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The Tall, Polycentric City:
Dubai and the Future of Vertical Urbanism

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CTBUH 2018
International Conference

Antony Wood will present some
of this research in his keynote
"Cities 2070: What is Truly
'Sustainable?' " in *Plenary 3: 50
Forward, 50 Back,* Monday
22 October.

Abstract

*The development pattern of Dubai, host city of the 2018 CTBUH Middle East
Conference core program, typifies the polycentric city phenomenon more than
most cities. This paper analyzes the conditions and characteristics of Dubai's tall
polycentrism. A longer version with more contextual analysis appears as the
introduction to the Proceedings of the Conference, see store.ctbuh.org/2018-
middle-east-proceedings.*

Keywords: Polycentric, Urban Habitat, Urbanization, Density

Introduction

The concept of polycentric cities is not new.
New York developed both its Downtown and
Midtown in differing waves of development,
and London was polycentric almost from its
origin. However, even New York and London
are seeing several new urban clusters shift
the centers of gravity around the city whole,
as other cities based on the core-CBD model
– Hong Kong for example – shift density out
beyond the established center. Numerous
cities now have new skyscraper districts as
part of these polycenters. The physical
manifestation of this is often an undulating
skyline, with density rising to a series of
apexes across the city.

There is perhaps nowhere that demonstrates
this concept better than our host city for the
core of the 2018 conference, Dubai. Indeed,
it could be argued that Dubai, a city that has
largely risen in just three short decades, is a
direct result of this decentralized urban
approach, comprised as it is of evocative-
sounding districts – Downtown Dubai;
Business Bay; Dubai Marina; Festival City;
Palm Jumeirah; and several others. New
"centers" are still being added, including
Midtown; Emirates Business Park; Meydan
One; and Dubai Creek Harbour, anchored by
the under-construction Dubai Creek Tower.

Equally as important as the centers
themselves is the infrastructure that
connects them. To enable the creation of
new urban centers that match the
socioeconomic intensity of longstanding

metropolitan hubs, we must devise practical
means of transportation that maximize
geographical access and provide extensive
city services, not just in the horizontal
direction, but vertically. Such systems will
progress the concept of transit-oriented
development along a course of natural
evolution, to polycentric city-building.

What is a "Tall, Polycentric" City?

This paper analyzes the phenomenon of
Dubai's polycentrism in detail. It also
attempts to isolate and identify the
contemporary urban phenomenon of the
"tall, polycentric" city, where the undulating
skylines in question display certain common
characteristics, recognized colloquially or
formally by their populaces and governing
authorities, respectively; which are
reconciled with data from the CTBUH
Skyscraper Center and other sources.

A definition of "tall, polycentric" city is first
needed to limit study areas to the locations
with the highest development intensity and
velocity of vertical development, and to
distinguish "polycentrism" from mere "sprawl."
For the purposes of this research, then:

*A "tall, polycentric" city has three or more
"clusters" of tall buildings that are clearly
separated, visually and geographically. A
"cluster" is a group of buildings that is
significantly taller than the surrounding urban
fabric, and is visually and geographically
distinct, with at least five buildings (completed*

or topped out) of at least 100 or 150 meters, depending on the local height context.

The determination of a local context that is used to define individual tall building clusters is both a numerical and observational operation. In general, if a city's 100 tallest buildings have an average height of 200 meters or greater, the default determination is that 150 meters should be the minimum height threshold for consideration of a group of tall buildings as a "cluster." Likewise, cities whose 100 tallest buildings average less than 200 meters in height are generally assigned a 100-meter minimum height threshold for consideration of clusters.

Dubai is somewhat unique, in the sense that the boundaries of high-rise clusters in Dubai are much easier to delineate than in other cities, because the terrain is mostly flat, and there is a great deal of horizontal separation between clusters. Its 100 tallest buildings also have an average height of 265.4 meters, which would place the cutoff for cluster consideration at 150 meters and higher, from an objective standpoint. But from the perspective of visual coherence, the interpretation is different. Other cities with a particularly high average building height (such as New York and Hong Kong) tend to have a "carpet" of tall buildings, from which a few pinnacles rise. However, due to its distinctly separate tall building clusters, Dubai is assigned 100-meter minimum threshold, which ensures inclusion of a

❝A 'tall, polycentric' city has three or more 'clusters' of tall buildings that are clearly separated, visually and geographically. A 'cluster' is a group of buildings that is significantly taller than the surrounding urban fabric, and is visually and geographically distinct, with at least five buildings (completed or topped out) of at least 100 or 150 meters, depending on the local height context.❞

greater number of buildings within a visually discernible cluster.

Dubai's Polycentrism – An Overview

Dubai (see Table 1 and Figure 1) can be thought of as a linear array of tall building clusters, stretching some 35 kilometers from the International Airport to the southern end of Dubai Marina, along Sheikh Zayed Road, a broad thoroughfare that in some places is wide enough to form the boundary between clusters; in others, it's the main street. In many cases, the clusters are easily identifiable, not just on the skyline physically, but also because they are name-branded comprehensive developments by single

developers that are practically small cities. From north to south, these clusters are: Deira, Al Satwa & Dubai International Financial Centre (DIFC), Downtown Dubai & Business Bay, Barsha Heights, Dubai Marina, and Jumeirah Lakes.

