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Towards A More Responsive Urban Configuration

The Case of Kuwait

RECLAIMING PUBLIC LIFE

in Hot Arid Climate

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MAJOR PROJECT:
RECLAIMING PUBLIC LIFE in Hot Arid Climate: Towards a more responsive urban configuration, the case of Kuwait

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Being a Major Project in Urban Design and City Planning submitted to the faculty of The Built Environment as part of the requirements for the award of the MSc Urban Design and City Planning at University College London, I declare that this project is entirely my own work and that ideas, data and images, as well as direct quotations, drawn from elsewhere are identified and referenced

ACKNOWLEDGMENT

I would like to start by sending my love and appreciation to my parents who have supported me throughout my academic life.
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I would also like to thank my friends, family and colleagues for their motivation and just for being there for me and especially Yousra Margaret Aljohmani for her persistent positivity.

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ABSTRACT

Urban open spaces play a vital role in supporting the social, cultural and economic life of cities while enhancing the health and wellbeing of its inhabitants. Attractive open spaces bring people to the streets and life to the city. Unfortunately, with the rapid urbanization and the introduction of automobiles, a lot of cities have adopted global paradigms that are insensitive to their climatic conditions, creating unsustainable and inhospitable environments for its inhabitants. Within hot-dry regions, precisely the case of Kuwait, the radical transformation from traditional compact urban fabric to fragmented urban sprawl, has formed a negative impact on the social coherence and public life of the city.

This literature review highlights the fundamental determinants to the provision of active and vibrant open-spaces in hot-dry regions, to reclaim public life. The study of traditional urban settlements highlighted the basic understanding of climate-sensitive open spaces and social engagement. Urban morphology, spatial configuration, social and mixed uses play a vital role in the movement patterns and vitality of urban spaces. This research attempts to merge these findings to create a comprehensive study on vibrant open spaces within hot-arid climates. Case studies are selected within the global-north and the Middle-East to draw wider perspective while seeking climate-responsive and innovative approaches.

The result of this research is a practical design toolkit which assists urban designers and planners in the provision of liveable open-spaces in hot-dry regions. The toolkit includes physical design principles supporting the provision of climatically tolerable open spaces, along with management guidelines to encourage and maintain regular use of open public spaces and pedestrian routes. The toolkit is then applied to configure/reconfigure a site in the centre of Kuwait City to test and evaluate its practicality. The result demonstrates a new approach to the sustainable provision of open public spaces while highlighting its limitation. This research aims to pave the way for healthier and more sustainable living for people and cities within hot-arid climates.

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Introduction

RESEARCH TOPIC AND QUESTION

Re-activating public spaces and the pedestrian realm through looking into the configuration of cities in extreme climates over time; the case of Kuwait.

How can urban configuration, spatial properties and social functions restore and enhance the quality of public life in hot arid climates?

Fig.1: Research approach

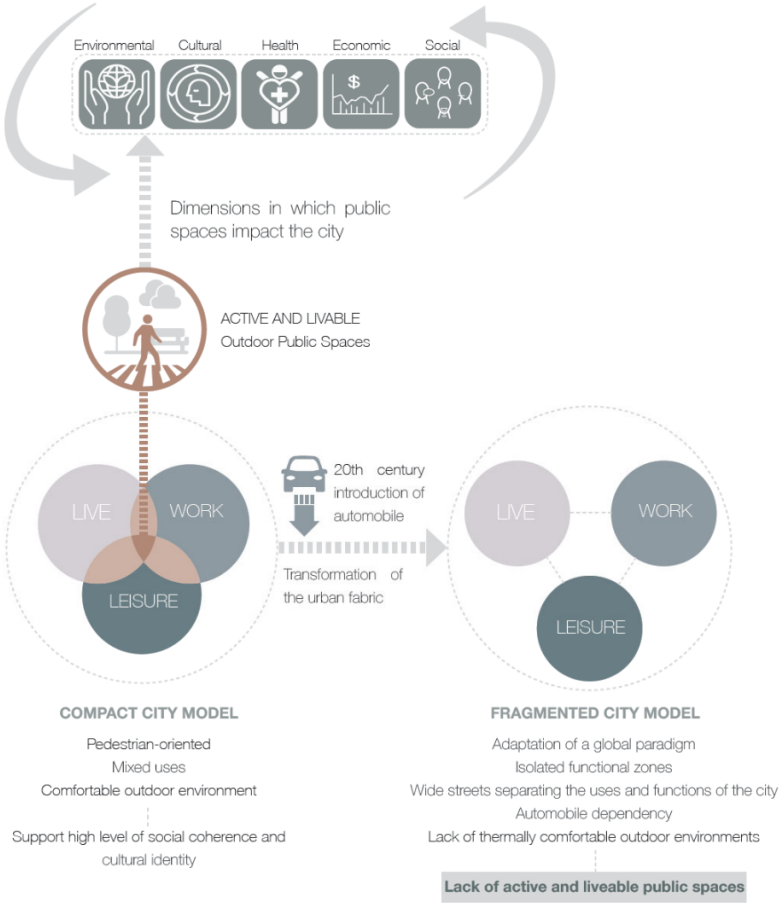


Fig 2: Diagram summarizing the conceptualisation of the problem

The turn of the 20th century saw the introduction of mass urban transportation which significantly neglected the humanisation of everyday city life by solely focusing on vehicular movement patterns. Outdoor urban spaces play a significant role in improving the physical wellbeing of its inhabitants whilst shaping the social, cultural and economic life of cities (Hass-Klau, 1999). This radical transformation changed the close-knit compact fabric which comprised of high levels of social coherence and cultural identity through its irregular and narrow street patterns and mixed uses into a set of fragmented quarters. The fine-grain urban fabric supported the provision of comfortable outdoor environments, countering the harsh climatic conditions. The new urban developments, however, are more regularly planned with wide streets separating the uses and functions of the city. This resulted in the fragmentation of the urban fabric which made outdoor environments much less comfortable and subsequently caused the loss of public life (Atash, 1993).

This study will look at the existing public spaces and pedestrian conditions in Kuwait. Following the radical transformation of the urban landscape in the 1950s influenced by the Garden City movement. A decade into the implementation of the first Kuwaiti master plan, it faced much criticism, namely by architect and town planner Shiber, who criticised the plan for being radical and ruthless. It was believed the plan neglected one of the integral determinants of urban formation i.e. the climate conditions. Instead, the plan centred on planning for cars (Shiber, 1966). The formerly integrated urban spaces transformed into isolated functional zones and "privatized spheres of behaviour" (Al-Nakib, 2016). This urban morphology resulted in a lack of public focus and consciousness, which produced unattractive streetscapes for pedestrians, whether for commuting or using the street as a destination for economic or social activities. Outdoor public spaces have become inaccessible and detached from their surroundings, leaving them unoccupied and substituted by private indoor malls.

JUSTIFICATION OF RESEARCH TOPIC

Why invest in quality public space?

Public spaces play a significant role in the life of cities and everyone who lives in it. Public spaces shape every aspect of one's life from open spaces to children's playgrounds, to commuting to school and work, to having safe spaces to retire to as we age. Investing and protecting public spaces is a valuable aspect of living a healthy, balanced and fulfilling lifestyle. As Ruskin (Gray, Bain & Rodgers 20113) noted, *"the measure of a city's greatness is to be found in the quality of its public spaces"*.

Jan Gehl argues that it's only "on foot" that people can have a true experience of life between buildings; this experience creates opportunities for contact and social interaction, which has been reduced to the point of deprivation due to the dependency on automobiles (Gehl, 2011). It has been further argued by other scholars that such walkable opportunities can ease the life of people with limited transportation access while encouraging a healthier lifestyle (Gray, Bain and Rodgers, 2013). Investing in quality public space can yield many other benefits including the development of the local economy, the increase in property value, and the decrease on automobile dependency (Gray, Bain and Rodgers, 2013).

Fig.3: The benefits of great places

Why explore the concept of public space within the Middle East and precisely the case of Kuwait?

Ali Mandanipour claims that the nature of public spaces is highly influenced by the nature of the city, therefore as cities change, so does public space. The increasing scale of modern development alongside the historic changes in the city has impacted the public space deeply increasing both the size and number. Consequently, the nature of such spaces have lost their true significance which many scholars have identified as the shift from "place" to "space". Space is considered impersonal and vague, while place embodies more meaning and value (Madanipour, 2010). Many humanist scholars engaged in public space and city rights, such as Jacobs, Sitte and Lynch, have criticised the modern approach and its global negative impact.

The lack of quality public spaces in the Middle East has been highly linked to "modernisation" (Germeraad, 1990). Modern urban planning systems are influenced by western paradigms in response to globalization. Implementing western design concepts and cutting-edge technologies is regarded as a way of catching up with developed countries (Kiet, 2010). Due to major changes, the traditional perception of open public spaces have lost their value and place. Contemporary public spaces replaced the older traditional quarters, injecting western typologies, such as squares, plazas, waterfront, and streetscape, with more emphasis on its picturesque value rather than functionality. Public spaces within the Middle East are currently being criticised for not meeting the user's needs nor responding to climatic requirements (Germeraad, 1990; Aljabri, 2014).

The socio-spatial patterns of old Kuwait town were characterized as diverse and functional. The port city life embraced cultural exchange and the acceptance of differences. People's daily activities were enriched by multiple interactions with different social groups. At this period, people relied on each other to support their daily life. This form of dependency developed an intricate sense of loyalty between different social groups, overcoming their diverse ethnic and socioeconomic status, and subsequently induced a strong sense of community and belonging. The city's spatial configuration supported such behavioral attitudes. The morphological distribution of different sectors, residential, market, and port area were highly integrated to encompass its mutual functions. Shared experiences were celebrated through the networks of multiple encounter zones. The implementation of intricate compact form was essential to ensure comfortable environments capable of supporting such activities (Al-Nakib, 2016).

Kuwait's former social and cultural life has been replaced with segregation and isolation. The newfound dependence on automobiles and indoor spaces has established distorted social relations and a significant decrease in public health and well-being. Lack of walkability and participation in outdoor activities has increased Kuwait's obesity rates. Also, the surge of traffic congestion and lack of appropriate pedestrian routes has resulted in high rates of traffic accidents and consequently injuries and deaths (Caton and Ardalan, 2011).

Current literature regarding public space usage in the Middle East & North African (MENA) region is limited however available sources stress the need for efficient approaches to urban public spaces (Aljabri, 2014). Reclaiming outdoor public life is essential for a sustainable model of living. This research project will explore and investigate new design parameters that are regionally and locally specific. Furthermore, this research will provide a design toolkit to produce attractive and climatically tolerable outdoor urban environments. In addition to the design parameters, policies and incentives will be drafted to encourage and maintain regular use of such spaces.

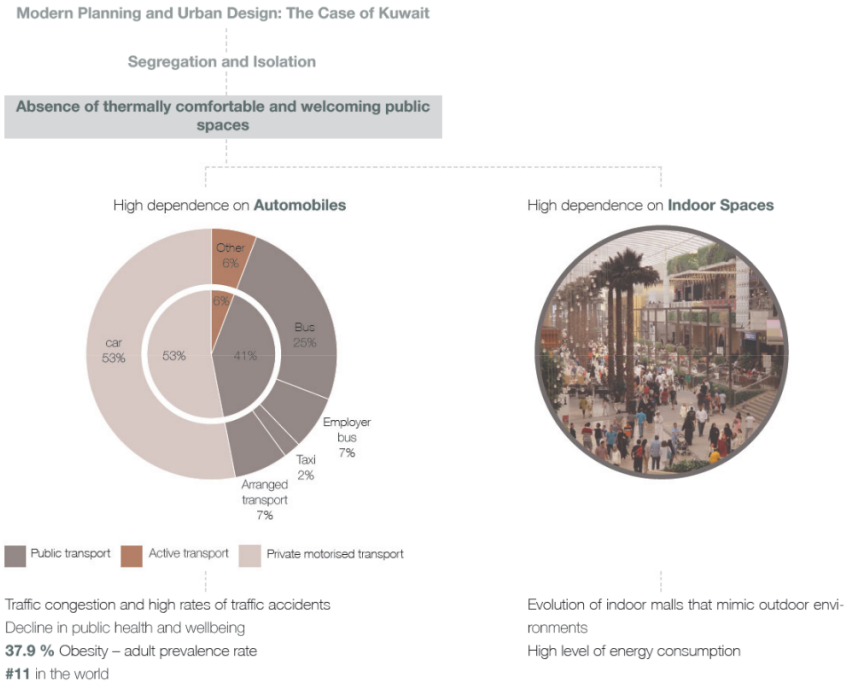


Fig 4: Impacts of modern planning in Kuwait

CONTRIBUTION TO PRACTICE

The contemporary practice of urban design and planning, specifically regarding public space, within the MENA region, does not correspond to users demands nor the climate. Mandeli argues that such a practice creates "picturesque areas that are easily constructed and maintained", however they do not contribute to the quality of the public realm (Mandeli, 2008). Concerning the explicit cultural and environmental context, this study will be applicable to Kuwait City, as well as any developing city in the MENA region with extreme dry-hot climatic conditions. This research's main features, the proposed urban design toolkit, policies and incentives will raise public awareness and create access to sustainable design processes.

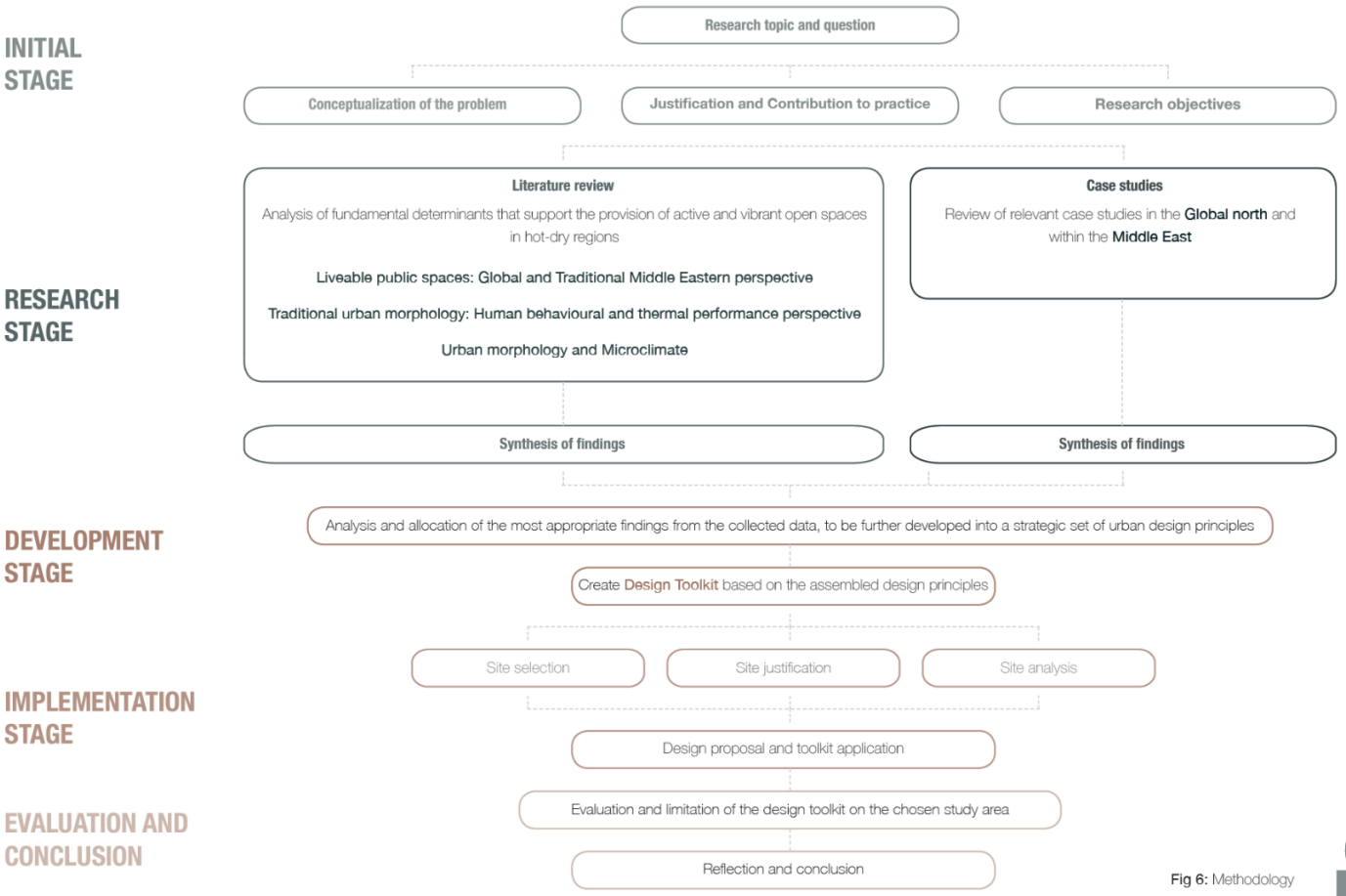


Fig 6: Methodology

LIVEABLE PUBLIC SPACES: GLOBAL PERSPECTIVE

Extensive research determining liveable public spaces within cities worldwide has highlighted the importance of multi-level planning and urban design in achieving successful outcomes. Each stage impacts the quality of the public realm, many scholars have noted that decisions made at early stages of strategic planning form the basis to which the development of well-functioning outdoor spaces are conceivable (Carmona, 2018; Gehl, 2011; Madanipour, 2010).

