TOWARDS A SUSTAINABLE NEIGHBORHOOD: THE ROLE OF OPEN SPACES

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Abstract

The neighborhood is a basic planning entity in modern residential planning theories. However open spaces as a vital constituent of the neighborhood's physical structure, have an important role to play. They are the arena of both, neighbors' outdoor interactions –consequently building the neighborhood's sense of community- and the micro ecological sphere - setting its parameters and configuring its fundamentals. The paper aims to investigate the roles and responsibilities that open spaces -in neighborhoods- have to take to achieve sustainability goals and objectives. However it follows an approach based on both the social and ecological neighborhood's ability to tackle sustainability issues. It focuses on the typical open space structure of the neighborhood as the media of different social and ecological interactions. Regarding this concern the paper differentiates between two main categories of the neighborhood's open space; "greenspace" and "greyspace". Moreover, the paper develops a three dimension matrix that sets the interrelations between different types of neighborhood open space and sustainability goals and objectives that have to be achieved within the community. It uses this matrix to assess the sustainability performance of different typologies of open space; moreover it determines the priorities of sustainability parameters that have to be applied to an assigned open space. Finally, the paper applies its findings to two different typologies of open spaces in Lebanon; Beirut Pine 'Horsh Beirut' as a greenspace, and the historical market, and pedestrian streets in Byblos as a greyspace. The application comes to show the validity of conceptual application of the proposed matrix.

Keywords:

Sustainable development; neighborhood; open space; Beirut Pine; Byblos.

Introduction

The rapid growth of towns and cities in the nineteenth century led to calls for parks to be provided for the health of factory workers and consequently it benefited society as well. This could be seen as an early precedent to highlight the role of open spaces in supporting what we now call sustainable development. This achieved a wide range of benefits to the economy (healthier, happier, and therefore more productive workers), social life (people relaxing and meeting in the parks) and the environment (as open spaces were created amongst the streets, mines and factories). (Shirley, 2005).

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Nowadays, open spaces take up more than one third of total neighborhood areas. They are playing a dual role in the structure of neighborhoods. The first is 'social': that come out of understanding the neighborhood as a 'community'. Meanwhile, the second is 'ecological': that see the 'ecological perspective' is much more appropriate to be applied to a neighborhood regarding its unique site qualities. Each of these two approaches covers a different perspective of sustainability application to neighborhood scale. However, the paper develops an integrated approach that appreciates the fact that social and environmental goals are often mutually reinforcing, thus providing a broad constituency of support for policy. Moreover, they come to the heart of the role that open spaces play.

Sustainable Neighborhood.

There are different approaches that tackle the application of sustainability to neighborhoods. Among these approaches, stands both social and ecological as two different but integrated perspectives. Regarding the social perspective, the overlapping area of both the terms 'neighborhood' and 'community' could be used to understand the definition that the Egan Review (2004) report 'Skills for Sustainable Communities', develops. It highlights sustainable communities as those which "meet the diverse needs of existing and future residents, their children and other users, contribute to a high quality of life and provide opportunity and choice. They achieve this in ways that make effective use of natural resources, enhance the environment, promote social cohesion and inclusion and strengthen economic prosperity". (Review, 2004:1) It concludes that there are

seven components of sustainable communities drawn from this definition; governance; transport and connectivity; services; environment; economy; housing and the built environment; sociology and culture.

From another stand point, Hugh Barton (1996) gives a different approach based on the 'Ecological Perspective'. He asserts that "One way of approaching the problem of sustainable design is to see each development as an organism or a mini ecosystem in its own right". (Barton et al, 1996) Regarding this point of view, a neighborhood is an ecosystem in the sense that it provides the essential local habitat for humans, creating its own microclimatic conditions, and should provide as far as possible for their comfort and sustenance.
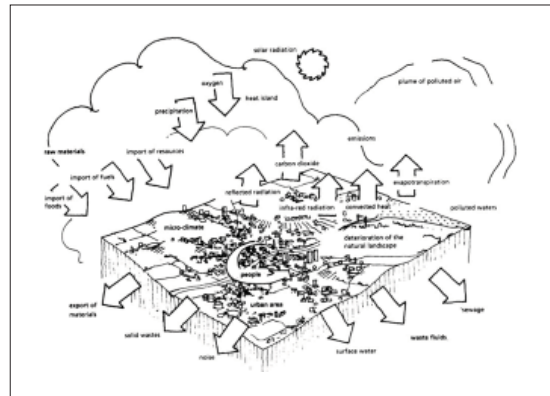

Figure 1: Neighborhood as an Eco-system.
(Source: Barton et al, 1996).

