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Planning of sustainable cities in view of green architecture

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Abstract

Green architecture usually symbolise the sustainability of modern cities. While urban central areas are usually endowed with a multitude of green spaces, they are also the areas that are most prone to the undesirable effects of growth and urbanisation. Planning of sustainable cities serves as a fundamental catalyst for change, improving environmental quality of the natural and built environments, and upgrading conditions for development of green architecture. This paper analyses strategies that have been used in Baku, Azerbaijan, and a focuses on the strategies of sustainable development, that have been used to upgrade the environmental quality of this city.

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Keywords: sustainable city, urban planning, green architecture, environmental quality, Baku.

1. Introduction

In order to comprehend the nature of cities, it is essential to look back into history and identify their beginnings, growth, development and the multiple layers time has bestowed upon them. It is interesting to note how the green areas of the city tend to represent their origins. The beginnings of most world-famous cities, such as Alexandria, Egypt, Istanbul in Turkey, Barcelona in Spain and Baku in Azerbaijan, were originally constructed in the area that nowadays represents the green beginnings of these cities. Over the centuries, the city's urban fabric began to articulate with respect to this green area, and urbanisation accordingly occurred in a peripheral direction, as depicted in Fig. 1.

The importance of green spaces is that they serve as a place of identity, memory and belonging [1]. Green city spaces tend to forge an urban identity for the rest of city, and for surrounding districts to adopt.

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In many cases, green areas are representative of the entire city, the result of the outstanding multitude of green trees and architectural heritage and archaeological sites, which manage to endure time, contradicting new functions and development that take place around them, at expeditious rates. City green areas usually tend to serve as the city's central public spaces as they are often visited to. This is owing to the high percentage of ecological functions, public buildings and offices that environment exist within. In this way, the city green architecture tends to both represent and reveal a great deal about the city's ecological performance and success of sustainable planning, thus adding notable eminence and value to it.

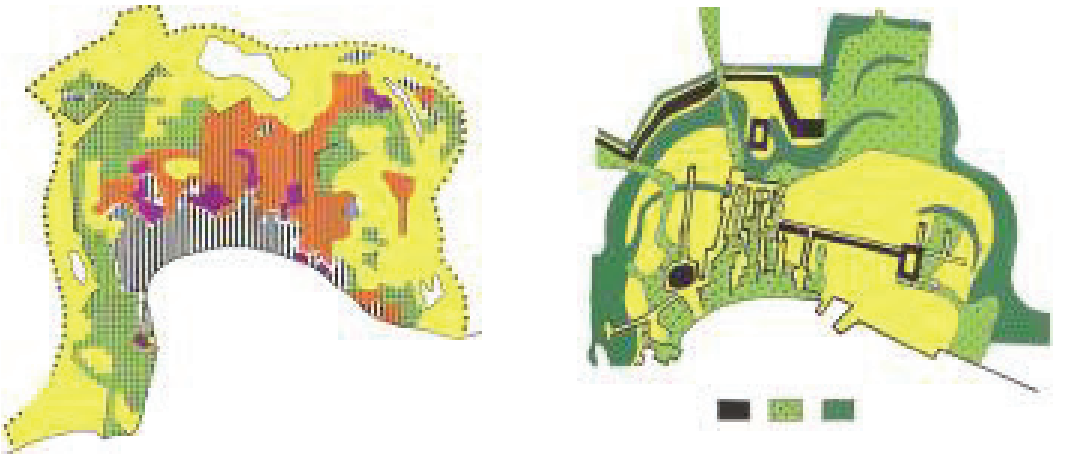

Fig. 1. (a) The plan of Baku to show Urban Green Expansion that Radiates out from the City Centre, in a Concentric, Linear or Polycentric Direction, (b) The plan of Baku centre to show Urban Green Development from the Green Core City.

2. Challenges Facing Green Areas

While green areas are identitarian, core to the city both historically and geographically, they are also central to many challenges and obstacles. The explosion in urban population is partly to blame for this. In 2007, the world's urban population had exceeded its rural population, and by the year 2050, the world's urban population is expected to increase by up to 65% [2]; [3]. Green city areas all over the world tend to witness a multitude of undesirable effects, the result of the overwhelming waves of rural migration taking place. Overcrowding and consequential unplanned growth have resulted in environmental degradation on a variety of scales. This is inclusive of localised environmental health problems, such as indoor air pollution and contamination of drinking water, and city-regional environmental problems such as ambient air pollution, inadequate waste management and resultant pollution of water-bodies such as rivers and lakes. This persistence and the overall laissez-faire attitude that is usually adopted by city administrations may contribute to pollution on a broader scale, and have extra-urban impacts such as ecological disruption, resource depletion, emissions of undesirable greenhouse gases and subsequent rise in anthropogenic heat in the ambient atmosphere.