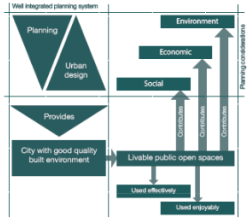


Fig 7: Relationship between urban planning and liveable public spaces

Outdoor activities are highly influenced by the physical environment. Adopting a pedestrian-responsive physical framework can stimulate human activities and encourage social interaction. Several scholars have emphasised smart growth, mixed-use and form-based coding systems to support the production of functional cities for people. By addressing planning policies to promote compact and dense form, with a well-distributed and accessible mix of uses within a convenient walking distance, 400-500 meters, the outcome will encourage walkability and subsequently contribute to a vibrant public realm. Furthermore, the development of efficient multiple modes of public transportation provides more options to commute and reduce automobile dependency(Gray, Bain and Rodgers, 2013; Gehl, 2011).

"With great distances between buildings, there is nothing much to experience outdoors, and the few activities that do take place are spread out in time and space" (Gehl, 2011). Cities for people embrace human-scale buildings, narrow streets, and small public spaces in which the perception of the public realm is warm, intimate and personal. Defining public spaces is generally a matter of land-use regulations. By advocating for the placement of buildings at the property line, a sense of enclosure can be achieved. In existing large undefined open spaces, the above atmosphere can be created by planting rows of matured trees resulting in a sense of a smaller enclosed space within a larger one (Gehl, 1971).

Furthermore, Speck (2013) stressed that for cities to be more walkable, there should be a reason to walk, alongside a safe, comfortable and interesting environment. Maintaining continuity in road-side conditions and length planning are vital for developing safe pedestrian routes, however, they often result in dull and boring constructs. Contrary to this, by providing compact and well-connected winding pedestrian networks this can enrich the walking experience while making it feel shorter (Gehl, 2011). Additionally, managing vehicle traffic and parking spaces are critical to the safety and quality of these pedestrian routes (Speck, 2013; Gray, Bain and Rodgers, 2013).

Jacobs best describes mixed uses as the need to adopt an extremely complex and intricate diversity of facilities to generate well-functioning vibrant urban life (Jacob, 1961). Active frontages must be carefully managed when buildings face public environments. A concentration of functions using narrow and deep lots with physically permeable facades help animate the public realm (Gehl, 2011). The mixing of various functions should be site-specific and evaluated based on community needs. Collaborating with locals in the design of public spaces reinforces the cultural identity whilst enhancing the sense and character of the place (Jacob, 1961; Gray, Bain and Rodgers, 2013).

William Whyte had acknowledged the correlation between the quality of a space and the activities that take place around it. Building on this concept Jan Gehl, further classified activities into three different categories: necessary, optional and social activities. Gehl associated optional and social activities with the qualities offered by the environment. Both scholars have recognised the significance of people's presence in attracting more people (Gehl, 2011; Whyte, 1980). Inviting people to spend more time outdoors centres on the art of placemaking at a local level. Providing a place that caters for different groups of people and various types of activities will generate more social interaction and shared experiences. The provision of seating stimulates human activities such as people watching, eating, reading, socializing, etc. The careful consideration of seating positioned around spatial boundaries are more desirable to users with those oriented towards active views are more enticing. The adequate spacing of 100 meters between seating areas allows the pedestrian to rest on whilst using the open spaces (Gehl, 2011).

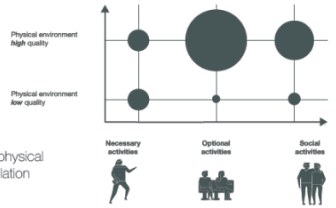


Fig 8: Quality of physical environment in relation to activities types

Many scholars have stressed the impact of visual expression produced by the art and architecture surrounding urban spaces. Small and intricate details can form an amusing and memorable experience while improving legibility (Sitte,1945; lynch, 1960; Gray, Bain and Rodgers, 2013). The concept of "triangulation" by Whyte (1990) implies that the provision of a third object can stimulate social interaction. He has further identified elements such as water, greenery, and food as catalysts for the functionality of a space (Whyte, 1990).

'Projects for public space' has acknowledged that a successful public space generally needs to offer four qualities: accessibility, sociability, activities and uses while ensuring comfort. While all four qualities are important, comfort is critical to enhancing the time spent in these spaces. Comfort can be interpreted in many ways; it can be implied as to the availability of seating within a space or the provisions of protection from adverse weather. In cases where microclimate has a strong impact on the way people perceive outdoor environments, solutions are mostly context-dependent and therefore will be further discussed in a subsequent section (Pps.org, 2019).

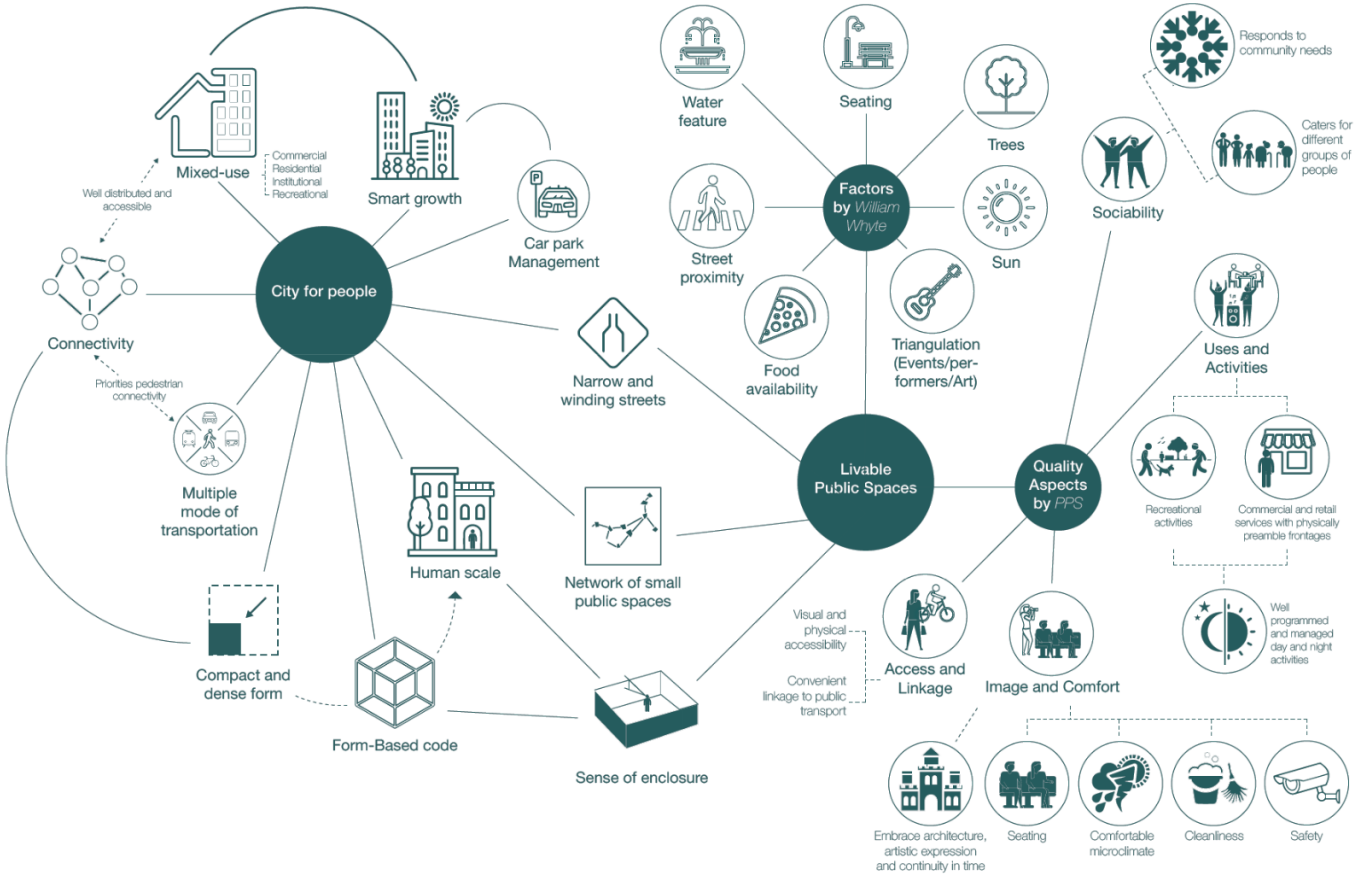
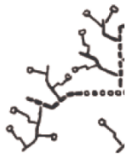


Fig 9: Summary of key concepts

LIVEABLE PUBLIC SPACES: TRADITIONAL MIDDLE EASTI

This focused study area is part of the Middle East, specifically an Arab Muslim region. Historical context is vital to further explore and understand liveable public spaces and for the development of a relevant toolkit.

Many scholars have linked the challenge with the use and perception of current public spaces within the Middle East to the major transformation of the traditional urban fabric and the implementation of western paradigms that do not represent the social-religious values of Islamic cities (Germeraad, 1990).



public center [faciliti
public thoroughfare [
semi-public [resident

Social principles:

Social order was a fundamental principle. The grouping of people sharing the same blood, ethnic origin and culture was strongly emphasised in the way clusters were organized and semi-public spaces were shared (Kiet, 2010).

Function principles:

Development of open spaces within Islamic cities was based on preidentified functions and activities, which explained the efficiency of their organic growth (Germeraad, 1990; Kiet, 2010).

Public space typologies in traditional Islamic cities:

Public spaces in traditional Islamic cities were owned and controlled collaboratively by the public (Akbar, 1984). The range of public space typologies at this era differed from public spaces in Western cities. These traditional typologies included Musallas [prayer areas], courtyards, streets, souqs [markets], maydans [large open spaces in front of the central mosque], and sahas [small public spaces between street conjunctions] (see Appendix A for full transcripts).

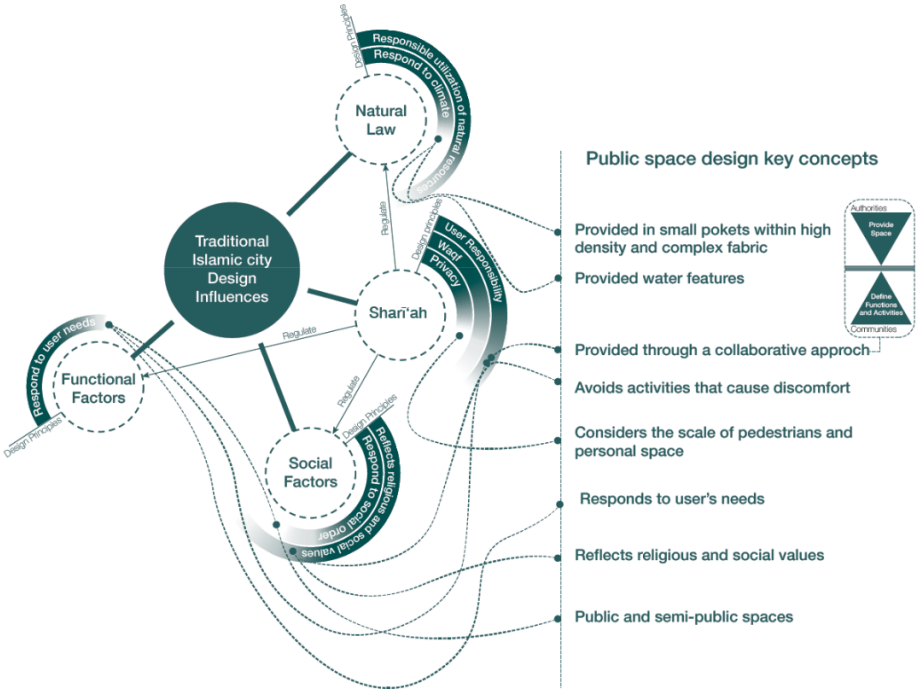


Fig 13: Summary of Islamic urban planning principles and key concepts in public space design

TRADITIONAL URBAN MORPHOLOGY

Human behavioural perspective

The impact of urban form on the behavioural attitudes has been cited by many academics, In Hillier's perspective, the urban fabrics structural and spatial configuration strongly correlates with patterns of movement and functionality. We must first understand the physical and functional aspects of cities simultaneously to achieve sustainability. "How we organise space into configuration is the key to both the forms of the city and how human beings' function in cities" (Hillier, 1996, p.152). In his attempt to explore historical cities, Hillier described them as "Mechanisms for generating contact" because of the way they exploit movement to create encounter zones (Hillier, 1996, p.174).

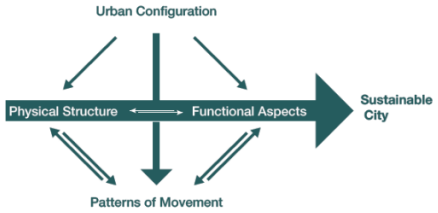


Fig 14: Impact of urban configuration on patterns of movement

The urban structure of historic Arab-Muslim cities usually revolves around a multifunctional core with a Mosque at the centre which acts as the focal point. The courtyard of the mosque is considered to be the primary public space. The surroundings are interconnected by a large network of souqs and alleyways that promote accessibility from multiple directions. Public spaces were limited to those areas (Atash, 1993). Moreover, moving around the intricate urban fabric instils a feeling of spatial continuity. While each public space reflects a distinct spatial characteristic, their coherence embraces legibility. The main street running from the gates of the city to its centre is defined by retail and commercial use while being interconnected with a system of narrow alleyways that lead to residential clusters. This emphasises the transition from public to private settings, respecting the Arab cultural principle of privacy (Bianca, 2000).