Dubai's development pattern is fairly unique, and its speed and scale are even more so. Its development pace reflects a conscious strategy to build on the city's foundation as a trading port, while also becoming a financial and tourism hub. The dredging of Dubai Creek in the 1950s, the construction of the Dubai International Airport in 1960, unification of the seven emirates into the United Arab Emirates in 1972, and the opening of the Port of Jebel Ali in 1979 are

Metropolitan area	Name of cluster	Number of 100 m+ buildings in cluster	Combined height of 100 m+ buildings in cluster (m)	Average building height in cluster (m)	Tallest building within cluster (completed or topped out)	Height (m)	Completion year	Function
Dubai (United Arab Emirates) • *Population: 4,625,000* • *Average height of 100 tallest buildings: 265.9 m* • *Minimum height threshold of clusters: 100 m* • *Number of clusters: 6*	● Downtown Dubai & Business Bay	88	17,434.99	198	Burj Khalifa	828	2010	office/residential/hotel
	● Dubai Marina	87	15,854.30	182	Marina 101	425	2017	residential/hotel
	● Jumeirah Lakes	61	9,599.66	157	Almas Tower	360	2008	office
	● Al Satwa & DIFC	55	10,968.28	199	Gevora Hotel	356	2017	hotel
	● Barsha Heights	9	16,28.55	181	Business Central Towers	265	2008	office
	● Deira	9	985.82	110	Deira Tower	135	1980	government
	6 Clusters	**309**	**56,471.60**					

Note: A different color is used for each cluster as per cluster location map.   □ = Highest value in column   □ = Lowest value in column

Table 1. Dubai's tall building clusters, containing at least five buildings of 100 meters or greater height.

Deira
_____

- Tallest building:
  Deira Tower
  (135 m, government, 1980)
- No. of 100 m+ buildings: _9_
- Combined height of buildings: _986 m_
- Average building height: _109.54 m_

Deira Tower
_(135 m, 1980)_

Al Maktoum Hospital Rd.

Deira Twin Towers, Tower 1 & 2
_(102 m, 1998)_

Baniyas Rd.

Omar Bin Al Khattab

Al Maktoum

Arbift Tower
_(105 m, 1982)_

Dubai CreekTower
_(117 m, 1995)_
*Not to be confused with the observation tower under construction in Dubai Creek Harbour

National Bank of Dubai
_(124 m, 1998)_

Dubai Creek

Key
- ● Office
- ● Mixed-Use
- ● Residential
- ● Hotel
- ● Other

Note: Size of dots correspond to building height

0   500   1,000 m

Figure 2. Detailed map of Deira cluster.

Deira

Dubai International Airport

Al Satwa & DIFC

Downtown Dubai & Business Bay

Sheikh Zayed Rd.