Sustainability dimensions, goals, and objectives applied to neighborhoods

The application of wide-scope conceptual sustainability dimensions to neighborhoods

needs them to be interpreted practically into goals and objectives. However, the following table sets the sustainability goals and objectives that have to be achieved at neighborhood level. They are driven from the sustainability dimensions applied to the neighborhoods (Figure 2).
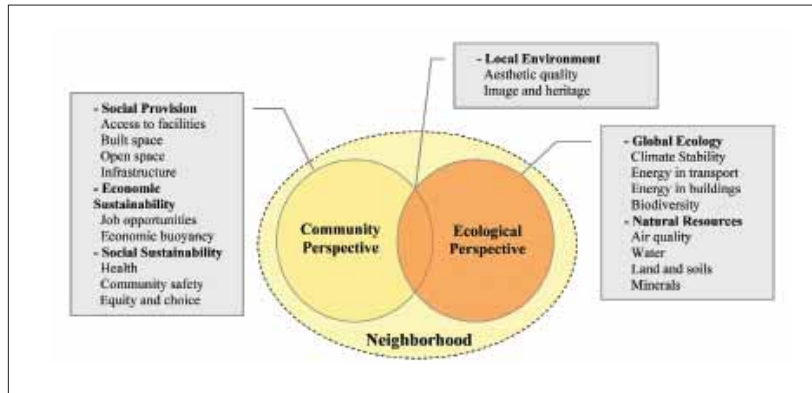

Figure 2: Sustainability Dimensions, Applied to Neighborhoods. (Source: the Author based on Shirley, 2005).

Open Space Morphology of Neighborhoods

Open spaces in neighborhoods are defined as 'any unbuilt land within the boundary or designated envelope of a neighborhood which provides, or has the potential to provide, environmental, social and/or economic benefits to communities, whether direct or indirect.' (Campbell, 2001) They could be classified according to a number of criteria, however this paper differentiates vegetated from non-vegetated areas and this leads to the following typological classification:

- Greenspace: a sub-set of open space, consisting of any vegetated land or structure, water or geological feature within urban areas.
- Greyspace (sometimes referred to as "civic space"): a sub-set of open space, consisting of urban squares, market places and other paved or hard landscaped areas with a civic function.

Moreover; seven distinct sub-sets of publicly accessible greenspace, could be realized each with a specific and distinct primary function (Campbell, 2001):

■ **Parks and gardens:** areas of land, normally enclosed, designed, constructed, managed and maintained as a public park or garden. They can be either urban parks or country parks depending primarily on their location. They often incorporate other types of greenspace, such as children's play areas and sports facilities, but their primary function is for informal activity or relaxation, social and community purposes, and horticultural or arboricultural displays. Some parks and gardens may also be designed landscapes of

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historical importance, where they are of national significance.

■ **Amenity greenspace:** Managed and maintained landscaped areas with no designated specific use by people, but providing visual amenity or separating different buildings or land uses for environmental, visual or safety reasons. They may also be used, incidentally, as wildlife habitats.

■ **Children's play areas:** Designated and maintained areas providing safe and accessible opportunities for children's play, usually linked to housing areas and therefore normally set within a wider green environment of amenity open space. The primary function of these areas is to provide safe facilities for children to play, usually close to home and under informal supervision from nearby houses.

■ **Sports facilities:** Designed, constructed, managed and maintained large and generally (although not always) flat areas of grassland or specially-designed artificial surfaces, used primarily for designated sports. The primary function of these areas is to accommodate practice, training and competition for recognized outdoor sports.

■ **Green corridors:** Routes linking different areas within a town or city as part of a designated and managed network and used for walking, cycling or horse riding or linking towns and cities to their surrounding countryside or country parks. The primary function of green corridors is to allow safe, environment-friendly movement within urban areas. Moreover, they support wildlife colonization and therefore habitat creation.