Thermal performance in public open spaces

Studies of traditional urban settlements formed the understanding between the physical configuration of a place and its climatic conditions. Traditional practices in indigenous societies shaped urban settings to be more responsive to specific urban environments. In the early urban design stages, data from other disciplines should be incorporated, to enhance urban comfort (Golany, 1995).

Compactness was the primary planning approach in all traditional urban settlements within hot-arid regions. It reduces the exposed building surface to direct sunlight while increasing shade around pedestrian networks. Defining building orientation is considered crucial. N-S orientation is contemplated as the most effective within the scale of buildings, however, many scholars stressed the efficient use of NE-SW orientation to maximize the overall benefit within the scale of the city (Golany, 1983).

The configuration of the urban fabric influences the wind moving around the city. In hot arid regions, the traditional use of flat roofs with uniform building heights supports wind flow over the city. However, in the case of dense modern cities the high-rise buildings, if utilized carefully, can help divert the wind flow to ventilate and cool adjacent streets. Additionally, the use of narrow and winding streets reduces wind velocity and controls sandstorms, creating a comfortable micro-climate around open spaces (Golany, 1995).

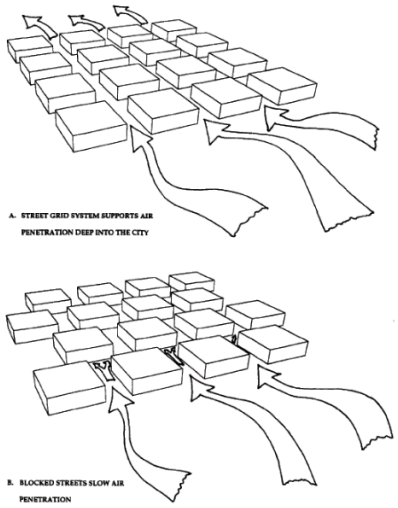


Fig 15: Impact of street design and orientation on wind flow

Golany in his book 'Design for arid regions' highlighted the importance of micro-climate consideration within open spaces. The location of open spaces, their distribution around the city along with their size and relation to adjacent land use is vital for their success. Open spaces should be distributed in small pockets rather than one large open space. Locating open spaces within accessible distance from all land uses, animates the space while maximising shading from adjacent buildings. As water resources are limited in such regions, special attention should be given to the type of vegetation, focusing on native plants. This is important for sustaining an aesthetical environment (Golany, 1983).

Despite the significant association between thermal comfort and urban structure in hot-arid climate, there is a limited amount of recent research on the subject. However, several scholars have underlined the vital role which Height to Width (H/W) ratio plays in regulating outdoor thermal comfort, acknowledging the value of compact forms and deep canyons on comfortable micro-climates. Street orientation and vegetation were also recognised as fundamental aspects of mitigating the heat. In the case of NE–SW and NW–SE street orientations, Ali-Toudert & Mayer have identified H/W ratios of 2 or above as successful values to the provision of comfortable thermal environments. On the contrary, they have identified E-W orientation as troublesome in all cases regardless of the H/W ratio, and therefore recommended the implementation of galleries and trees to counteract negative effects (Johansson, 2006; Ali-Toudert & Mayer, 2006).

While conducting a walkability study in Algeria, scholars have summed up the physical determinants of thermally comfortable open spaces into density, H/W ratio, and vegetation. Whereas diversity, connectivity, enclosure, and human-scale are essential aspects when attempting to stimulate walking behaviour in such regions (Mouada, Zemmouri and Meziani, 2019).

Hatem and Heba further identified geometrical parameters and proposed urban guidelines for heat mitigation to improve outdoor thermal comfort in public spaces. They included H/W ratios and a set of street-side profile options depending on the street orientation (Mahmoud and Ghanem, 2018) (see Appendix B for full transcripts).

Balakrishnan conducted field research focusing on pedestrian comfort in Sharjah, Saudi Arabia during the summer period. His findings indicate that the maximum acceptable exposure to direct sunlight is 10 minutes before an air-conditioned resting zone is required. He further developed a cooling spot as an alternative solution to air-conditioned zones, recommending 300 meters as the ideal spacing between the zones to avoid thermal stress (Balakrishnan, 2014).

CASE STUDIES APPROACH

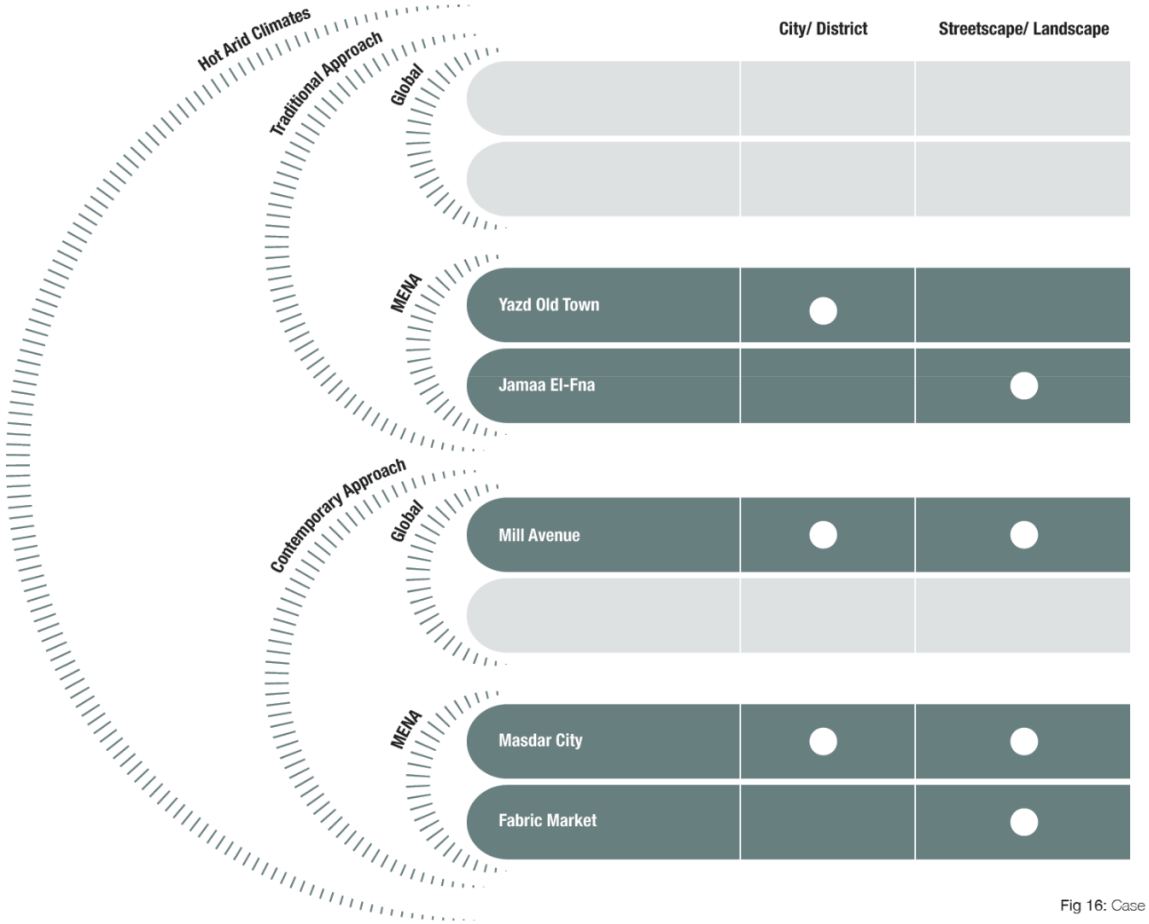


Fig 16: Case study approach

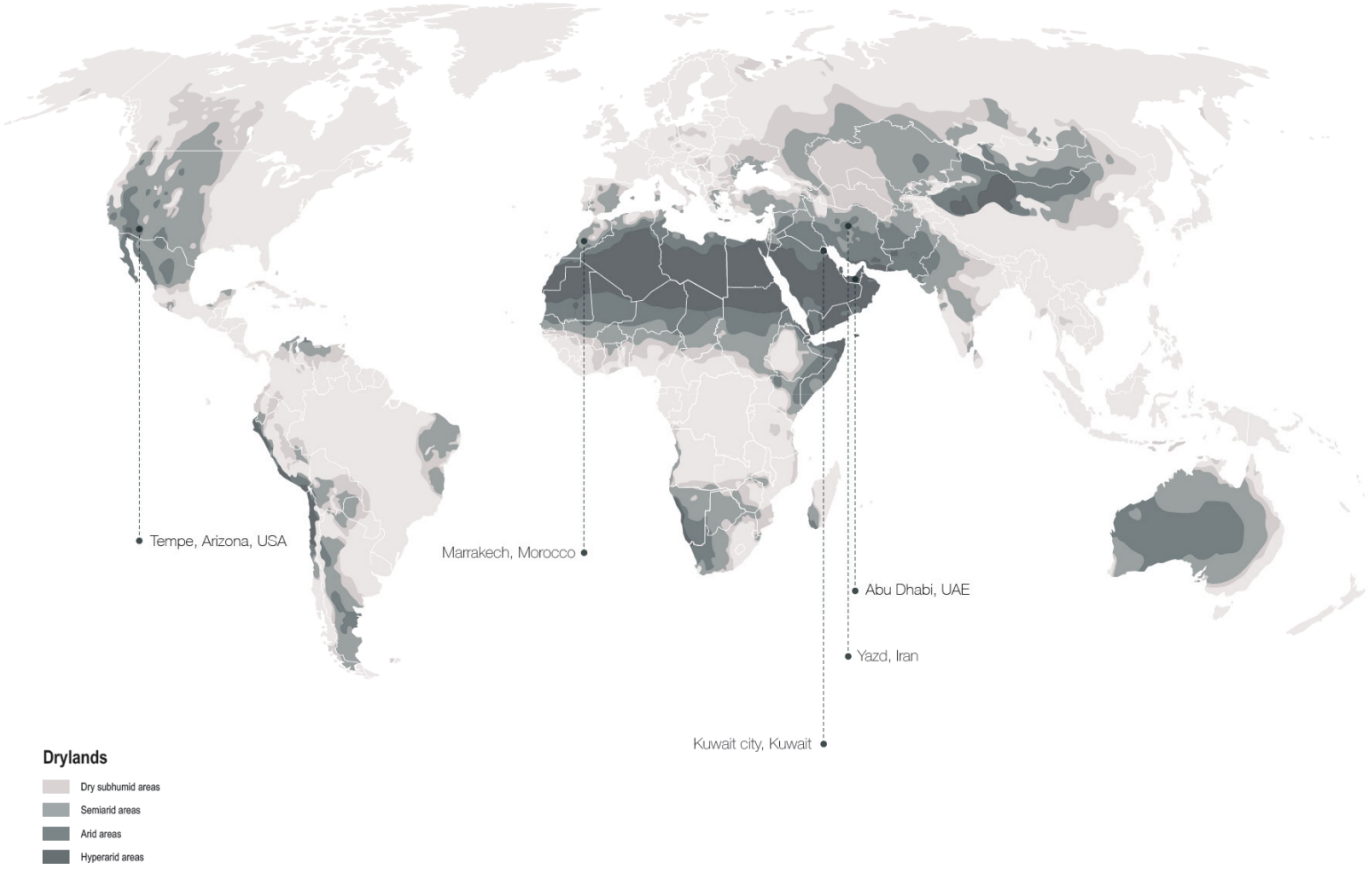


Fig 17: Location of case studies

MASDAR CITY

Location: Abu Dhabi, UAE
Scale: City|District + Streetscape|Landscape

Named one of the most sustainable communities and host of a rapidly growing clean-tech cluster. Abu Dhabi's Masdar city is home to business free zones and residential neighbourhoods with restaurants, shops and green spaces.

Phase 2 of the project is focused on a vibrant public realm, beautiful landscape and innovative urban planning. The aim is to encourage a healthy lifestyle while fostering an engaging community spirit. While several scholars have criticised individual master-planned projects within the Middle East for deserting citizen's right to participate in the development process (Bagaeen, 2016), the project encompasses numerous valuable strategies that support well-connected and thermally comfortable public spaces. The approach combines passive systems drawn from vernacular designs with intelligent systems to deliver a contemporary urban form that is efficient and locally viable. The project implements fully integrated public spaces at early stages, providing the bases for public realm design (CBT architects, 2015).

EXTRACTED STRATEGIES

DESIGN PRINCIPLE.1:

CONNECTED AND WALKABLE PUBLIC REALM

APPROACH:

- *Network of shaded walkways and narrow streets*
- *Mixed-use functions*
- *Bike infrastructure with a multi-modal public transit network*

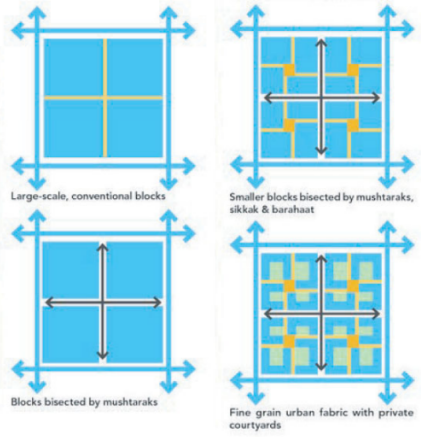


Fig 18

Fig 19

Fig 20

COMPLETE STREET SECTION

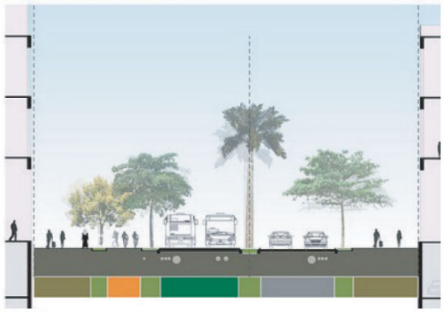


Fig 21

DESIGN PRINCIPLE 2:

NATURAL NETWORK OF OPEN SPACES

APPROACH:

- *Multiple open space typologies – courtyards, plazas and linear parks*
- *Hydro-zoning planting strategy to reinforce the natural environment*
- *Tree-lined walkways to provide shade and cooling through evaporation and transpiration*

Fig 23

Fig 24

DESIGN PRINCIPLE 3:

ENVIRONMENTALLY COMFORTABLE COMMUNITY

APPROACH:

- *Passive urban cooling techniques*
- *Street orientation and varied building heights to capture prevailing winds*
- *Building colours and materials to reflect solar energy*
- *Close building arrangement to maximise shading at nearby outdoor spaces*
- *Roof overhangs to protect building facades from direct sunlight*

Fig 22

Fig 25

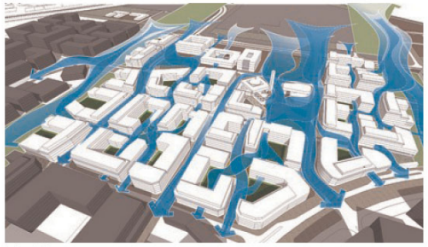


Fig 26

JEMAA EL-FNA

Location: Marrakesh, Morocco
Scale: Streetscape|Landscape

Since the 11th centaury, Jemaa el-Fna has been considered Marrakesh's main market square. The square is now one of the cultural attractions and most vibrant places in the city. The concentration of varied recreational activities, artistic and religious performances surrounded by mixed-use function, create an inviting atmosphere for both locals and visitors.