The Palm Jumeirah

Barsha Heights

Dubai Marina

Jumeirah Lakes

DUBAI

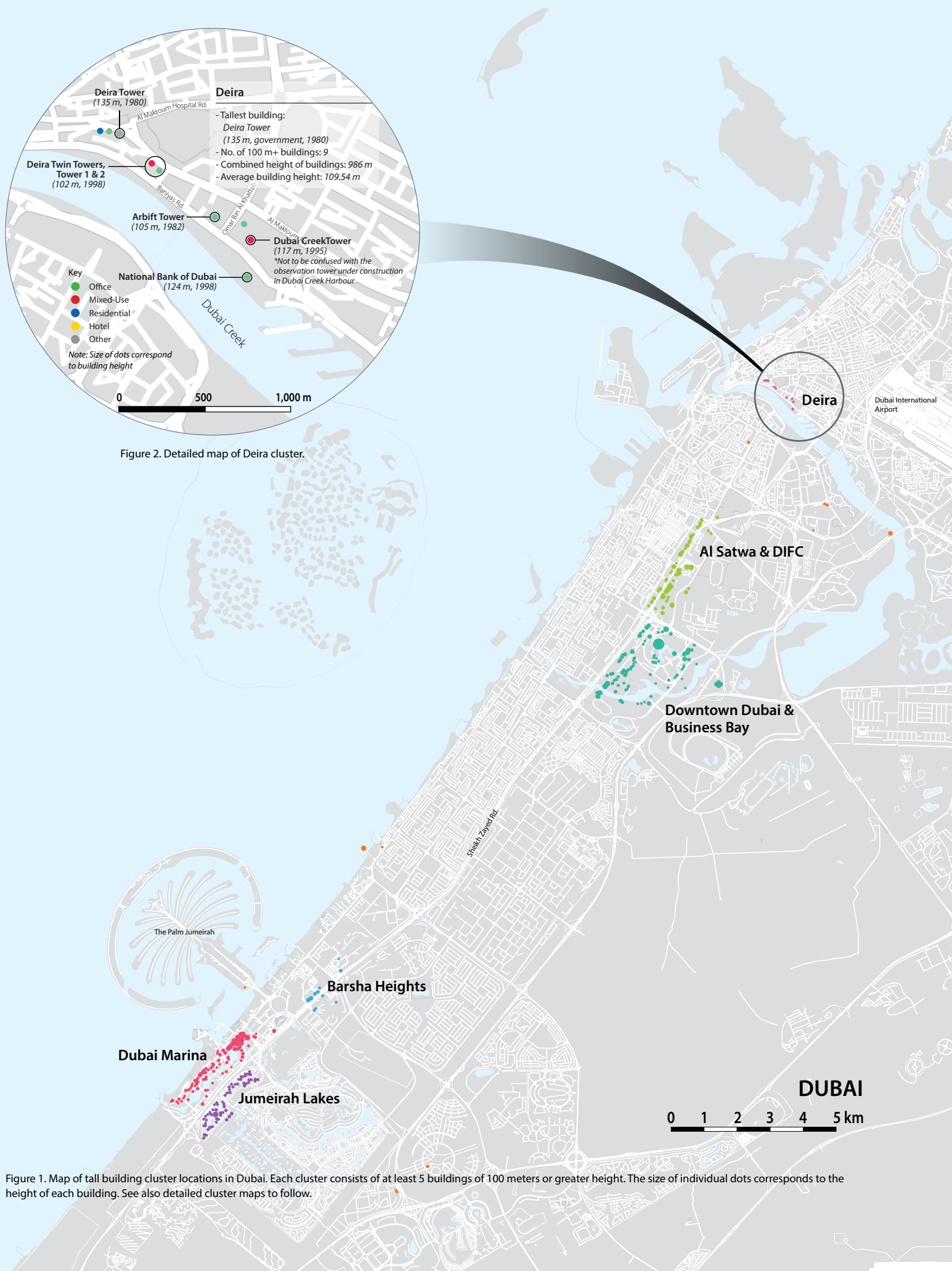0   1   2   3   4   5 km

Figure 1. Map of tall building cluster locations in Dubai. Each cluster consists of at least 5 buildings of 100 meters or greater height. The size of individual dots corresponds to the height of each building. See also detailed cluster maps to follow.

Figure 3. Deira, the city's original core trading district, represents one of the earliest tall building clusters in Dubai. The Deira Twin Towers (102 m, 1998) are prominent at the center right of the photo. © Fabio Achilli (cc by-sa)

considered major milestones in the city's development. The floodgates truly opened in 2002, however, when the real estate market was converted from a quasi-feudal system controlled by the sheikhs, from which foreigners could only rent; to a system more reminiscent of market economies in the West, in which anyone could buy property. Between 2002 and 2008, the city's population doubled and its urbanized footprint quadrupled (Brook 2013). By 2008 (the date of the previous CTBUH Middle East Conference), 144 buildings of 100 meters or greater height had been constructed in the city's entire history to date. From 2009 to mid-2018, 184 such buildings had been built (CTBUH 2018).

This strategy was further propelled by the establishment of several free-trade zones, which observe Western customs within their boundaries. Some of the clusters identified in this report, such as Dubai International Finance Center (DIFC) and Jumeirah Lakes/ Dubai Multi-Commodities Center (DMCC) can attribute much of their tall building population to these policies.

Because of the tendency to grant enormous swathes of land at once to a group of development companies with deep government and cultural ties, in Dubai there is an unusually strong correlation between the colloquial understanding of district boundaries and tall building clusters in the popular imagination, and that of the official designations of these places. In Dubai, city-scaled clusters are promoted as brands with distinct identities and marketing apparatuses, as a one-off gated community

or consumer product might be marketed in most of the rest of the world. These distinctions are further enforced by the massive scale of the developments themselves, their tendency to be centered around a distinctive tall building or buildings, or a manmade water feature, and the huge distances separating even neighboring developments. This high correlation is also likely reinforced by the automobile-dominated mode of passage from one place to another; even the Dubai Metro has station names that reflect not just the development names, but sometimes the names of the development companies themselves (e.g., DAMAC Properties). The high temperatures, hostile terrain and long distances mean that one does not simply wander the streets and form a human-scaled mental map with the skyline as a distant reference point. By default, one is almost always pointed toward an icon-centered group of buildings on the horizon, in an air-conditioned vehicle.

Deira

Deira (see Figures 2 and 3) is the original core city of Dubai, which still contains some traditional architecture, narrow streets, and the Gold Souk that have long been part of its historic trading culture. It also contains the city's first crop of tall buildings, nine of which are 100 meters or higher, with Deira Tower (1980) rising highest, at 135 meters. At that time, the city's population was only 276,300; it is now more than 4.6 million (GRC 2018). It is unlikely that Deira will grow much higher now; a good portion of the district is in the flight path of Dubai International Airport, which has since become one of the world's busiest and is perhaps the largest single driver of Dubai's economic boom, handling 88 million passengers in 2017. It is telling that Dubai is busily enhancing capacity at Al Maktoum International Airport, some 37 kilometers away, which will cover more than 10 times as much area and handle more than twice as many passengers.

"The high temperatures, hostile terrain and long distances mean that one does not simply wander the streets and form a human-scaled mental map with the skyline as a distant reference point in Dubai. By default, one is almost always pointed toward an icon-centered group of buildings on the horizon, in an air-conditioned vehicle."