■ **Natural/semi-natural greenspaces:** undeveloped land with little or only limited maintenance which have been planted with wild flowers or colonized by vegetation and wildlife. They also include woodland, railway embankments, river and canal banks and derelict land, which may in some cases be thought of as temporary natural greenspace. The primary function of natural greenspaces is to promote biodiversity and nature conservation.

■ **Other functional greenspaces:** Essentially allotments, the yards of religious buildings and cemeteries.

Some classifications may wish to add an eighth type of greenspace – school grounds. However, regarding the approach of this paper, they could be included within the above typology, even if they normally include more than one type of greenspace.

There are also various types of Greyspace (civic space), including:

■ **Civic squares and plazas:** often containing statues or fountains and primarily paved, sometimes providing a setting for important public buildings.

■ **Market places:** usually with historic connotations.

■ **Pedestrian streets:** usually former roads which have been paved over and provided with seats and planters.

■ **Promenades and sea fronts:** usually used for recreational activities. They have special value when located at historical areas.

The Role of Open Space in Achieving Sustainable Neighborhood

The role that is assigned to open spaces to play within the neighborhood structure, to achieve sustainability goals and objectives, is formulated in three key issues; space management, space function (circulation of people and permeability), and the role of objects within

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space (sustainable landscape). (Campbell, 2001, Ironside, 1999, Birkeland 2004) The detailed study for these issues sets the sustainability checklist applied to open spaces. These details are as follows:

■ **First: Space Management** is a key issue to be taken into consideration. As in open space terms, sustainability is a function of the inter-relationship between design and management. This includes: (Campbell, 2001) (Ironside, 1999)

- encouraging sustainable lifestyles, for example by providing paths and cycle routes

- making maximum use of existing features and assets

- strengthening the sense of place

- incorporating local or recycled materials

- encouraging community participation and involvement

-reducing inputs of non-renewable resources during construction and subsequent maintenance

- eliminating or reducing the use of herbicides and resources that affect other ecosystems

- encouraging habitat creation and native planting

- managing resources carefully

■ **Second: space function** (circulation of people and permeability), while most modern development planning uses the road network as the key structural element, a sustainable design takes the circulation of people on foot and bike and the effectiveness of public transport as starting points (Barton, 1996). However, creating

neighborhoods where walking is the natural and pleasurable means of access between activities achieves much of sustainability goals and objectives (quality of life-health economics of communities, and community participation) (National Neighborhood Coalition, 2005). Moreover, it becomes a social activity in its own right. Thus the number of people on the streets and paths itself provides security. On the other hand, Smart Growth, New Urbanism and Neo-traditional Development trends highlight the importance of developing 'mixed land use' strategies to promote walking activities. They assert that "Communities can support walking and cycling if they are developed with meaningful destinations in close proximity to each other, such as shopping, school and employment". (National Neighborhood Coalition, 2005) These movements strive for well-designed communities that provide safe and abundant opportunities for routine physical activity. The objectives are to:

- reduce the level of car reliance,
- reduce the need to travel - with the social benefits of increasing transport choice for all groups in the population,
- enhancing local security and community

■ **Third: the role of objects** within space (sustainable landscape). Landscaping elements are the basic constituent of any open space's structure. They have to be utilized to achieve sustainability goals at the micro level. Janis Birkeland (2004) draws a framework for sustainable landscaping elements as they should:

- Return to original sources of inspiration, whether nature or culture. (Papnek, 1984).

- Respond to the site, designing in harmony with its distinctive character to enable the

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unfolding of the landscape's ecological potential over time. This involves:

• creating connections and themes (functional and perceptual as well as spatial) within and across sites while defining and delineating boundaries;
• transforming site constraints into environmental opportunities;
• minimizing negative environmental impacts (including sensory as well as physical pollution);
• maximizing positive impacts, off-site as well as internally.

- Minimize inputs of materials and energy and maximize outputs of renewable and reusable resources.