3. Planning of Sustainable Cities as a Catalyst for Change

Planning of sustainable cities and the revitalization of green city areas contribute largely towards upgrading environmental quality as the vast umbrella, thus serving as a fundamental catalyst for change. Sustainable development projects taking place in green city areas tends to attract a variety of economic

activity and competition, therefore encouraging both new inhabitants and visitors to revisit and rediscover these restored vicinities of their cities. Moreover, upgrading the physical built environment, social fabric and urban spaces within the historical urban structure all contribute towards increasing their adoption as places for public congregation and activity. This consequently increases social interaction and cohesion between citizens. Furthermore, Planning of sustainable cities and revitalization of green city areas tends to re-affirm residents' feelings of identity and sense of belonging. Furthermore, urban planning is often witnessed as an approach towards sustainability. According to Stren and Polese [4], one of the main aims of sustainable urban policy is to "bring people together, to weave parts of the city into a cohesive whole, and to increase accessibility (spatial and otherwise) to public services and employment [4]." In addition, sustainable areas are those which are created to support sustainable living, with a prime focus being placed on economic, social and environmental sustainability [5]. This is of distinguished importance in green areas which tend to represent and symbolise a diverse set of ideals of the city's identity, including its history and culture on one hand, and its local economic viability on the other. This paper aims at scrutinizing the green areas of the Caspian city of Baku, in Azerbaijan, which is also known as the Green Core City of Baku. The paper sheds light upon recent attempts that have been made at sustainable urban planning by the Baku City Council. The strategic plans that have been made for sustainable development of this green core area are discussed further in this study.

4. The Green Core City of Baku

The Green Core City of Baku is considered the green hub of the of capital city Baku, of the Apsheron peninsula, in Azerbaijan [6]. As shown in Fig. 2 a, the Green Core City of Baku is situated directly along the Caspian Sea. It is bounded by natural elements in several directions; the Great Caucasus mountain ranges to the North and coasts Caspian Sea to the east and west respectively [7].

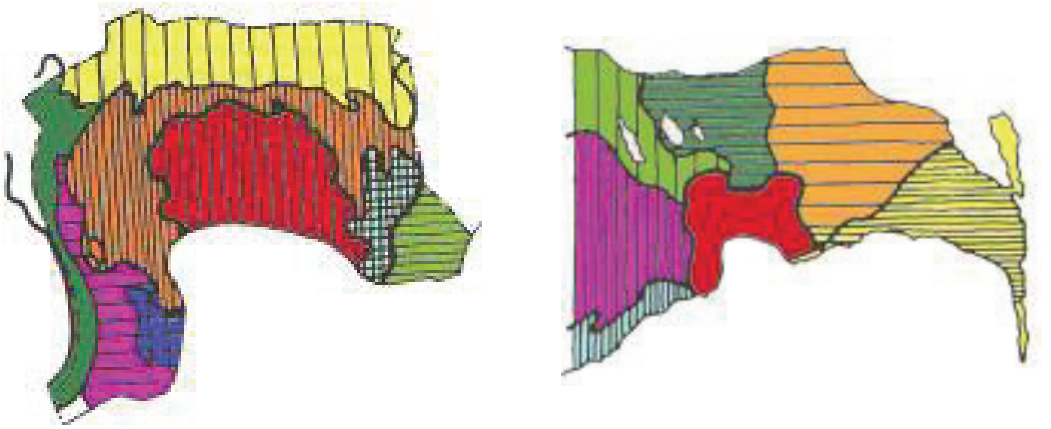

Fig. 2. (a) An Aerial View of the Green Core City of Baku's Location. (b) Caspian Sea rings surrounding the Green Core City.

It is important to identify Baku as an historical city, whose urban structure has evolved over time, until it reached the present state. As depicted in the diagram shown in Fig. 2 b, the city began as a medieval town bounded by the sea, with a series of peripheral villages around it. Throughout the 20th Century, however, notable development began to take place in a concentric direction, one which is highly characteristic of many cities in the Caspian region. This has consequentially resulted in the urban fabric found today; with the Core City at the centre, and seven metropolitan rings surrounding it. This Core City

currently covers an area of 211.5km² [8], and serves a population density of 410 people/ha [9].