Key
- 🟢 Office
- 🔴 Mixed-Use
- 🔵 Residential
- 🟡 Hotel
- ⚪ Other

Note: Size of dots correspond to building height

Dubai World Trade Center
(149 m, 1979)

Sheikh Zayed Road

Al Satwa & DIFC

- Tallest building:
  Gevora Hotel (356 m, hotel, 2017)
- No. of 100 m+ buildings: *55*
- Combined height of buildings: *10,968 m*
- Average building height: *199.42 m*

Emirates Tower 1
(355 m, 2000)

Al Yaqoub Tower
(328 m, 2013)

Gevora Hotel
(356 m, 2017)

The Index
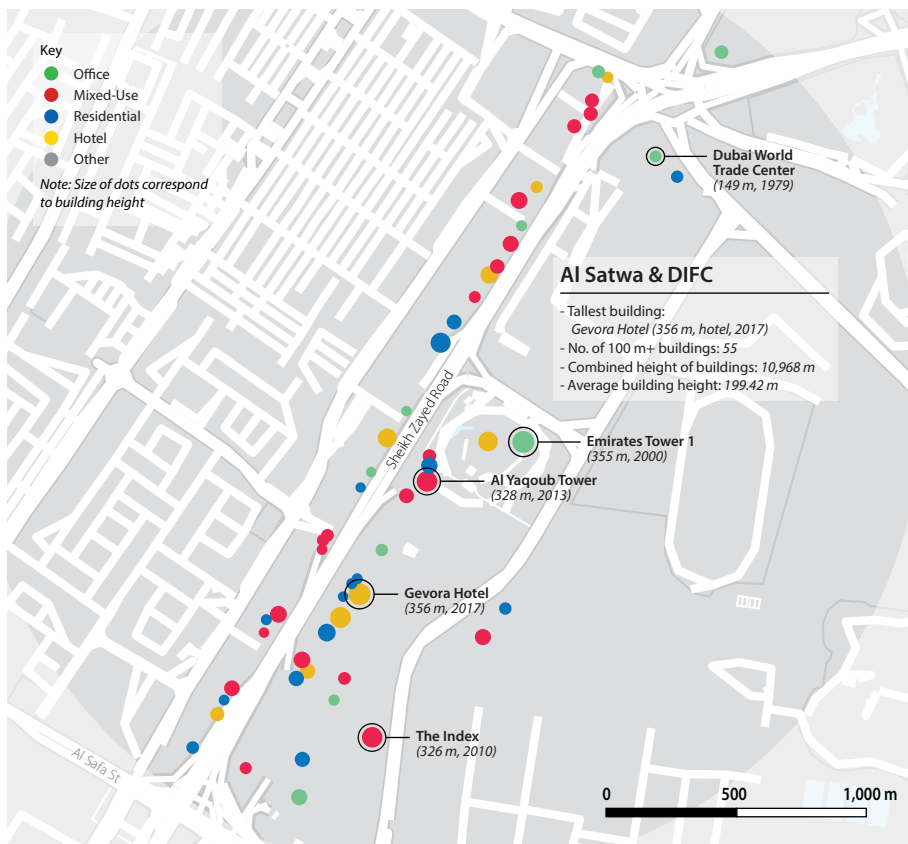*(326 m, 2010)*

Al Safa St

0 — 500 — 1,000 m

Figure 4. Detailed map of Al Satwa & DIFC cluster.

Figure 5. The Dubai International Finance Center (DIFC) (foreground) is a free-trade zone established to attract global businesses. A cluster of tall buildings has grown up around it. Emirates Towers are visible at right; the clock-topped building is the Al Yaqoub Tower. © Jackardsiffant (cc by-sa)

Al Satwa & DIFC

The Al Satwa District (see Figure 4) was the first area of Dubai outside the original urban core to be developed with high-rises, beginning with the Dubai World Trade Centre (1979) at its northernmost extent. A large traffic circle, Trade Centre Roundabout, marks the northern boundary. From here, a row of towers marches down both sides of the 12-lane Sheikh Zayed Road to Al Safa Street/Financial Center Road, where a massive cloverleaf interchange provides a break in the urban topography. The DIFC is a purpose-built development with independent financial regulation and jurisdiction, intended to bring global businesses to Dubai. It contains the Jumeirah Emirates Towers (see Figure 5), an important commercial complex that was the first to break the 300-meter threshold, in 2000. The row of tall buildings across the road is more of an ad-hoc development, consisting largely of hotels servicing the DIFC. The two corridors of tall buildings are gathered into one "cluster" however, at the scale of Dubai, they read as one on the skyline. The entire strip is "only" two blocks wide, although the block northwest of the highway is 100 meters deep and the block to the southeast is nearly 300 meters deep. Some 55 buildings of at least 100 meters are in this cluster, topped by the 356-meter Gevora Hotel, the tallest hotel-only building in the world.

This arrangement provides a useful discussion point for the Dubai urbanization phenomenon. At the scale of Dubai, Sheikh Zayed Road is actually the unifying element, akin to 5th Avenue in New York, running through an "urban canyon," whereas in a typical Western city it would be a divider. The buildings orient their "front doors" to the massive highway, which, although impassable to pedestrians across most of its length, is bridged at the World Trade Centre, Emirates Towers and Financial Centre Metro stations. The Dubai Metro is largely an above-ground system, running parallel to major roads, with air-conditioned stations.

Downtown Dubai & Business Bay

Downtown Dubai, developed by Emaar Properties, is perhaps the most emblematic

district when it comes to the Dubai style of urban growth (see Figure 6). The city-scale development contains the Dubai Mall (the world's second-largest by land area) and the Burj Khalifa, the world's tallest building. Amid an artificial lake, the Dubai Fountain performs "jumps" choreographed to music at regular intervals; the Dubai Opera is situated on the shores of the lake. A phalanx of hotels and high-rise residential buildings surrounds the lakeside core (see Figure 7).

