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Sustainable rehabilitation of the built environment in Lebanon

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ABSTRACT

This paper reviews the results from a field survey of the impact of the built environment on the physical environment in the coastal area of Zouk Mosbeh (ZM), Lebanon. This area suffered extensive infrastructure damage and displacement of people during the civil war, followed by unprecedented unplanned urban growth. The survey was undertaken in 2005 and 2006 using a triangulation method which combined semi-structured interviews, designed questionnaires and objective surveys. The survey was not only to analyze the nature and extent of environmental degradation but also was to produce guidance for use by built-environment professionals, practitioners and policy makers for achieving sustainable rehabilitation of the built environment sector in Lebanon. The results suggest that a bottom-up approach to urban management involving all stakeholders in the policy and implementation process is needed to allow them take ownership of the sustainable development process. The outcomes of the field survey also show that only 61% of occupants are generally satisfied with their environment of 77 buildings surveyed in this study, and the measurements of predicted mean vote (PMV) provide general satisfactory comfort conditions according to ISO 7730 and the occupants agree by indicating a satisfactory actual mean vote (AMV). Additionally, the results show environmental sustainability in the Lebanese coastal area is severely undermined by unplanned and unregulated physical development resulting in huge impact on the bio-physical environment.

1. Introduction

Fifteen years of civil war (1975–1990) and regional tension has altered the physical characteristics as well as the economic and social structure of Lebanon that was once described by Kassir as the "La Suisse de l'Orient" or the Swiss of the East (Kassir, 2003). In his observation, Lebanon was "a country of milk and honey and certainly a city of luxury and pleasures". He further noted that 20 years after independence from France in (1946), Lebanon appeared a success story, and Beirut, its capital, was widely seen as a rare pearl of the afflicted near east. This golden age lasted, albeit with ups and downs, until the beginning of the civil war in 1975. This positive and socio-economic and political trend was brought to an abrupt end by the civil war which lasted 15 years from 1975 to 1990, and caused severe physical destruction and socio-economic disruptions. The displacement of huge numbers of people of different religious and political groups imposed huge pressure on the built and the natural environment, especially the rural coastal towns and cities (Global IDP database, 2004; Republic of Lebanon, 1997, 2001). This situation was further compounded by the Israeli invasion and occupation of southern Lebanon for many years. The end of the civil-war in 1990 and the relative reduction in regional tension has seen the gradual return to normality and nowhere else has this manifested most other than the built environment. The built environment has changed drastically with huge construction of residential, commercial, and industrial buildings. A noticeable feature of these developments is the lack of adequate planning and development controls. This is evidenced by the typology and heights of these buildings, especially regarding their morphological contexts, which violate basic planning rules and development controls (Saab, 2004). The buildings are clustered and the lack of adequate infrastructures is endangering to the health and lives of the inhabitants (Republic of Lebanon, 1997, 2001). The reluctance of the government to enforce planning and development controls can be explained, and this derives from the war sentiments and the spirit of peace and reconciliation that have endured. However, there is the fear that when such culture becomes entrenched, it will be very difficult to reverse. The real problem is how to persuade all built environment stakeholders, including the government that building to plan, standards, and development controls hold the key to sustainable development of the coastal area of Lebanon.

Lebanon is undergoing what can be called an exciting period of urban transformation. As Lebanon emerged from this crisis, there has been an unprecedented level of optimism in the economy which has manifested it in huge commercial, residential, and industrial property development. A casual observation reveals that

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these physical developments adhere to no sustainable patterns of development: houses are being built with no regards to existing laws on planning and development controls with the encroachment of buildings over natural landscapes, poor visibility, air, and noise pollution as well as water pollution have become the defining characteristics of Lebanon's coastal areas. It is desirable to try and understand the extent and dimension of the problem, and search for possible solutions. Countries in the region might also be experiencing the same situation as Lebanon and would accordingly benefit from this work.

The overall aim of the paper is to analyze the nature and extent of environmental degradation in Lebanon, particularly the impact of the built environment on the physical environment; to produce advice and guidance for use by built-environment professionals, practitioners and policy makers, for achieving sustainable rehabilitation of the built environment sector as applied to Lebanese coastal zone (LCZ) area of Zouk Mosbeh (ZM).