- Maximize resilience and dynamic stability in the landscape in such a way that each element fulfils several functions and each function is undertaken by several elements.
• maximizing the diversity of landscape elements and the diversity of relationships between elements;
• creating opportunities for the emergence of self- sustaining and self-regulating systems in the landscape.
- Create 'place' as distinct from merely manipulating space, in such a way that the design maximizes the potential for user interaction with the environment.

- Make systems visible, which means making environmental processes apparent and celebrating them.

- Minimize maintenance and maintain to enable full expression of design, acknowledging that ongoing management is itself an aspect of design, to ensure the continuity of sustainable outcomes.

On the other hand, Ironside (2005) gives a detailed definition to sustainable residential greenspace as: "Greenspace fit for its purpose, responsive to evolving needs and changes over an extended period of time, not requiring an excessive input of resources."

In addition to the previously mentioned key issues, this definition dictates that; for a Greenspace – as a division of open space- to be sustainable it should:

- meet the varied recreation and leisure needs of users and
- involve local communities

Open Space Sustainability Parameters

Based on the above-mentioned discussion, this paper proposes a three dimensional matrix that consists of two main parts. The first is a two dimensional matrix that investigates the relationship between the sustainability goals and objectives, and the different types of open spaces in a neighborhood. This matrix indicates the roles and responsibilities that each of these types has to play –divided mainly into categories of 'greenspaces' and 'greyspaces'. The second, is a two dimensional matrix that correlates the assigned sustainability parameters (checklist) –driven out of three main sustainability issues, management, circulation, and sustainable landscape– with the open spaces categories of neighborhoods, 'greenspaces' and 'greyspaces'.

However, it draws space responsibilities that have to be achieved to support sustainability practices in neighborhoods. That clearly depends on spaces' integrated dimensions: physical and non-physical. Moreover, it shows the overlapping

area of practices that these types have to play all together to fulfill their sustainability responsibilities.

The first two-dimensional matrix answers the question about 'What' are the goals and objectives that the open spaces in a neighborhood have to achieve. And the second is about 'How' these goals and objectives could be achieved. The overlapping answers of these two questions draw the dimensions of the developed three dimensional matrix. However this matrix could be used to develop a further checklist for evaluating the open spaces performance in neighborhoods. This could be achieved in three consequent steps as follows [numerically indicated in Figure 4].

■ The first, is to determine which type of open space the study wants to investigate
■ The second, is to determine the sustainability goals and objectives that are assigned to this type of open space and have to be achieved in the neighborhood. [table 1]
■ The third, is to develop a checklist of the sustainability parameters assigned to this type of open space. [table 2]
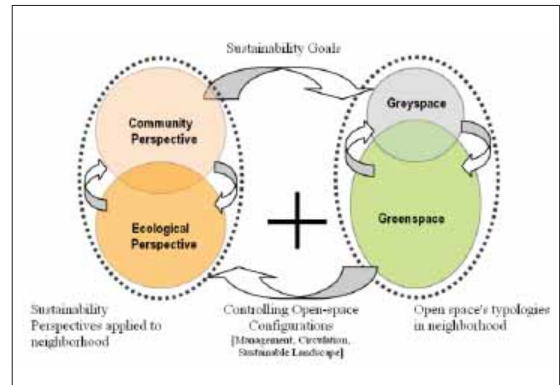

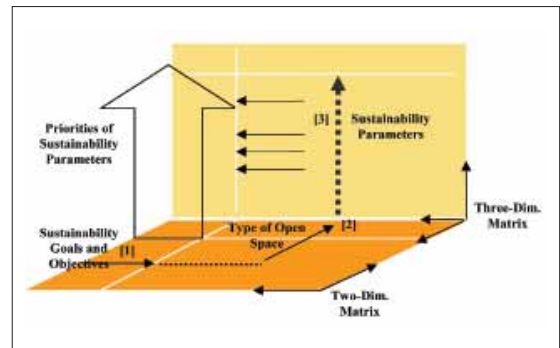Figure 3: Neighborhood's Sustainability Mechanism. (Source: Author).

Figure 4: Three Dimension Matrix Correlates Types of Open Space to Sustainability Attributes. (Source: Author).

Table 1: Sustainability Matrix-A (correlating sustainable development with open space typologies - Source: Author).