Located at the entrance of the Medina, the square serves as a meeting point and a place for cultural exchange. From traditional medicine, fortune-telling, and local food to traditional performances such as storytelling, poetry, Gnaoua dancing, and Berber music, which creates constant vibrant energy.

Colourful umbrellas cover most of the active and exchange areas, providing shade from the harsh sun. The surrounding buildings host hotels, cafes and restaurants offering an escape from the heat while providing a platform to observe the lively public space. In 2000 the whole market area had been pedestrianised and by 2001 the site got acknowledged as a "Masterpiece of World Heritage" by UNESCO. The shading & platform feature helped space thrive despite the threat of 21st-century modernization (Danesie, 2015).

EXTRACTED STRATEGIES

- *Multi-use surrounding public square*
- *Traditional and cultural reflection of national heritage*
- *Flexible platform supporting both day and nightlife*
- *Diverse range of services: food, beverage, entertainment, etc.*
- *Elevated viewing points to create a holistic experience*
- *Human scale architecture and distinct façade details*
- *Well-connected central location*
- *Shading elements around active nodes*

Fig 27

Fig 28

Fig 29

Fig 30

Fig 31

Fig 32

EXTRACTED STRATEGIES

- *Adopt community-led design principles*
- *Urban design features to mitigate heat: Overhangs, walkthroughs and vegetation placement*
- *Narrowed streets to calm traffic and accommodate new form of transportation*
- *Wide tree-lined sidewalks*
- *Active frontages*
- *Building height and orientation to be in response to natural factors: wind and sun radiation*
- *Land uses and open spaces to be designed with respect to daytime and night-time activities*
- *Increase shade around daytime activities: business and recreation open spaces*
- *Open space with heavy night-time activities to be positioned along wind flow*
- *Understand tree species in urban cooling*
- *Building structures to provide shade as needed*

Fig 33

Fig 34: Map of downtown Tem
(Crewe, Brazel and Middel, 201

Location: Tempe, Arizona, USA
Scale: City|District + Streetscape|Landscape

Both social and economic benefits, Tempe City officials have set a goal encouraging pedestrian activity around Mill Avenue. Throughout history, Mill avenue gained constant attention as Tempe's downtown destination. Rapid modification to its streetscape took place around different periods. In 1987, sidewalks were widened, and street planting and lighting were introduced. In 2004, bike lanes and on-street parking were integrated, reducing the four lanes to two while reducing traffic around the area. These initiatives supported pedestrian activities and social interaction. In recent years, the city council adopted strategies from New Urbanist models to create compact walkable environments, reduce commuting and improve the local economy. The project incorporated high densities in the form of urban infills surrounding narrowed streets. The council also adopted

FABRIC MARKET

Location: Kuwait City, Kuwait
Scale: Streetscape|Landscape

Post the 1952 modernisation plan of Kuwait, many projects around between the 1950s and early 1970s embraced an interconnected network of spaces and souks. The Fabric Market block exemplifies well-integrated arcaded walkways both through and around property lines. The adaptation of mixed/variable uses around ground-level stimulated/enhances pedestrian activities. The building typologies formed a highly connected network of comfortable walkways. Pedestrians can walk from one building to another through shaded corridors, some of which are air-conditioned. The consistency of comfortable walkways alongside the publicly accessible ground floor level increased street life and consequently strengthened public life (Green, 2018).

EXTRACTED STRATEGIES

Network of publicly accessible ground levels

Arcaded walkways through and around the property line

High-density mix-use blocks with human-scale massing and narrow corridors

Fig 35

Fig 36

Fig 37

Fig 38

EXTRACTED STRATEGIES

- *High density with a mix-use compact form*
- *Partially covered narrow and winding alleyways*
- *Passive cooling through wind catchers and water elements*
- *Urban structure orientation in response to climate parameters*

Fig 40

Fig 41

Fig 39

Fig 42

Location: Yazd, Iran
Scale: City|District

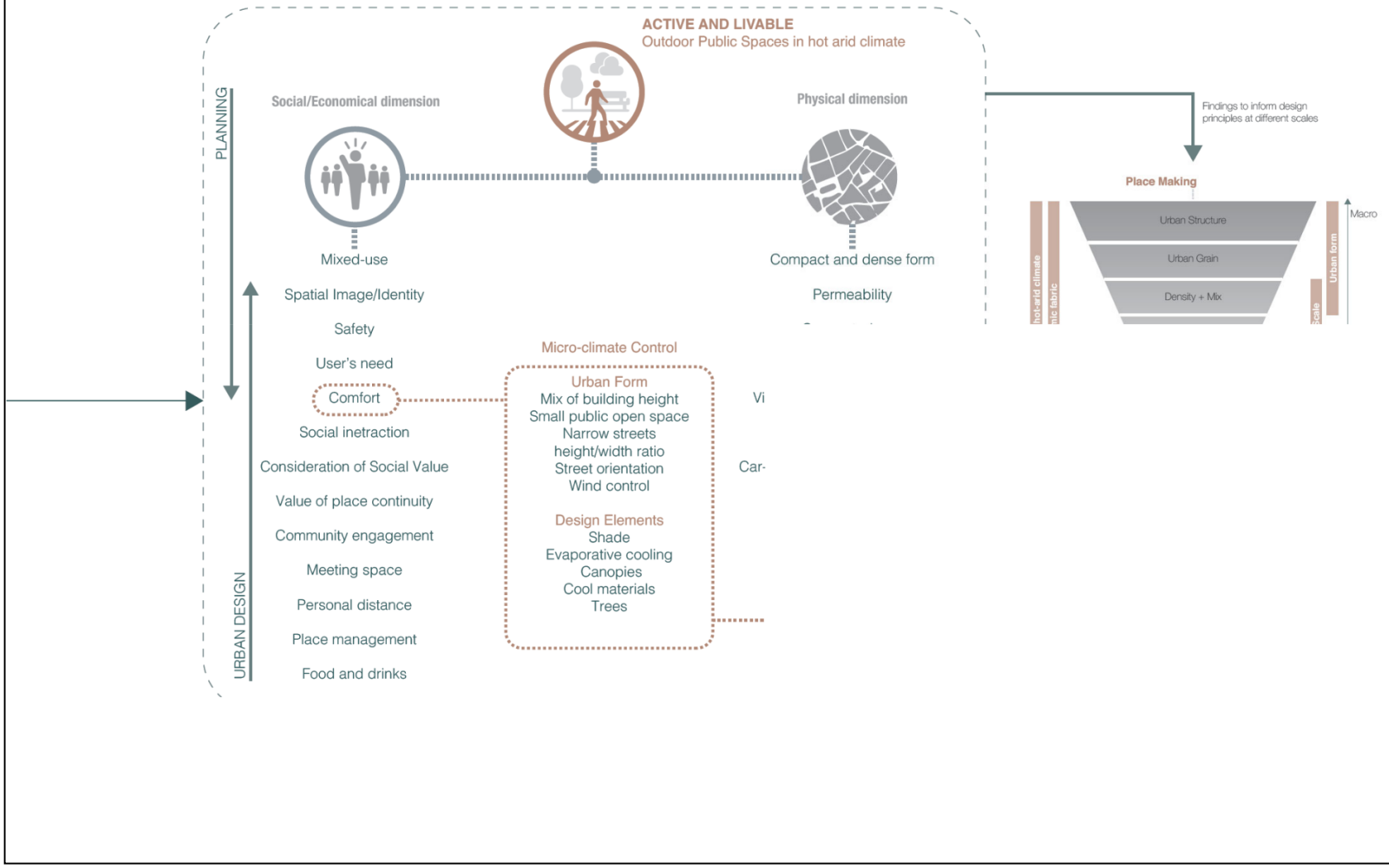
Located in the centre of Iran, Yazd city is one of the oldest cities with a history of over 5,000 years. Yazd's climate falls under hot-arid regions. Excessive solar radiation and dusty winds played a significant role in the formation of its urban structure. The compact urban fabric/layout/structure along with multiple spatial features and passive cooling strategies helped create a hospitable environment for its inhabitants (Makvandi and Li, 2016).

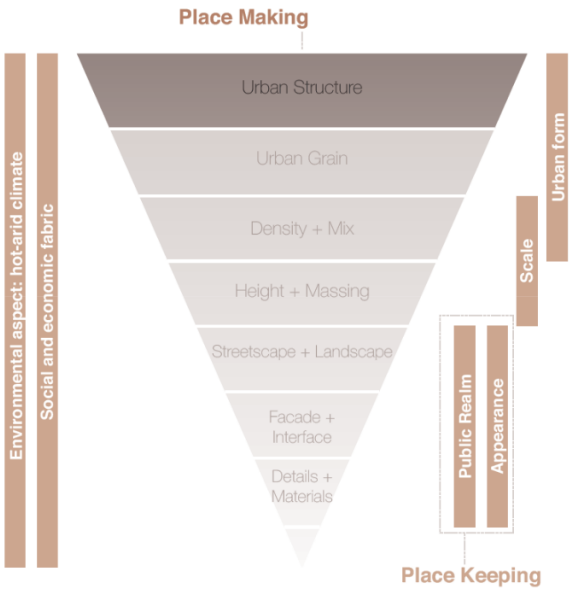
The main principle of Iran's vernacular architecture is the orientation of buildings according to the path of the and wind direction. In Yazd city, following a NE–SW building orientation, supported optimum utilization of solar radiation and wind flow, precisely in the protection against direct harsh sunlight and undesirable wind (Sahebzadeh, 2018). The narrow and curved alleys supported by high walls and Sabat, arched roofs, provided shade around pedestrian walkways. Wind catchers are significant features of Yazd city, the high towers acting as a cooling system to replace hot air with a cooler breeze. Combining wind catchers with ponds are a common approach to improving the cooling process, resulting in supplying a cooler space (Keshtkaran, 2011). The integration of responsive urban structures with high density and mix-use encourages walking and cycling as the main modes of transportation (Monshizade,2008).

CONCEPTUAL FRAMEWORK

03

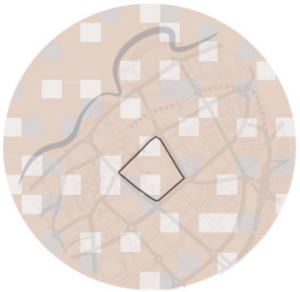
Fig 43: Summary of Findings


ACTIVE AND LIVABLE
Outdoor Public Spaces in hot arid climate
Social/Economical dimension
Physical dimension
PLANNING
Mixed-use
Spatial Image/Identity
Safety
User's need
Comfort
Social inetraction
Consideration of Social Value
Value of place continuity
Community engagement
Meeting space
Personal distance
Place management
Food and drinks
URBAN DESIGN
Micro-climate Control
Urban Form
Mix of building height
Small public open space
Narrow streets
height/width ratio
Street orientation
Wind control
Design Elements
Shade
Evaporative cooling
Canopies
Cool materials
Trees
Vi
Car-
Compact and dense form
Permeability
Findings to inform design principles at different scales
Place Making
Urban Structure
Urban Grain
Density + Mix
Macro
Urban form
Scale
hot-arid climate
nic fabric



Design for people not vehicles

Provide infrastructure that supports multiple modes of transportation (metro, pedestrian networks and cycle lanes)

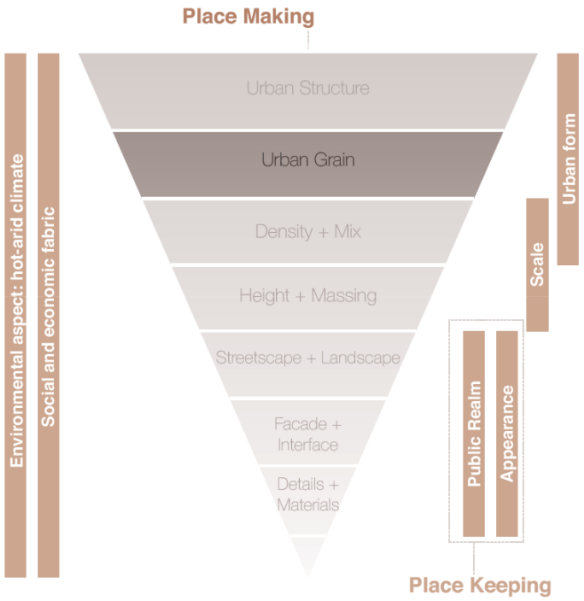


From Homogenous to Heterogeneous

Avoid homogenous land use zoning and promote a heterogenous urban structure

Increase the percentage of public open spaces

Open spaces comprise just 2 percent of the area of cities in the Middle East compared to 12 percent for European cities - UN Habitat



Fine urban grain

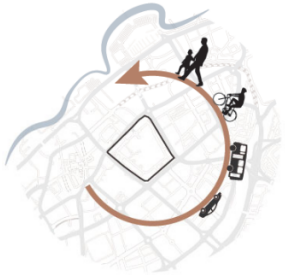
Small urban blocks to generate a network of small and connected streetscape in order improve permeability and connectedness

Network of small and connected pockets of open public spaces

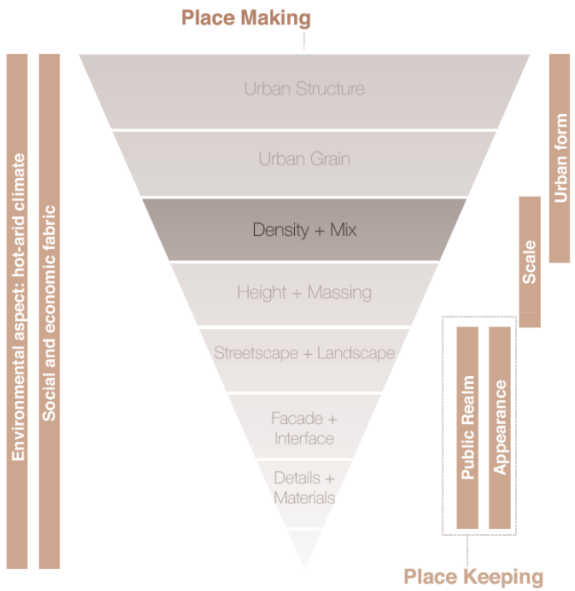
Avoid large and isolated open public spaces and encourage small pockets of open spaces that links streets with recreational areas

Hierarchy of continuous and safe walkways

Improve pedestrian physical linkage and movement between locations and modes of transport



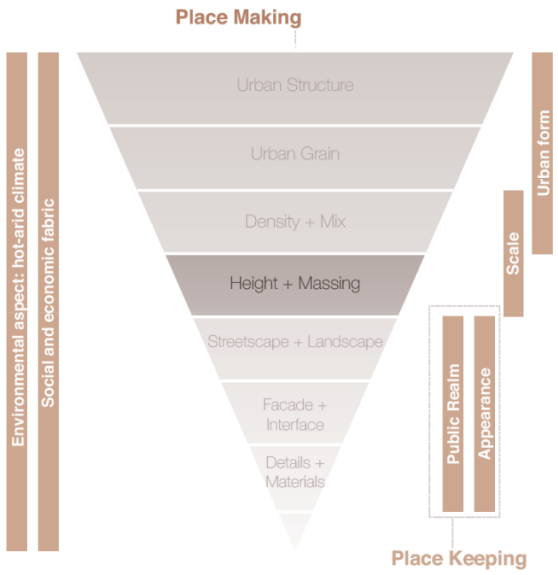
Prioritized pedestrian connectivity when possible