5. Urban Planning for the Improvement of the Ecological Performance of Baku

A variety of strategies have been adopted by the Baku City Council, aiming at both urban planning and upgrading the ecological performance of the Green Core City of Baku, which is considered the city's green area. As part of the research conducted by the researchers looking at urban planning; environmental and ecological development conducted in some Caspian cities are classified under different strategies. These strategies can be classified under five main areas, as shown in the flow-chart in Fig. 3 a.

6. Improvement of Natural and Man-Made Environments

Significant growth in green areas has taken place between the years 2005 to 2010, as part of the Region's Strategic Plan to protect natural spaces and biodiversity, and increase the breathable areas of green spaces within the city [9]. The following table reveals increases in green spaces that have taken place between the years 2005 and 2010.

Table 1. Growth of the city's green areas between 2005 and 2010 in hectares (ha)

Green Areas	2005	2006	2007	2008	2009	2010
Urban Green	865.6	905.8	930.9	954.7	989.5	1017.0
Trees Along Streets	74.4	77.0	81.1	86.0	92.2	95.5
Parks and Gardens	34.7	35.5	36.9	38.6	47.0	47.5
Total	974.7	1018.3	1048.9	1079.3	1128.7	1160.0

Furthermore, being a Caspian city, the beaches of Baku are considered an integral part of the historical city of Baku. Thus, the beaches located within the Green Core City of Baku undergo regular checks, under the Integral Management Programme for the Baku Coastal Area that was set up in 2009. This programme incorporates measures such as sand and water analysis, ecological sifting of sand and collection and recycling of waste materials found both in nearby waters and on the beaches. Under the project of development of Seaside park of Baku it is planned to increase its extent up to 12.5 km. Extent of Parkway Fizuli increases almost twice. Under parkway the city parking for motor vehicles will be placed. Some of these measures are highlighted in Fig. 3 b.

Moreover, environmental audits and checks are performed to ensure that environmental laws are strictly enforced. A large part of the city council's commitment towards sustainability, involves protection and improvement of public spaces within the Green Core City, as man-made elements integrated within both the natural environment and the built one. Public spaces in Baku follow a distinct style and tradition that date back to planning [10]. The need for development of the Green Core City's public spaces was initially recognised during the 2000s, and improvement began prior to the 2012 Eurovizion, in an attempt to transform Baku into the "City of Public Space" [11]. Consequently, entire green areas, such as Parkway of Fizuly where designed, and existing urban green areas such as the Seaside Park, were further developed. The Seaside Park continues to stand as an important aspect of Baku public space design, giving priority to pedestrian activity, providing a meeting point and enhancing social interaction between citizens and tourists alike.

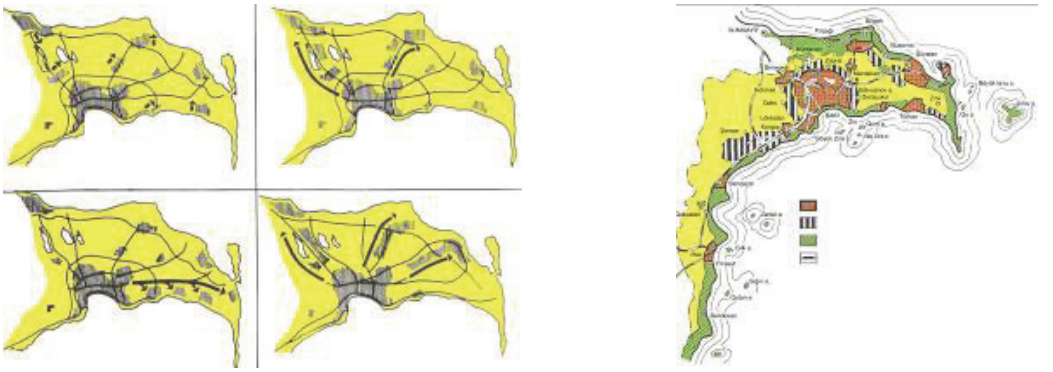

Fig. 3. (a) Strategies that may be used for Urban Planning and Upgrading the Ecological Performance of Chosen Districts of the City. (b) Existing urban green areas such as the Seaside Park on the Apsheron peninsula

7. Green Architecture: New Field of Sustainable Planning

By the beginning of the 21st century the field of green architecture has changed its way in a more complex issues under green urbanism works. Beyond the traditional approaches, green architecture theory and practice have enlarged its concerns with a multidisciplinary vision. The term green architecture has enlarged its boundaries and infrastructure, technology, ecology, art network systems are combined in one total vision.