To the immediate south, Business Bay, developed by Dubai Properties, extends along Dubai Creek on both sides. Not yet complete, it is designed for more than 300,000 people. It currently contains the 355-meter Emirates Park Towers/JW Marriott Marquis Hotel (the 2018 CTBUH Conference venue), the Vision Tower, the U-bora Towers, and many more.

The combined Downtown Dubai & Business Bay cluster has the greatest number of 100-meter-plus buildings in Dubai – 88 – and, partly owing to the height of the Burj Khalifa, it is also the tallest in terms of the

Figure 6. Downtown Dubai, featuring the Burj Khalifa, is perhaps the most emblematic district when it comes to the Dubai style of urban growth. © David Rodrigo
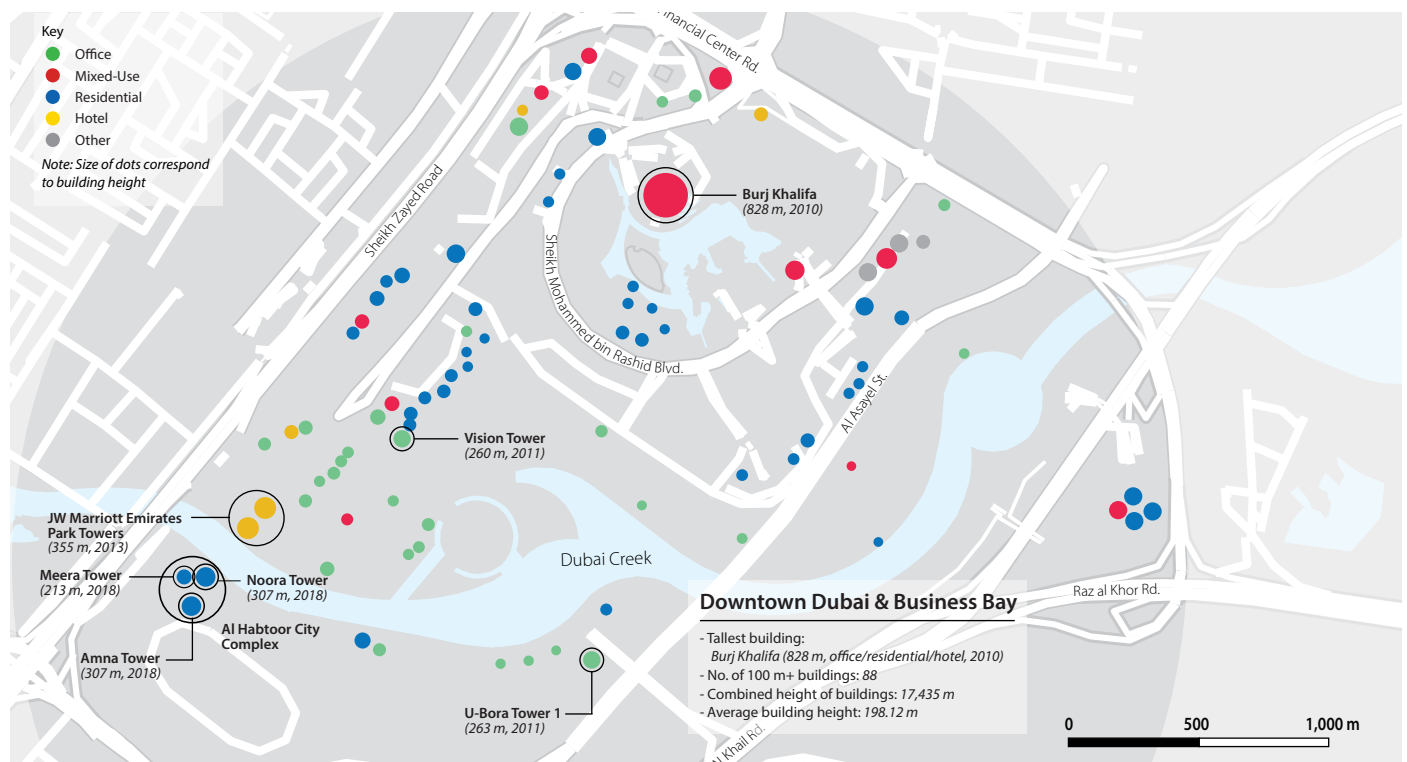

Key
- 🟢 Office
- 🔴 Mixed-Use
- 🔵 Residential
- 🟡 Hotel
- ⚪ Other

Note: Size of dots correspond to building height

Burj Khalifa (828 m, 2010)

Vision Tower (260 m, 2011)

JW Marriott Emirates Park Towers (355 m, 2013)

Meera Tower (213 m, 2018)

Noora Tower (307 m, 2018)

Amna Tower (307 m, 2018)

Al Habtoor City Complex

U-Bora Tower 1 (263 m, 2011)

Dubai Creek

Downtown Dubai & Business Bay
- Tallest building: *Burj Khalifa (828 m, office/residential/hotel, 2010)*
- No. of 100 m+ buildings: *88*
- Combined height of buildings: *17,435 m*
- Average building height: *198.12 m*

Raz al Khor Rd.