Utilizing the Matrix in Evaluating Open Space Sustainability Performance

The study applies its findings to two different types of open spaces. The first is the Beirut Pine 'Horsh Beirut' that is located at the southern portion of the city, at the heart of a number of residential neighborhoods. It is classified as a 'Greenspace' serving number of functions –parks and gardens, children playgrounds, and sports facilities. The second is the pedestrian open spaces at Byblos. They are classified as 'Greyspaces', however they function as: market places and pedestrian streets.

Evaluating the sustainability performance of Beirut Pine 'Horsh Beirut'

Using the proposed matrixes (tables 1 and 2), the paper builds up the following tables that focus on the functions that the Beirut Pine 'Horsh Beirut' serves (figure 5).

Sustainability Parameters		Green Space							Grey Space			
		Parks and gardens	Amenity greenspace	Children's play areas	Sports facilities	Green corridors	Natural/semi-natural greenspaces	Other functional greenspaces	Civic squares	Market places	Pedestrian streets	Promenades and sea fronts
Space Management	• encouraging sustainable lifestyles, for example by providing paths and cycle routes	▫			▫	▪	▫		▫		▪	▪
	• making maximum use of existing features and assets	▫	▫	▫		▪	▫				▫	▪
	• strengthening the sense of place	▪	▫	▪		▫	▫		▪	▫	▪	▪
	• incorporating local or recycled materials			▫		▫		▫		▫	▫	▫
	• encouraging community participation and involvement		▪	▪	▪		▫		▪	▪		
	• reducing inputs of non-renewable resources during construction and maintenance	▫	▫	▫				▫	▪	▪	▫	▫
	• eliminating or reducing the use of resources that affect other ecosystems	▫		▫		▫	▫	▫	▪			▫
	• encouraging habitat creation and native planting	▪	▪			▪	▪	▫			▫	▫
	• managing resources carefully	▫				▫	▫	▫				▪
Circulation	• reduce the level of car reliance						▫			▫	▪	▫
	• the effectiveness of public transport											▫
	• reduce the need to travel	▫		▫	▫					▫	▪	
	• social benefits of increasing transport choice for all groups population						▫		▫			▫
	• enhancing local security and community	▫	▫		▪				▫	▪	▪	▫
Quality Greenspace	• Return to original sources of inspiration	▪	▫	▫		▫		▫		▫	▪	▪
	Respond to the site • creating connections and themes within and across sites	▫				▪	▪	▫				▪
	• transforming site constraints into environmental opportunities	▫	▪		▫	▫	▫	▫		▫	▫	▫
	• minimizing negative environmental impacts	▫	▫			▪	▫	▫				▫
	• maximizing positive impacts, off-site as well as internally	▫		▫		▫	▫		▫		▫	
	• Minimize inputs of materials and energy and maximize outputs of renewable and reusable resources	▫				▪	▫	▫	▫	▫	▫	▫
	Maximize resilience • maximizing the diversity [landscape elements and the diversity of relationships]	▪	▫			▪	▫	▫		▫	▫	▫
	• creating opportunities for the emergence of self-sustaining and self-regulating systems	▫				▪	▫	▫				
	• Create 'place' as distinct from merely manipulating space	▪		▫		▫			▪	▪	▪	▫
	• Make systems visible, which means making environmental processes apparent and celebrating them	▫				▫	▫	▫				▫
	• Minimize maintenance	▫	▫	▫					▪	▪	▪	▫
	• meet the varied recreation and leisure needs of users	▪			▪	▪	▫					
	• involve local communities			▪	▪	▪						

Table 2: Sustainability Matrix-B (correlating sustainable development with open space typologies - Source: Author).

Figure 5: Different Activities Performed in the Beirut Pine 'Horsh Beirut', [park and gardens, children's play area, and sports facilities]-(Source: Author).

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The application of the proposed matrix to Beirut Pine 'Horsh Beirut' is divided into two succession stages; the first is to determine the sustainability objectives -and their priorities- that have to be achieved while using this greenspace, and the second is to define the parameters used to evaluate its sustainability performance.