Sustainable planning, as a set of ideas and frameworks - lays new ground for design and urbanistic practices: performance- based, research-oriented, logistics-focused, networked [12]. Green Urbanism is an emergent field of planning and design in which the dominant forces that influence urban design are landscape features and ecologies as opposed to architectural structures and utilitarian infrastructure.

Nowadays, the green architecture of the city becomes commodified as a cultural product, ironically rendering many cities less and less distinguishable from one another. In place of regional and historical distinctions, many urban sites have long since lost most of their inhabitants to their decentralized suburban surroundings. In place of traditional, dense urban form most Azerbaijan spend their time in built environments characterized by decreased density, easy accomodation of the automobile and public realms characterized by extensive vegetation. In this horizontal field of urbanization, green architecture has a newfound relevance, offering a multivalent and manifold medium for the making of urban form ad in particular in the context of complex natural environments, post-industrial sites and pubic infrastructure [13].

In the context of sustainable planning, city sites become a major subject for designers with multivariable design lexicon, which includes the terms produced by the vocables of “re”: rehabilitation, renovation, restoration, reclamation, recovery, etc. include green structures and spaces between them. In these areas the land is covered by structures which are fundamental for green architecture. With their scale and materials, these structures have dominance on the land where they are located. Green areas have a different characteristics depend on the urban activity.

8. Planning of Sustainable City’s Multifunctional Complexes in the Industry Zones

In the past, industry was often abandoned without performing the appropriate reclamation work. Today, with the increased ability of perturbation that affect large portions of the landscape, there is a deep public

concern that industry should not be abandoned without performing any reclamation work. New design strategies to reclaim derelict industrial sites have been devised in recent years, focusing on the sustainability, quality and multifunctionality of the space, with attention to historic, socioeconomic and cultural aspects [14]. By the beginning of the 21st century transformation of industrial areas in to viable urban spaces become popular issues for landscape architects, architects, urban designer and planners. Derelict industrial sites have a potential to create attractive spaces in urban fabric and to transform great amount of land into socially, culturally and ecologically viable spaces with variety of uses for the society and environment.

The interesting example of Aglepeler multipurpose complex in Baku is shown in Fig. 4 a, b.

Fig. 4. (a) The general plan of Aglepeler multipurpose complex in Baku, (b) General view of a complex

The objective of this design is to analyze new sustainable strategies used in reclamation of post-industrial site Black City in Baku. This project represent different and innovative approaches, which bring different issues in one comprehensive work to create an aesthetic balance with natural and built environment, technology and culture by introduction of new uses upon remains of past industry [15]. Each strategy gain insight to design efforts with a new theoretical and practical base in the realm of recovery, restoration and reclamation to create culturally and environmentally valued public spaces. The sustainable strategy, which is based on the notion of adaptation and interpretation represents metamorphosis of industrial spaces and green architecture structures and show how derelict industrial sites can evaluated as a cultural heritage with different landscape characters.

9. Planning of Sustainable Strategies: Process, Adaptation and Regeneration

In order to create a successful and sustainable regeneration design it is important to recognize and interpret the historic and cultural significance of the green architecture and to understand how sustainable urban ecology and design can invent alternative forms of relationships between people and place so that green architectural projects become more about invention and programs rather merely corrective measures of regeneration. The planning of sustainable strategies and territory regeneration design should integrate similar five fundamental principles: 1) perform well the functions for which they are redesigned; 2) be long lasting and adaptable to new uses; 3) respond well to their surroundings and enhance their context; 4) have a visual coherence and create ‘delight’ for users and passers-by; 5) be sustainable – non polluting, energy efficient, easily accessible and have a minimal environmental impact. The green architecture is an important cultural objective and is inherently sustainable in that it encourages the positive re-use of redundant buildings that are part of our industrial and commercial heritage. Regeneration can play a very important role in planning in raising the quality of the local environment,

preserving local distinctiveness, and attracting visitors and new business, and it is very popular with local communities. Even derelict and degraded urban areas can filled with a new spirit and can be made worth living by keeping visible the spirit of existing site, by applying design strategies that contribute to economic prosperity, social cohesion and environmental quality [16].