Dense and diverse compact form

Compact form that supports higher density and mix-use, (such as residential, commercial, institutional or recreational uses) around transportation nodes and open public spaces,

Improving accessibility to local services and complementary uses within easy walking distance enables more trips to be undertaken on foot

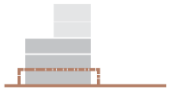


Form-based code to ensure a sustainable urban structure

Hight and massing to maximise the provision of thermally comfortable walkway networks and open spaces

Enhance sense of enclosure along walkways and open public space

Support aforementioned density at a human scale



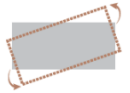
Plot Compactness

Support the provision of narrow and thermally comfortable streets
Enhance the sense of enclosure
Support aforementioned density at a human scale

Mix of building heights

Enhance shading and passive cooling
Ensure optimum height based on building location and orientation

Density at Human scale

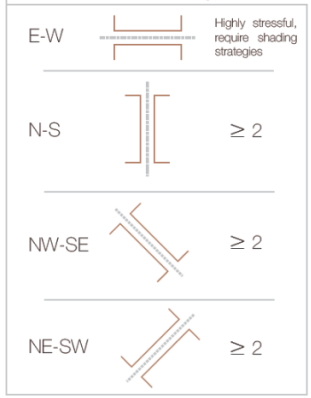


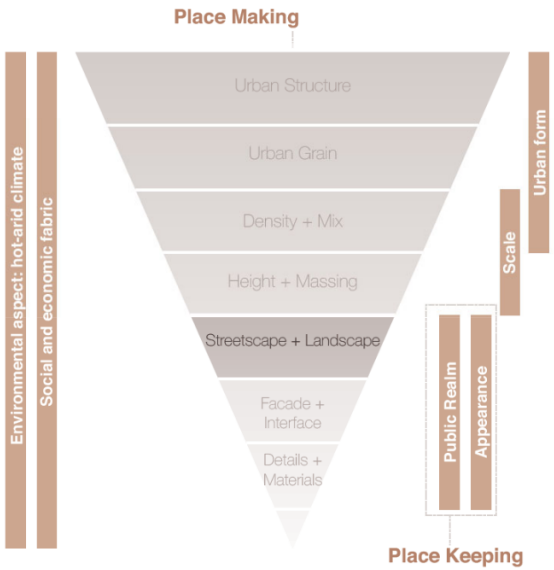
Plot orientation

Establish optimum plot orientation to maximize shading and passive cooling along walkways and open spaces

H:W Ratio

Establish optimum height width ratio to maximize shading on walkways and open spaces in summer while ensuring proper sunlight in winter





Safe and well-connected cycle routes

Street lighting to enhance safety

Limit parking structures to the periphery of the city centre

Priorities pedestrians by maximizing the width of sidewalks

Intermediate cooling spots every 60 - 300 m

Convenient and marked crosswalks to ensure safe and well connected pedestrian networks

Provide well designed bus stops to reduce heat stress

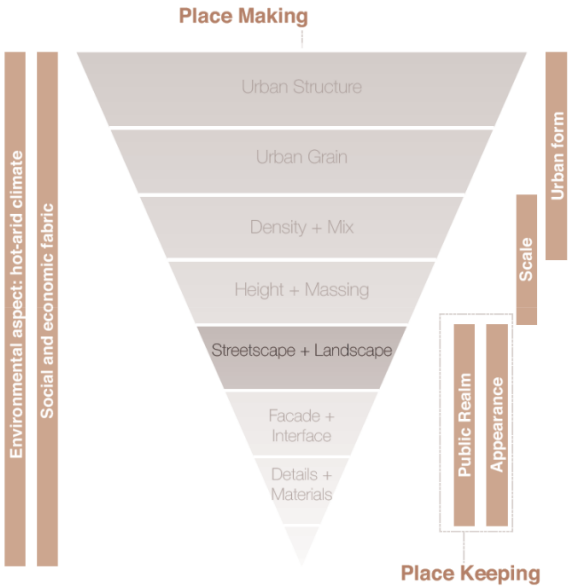
Make walkable areas legible and accessible to all people

Trash bins to be spread along walkways to ensure clean environment

Fully shaded walkways around large and unsheltered pedestrian pathways

Provide drinking fountains along walkways and open public spaces

Tree lined sidewalk with proper number of seating to provide shade and comfort



The provision of multi scale and mixed-use open spaces

Based on activities:

Fixed use - predominantly in close proximity to transportation nodes and public services

Flexible use - provision of social and physical activities

Temporary use - Planned activities such as festivals, markets and community events

Provision of food

Water element

Vegetation

Shading elements

Drinking Fountain

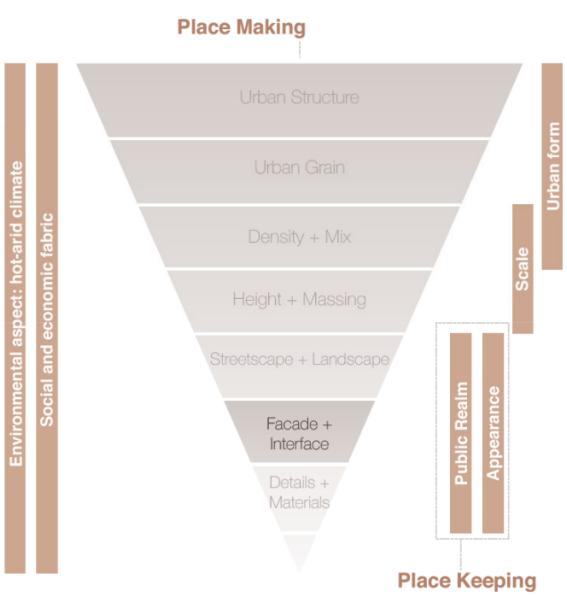
Shaded seating

Lighting

Kids play zone

Gym zone

Open space to host temporary uses



Active Frontages

Physically permeable active Frontages along walkways and open spaces to enhance safety and animation

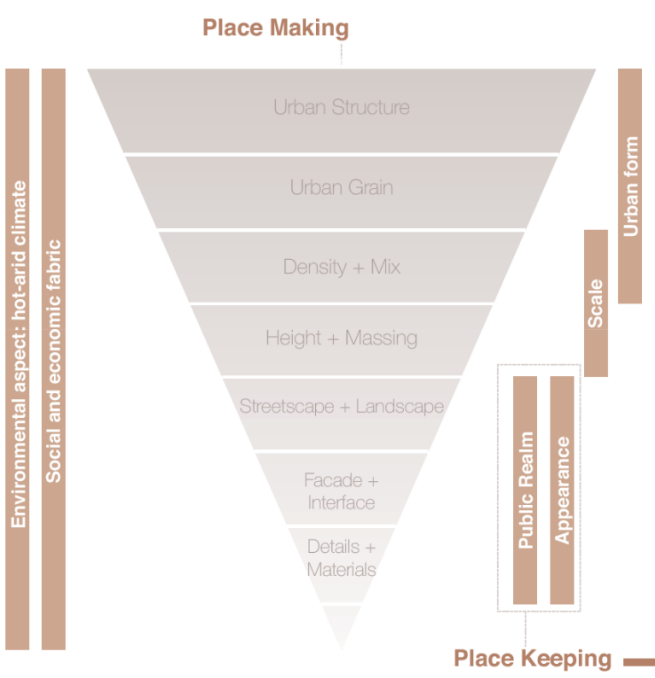
Image / Identity

Architectural expression to support local identity and enhance legibility

Overhang I Arcade I Hybrid

Maximize the use of architecture elements to protect pedestrians from direct exposure to solar radiation

Arcade or Hybrid model recommended for E-W streets



Maintenance and **management** of public space

Encourage **night-time attraction**

Site program [site specific events and activities] to encourage consistent use of public space

Host **national/traditional scale events and celebrations**

Encourage the use of public transportation through **incentives**

Ensure activities to cater all user groups

Ensure **inclusivity and safety**

Community engagement through participation in design and management of public spaces

CONTEXT OVERVIEW

Location: Kuwait

Kuwait City is located at the north-western end of the Persian Gulf at a latitude of 29° 20'N. Climatically, Kuwait falls under arid regions with proximity to the sea. The weather conditions are characterized as hot, dry and windy.

The rapid urbanization and economic growth in Kuwait City have had a major impact on the socioeconomic status and lifestyle of its inhabitant. The complete transformation of the urban fabric following the 1950s master plan, illustrated by the significant changes in urban form and transportation infrastructures, had its impact on land use activities and population configuration within the area. The adopted plans and policies developed an automobile-dependent city, leaving no room for pedestrian life and social interaction on the street (Koushki, Ali,1993). (see Appendix C for more data).

Total population
4,178,572

Total area
17,399 km2

Population density
Metropolitan density
4,904 pers/km²
Urban living area density
9,848 pers/km²
Peak density
52,941 pers/km²

Source: Rode, 2017

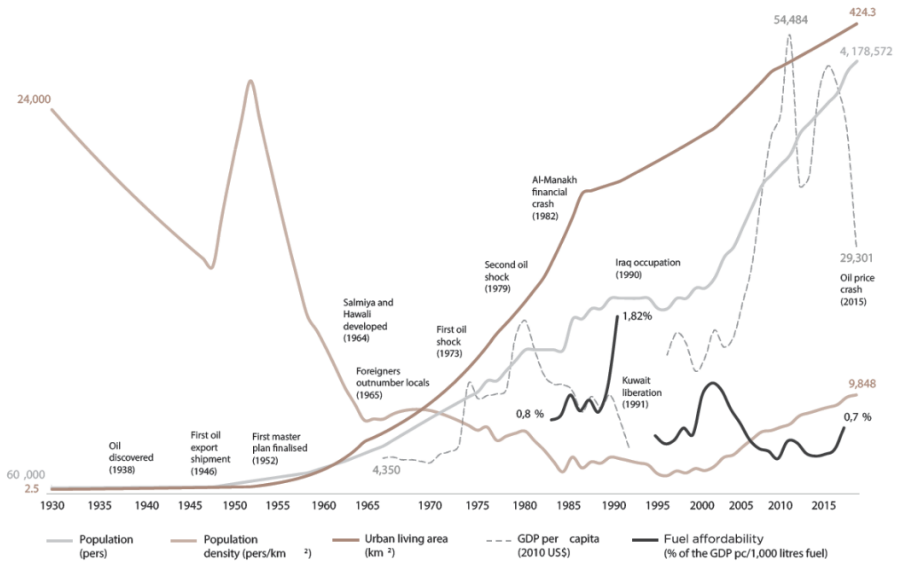


Fig 44: Kuwait: 85-year period

Kuwait

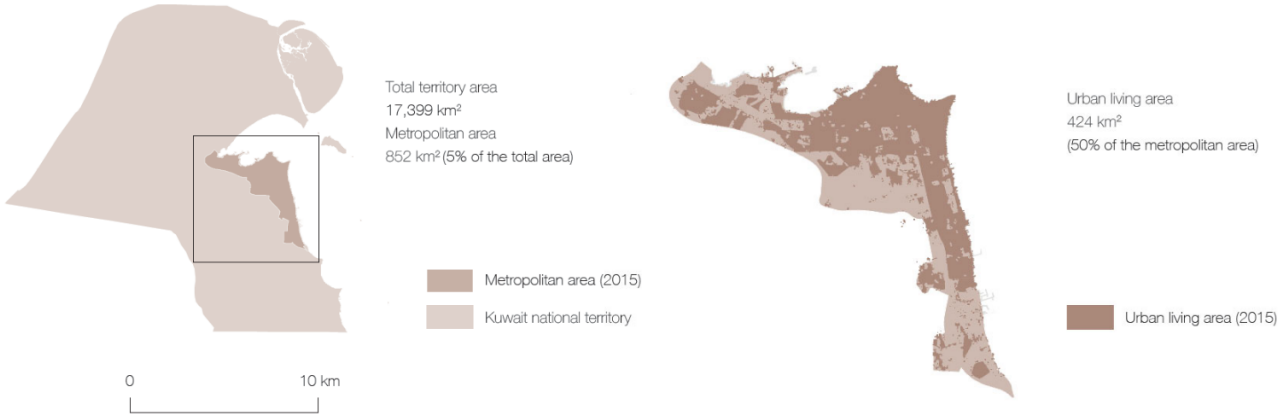


Fig 45: Location map

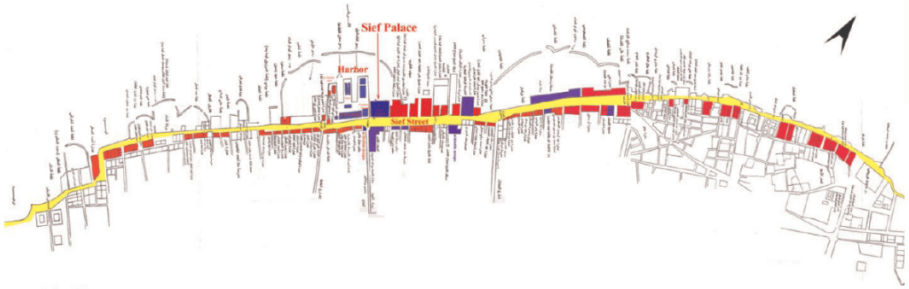


Fig 54: Map of Sief Street in 1951. Yellow: Sief Street. Red: amarat (wholesale storges). Blue: governmental buildings.

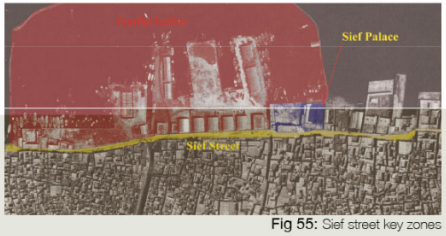


Fig 55: Sief street key zones

Fig 57: Boat Launch, Sief street, 1912

Fig 56: Sief street

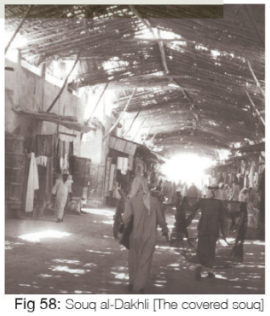


Fig 58: Souq al-Dakhli [The covered souq]

Fig 59: 1940s Key Kuwaiti souq areas

FOCUS AREA

Location: Sawaber, Sharq, Kuwait City, Kuwait

The study area for this research project will be located in Kuwait City. The specific site will be based in Sawaber, a central block within walking distance from the old Kuwaiti Souq [Al Mubarakeya], the Kuwait Stock Exchange and main financial districts. The Sawaber complex is a high-density residential building that has been considered as a modern heritage building. Unfortunately, due to lack of maintenance, escalating land values within the area and gentrification, the building was demolished in January 2019. The proposed Kuwait metro will have a main station within the site with two lines, one connecting it to the airport and the second to the Salmiya area, another highly dense commercial and residential area. The sustainable approach plan for the reactivation of the public realm in extreme climates will be superimposed on the chosen site.

The new site will present an opportunity to redevelop the existing urban form and to develop a new urban morphology. By reshaping the existing urban form, the proposal will present a more pedestrian-friendly, well-connected, walkable streetscape connecting pockets of vibrant and active open spaces. The new development will create an opportunity to apply urban morphology findings that support the provision of well-connected and useable public spaces. The design will implement the social and physical determinants of liveable public spaces.