0   500   1,000 m

Figure 7. Detailed map of Downtown Dubai & Business Bay cluster.

Business Central Towers
(265 m, 2008)

Sheikh Zayed Road

Hessa Street

Abdullah Omran Taryam Street

First Al Khail Street

Barsha Heights

- Tallest building:
  Business Central Towers (265 m, office, 2008)
- No. of 100 m+ buildings: *9*
- Combined height of buildings: *1,629 m*
- Average building height: *180.95 m*

Key
- Office
- Mixed-Use
- Residential
- Hotel
- Other

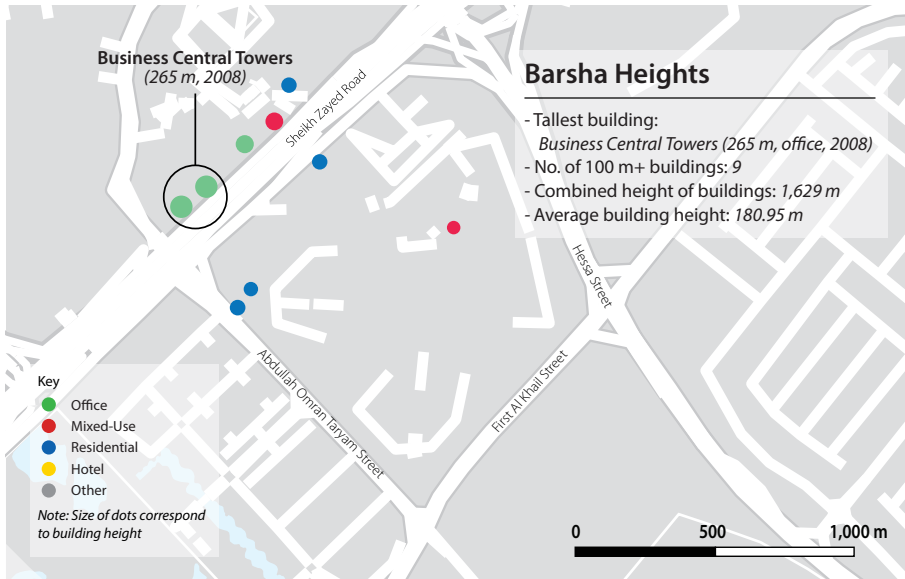*Note: Size of dots correspond to building height*

0   500   1,000 m

Figure 8. Detailed map of Barsha Heights cluster.

cumulative height of all its buildings (17,435 meters).

Barsha Heights

Barsha Heights (see Figure 8) is another single-developer-led community, which was originally called Tecom and renamed in 2017. The Tecom Group is a member of Dubai Holding, which also owns Dubai Properties, developer of Business Bay. It is served by the Dubai Internet City Metro station. As the names imply, high-speed Internet and business-friendly accommodations are hallmarks of the development. It is located along Sheikh Zayed Road (here 18 lanes wide) at its junction with Hessa Street (an elevated road, merely eight lanes wide). It is 18 kilometers south of the next-nearest
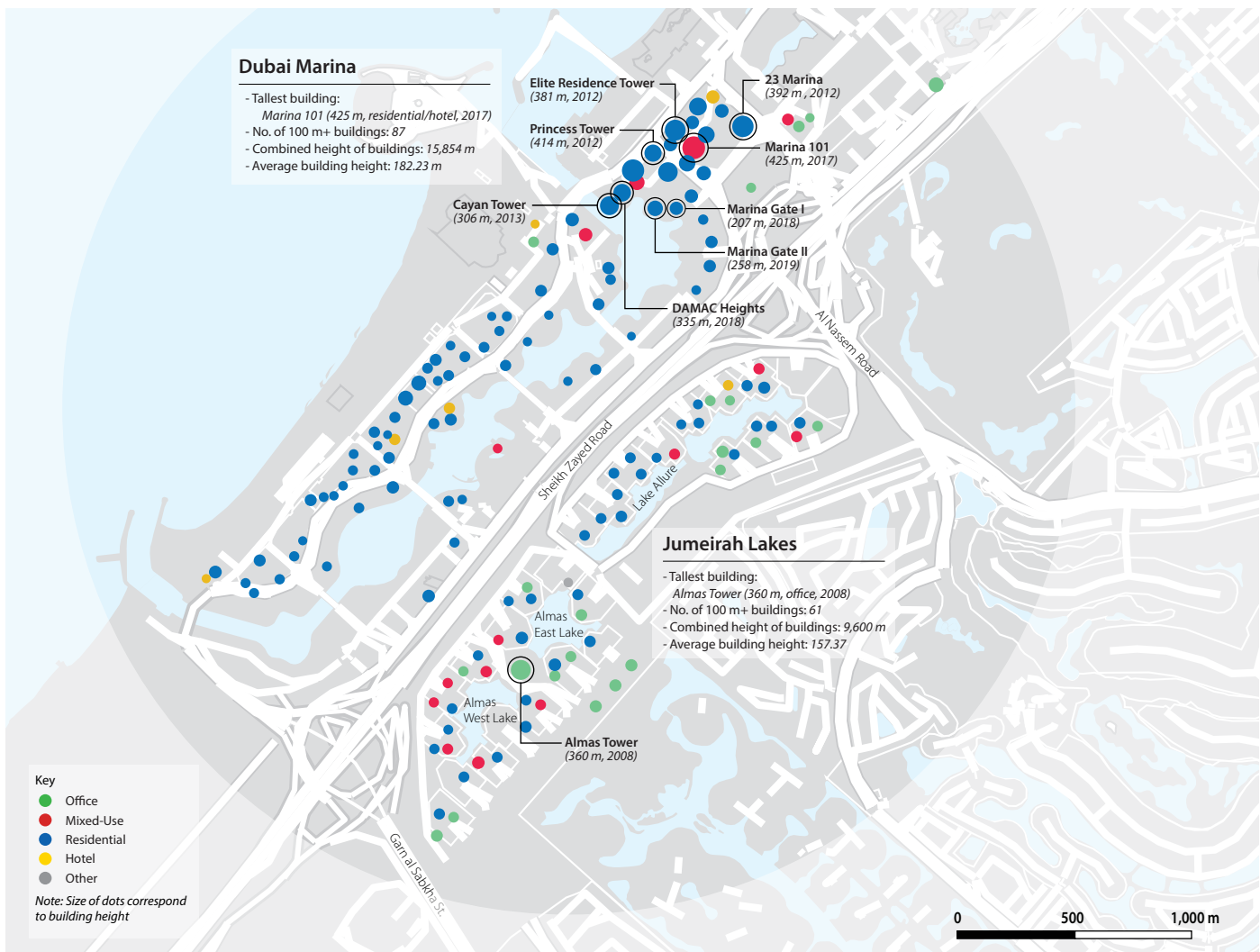

