide us in choosing the right and appropriate environmental model for stressful urban environments. In this section, first by presenting an analysis of how the environmental performance of forests, I want to find out how these ancient ancestors of nature were able to provide a strong ecological network and a sustainable environment in nature [12]. And then further with a simple comparison of the two models of the usual eco-park and urban park, I have this question in mind. Which of these two urban artefact models can approach its natural model, which is forests? And will play a more active and effective role in improving the stability of urban ecosystems and reducing environmental pollution? Forests as sustainable natural environments with a collection of trees, shrubs, diverse vegetation, animals and microorganisms such as fungi, bacteria, viruses with the potential of their non-vital natural factors such as water, soil, temperature, wind, rain, the sun, etc. to create a specific and desirable environment and habitat for its owners [4].

Therefore, based on the same rules governing the environmental network of forests, these stable environments could act not only with their diverse vegetation as natural materials to absorb the sun's heat and adjust the ambient temperature in a completely natural way. Instead, decompose wood and other related products in the same natural substrate and return it to the forest environment and cause that no living or non-living materials are transported outside the place of production and consumption. Such regular and accurate operation in the forest ecological network. It has made it possible for these sustainable natural environments to establish a vital, reciprocal and sustainable partnership between their producers (plants) and their consumers (animals) and the breakers of this cycle (microorganisms).

With the uncontrolled expansion of cities and the unbridled growth of compact and polluted urban areas, Plan to use artificial and modern urban spaces such as parks. It should be considered on a smaller scale than its real and natural model in order to align the public environments of the city with the sustainable development of the city [9]. But in recent years, with the growing trend of environmental pollution in cities. Showed that there are complex shortcomings and challenges in the pattern of environmental behavior of ordinary urban parks that have caused these parks to not be able to function properly, demonstrate effective and active participation in reducing these threats [18].

Comparison of Eco-park and Ordinary Urban Park

1. Energy requirements and standards

Eco-park: Supply of electricity through solar cells or wind generators (Utilization of renewable and environmentally friendly energies);

Urban Park: Supply of electricity through the municipal electricity network. (Use of fossil fuels and non-renewable and polluting environment).

2. Requirements and standards for plants and animals

Eco-park: Application of native plants resistant to pests, minimal planting of foreign species, planting medicinal plants, supply of seeds for birds, conservation of species life cycle and wildlife conservation.

Urban Park: Planting plant species resistant to air pollution [3].

3. Environmental pollution requirements and standards

Eco-park: Reduce air pollution, Noise, the traffic, utilizing the green wall and the waterfall wall between the park and its fast-moving path to reduce noise pollution. Use dense trees to reduce air pollution and noise pollution, improving bioclimatic conditions, strengthening the urban ecological network and reducing the temperature of the island heat air in cities.

Urban Park: Reducing air Pollution, reduce noise pollution, improving bioclimatic conditions, air conditioning, prevent rising temperatures [22].

4. Waste and wastewater recycling requirements and standards

Eco-park: Wastewater Recycling, For example, the use of dry and composting toilets, proper separation and recycling of 100% waste and turning it into compost. Insert colored trash

cans, to separate three types of waste, including metals, Plastics and paper through public participation [14] (waste collection by garbage trucks with electric and environmentally friendly fuel).

Common urban park: using absorption wells as well as septic tanks to drain sewage in the park, install enough garbage bins with lids and bags in the park, appropriate equipment for correct and fast collection of waste in different days (waste collection by garbage trucks with fossil fuels and environmental pollutants) [26].

5. Fertilizer production requirements and standards.

Eco-park: Use of fertilizer and composting machines to convert waste into fertilizer required by the park; Using composting techniques of dry and fertilizer toilets to produce fertilizer; Consumption of natural and organic fertilizers in the green space of the park.

Urban Park: Use of chemical fertilizers, Organic and animal in appropriate proportions and different according to the needs of park plants; Transportation and storage of chemical fertilizers in the park warehouse [21].

6. Pest control requirements and standards

Eco-park: Pest control using organic pesticides and no use of chemical pesticides.

Urban Park: Use of chemical pesticides such as insecticides, Herbicides, Fungicides and rodents in urban park environment.

For example: organochlorine toxins, which are pesticides with chlorinated hydrocarbons (DDT) are famous. This type of pesticide is due to its bioaccumulation properties in the food chain, in each floor of the food pyramid its concentration increases and therefore in the higher classes at the top of it man is placed, it leaves negative and irreparable effects. Another negative feature is the high stability of these compounds in nature, and another feature of this group of pesticides is their high solubility in fat, which can be easily stored in the adipose tissue of the human body and other living things. For example, in birds, DDT It negatively affects their reproduction in such a way that DDT in the bird's metabolism, it interferes with calcium, causing the bird's eggshell to become too thin. So that it cannot bear the weight of the bird and breaks easily [23].

7. Detergent requirements and standards

Eco-park: Using detergents with phosphate-free or low-phosphate compounds to clean and wash different areas of the park. (Do not use acidic cleaners in the park).

Common urban park: use of chemical detergents and acidic cleaners in different areas of the park.

8. Water consumption requirements and standards

Eco-park: Collect rainwater using new water storage techniques. Collect water from the floor of the park in parking spaces and passages. Treatment and reuse of sewage water in the park as well as the use of intelligent and correct irrigation systems.

Urban park: use of urban water network, water wells as well as the use of water tanker vehicles to supply water and irrigate the park environment; Utilizing the traditional method of irrigating the park green space by gardeners and park green space personnel [25].