To design the city for people and not vehicles, Kuwait needs to reduce the dependency on the automobile by providing an infrastructure that supports multiple modes of transportation. For the new proposed metro lines to be viable, a network of safe and connected pedestrian corridors must be integrated linking the city with transportation hubs and existing public spaces.

Fig 60: Sawaber

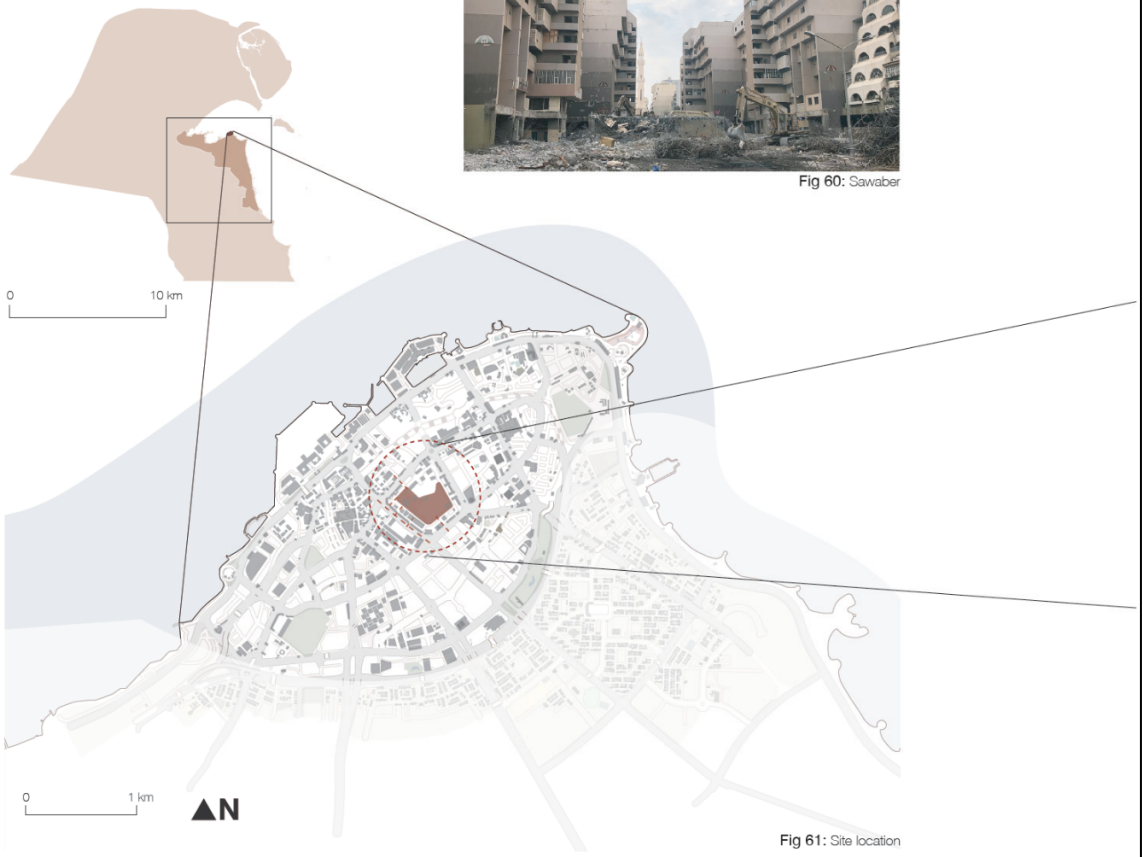
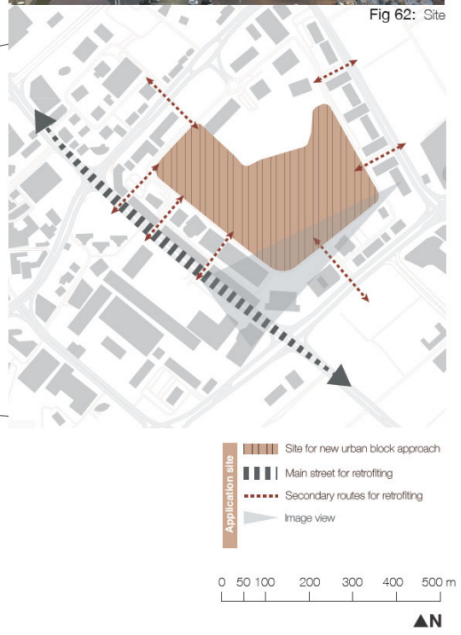
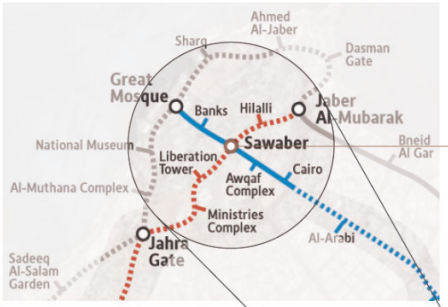


Fig 61: Site location

Fig 62: Site





Sawaber Station
Within proposed site
Connections Line 2
Line 3

Salmiya
Hight density and
mix-use area

Airport

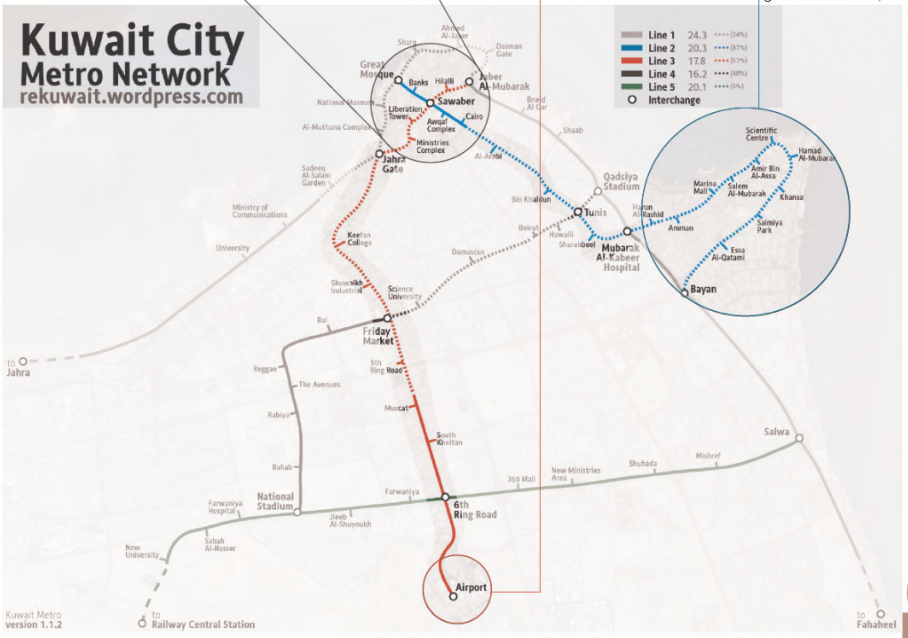


Fig 63: Future metro plan

05

While this map shows diversity in services, it shows a limited number of residential building and preserved historic sites. Additionally, it shows large vacant spaces due to dispersed urban grain.

Existing building structures

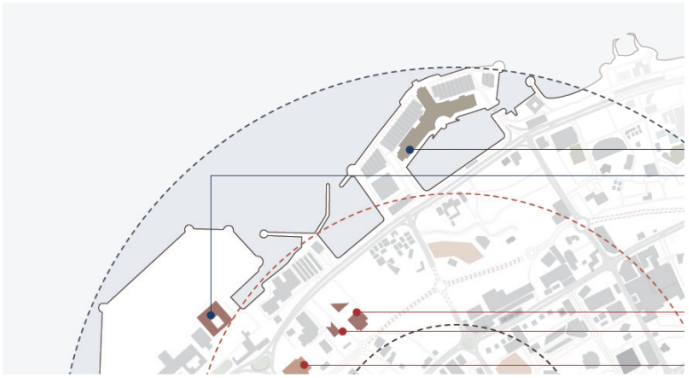
- Public park
- Civic buildings
- Educational
- Cemetery
- Religious buildings
- Multi level car park
- Mixed-use: Offices + Retail
- Mixed-use: Residential + Retail
- Commercial
- Petrol station
- Financial institutions
- Industrial
- Hospital
- Historic structures
- Application site

0 250 m 500 m 1 km N

Fig 64: Land-use map

Fig 65: Transport map

The map shows unconnected pedestrian paths that are limited historic quarters and parks.



1 Fig 67: Souq sharq mall

2 Fig 68: Al-Seif palace

3 Fig 69: Central bank

4 Fig 70: Al-Babtain library

5 Fig 71: Grand mosque [listed building]

6 Fig 72: Al-Hamra Tower

7 Fig 73: Kuwait stock exchange

8 Fig 74: KIPCO Tower

9 Fig 75: Souq Al-mubarakiya [Historic market]

10 Fig 76: Assima mall

11 Fig 77: Souk Al-Safat [old fabric market]

12 Fig 78: Chamber of Commerce and Industry

13 Fig 79: Safat Square

14 Fig 80: Al-Shaheed park

15 Fig 81: Liberation Tower

In order to design the city for people and not vehicles, Kuwait needs to reduce the dependency on automobile by providing an infrastructure that supports multiple modes of transportation. In order for the new proposed metro lines to be viable, a network of safe and connected pedestrian corridors must to be integrated linking the city with transportation hubs and existing public spaces.

Open spaces compromise 2% of the area in Middle Easter cities in comparison to 12% in European cities (Elsheshtawy, 2019). To reclaim public life, there should be an increase in open spaces within an accessible distance from transportation hubs.

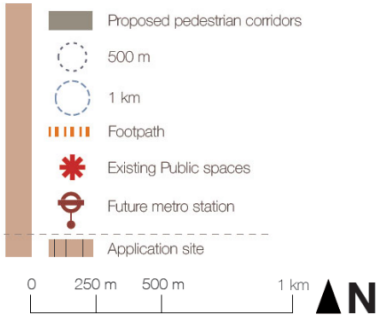
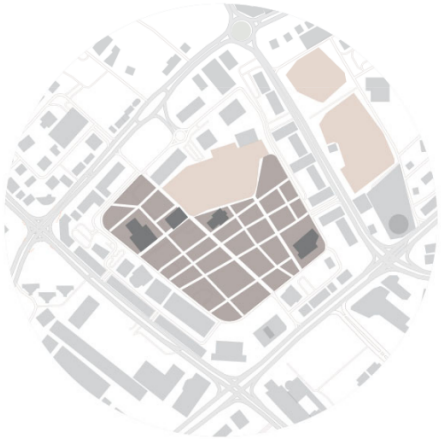


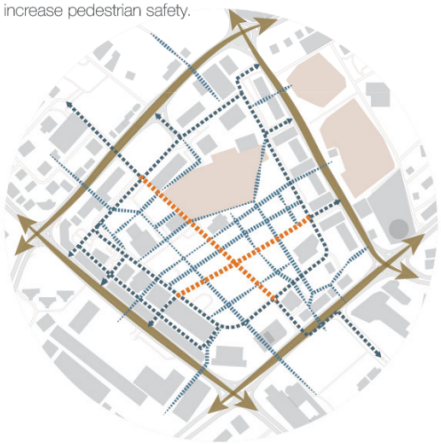
Fig 82: Urban structure tools applied on site

Adopt a compact and intricate form to support the provision of thermally comfortable narrow alleyways, and improve accessibility

Improve physical linkage through a hierarchy of continuous and safe cyclists and pedestrian networks. Integrate cycle lanes and walkways to existing streets when applicable.
Priorities pedestrian connectivity by limiting vehicle access to within the block. The use of shared roads to calm the traffic and increase pedestrian safety.

Open public spaces will be distributed along pedestrian networks in small pockets to promote accessibility and enhance micro-climate.





Existing structures

Proposed urban blocks

Integerated cycle lane and pedestrian path to primary and secondary roads

Integerated cycle lane and pedestrian path to tertiary and minor roads

Shared road

Pedestrian path

Open spaces

0 100 m 250 m 500 m

N

Fig 83: Urban grain tools applied on site

The existing structures within and around the block is highly compromised of mixed-use facilities with limited residential areas therefore the site will dedicate more land for residential uses along with other diverse facilities.

Fig 84: Mix-use tools applied on site

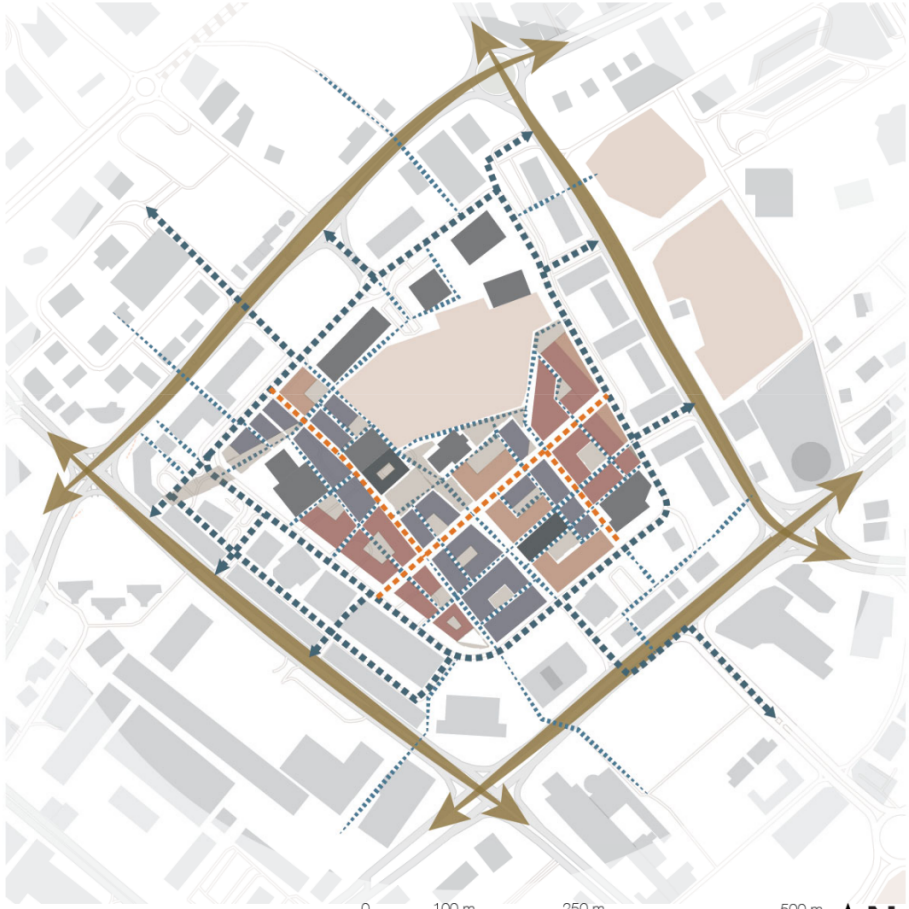
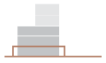
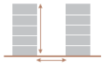


Fig 85: Final layout

Due to the site orientation and its position in relation to adjacent streets, the site helped in establishing the optimum orientation for plots and streets to maximise shading around public spaces. The proposed layout avoids E-W and N-S orientations and instead takes advantage of the site conditions to keep orientations to NW-SE and NE-SW



Buildings are established around the plot perimeter to maximize the plot compactness and define proposed streets and open spaces



Heights are established based on proposed street width inspired by best practice and optimum Height/Width ratio based on orientation