Dubai Marina

- Tallest building:
  Marina 101 (425 m, residential/hotel, 2017)
- No. of 100 m+ buildings: *87*
- Combined height of buildings: *15,854 m*
- Average building height: *182.23 m*

Elite Residence Tower
(381 m, 2012)

Princess Tower
(414 m, 2012)

23 Marina
(392 m , 2012)

Marina 101
(425 m, 2017)

Cayan Tower
(306 m, 2013)

Marina Gate I
(207 m, 2018)

Marina Gate II
(258 m, 2019)

DAMAC Heights
(335 m, 2018)

Al Nassem Road

Sheikh Zayed Road

Lake Allure

Jumeirah Lakes

- Tallest building:
  Almas Tower (360 m, office, 2008)
- No. of 100 m+ buildings: *61*
- Combined height of buildings: *9,600 m*
- Average building height: *157.37*

Almas
East Lake

Almas
West Lake

Almas Tower
(360 m, 2008)

Garn al Sabkha St.

Key
- Office
- Mixed-Use
- Residential
- Hotel
- Other

Note: Size of dots correspond to building height

0   500   1,000 m

Figure 9. Detailed map of Dubai Marina cluster and Jumeirah Lakes cluster.

Figure 10. Dubai Marina contains the "world's tallest residential block," including Elite Residence, Marina 101, and Princess Tower. © Elgaard (cc by-sa)

cluster, Downtown Dubai & Business Bay. In terms of skyscrapers, the tallest is Business Central Towers (265 meters), a pair of towers with a striking resemblance to New York's Chrysler Building. There are nine buildings of 100 meters' or greater height in the cluster. Here, Sheikh Zayed Road is the "front door" to the buildings in the cluster, which is located on both sides of the road.

Dubai Marina

The Dubai Marina is an "artificial canal city" built along a man-made marina that connects to the Arabian Gulf at both its ends, essentially carving an island out of the shoreline, and creating more potential for waterfront properties (see Figure 9). Mainly developed by Emaar Properties, it was designed to house more than 120,000 people, although several phases are still under construction. Here, the "clustering effect" is particularly pronounced, as it is the location of the "world's tallest residential block," containing the Marina 101 (the tallest in the cluster, at 425 meters), Princess Tower (414 meters), Elite Residence (381 meters), and several other supertall buildings (see Figure 10). The cluster boundary includes the

Jumeirah Beach Residences, a group of oceanfront apartment buildings and hotels on the artificial island created by the dredging of the Marina. The level of placemaking is somewhat higher here than in many Dubai developments, partly due to the "marina" water feature and its associated pedestrian promenade, and also to the presence of an internal tram line.

Overall, the cluster contains 87 buildings of 100 meters or greater height, with a cumulative sum of heights of 15,854 meters. Interestingly, this is about 1,851 meters less than Downtown Dubai & Business Bay, which has only one more building in the 100-meter-plus range, one of which is the 828-meter Burj Khalifa. Therefore, the average height of buildings in Dubai Marina is 182.2 meters, compared to 188.7 meters in Downtown Dubai & Business Bay (with the Burj Khalifa removed).

Jumeirah Lakes

Jumeirah Lakes is located on Sheikh Zayed Road opposite Dubai Marina, along its own water feature, a series of three man-made lake (see Figure 11). Though it is near Dubai

Marina, it is counted as a separate cluster for several reasons. First, the highway right-of-way is approximately 160 meters wide at this point, containing two four-lane frontage roads on either side, 14 lanes of mainline highway, and the tracks of both the Dubai Marina tram and the Dubai Metro. As elsewhere, the only practical pedestrian crossing of the concrete gulf is via bridges associated with the Metro stations. Also, the orientation of the buildings in both Dubai Marina and Jumeirah Lakes is toward their respective water features; their "backs are turned" to the thoroughfare, with only garage and service entrances appearing along the frontage roads.