2. The Lebanese coastal zone (LCZ)

In Lebanon the impact of the built environment on the physical environment is evident and has reached a crisis proportion (Republic of Lebanon, 1997). This is particularly the case given that over 75% of the Lebanese population and economic activity are concentrated in the coastal zone, which is less than 16% of the country's geographical area but contributes about 73% of Lebanon's GDP. In addition, the Lebanese coastal zone (LCZ) hosts four commercial ports and over 15 fishing harbours, dozens of sea pipelines for petroleum imports, three fuel power plants, and series of various industries. Although endowed with natural landscapes and rich cultural and archaeological heritage, it also remains the main source of the country's drinking water (Republic of Lebanon, 1997). However, the LCZ is suffering from uncontrolled urban sprawl and unplanned development exemplified by the beach complexes, citing of landfills, breakwaters, and marinas, which hinder public access to the seashore. Similarly, incompatible coastal land-uses with polluting industries located side by side to residential and commercial developments, especially tourism. The problem is further compounded by unregulated ribbon development along coastal access roads and traffic arteries. However, the problem of environmental degradation in LCZ can also be a symptom of institutional deficiencies, which is more pronounced in the area of planning and regulation. The lack of coastal, regional or national land-use plans; poorly defined national planning authorities; overlapping and uncoordinated environmental management responsibilities; outdated and inconsistent environmental laws and regulations and lack of implementation of the little regulations that exist are cases in point. Thus, the failure to establish environmental impact assessment (EIA) and the haphazard public participation in decision-making comes as no surprise (Republic of Lebanon, 1997).

Lebanon is a typical case of most coastal areas of the developing countries. In most of these countries, coastal areas provide diverse and productive habitats, which are important for human settlements (Shi, Hutchinson, Yu, & Xu, 2001; UNDP, 1992). It is hardly surprising that more than half of the world's population lives within 60 km of the shoreline, which is forecast to rise to three-quarters of the global population by the 2020. Coastal zones throughout the world are attractive areas for economic development and opportunities (Shi et al., 2001; UNDP, 1992). It is estimated that 50% of the world's population inhabit coastal zones, which represents approximately 10% of the earth's surface (Shi et al., 2001; UNDP, 1992). Many of the world's poor are crowded in coastal areas (UNDP, 1992). El Sabh et al. (1998) have robustly argued that this trend of population concentration in coastal areas is expected to continue into the future, and will impose further pressure on the biophysical environment of coastal regions.

The Lebanese territory is a narrow strip of approximately 10,452 km^2 with its maximum width reaching 70 km, and its coastal line estimated at approximately 210 km. The geomorphology of the Lebanese territory is characterized by two parallel faults: Mount Lebanon and the anti-Lebanon. The volcanic lava and basaltic black stone determined the external aspect of vernacular architecture of northern Lebanon, while limestone in architecture was used along the coast and in Mount-Lebanon.

The morphology of the LCZ is particular for its diversity. Along the coastal line and parallel to it runs the western mountain range. Several valleys crossing the western mountain range were created by the numerous water courses that cross this massive calcareous mountain, dividing the country into separated physical parts and creating important natural barriers. Fig. 1 shows the morphology of Lebanese territory. The light green area on the left of the map represents the LCZ, which is about 300 m altitude from the sea level. The red circle indicates the coastal area of Zouk Mosbeh object of the case study. Moreover, the northern part of Lebanon has medium density relatively to the central part. The central part, comprising the capital Beirut with its northern and southern expansions, has the highest population density and urbanization rate.

The aesthetic serenity and beauty of the valleys are under stress due to the irregular encroachment of high rise residential buildings. Rivers are polluted by wastewater and other effluents discharged directly into the rivers. Deforestation and erosion are caused by the opening and expansion of roads networks.

Since the middle of the 20th century, Lebanon has experienced an average urban growth rate of 8.14% annually. This phenomenal growth rate is attributed to the centralized nature of its economic and political systems. Similarly, the distortion effects to rural life by the civil war and attendant political upheaval has also forced rural-to-urban migration. In particular, the civil war which lasted for 15 years and the Israeli invasions of 1978 and 1982 resulted in the internal displacement of almost one million people. More worrisome is the distortion to the growth patterns of cities, which swelled to overwhelming levels (Global IDP database, 2004).

Although there is paucity of data, Global IDP database (2004) has attempted to develop a map and pattern of internal displacement in Lebanon. Accordingly, 62% of these people originate from the Mount Lebanon region while 24% originate from Southern Lebanon. Nevertheless, it is estimated that approximately 79,500 displaced people returned to their places of origin. However, the movement of people has overwhelmed Beirut, and the lack of urban planning and coordination has resulted in urban sprawl and uncontrolled urban expansion. Figs. 2 and 3 are vivid demonstration of the huge expansion and overcrowding that have taken place in Lebanon.

Figs. 2 and 3 show numerous high density high-rise buildings that have been put up in the last 10 years and dwarf traditional buildings while encroaching on the natural environment. The typology of these buildings can be seen to be totally devoid of context whether in their integration with the traditional existing architecture, or with the local climate. These new buildings alter and transform environmental attributes and characteristics of the areas in question. Also manifest in the figures is the lack of planning input to these buildings given their close proximities and the shadows that preclude use of solar energy and a huge obstacle to natural ventilation and airflow. This is particularly so when many of these buildings are left incomplete, helping to fuel urban aesthetic pollution and urban chaos. The types of materials that have been used for housing construction embody huge energy in contrast with traditional stone buildings that use in situ materials are also evident. Embodied energy being the energy consumed by all of the processes associated with the production of a building, from the acquisition of natural resources to product delivery. This includes the mining

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