Taking into consideration the existing building heights around the site, the proposed heights are mainly between 4-6 storeys with some buildings up to 10 storeys, to ensure the best possible microclimate at street level while supporting human-scaled, low and dense form

Kuwait is known for sandstorm winds, therefore the built form avoided high and free-standing buildings to reduce the possibility of turbulence at street level

Fig 86: Sun path and wind analysis

The proposed heights are tested several times through shade analysis to confirm the optimum results all year round

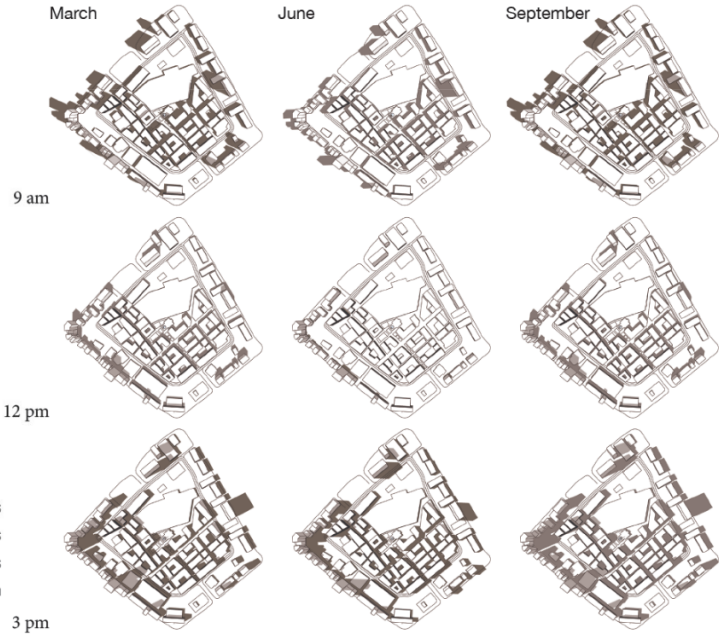


Fig 87: Shadow study

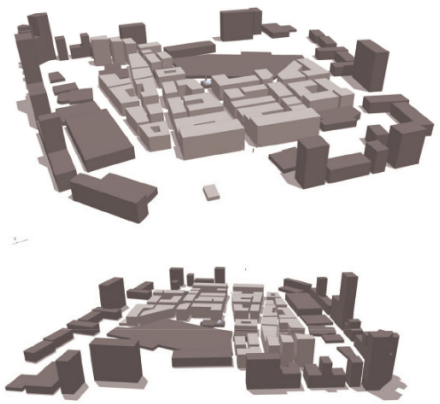


Fig 88: Aerial views of final massing

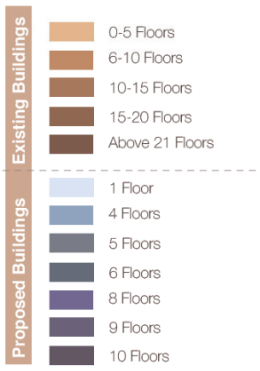
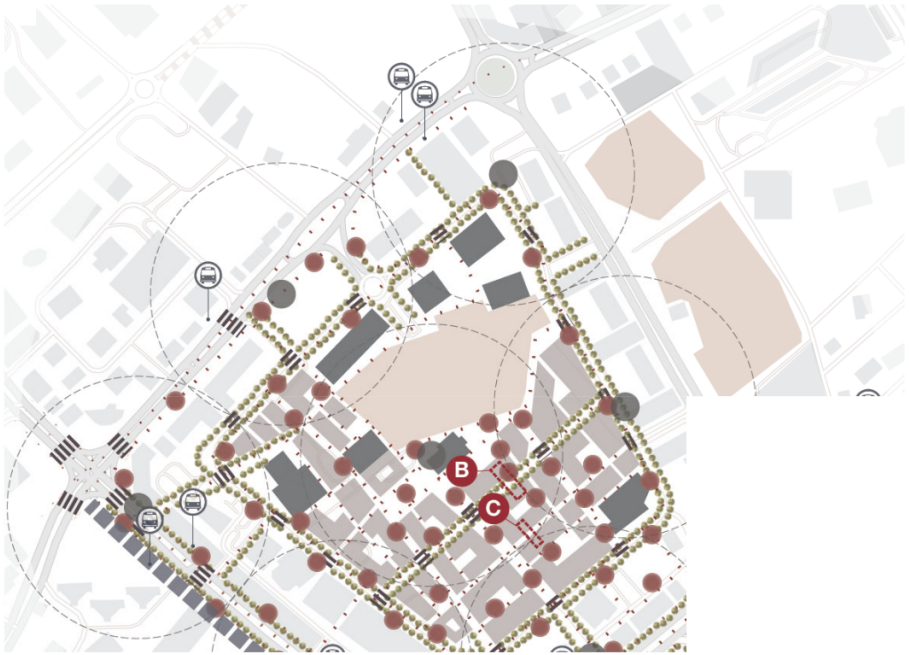


Fig 89: Building heights



Streetscape tools are implemented to priorities pedestrian and cyclist connectivity, by providing attractive, safe and well-connected walking links to public transport

- Lighting are spread along all streets to secure pedestrian right-of-way.
- Separate cycle lanes are introduced when applicable to ensure safety and cyclist right-of-way.
- Straight and diagonal crossing are introduced whenever pedestrian routes intersects with a street to calm traffic and maximize pedestrian connectivity
- Tree lined sidewalks are implemented to provide shade. In the

Due to large and unevenly distributed public spaces in Kuwait City, the use of such spaces is limited and irregular and, in some cases, the space is abandoned and unsafe.

In order to reclaim the public life:

- The proposal introduces a hierarchy of well-connected and clearly legible network of public spaces along with small hidden courtyards to enhance the walking experience
- The design proposal supports the provision of multiple scale open spaces with different characters
- Public spaces are located around pedestrian routes and transportation hubs to develop a network of high quality and attractive walkways (visually and functionally)
- The proposal introduces different kinds of public spaces to accommodate various types of activities in order to attract a wide range of user groups and develop a diverse public realm
- Based on the size of the space and its location in relation to adjacent function, the classification of these spaces range between fixed use, flexible use and temporary use.
- Reintroducing main public spaces in front of mosques to reinforce the cultural image and identity
- Active frontages are introduced around main public spaces to make the space more active and attractive.
- Based on previous shading analysis, overhang and arcades are introduced to form a continuous shaded walkway

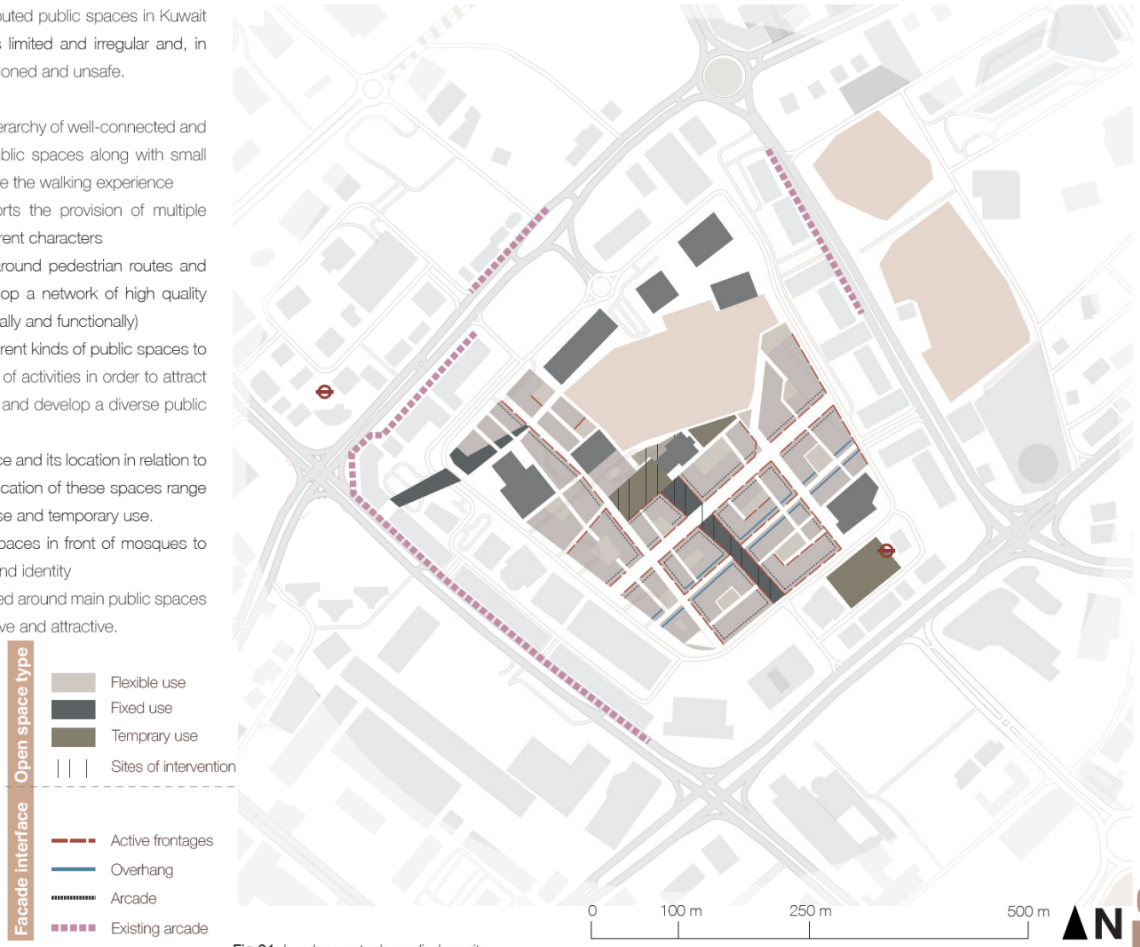


Fig 91: Landscape tools applied on site

Fig 92: View of existing street

Sidewalks are widened to priorities pedestrian connectivity and provide opportunity for commercial seating to create more active and attractive environment

Separate cycle lanes to ensure safety and connectivity

Street calming measures to priorities pedestrian connectivity and safety

Due to large vacant area sidewalk are designed to combine shading element with trees to make the walkway more comfortable and attractive