The sustainability performance of Beirut Pine 'Horsh Beirut' is seen as complex as the multi functions that this greenspace is utilized for. The table (3) shows 'Horsh Beirut' as a composite of three different greenspace typologies; parks and gardens, children's play areas, and sports facilities. However, to determine the priorities of sustainability goals and objectives that have to be achieved through this multi functional greenspace, the paper assigns a relative weight equivalent to the type of influence that each space typology affects sustainability performance (2 to direct influence, 1 to indirect influence, and 0 to no influence). Reading table (3), and according to the shown relative scale, sustainability goals and objectives, could be re-arranged regarding their importance (indicated at the last column-right).

Sustainability Goals	Sustainability Objectives	Parks and gardens	Children's play areas	Sports facilities	Assigned Weight
Cutting greenhouse gas emissions Energy	• Reduce the need to travel		□	□	2
	• Reduce car reliance				0
	• Increase energy efficiency in buildings				0
Closing local resource loops	• Reduce demand for non-renewable resources	■	□		3
	• Reuse and recycling of resources locally	□			1
	• Local water sourcing, treatment and aquifer recharge	□			1
	• Local low-input food production	□			1
Enhancing local environmental quality	• Promote local distinctiveness and heritage	■	□		3
	• Create an attractive public realm	■	■	■	6
	• Enhance local habitat diversity	■			2
Creating a healthy environment	• Improve local air quality	■		□	3
	• Promote an active life-style (especially walking)	□	□	■	4
	• Encourage consumption of fresh fruit and vegetables				0
Increasing street safety	• Reduce the chance of vehicle/pedestrian accidents				0
	• Reduce the fear of violence		□	■	3
Increasing accessibility and freedom of choice	• Choice of transport mode for trips				0
	• More facilities accessible locally		■	■	4
Equity and social inclusion	• Choice of facilities within easy walking distance		■	□	3
	• Viability of public transport				0
Local work opportunities	• Accessible jobs for those tied to the locality		□		1
	• Reduce transport emissions	■			2
Value of local community	• Facilitate accessible social networks	■	■	□	5
	• Promote mental health	■	■	■	6
Increasing local self-determination	• Increase user/citizen control		□		1
	• Management of decentralized systems				0

Table 3: Applying Sustainability Matrix to the Beirut Pine 'Horsh Beirut' Greenspace - Section A - (Source: Author).

The matrix correlates different sustainability goals and objectives to the composite typology of the Beirut Pine 'Horsh Beirut' greenspace.

Sustainability Parameters		Grey Space			
		Parks and gardens	Children's play areas	Sports facilities	Assigned Weight
Space Management	• encouraging sustainable lifestyles, for example by providing paths and cycle routes	□		□	2
	• making maximum use of existing features and assets	□	□		2
	• strengthening the sense of place	■	■		4
	• incorporating local or recycled materials		□		1
	• encouraging community participation and involvement		■	■	4
	• reducing inputs of non-renewable resources during construction and maintenance	□	□		2
	• eliminating or reducing the use of resources that affect other ecosystems	□	□		2
	• encouraging habitat creation and native planting	■			2
	• managing resources carefully	□			1
Circulation	• reduce the level of car reliance				0
	• the effectiveness of public transport				0
	• reduce the need to travel	□	□	□	3
	• social benefits of increasing transport choice for all groups population				0
	• enhancing local security and community	□		■	3
Quality Greenspace — Respond to the site	• Return to original sources of inspiration	■	□		3
	• creating connections and themes within and across sites	□			1
	• transforming site constraints into environmental opportunities	□		□	2
	• minimizing negative environmental impacts	□			1
	• maximizing positive impacts, off-site as well as internally	□	□		2
	• Minimize inputs of materials and energy and maximize outputs of renewable and reusable resources	□			1
Maximize resilience	• maximizing the diversity [landscape elements and the diversity of relationships]	■			2
	• creating opportunities for the emergence of self-sustaining and self-regulating systems	□			1
	• Create 'place' as distinct from merely manipulating space	■	□		3
	• Make systems visible, which means making environmental processes apparent and celebrating them	□			1
	• Minimize maintenance	□	□		2
	• meet the varied recreation and leisure needs of users	■		■	4
	• involve local communities		■	■	4

Table 4: Applying Sustainability Matrix to the Beirut Pine 'Horsh Beirut' Greenspace - Section B - (Source: Author).