Generally, planning of sustainable strategies for derelict urban areas represent two main attributes. In the first strategy, adaptation and regeneration of the existing structure is the main point of the strategy. All the structural composition of former urban activity is regenerated as focal objects or these structures are used as a base for new activities. The land in which all the structures located is rehabilitated to prepare the surface for the further development, which is mostly end up with the embodied of a public park. So new activity pattern, new spatial organization and new vegetation strategies and the old structures are combined to create new spatial organization. Industrial fabrics, production sites are usually reclaimed by this view of strategy. By preserving all the structural elements the sense of place could be able to maintained easily by the design strategy.

In the other strategy, all the components of industrial activity pattern is demolished and the site is rehabilitate for further activity. Mostly landfill areas, deposited areas and contaminated areas are treated as a new surface need to be clean up. And after long time period of rehabilitating process the land become available for new activities and development. By the beginning of the 21st century, reclamation of derelict industrial sites has become one of the major subjects in landscape design agenda and new design approaches are emerged from comprehensive reclamation works. All of those works show us some specific qualities and open a new way in landscape design theory and practice. First, it is understand that by the combination of reclamation works and design intelligence more effective, spatially organized public spaces can be created. Thus, reclamation becomes an important design issues that required specific knowledge. Second, all of those projects are process - based projects. Planner, working with processed based approach, rather than a purely compositional one, demands four significant shifts in design methodology. First, the dynamic nature of material itself requires one to design process rather than a landscape's final form. Instead of introducing external forms and transforming the site to accomodate those forms, these are "found" and evolved out of systems already there. This implies a shift from creating compositions based on notions of balance, regularity and hierarchy to working with systems, natural and man-made and the various ways in which they can be organized and distributed as fields, gradients, program and the perception of phenomena.

Second, there is a shift in design methodology toward dedicating more effort to site planning than once was the case in formally focused design approaches. Thus in addition to standard ecological inventory, site planning includes a broader set of concerns that extends beyond property limits, such as economic interests, demographics, migration pattern, politics of resource allocation and toxicity. Site planning also explores how systems have evolved and performed over time, questioning how and why the landscape arrived at is present state, in addition to registering what is already there.

Third, history is understood as a sustainable process itself, rather than a visual reference for form, style or type of green architecture. Process-based practices acknowledge that the site is defined as much by its visible qualities as by its accumulated histories.

Fourth, sustainable process-based practices anticipate change from the outset, understanding that their intervention is only one of many in the immense evolutionary process of the green architecture. Design in this case is less about permanence and more about anticipating and accomodating growth, evolution and adaptation in the face of unexpected disturbance and new programs and events [17]. All this the full concerns also to planning of sustainable cities in view of green architecture.

10. Conclusion

Planning of sustainable cities indisputably adds notable value, eminence and physical integrity to the city, and promotes cultural heritage. Furthermore, urban planning can be considered a road towards sustainability, as urban planning often tackles many detrimental environmental problems, which have recently been considered characteristic of crowded city centres and urban environments. The Metropolitan City of Baku is an example of an historic city, which originated as a medieval town and has expanded in a linear direction alongside the waterfront of Caspian Sea, achieving the metropolitan status it is known for today [18]. Some parts of this town has been periodically transformed over time to become the Green Core City of Baku, it's a popular tourist attraction. However efficient this proved, it is still important to mention that it should never be left for spontaneous events (cultural) to initiate this type of good practice in planning of sustainable cities. Planning and projects of green architecture which aimed at increasing green areas within the Core City and transforming it into a 'city of public space' have continued throughout the years, and are in constant focus. Planning projects of sustainable city are continually being devised and implemented, to overcome undesirable environmental problems, and transform this green areas into a sustainable section of the city to the largest possible extent.

It is obvious that sustainable cities and their green structural components provides an opportunity for new innovations and developments of the green architecture. Our cultural landscape has started to change by the new inventions and new opportunities. Most of us evaluate old industrial structural areas as a derelict and vacant spaces. But past industry and its structures represent our close urban history and need to be developed with new innovations in planning of sustainable cities and designing of green architecture.

There is lots of work doing by the planning and design disciplines to find an appropriate way to figure out the environmental problems caused by urban development. As our cities grow up and cover territories in city periphery green areas now become a part of the city pattern and our daily life. To the beginning of 21-st century the success reached in the field of planning of viable cities and regenerations city territories has opened a new way for projects of green architecture.

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