Benches are positioned around trees to ensure sufficient shade

Drinking fountains are introduced around main walkways

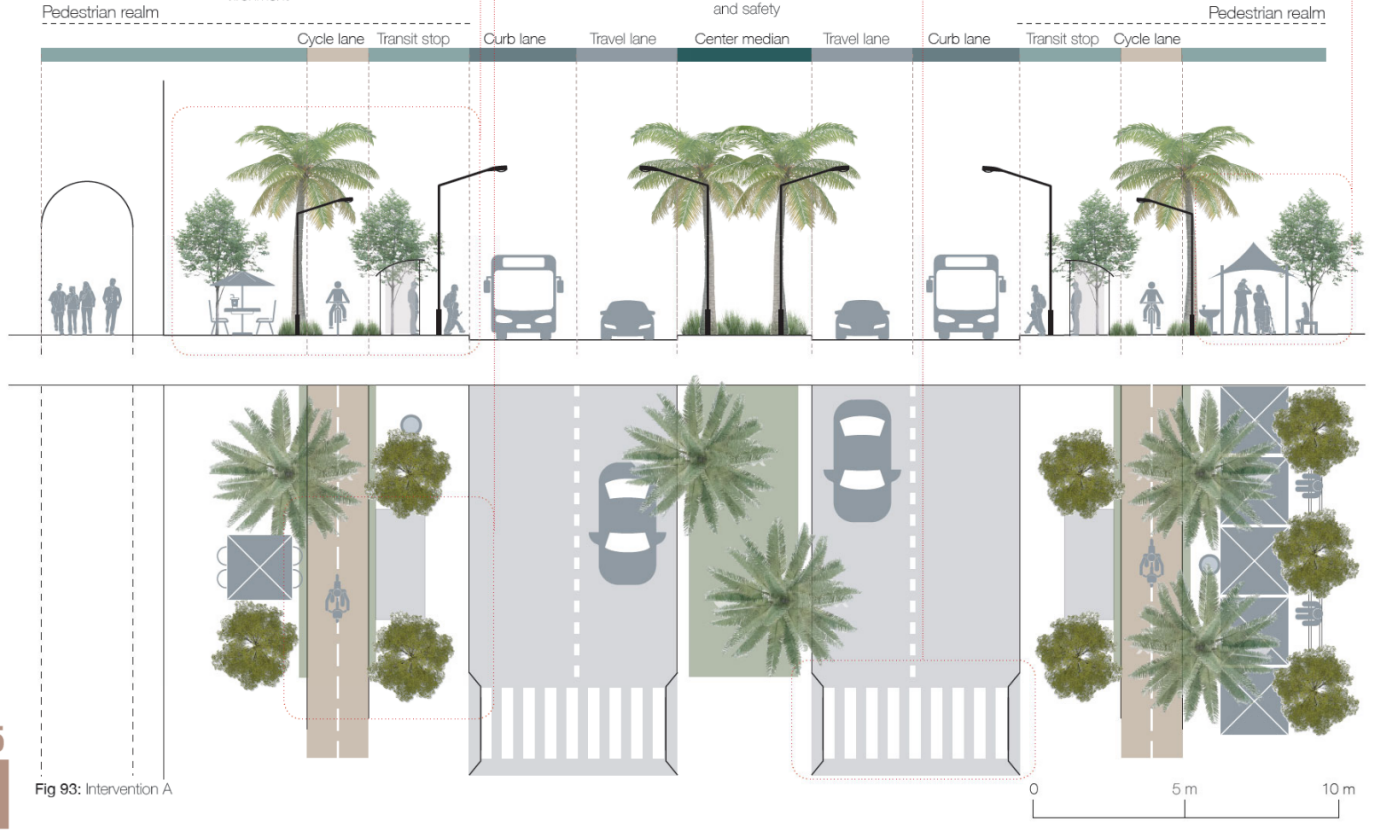


Fig 93: Intervention A

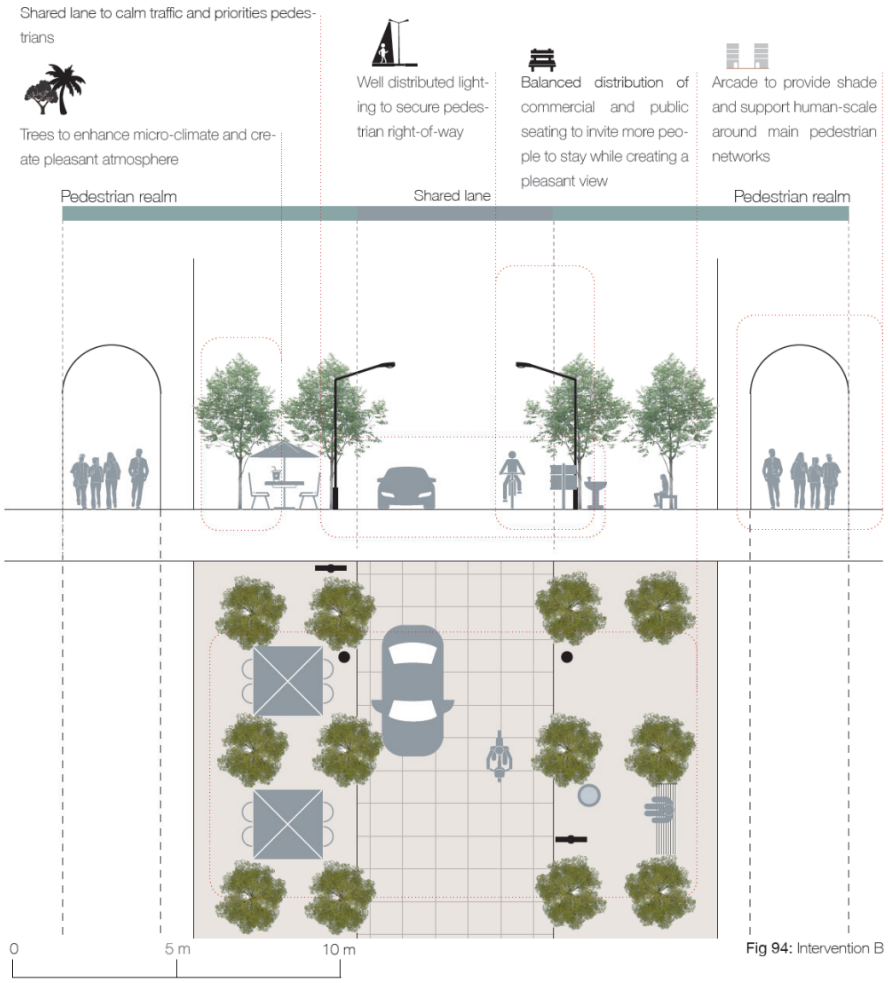


Fig 94: Intervention B

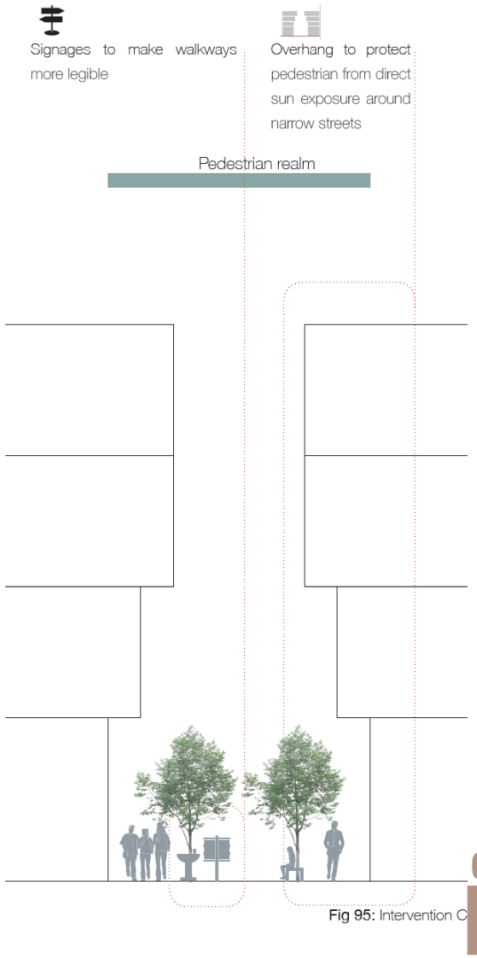


Fig 95: Intervention C

Arcade
Active frontage
Fixed seating
Movable seating
Signage
Drinking fountain
Lighting
Retractable shading
Tree
Water element
Pavement
View point

With the lack of quality public spaces, the proposal supports a network of car-free open spaces that will encourage people to use the city in a different way

Based on previous classification of open spaces, three different types of spaces are furtherly developed to show how tools can be implemented to improve the quality and appearance of the public realm

In order to manage and maintain the quality of the proposed public realm policies should be developed based on place keeping tools

Fig 96: Detailed map of public space interventions

Well distributed lighting to secure pedestrian right-of-way

Drinking fountains are introduced along walkways

Native trees are introduced close to water elements to enhance passive cooling

Water element are introduced to enhance the micro-climate and create a pleasant quiet retreat

Physically permeable active frontages to animate the space

Arcade to provide shade around exchange points

Fig 97: Fixed use Public space

Trees to enhance micro-climate and create pleasant atmosphere

Celebrate views of existing mosque to encourage continuity in time while reinforcing cultural image and identity

Large open space to host temporary uses such as festivals, markets, and community events

Retractable shading elements to provide shade when needed

Balanced distribution of commercial and public seating to invite more people to stay while creating a pleasnat view

Balanced mix of fixed and movable seating

Cafes, restaurants and food carts to provide options for people to stay longer

05

Fig 98: Temporary use Public space

Signages to make walkways more legible and display activities program around the space

Fixed benches to be oriented towards active views and positioned next to trees to provide sufficient shade

Kids play environment is introduced in a close proximity from other open spaces and main pedestrian networks to ensure safety and animate the space by catering for different user groups

Playful water elements are introduced to enhance passive cooling while offering fun play for everybody

Fig 99: Flexible use Public space

CONCLUSION

The fast growth and rapid urbanisation that Middle Eastern cities had gone through in the last few decades, created urban environments that are hostile and alienated form their own setting. Due to the high dependency on the automobile, the traditional compact urban fabric has been replaced with fragmented urban sprawl. This shift did not just impact the perception of public life within the area, but also resulted in sociocultural segregation.

Thorough research on the determinants of global and Middle Eastern liveable public spaces was coupled with an exploration into the traditional approach to this. This was carried out through analysing case studies and reviewing literature. It became clear that the urban configuration has a large impact on the thermal comfort of microclimates around public space, and therefore pedestrian life. It was also evident that the segregation of uses did not foster walkability or active public life.

The toolkit developed aims to tackle the challenge of creating liveable public spaces within hot-arid Middle Eastern cities. It promotes a new approach to reclaiming the city for people. Therefore, it is crucial that the toolkit ranges from the city scale to that of individual sites.

In order to promote active and vibrant life, fragmented cities must rethink the way they approach new developments. Planning should reflect local values, with more sensitivity to context. This toolkit aims to change practice in urban planning within the Middle East regarding the provision of public spaces.

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APPENDIX A

Musalla: A large open space dedicated mainly for prayers, and Islamic festivals. It was also used as a gathering and a preparation point for military events (Hakim, 1986).

Courtyards: Courtyards were mainly part of residential buildings acting as a transitional area between different spaces with different levels of privacy. Their main purpose was for cooling. The same concept was applied in non-residential buildings, yet in this case, courtyards are considered public spaces or semi-public spaces depending on the function of the building. For example, in schools, courtyards were perceived as a semi-public space, while in commercial buildings, mosques, etc. they were perceived as a public space. (Hakim, 1986)

Streets: Streets were classified based on their purpose and the social requirement of the user. As a result, streets formed a hierarchy of networks in which the depth of the street corresponds to its classification (Akbar 1984; Kiet 2010). Streets adjacent to mosques and markets were usually interpreted as an extension of public buildings, therefore serving as a gathering space.

Souq: The Souq [the market] was integrated into the multifunctional core of the city. Usually, the souq surrounded the mosque which used as the focal point of the city centre. The grouping and distribution of units were based on the nature of goods, their function and the impact on the environment. The Souq used to function as an interconnecting layer, linking different civic and educational buildings with other religious and social structures. Two different types of open spaces were associated with the souq: maydan and saha.

Maydan: The main open space in the middle of the multifunctional space in front of the mosque, acting as the main public space for gatherings, socializing and celebrating. Activities which occurred in Maydan included: Eid, weddings, funerals, occasional festivals and Ramadan (Hakim, 1986).

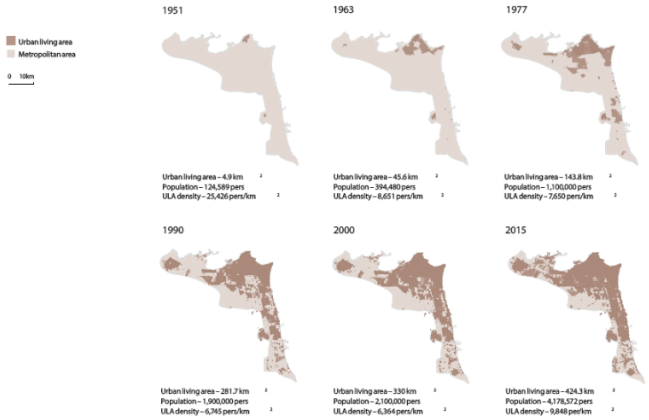
Sahah: A relatively smaller space located at street junctions. A Sahah was usually surrounded by markets or public facilities, serving as a smaller gathering space with a more flexible character (Hakim, 1986).

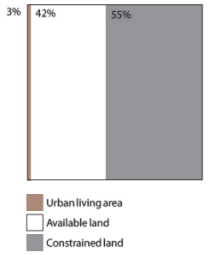
Appendix: B

Strategies for heat mitigation to enhance urban microclimate.
Source: (Mahmoud and Ghanem, 2018)

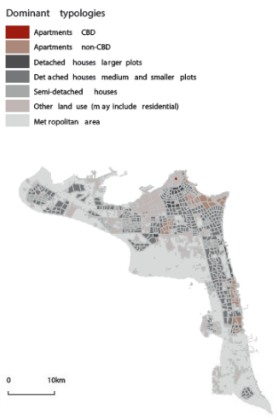
Refrences	City& climate	Urban pattern variables						canyons geometrical mitigation variables								study objective		Results
		Urban/ form.	Geometry							Street side Profile Shape								
			Canyon orientation							A	B	C	D	E				
		shape	(N-S)	(E-W)	(NE-SW)	(NW-SE)		Aspect ratio (H/W)	S.V.F	symmetry	With galleries	Overhanging	asymmetry	hybrid		Thermal comfort	Urban microclimate	
[44]	Algerian Sahara-hot arid	—	√	√	√	√		2:1 for all orientation&1: 1 for main orientation	Wide & low	Used for main orientation	Used for all orientation	——	Used for all orientation	Used for all orientation		√		Galleries effective with (E-W) & intermediate orientation with low aspect and wide SVF , hybrid is good with all other orientation
[48]	Fez, Morocco hot dry	(c)	√	√	√	√		From0.6 to11 for main orientation& 0.6 to1.1 for intermediate	——	Neglected street design						√		Thermal comfort is more than 10 degrees comfort in deep canyon and orientation don't has a Significant effect in deep and shallow canyons
[46]	Ghardaia, Algeria -hot and dry climate	(c)	√	√	√	√		0.5,1,2,4 for main orientation& 2 for intermediate	——	Used for main orientation	——	——	——	——		√		for the same aspect ratio N-S is the lowest stressful and PET become better if it combined with aspect ratio equal or greater than 2
[49]	Constantine-Algeria semi-arid climate	(a)	√	—	√	√		From 1 to 6.7	From .076 to.58	——	——	——	Used for all orientation	——			√	Air& surface temperature increase with SVF increasing and H/W decreasing with about 6c. at the night open natural spaces is cooler than urban spaces with 3 or6 degree
[45]	Ghardaia-Algeria Hot Dry Climate	(b)	Neglected for deep and shallow canyon					.78, 2.22, 3.40, 3.75	From .176 to .88	Real case	Modification case	Modification case	Modification case	——		√		the average percentage of time comfort for the PMV increases with more than 25% for modification scenarios
[73]	Ghardaia-Algeria Hot Dry Climate	(c)	√	√	√	√		0.5,1,2,4 for main orientation& 2 for intermediate		Used for all orientation	Used for all orientation	——	Used for all orientation	Used for all orientation		√		In hot and climate Galleries effective with (E-W) (N-S) however hybrid style is the most effective in term of thermal comfort
[72]	Tunisia Mediterranean subtropical climate, a hot, dry summer season	(a, b, c)	√	√	√	√		From very narrow 4 and medium 1.84 to sallow 0.25 for all orientation	From 0.23 to 0.80	Used for all orientation	——	——	——	——		√		Thermal comfort in deep canyons with aspect ratio= 4 is pitter than the shallow canyons with 0.25 ratio by 8.48 °C for the UTCI

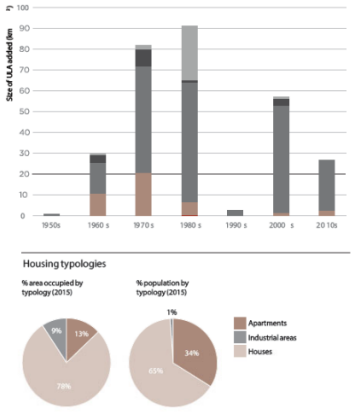
APPENDIX C





Land availability (out of total territory)





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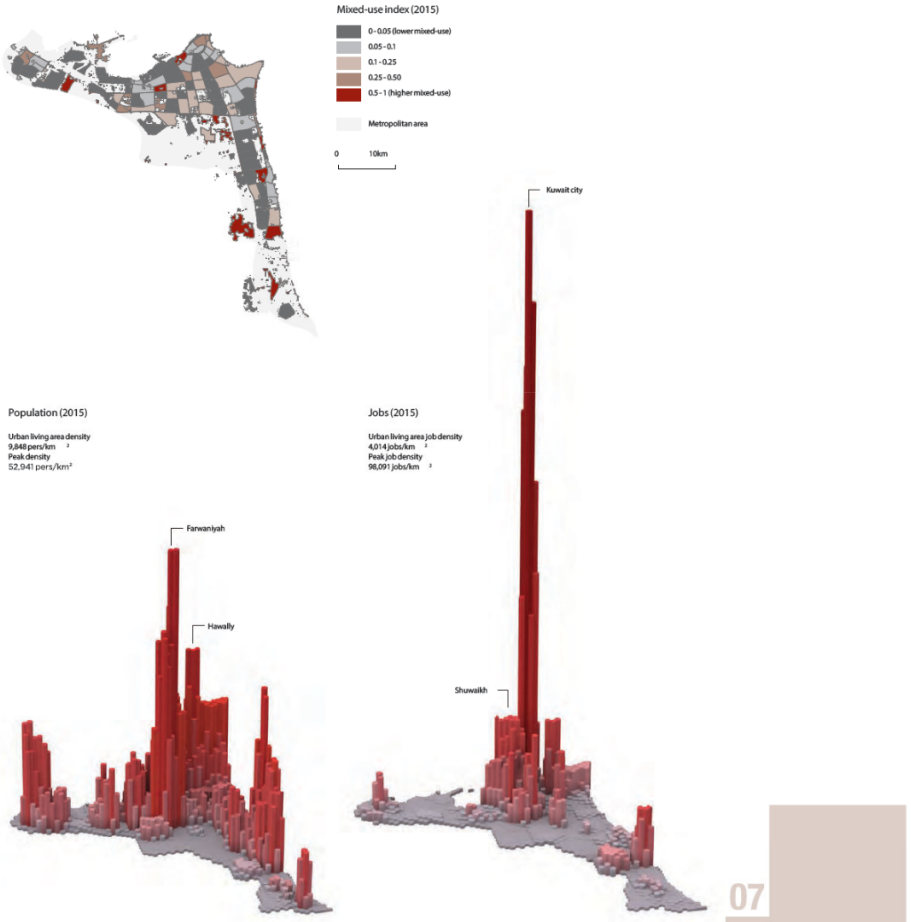
Mixed-use index (2015)
0 - 0.05 (lower mixed-use)
0.05 - 0.1
0.1 - 0.25
0.25 - 0.50
0.5 - 1 (higher mixed-use)
Metropolitan area
0
10km
Population (2015)
Urban living area density
9,848 pers/km ²
Peak density
52,941 pers/km²
Jobs (2015)
Urban living area job density
4,014 jobs/km ²
Peak job density
98,091 jobs/km ²
Kuwait city
Farwaniyah
Hawally
Shuwaikh