The matrix correlates different sustainability 'Parameters' to the composite typology of the Beirut Pine 'Horsh Beirut' greenspace.

Table (3) shows that: for Beirut Pine 'Horsh Beirut' –in its composite greenspace typology-, the sustainability goals that have the first priority to be achieved are to: enhance local environmental quality and to increase the value of local community. Moreover, the sustainability objectives are: to create an attractive public realm, to promote mental health, and to facilitate accessible social networks. Moreover, Table (4) shows that: the most important sustainability indicators are as follows:

Does the Beirut Pine 'Horsh Beirut' ...... ?
- Strengthening the sense of place?
- Encourage community participation and involvement?

- Meet the varied recreation and leisure needs of users?

Does the Beirut Pine 'Horsh Beirut' ...... ?
- Reduce the need to travel?
- Enhance local security and community?
- Return to original sources of inspiration?
- Create 'place' as distinct from merely manipulating space?

Evaluating the sustainability performance of pedestrian streets and historical marketplace at Byblos

The sustainability performance of the pedestrian open spaces at Byblos is seen as complex as the multi functions that these greyspace are used for.

Figure (6) and table (5) show streets of Byblos as a composite of two different greyspace typologies; historical market spaces, and pedestrian streets. However, reading table (5), -according to the shown relative scale-, sustainability goals and objectives, could be re-arranged regarding their importance (indicated at the last column- right).

Table (5) shows that: for the pedestrian open spaces at Byblos, the sustainability goals that have the first priority to be achieved are to: enhancing local environmental quality, increasing both the value of local community and street safety.

Figure 6: Views of Different Architectural and Urban Features of Byblos Spatial Expression. [the open spaces function as; historical market place and pedestrian streets]-(Source: Author).

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Moreover, the sustainability objectives are to: promote local distinctiveness and heritage, facilitate accessible social networks, reduce car reliance, create an attractive public realm, reduce the fear of violence, and promote an active life-style (especially walking).

Moreover, Table (6) shows that: the most important sustainability indicators are as follows:

Do the greyspaces at Byblos ...... ?
- Enhancing local security and community?

- Create 'place' as distinct from merely manipulating space?
Comes to the second priority the following

Do the greyspaces at Byblos ...... ?
- Return to original sources of inspiration?
- Strengthening the sense of place?
- Reducing inputs of non-renewable resources during construction and maintenance?
- Reduce the level of car reliance?
- Reduce the need to travel?

Sustainability Goals	Sustainability Objectives	Market place	Pedestrian streets	Assigned Weight
Cutting greenhouse gas emissions Energy	• Reduce the need to travel	▫	▫	2
	• Reduce car reliance	▫	■	3
	• Increase energy efficiency in buildings			0
Closing local resource loops	• Reduce demand for non-renewable resources		▫	1
	• Reuse and recycling of resources locally			0
	• Local water sourcing, treatment and aquifer recharge			0
	• Local low-input food production			0
Enhancing local environmental quality	• Promote local distinctiveness and heritage	■	■	4
	• Create an attractive public realm	▫	■	3
	• Enhance local habitat diversity		▫	1
Creating a healthy environment	• Improve local air quality		▫	1
	• Promote an active life-style (especially walking)	▫	■	3
	• Encourage consumption of fresh fruit and vegetables			0
Increasing street safety	• Reduce the chance of vehicle/pedestrian accidents		■	2
	• Reduce the fear of violence	▫	▫	2
Increasing accessibility and freedom of choice	• Choice of transport mode for trips			0
	• More facilities accessible locally	▫		1
Equity and social inclusion	• Choice of facilities within easy walking distance	▫	▫	2
	• Viability of public transport			0
Local work opportunities	• Accessible jobs for those tied to the locality	▫		1
	• Reduce transport emissions		■	2
Value of local community	• Facilitate accessible social networks	■	■	4
	• Promote mental health		▫	1
Increasing local self-determination	• Increase user/citizen control		■	2
	• Management of decentralized systems	▫		1

Table 5: Applying Sustainability Matrix to the Byblos Greyspaces - Section A - (Source: Author).

The matrix correlates different sustainability goals and objectives to the composite typology of the Byblos greyspaces.

