

Green as a smart infrastructure for humanized cities in the GCC

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The Gulf Countries boast of being among the most resilient and smart human constructs, designed to survive a social life within an extremely hot climate, mostly in desertic areas. A manifest example of humans engaging with their destiny is building an urban construct serving its physical and social needs. Green oasis played an important role in it, falling under the broad rubric of a “[green infrastructure](#).”

In the rocky to sandy desert, the main resources are the water and the shade of the oases. These provide precious water and food and sensitive mitigation for the environmental conditions, allowing livability even in the very hot summer. It is demonstrated that the average temperature can drop by about 5 °C in the presence of green, and a further 5 °C when moving from direct sun to full shade; water feature might provide an extra drop of 3 °C. The extreme environmental condition is the main starting point for looking at the Arab traditions and architecture; it is the nomadic lifestyle that underlies the tribal social structure and the collective organization.

The Arab term, Bedouin or Bedu is the name for nomadic people who have inhabited the desert regions since ancient times and translates to desert dweller. The presence of wadis and oases made it possible for nomadic tribes to settle and start an urban tradition. Arab settlements require synergic efforts to survive the desert climate and spatial emptiness or afford the hot, humid climate of the coastal areas, were necessarily intended as an organism based on a circular economy. These cities always had a strong dependency on the oases for water supply, shade, and vegetables. In the desertic areas, oases are always related to the wadi and are maintained by advanced systems of wells, water pumped from the ground, and rainwater management. The soil of the bottom valley, on the other hand, is karstic, generating underground rivers and nourish green growth of bushes, acacia trees, and even natural palm groves – offering dramatic views of the unique natural scenery known as a wadi. The casual surfacing of the rivers generates temporary or permanent water basins and oases, allowing the establishment of human settlements. Rests of these ancient hydraulic infrastructures are still visible in archeological sites and settlements dating from the Neolithic era, all across the Arab Region.

For environmental and sustainability reasons, as part of the established circular economy system, the natural and inducted palm plantations are great contributors in terms of social and economic benefits. Palms cool the passing air, creating a wavy movement up and down, increasing the speed of the breeze while reducing the impact of sand storms and generating shaded outdoor areas. Date palms also provide dates and molasses, the main nourishment, animal products, and materials for domestic products like baskets or carpets, and fuel for fires. Palm groves grow both inside and outside the city wall. Those traditions are a source of inspiration for architecture, which serves human survival and social needs. The same building process was a community investment, typical for agricultural communities, where every social and design act is implicitly sustainable.

Urban settlements find in the oasis the fundamental principles of coexistence with the environment from the daily dialectic between humans and nature. The oasis is not so much a geographical accident as a philosophy of life, based on the thriftiness adopted in the modern city. Green features have in GCC an extra reason to be and must be conceived as a systemic infrastructure, as an unavoidable condition to allow outdoor activities and the vibrant ground floor, as mentioned in the [New Urban Agenda](#) (NUA). A vibrant ground floor is also the main requirement for smart cities, the main shared platform for social interaction and exchanging physical data and fluxes.

Public spaces comprise just 2% of the area of Middle Eastern cities compared with 12% in the average European city, and the challenging climate conditions play a main role in it.

As per the local implementation policies of the 2030 UN mandate for openness and sociability to be implemented, Kuwait, UAE, and KSA have officially launched green infrastructure programs. All the major GCC cities already have systems of parks in place, true oases within the hot cities, and a major booster of outdoor social life. The [Shaheed park](#) in Kuwait is a high-end cultural destination with perfect green space, cultural centers, museums, and an institutional site to celebrate national festivities. The United Arab Emirates has also recognized the significance of providing open space systems intended as part of a comprehensive strategy. Abu Dhabi announced the [Ghadan 21 initiative](#): \$2.5 billion to transform its public places and parks into community spaces while enhancing the local economy. It will include water features, community ponds, and playgrounds for children in a network of over 300 small- and large-scale projects across the city; among these, four 'signature parks' and the regeneration of 16 existing ones. In KSA, the Royal Commission for Riyadh City launched the [Green Riyadh project](#), aiming to increase the per capita share of green space based on three main principles: afforestation, autochthon tree species, and recycled water. This greening initiative will surely improve the air quality and reduce the heat island effect and temperatures in the city. It will also indirectly encourage Riyadh citizens to follow a healthy lifestyle as part of the Kingdom's Vision 2030. The Green Riyadh Project is huge and includes planting 7.5 million trees in gardens and parks, mosques, schools, academic, healthcare, and public facilities, reaching a 135km long green urban corridor from the northern King Khaled Airport to south of the city. A real urban infrastructure and systemic support from nurseries and seedlings. The per capita green space will increase from 1.7 (one of the lowest worldwide) up to 28 square meters, and tripling the 9 sqm minimum recommendation of the World Health Organization, while continuing the 'Humanization Program' initiated by its former mayor, urban planner Dr. Abdulaziz bin Ayyaf and part of a wider Quality of Life Program as illustrated in [Vision 2030](#).

The Garden City was the urban concept first theorized by Ebenezer Howard in 1898 and followed, with different meanings and visions, by the Ville Radieuse of Le Corbusier in 1930 and the Broadacre City of Frank Lloyd Wright in 1932. The positive principles of having extensive green facilities, or even agricultural fields within the urban settlement, launched during the car boom period, brought unfortunately to an increasing urban sprawl and not impacting the density of urban fabrics. A growing trend is now the repurposing and reconfiguring of hard and grey infrastructure systems (e.g., roads, highways, disused train tracks) into urban green parks throughout the world. It will keep a dense urban standard while increasing the green features and reducing the heat island effect.

Density is still the main requirement for smart and sustainable cities, and green infrastructures are the most valuable asset for the GCC metropolis, constantly threatened by harsh climate making outdoor life sometimes impossible. Smart cities, as hyperconnected urbanisms, need to enhance the quality of the public ground, making it livable first.

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