9. Requirements and standards for children's play equipment and urban furniture inside the park

Eco-park: The use of high quality, recyclable toys in the children's playground. Utilizing local materials and high-quality recycled materials in making urban furniture inside the park.

Urban Park: Do not use high quality toys and use poor quality recycled materials in the construction of children's play equipment in the park; Use of non-native materials, like concrete, Iron, low quality and sometimes toxic plastics and recycled materials in the manufacture of urban furniture in the park [18].

10. Requirements and standards of passages

Eco -park: The use of indigenous and natural materials for flooring and the permeable design of flooring to allow water to penetrate the subsoil.

Common urban park: use of non-native and artificial materials such as concrete, ceramic, artificial stones, etc. for flooring and impermeable design of park floor coverings, which naturally cause water not to penetrate the soil, and with the accumulation of surface water on the floor surfaces and the flow of this stray water to the deformed water outlet, we will see more retaliation in the park [24].

Considering the review of 10 important and key items in the field of environmental behavior of each of these urban artificial models, it can be concluded that eco-parks are able to recycle 100% of their waste and sewage compared to conventional urban parks and about 50% of the park's energy needs from the sun. In the construction of eco-park, about 75% of the materials used are local facilities and compatible with the surrounding environment, and its energy consumption up to 75% compared to its normal conditions in urban parks has an acceptable level of consumption savings. Also, 50% of the plant and animal species in it are native and has reduced the use of cars in city trips to parks by up to 75%, and use a bicycle, increased walking and public transportation for access to and from the park. Finally, the buildings constructed in the eco-park complex are all built and operated according to ecological standards.

Conclusion

As we know, urban green spaces and parks are part of the morphology, they are cities that are from the perspective of the physical skeleton of the city, they determine the body and the urban appearance in general. Therefore, carefully act in proper urban design and modify the performance of the environmental pattern of parks. Not only is it possible to balance the inanimate and living morphological components of the city. Rather, it reduced the environmental tensions at the heart of these vital green spots in the city to an acceptable level. To achieve such goals, the need to pay attention again to how the environmental model of forests works as a real and sustainable model of nature, it can be of great necessity and importance for artificial and green urban environments.

As it was mentioned in the previous section of this article, forests have an intelligent environmental structure, its producers, consumers and decomposers are well placed to maintain and stabilize the ecosystem in their environment. Therefore, another question that I reserve for myself in this part of the article is why the usual parks of the city, following the example of its natural and sustainable model, have not been able to help much to maintain the stability and sustainability of urban ecosystems. It should be acknowledged that the current condition of ordinary urban parks has been due to a defective production cycle until its decomposition in the environmental network of parks, which bears no resemblance to its true model in nature. Accordingly, I consider it necessary to present three main and central reasons, Reveal the hidden corners of such a flawed function in the ecological network of ordinary urban parks.

The first reason: the lack of sufficient and diverse producers in the environmental network of parks (plants).

The second reason is the huge difference between its harmless consumers in the nature of the forest (animals) and its high-risk consumers (humans) in its artificial model (parks). In other words, high-risk consumers leave a large amount of non-recyclable and toxic waste in their artificial parks. And this is while animals, or rather safe consumers, do not leave such hazardous waste in their natural environment.

The third reason is that they are decomposers or (microorganisms). As we wrote, microorganisms in their natural model perform the task of decomposing and cleaning the environment in such a way that no living and non-living materials are transported out of the

natural environment of forests, while in its artificial model (urban parks) conditions in such a way that microorganisms have not only not been able to decompose toxic and non-recyclable waste materials in the same park environment, but also due to insufficient decomposition structure to overcome such an abnormal situation.

Most of these materials settle to the underlying soil layers and the rest by spreading inside and outside the bed, it has polluted the parks. From the three reasons given, it follows that by upsetting the balance between the producer, Consumer and decomposer in the ecological network of common urban parks, The level of their vital, reciprocal and stable sharing has also been drastically reduced and the resulting stresses have caused these artificial green urban models as a component of the broad urban lungs. By stabilizing infected and diseased glands within their environmental tissue, they will not be able to purify the polluted and crowded spaces of the city.

This problem has progressed to the point that the respiratory system of cities due to their severe poisoning due to high air pollution, they are no longer able to strengthen the ecological network. Therefore, with the need to study and compare two environmental models of two models of urban artifacts, I intend to answer the question why ordinary urban parks by modeling their natural and sustainable green spots have not been able to significantly help maintain the stability of urban ecosystems. The answer to such a question is obvious given the explanations and reasons provided. Eco-parks are about 75% more environmentally friendly than conventional urban parks, and are able to help with environmental requirements and standards in line with the urban environment, Strengthen each part of the production cycle. Consume consumption and decomposition in their green and yard network in a desirable way and by establishing a stable balance between all three constituent structures of their environmental network, they can easily get closer to their natural model and reduce environmental stress and strengthen the ecological network in different and compact urban areas.

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Sources of illustrations / Источники иллюстраций

Fig. 1. Available at: <http://etnoart-travel.com/hr/>

Fig. 2. Available at: <http://gdu.com.mx/gdu/>

ABOUT THE AUTHOR**Nasiri Amir Gholamreza**

PhD Student, Department of Architectural Design and Town Planning, Azerbaijan University of Architecture and Construction, Azerbaijan, Baku

amir.architect82@gmail.com

ОБ АВТОРЕ**Насири Эмир Гуламреза**

Докторант, кафедра «Архитектурное проектирование и градостроительство»,
Азербайджанский Архитектурно-Строительный Университет, Баку, Азербайджан

amir.architect82@gmail.com