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Microclimate and human comfort considerations in planning a historic urban quarter

Amany A. Ragheb^{a,*}, Ingy I. El-Darwish^b, Sherif Ahmed^c

^a Faculty of Engineering, Delta University for Science and Technology, Mansoura, Egypt

^b Faculty of Engineering, Tanta University, Tanta, Egypt

^c High Institute of Engineering and Technology, Beheira, Egypt

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Abstract

Lately, unexpectedly developing urban regions have been observed worldwide. This boom has an instantaneous impact on the microclimate and for this reason on human comfort, as a result negatively affecting international climate and power consumption degrees. Urban design selections together with road geometry and orientation, sidewalk widths, shading structures, materials, landscaping, building heights and air drift are key elements for pedestrian thermal comfort. This evaluation covers the built environment's moderation components impact at the weather, with the purpose for optimizing the thermal comfort degree in out of doors urban area. The literature covers using simulation equipment to be expecting out of doors environmental situations with specific knowledge on Envi-met as a simulation device for comparing outside thermal comfort. Sooner or later, the paper expects to spotlight the microclimatic enhancement approaches, and the usage of simulation as a device in the field of urban layout.

The paper focuses on the importance of air temperature, relative humidity, air motion, and suggests radiant temperature in city canyons in addition to in open public spaces for the sake of human thermal comfort. As at the micro-scale, an old historical district south Kom Al Shoqafah by Al Mahmoudiyah Canal in Alexandria has been studied. The consequences deliver some initial proof of the wonderful urban microclimate with the aid of the use of simulation strategies that may influence the city area design and the planning procedure. This study proved that the microclimatic conditions in a critical historic region are in a near relationship among human consolation and urban design. The study is for evaluating the opportunity of changing the microclimate through distinct design parameters that have strongly impact the microclimate.

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1. Introduction

The lifestyles for thousands of people dwelling in towns may be advanced through improving the elements that

have an effect on the urban microclimate, and the form of the city responds to them in the correct way to its site. The issue isn't always to supply an excellent plan derived from climatic concerns, but as a substitute to provide a practicable plan for pedestrian comfort on the outdoor space. Mills (2006) referred to that "while the meteorologically ideal settlement serves a useful pedagogical purpose,

* Corresponding author.

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it does not recognize planning realities where climate issues are rarely a dominant concern". According to Brown, the outdoor environment, especially in hot arid countries (including Egypt), tends to be poorly regulated and not thermal comfortable.

The microclimate of urban open areas is motivated by numerous parameters, which includes urban form and geometry, urban density, vegetation, water levels and the properties of surfaces (Balafoutis et al., 1998; Setaihi et al., 2013). Climatic and physical factors are combined in order to achieve sustainable human thermal comfort conditions (Ragheb et al., 2015a,b).

This paper demonstrates modern plans sprawl situations on an urban area of the old district at by means of Al Mahmoudiyah Canal in Alexandria city. Al Mahmoudiyah Canal has been a focal matter for all Alexandria's governorate plans for the beyond forty years. There has not been a plan thinking about microclimatic situations which has direct effect on human comfort. The studies compare Kom Al Shoqafah district present scenario to a predicted urban design of the same region, thinking about microclimatic conditions as well as evaluating it to proposed designs. A simulation has been used to assist make choices about legislative measures that could positively improve human thermal comfort.

The particular aim of the study is to improve the outdoor thermal conditions with the aid of the design having sufficient open spaces, proper paving, vegetation and water levels; by means of comparing current, probable and proposed urban designs to adjust current legislative planning and constructing measures. The paper's intention is to enhance the understanding of outdoor human factors and microclimatic issues to be able to preserve and maintain well designed ancient areas in collaboration with adaptive reuse with conservation measures.

1.1. Urban microclimate

Climate is the long term behavior of the surroundings in a selected region, with specific features such as, temperature, pressure, wind, precipitation, cloud cover and humidity. An urban area is an area with a high density of human created structures in comparison with the regions surrounding it (Mahgoub et al., 2013; El-Shimy et al., 2015). A microclimate is a local atmospheric region where the climate differs from the encircling area. The term may refer to areas as small as a few square meters or as large as many square kilometers (Erell et al., 2011). Microclimates exist, as an example, close bodies of water which may cool the local atmosphere, or in heavily urban regions where brick, concrete, and asphalt absorb the solar energy, heat up, and reradiate that warmth to the ambient air; the resulting urban heat island is a type of microclimate.

As it is well defined in the practice-oriented literature urban microclimate relies upon the type of city in terms of size, geographical location, population size and density, and land use in addition to the street design features along

with height of buildings, street widths and orientation, subdivision of the building masses, etc. Consequently; the urban design of each neighborhood in a city creates its own unique local climate (Mahgoub et al., 2013).

1.2. Urban design

Urban design is the procedure of designing and shaping cities, towns and villages. Whereas architecture focuses on individual buildings, urban design with the larger scale of groups buildings, streets and public areas, whole neighborhoods and districts, and entire towns, with the intention to make city areas functional, appealing, and sustainable (Parsons, 2013).

The primary target is not to provide an idealized plan derived from climatic concerns, but as an alternative to provide a manageable plan; this is economically viable and accepts that the planner must consider other factors, together with the necessities of transportation systems. Mills (2006) noted that "while the meteorologically ideal settlement serves a beneficial pedagogical purpose, it does not recognize planning realities wherein climate issues are hardly a dominant situation".

Urban design addresses the larger scale of groups of buildings, streets, public spaces, neighborhoods, districts, and entire cities. It is the proactive urban areas design which focuses on the design, quality, character and appearance of places, including buildings and the spaces among them. Urban design is concerned with the subsequent aspects (Erell et al., 2011):

- Pedestrian zones – areas of a city or town reserved for pedestrian-single use and in which some or all automobile traffic may be prohibited.
- Incorporation of nature within a town – preserves and complements the livability of towns, large and small, by incorporating extra nature.
- Aesthetics – creation and appreciation of beauty.
- Urban structure – how a place is put together and how its components relate to each other.
- Urban typology, density and sustainability – spatial kinds and morphologies associated with intensity of use, consumption of resources and manufacturing and renovation of viable communities.
- Accessibility – providing for ease, safety and choice while transferring to and through places.
- Legibility and way finding – helping people to discover their way around and recognize how a place works.
- Animation – designing places to stimulate public activity.
- Function and fit – shaping places to assist their various planned uses.
- Complementary mixed uses – locating activities to permit constructive interaction between them.
- Character and meaning – recognizing and valuing the variations among one location and other.

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