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Sustainability Strategies		Market spaces at Byblos		
		Market places	Pedestrian streets	Assigned Weight
Space Management	• encouraging sustainable lifestyles, for example by providing paths and cycle routes		■	2
	• making maximum use of existing features and assets		□	1
	• strengthening the sense of place	□	■	3
	• incorporating local or recycled materials	□	□	2
	• encouraging community participation and involvement	□		1
	• reducing inputs of non-renewable resources during construction and maintenance	■	□	3
	• eliminating or reducing the use of resources that affect other ecosystems			0
	• encouraging habitat creation and native planting		□	1
	• managing resources carefully			0
Circulation	• reduce the level of car reliance	□	■	3
	• the effectiveness of public transport			0
	• reduce the need to travel	□	■	3
	• social benefits of increasing transport choice for all groups population		□	1
	• enhancing local security and community	■	■	4
Quality Greenspace	• Return to original sources of inspiration	□	■	3
	Respond to the site: • creating connections and themes within and across sites			0
	• transforming site constraints into environmental opportunities	□	□	2
	• minimizing negative environmental impacts			0
	• maximizing positive impacts, off-site as well as internally	□		0
	• Minimize inputs of materials and energy and maximize outputs of renewable and reusable resources	□	□	2
	Maximize resilience • maximizing the diversity [landscape elements and the diversity of relationships]	□		1
	• creating opportunities for the emergence of self- sustaining and self-regulating systems			0
	• Create 'place' as distinct from merely manipulating space	■	■	4
	• Make systems visible, which means making environmental processes apparent and celebrating them			0
	• Minimize maintenance	■	■	4
	• meet the varied recreation and leisure needs of users			0
	• involve local communities			0

Table 6: Applying Sustainability Matrix to the Byblos Greyspaces - Section B - (Source: Author).

The matrix correlates different sustainability 'Parameters' to the composite typology of the Byblos greyspaces.

Conclusion

This paper proposed an approach based on the intersecting area of both social and ecological approaches to investigate the potential of open space to achieve sustainability goals and objectives in neighborhoods. Such an approach is chiefly based on the dual role that open spaces play in articulating the character of neighborhoods. They are the domain for different

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social interactions and shared community activities, and the field of micro-ecological features to express their personality.

In its review of literature on neighborhood open spaces, the paper utilized a classification that would be appropriate to its approach. It differentiated between 'greenspace' and 'greyspace' as the main categories involved in open spaces. It placed special emphasis on 'greenspace' as more relevant to achieving sustainability prospects at the neighborhood level. As well, the paper discussed different types of 'greenspace' and their role in the neighborhood; parks and gardens, amenity greenspace, children play areas, sports facilities, green corridors, natural/ semi-natural greenspaces, and other functional greenspaces. Moreover, the paper highlighted different types of 'greyspace'; civic squares and plazas, market places, pedestrian streets, and promenades and sea fronts.

Three main sustainability attributes of neighborhood's open spaces were discussed; space management, space function (circulation of people and permeability), and the role of objects within space (sustainable landscape). Consequently, the paper concluded a set of parameters that could be used as an indicator of sustainability performance at the neighborhood level. These parameters were utilized to develop a three dimensional matrix correlating: different typologies of open spaces, sustainability goals and objectives, and sustainability parameters. Such a matrix was applied to two different space typologies in Lebanon; Beirut Pine 'Horsh Beirut' as a greenspace, and the historical market, and pedestrian streets in Byblos as a greyspace. The application comes to determine the priorities of both sustainability goals and objectives,

and sustainability parameters that have to be evaluated at each area.

Regarding the Beirut Pine 'Horsh Beirut', the paper concludes that: to enhance local environmental quality and to increase the value of local community are the main goals. Meanwhile, to create an attractive public realm, to promote mental health, and to facilitate accessible social networks are the main sustainability objectives. Regarding the historical market, and pedestrian streets in Byblos, the paper concludes that: to enhance local environmental quality, to increase both the value of local community and street safety are the main goals. Meanwhile, to promote local distinctiveness and heritage, facilitate accessible social networks, reduce vehicular movements, create an attractive public realm, reduce the fear of violence, and to promote an active life-style (especially walking) are the main sustainability objectives.

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