The Jumeirah Lakes development was created by the Dubai Multi Commodities Centre (DMCC), another free-trade zone within Dubai, although the individual towers are by multiple developers. Its tallest and best-known building is the scroll-shaped Almas Tower (360 meters), which was built to host the Dubai Diamond Exchange (see Figure 11). Overall, the cluster has 55 buildings of 100 meters or greater height, for a cumulative total of 9,599 meters of height.

Figure 11. Jumeirah Lakes has Almas Tower as its centerpiece. Dubai Marina is across Sheikh Zayed Road. © Atkins

An "Emerging" Cluster: Dubai Creek Harbour

The Dubai Creek Harbour development had 17 buildings of 100 meters or higher listed as either "topped out" or "under construction" as of August 17, 2018. It is fully expected that by 2021, this district will be discernible as a cluster on the Dubai skyline, in no small part due to the Dubai Creek Tower, set to rise to more than 1,000 meters, at its center (see "Talking Tall," page 54). However, at the time of this research, five buildings of at least 100 meters' height had not yet been completed.

Discussion of Results

The overall effect of tall building clusters on the urban topography varies widely, due to the scale and density of built-up areas in a given city, as well as to its natural topography. Therefore, it does not necessarily follow that the cities with the greatest number of tall buildings, or the highest overall skylines, or the greatest number of clusters, actually have the most culturally or visually distinct tall building clusters. Horizontal distances between districts or clusters, modes of transport, and the passage of time all play a role in infusing skylines with meaning.

While real-estate values, permitted uses, commuter patterns, and population densities are the 2D empirical tools of greatest use in enumerating demographic and built-environment changes in cities, the correlation of these broader patterns with the measurement of the skyline is a 3D operation, with great potential for complexity and a not-insignificant degree of subjectivity. Perception matters a great deal in reconciling the popular and statistical conceptions of place, even those with objectively gigantic identifiers.

As mentioned above, the boundaries of a high-rise cluster in Dubai are much easier to delineate than in other cities, because the terrain is mostly flat, and there is a great deal of horizontal separation between clusters. Indeed, the entire length of the island of Manhattan (21.6 kilometers) could fit easily between Deira and Jumeirah Lakes (see Figure 12). Importantly, in Dubai individual private developers have gone to great lengths to make their districts distinct.

"Polycentrism" is neither a case of increasing overall urban density, nor a continuation of the low-rise horizontal sprawl that was experienced throughout the automobile era.

Rather, it is a question of cities sorting out their complex economic interdependencies and cultural identities through selective concentration of mixed uses where there is available land, an intersection of transport routes, or both. Many cities have been polycentric through their entire existence; what's new is the increasing resemblance of these districts to the historical conception of a "central business district", with their own skylines. With several transportation innovations already on the horizon, from autonomous vehicles, to drones, to the "Hyperloop", it's possible that we will see yet more reconfigurations of the urban topography in a generation's time.

To see how Dubai's polycentrism compares to that of other global cities, see the full version of this paper in the Proceedings of the 2018 Conference at store.ctbuh.org/2018-middle-east-proceedings. ∎

Unless otherwise noted, all image credits in this paper are to CTBUH.

References

BLACKBURN, T. 2016. "Shifting Urban Gravity, from 'Central' to 'Core' Business Districts." *CTBUH Journal* 2016 Issue IV: 40–45.

BRITISH BROADCASTING CORPORATION (BBC). 2012. "Heygate Estate Residents Fight Compulsory Purchase Order." *BBC News,* August 29, 2012. Accessed 17 August 2018. https://www.bbc.co.uk/news/uk-england-london-19371334.

BROOK, D. 2013. "How Dubai Became Dubai." *Next City,* February 27, 2013. Accessed August 17, 2018. https://nextcity.org/daily/entry/how-dubai-became-dubai.

CITY POPULATION. 2018. "City Population: Statistics for Census Areas." Accessed August 17, 2018. http://citypopulation.de/.

COUNCIL ON TALL BUILDINGS AND URBAN HABITAT (CTBUH). 2018. "The Skyscraper Center." Accessed August 17, 2018. http://www.skyscrapercenter.com.

DUBAI STATISTICS CENTER. 2018. Accessed August 17, 2018. https://www.dsc.gov.ae/en-us.

GOVERNMENT OF DUBAI. 2018. "Dubai History." Accessed August 17, 2018. http://www.dubai.ae/en/aboutdubai/Pages/DubaiHistory.aspx.

GULF RESEARCH CENTER (GRC). 2018. Gulf Labour Markets, Migration, and Population Programme. Accessed August 17, 2018. http://gulfmigration.eu/uae-dubai-estimates-of-total-population-by-sex-1953-1968-census-dates-2006-2013/.

UAE GOVERNMENT. 2018). "Economy." Accessed August 17, 2018. https://www.government.ae/en/about-the-uae/economy.

SAFARIK, D., URSINI, S. & WOOD, A. "Megacities: Setting the Scene." *CTBUH Journal* 2016 Issue IV: 30–39.

WINKLER, M. 2018. "Dubai's the Very Model of a Modern Mideast Economy." *Bloomberg,* January 13, 2018. Accessed August 17, 2018. https://www.bloomberg.com/view/articles/2018-01-14/dubai-s-the-very-model-of-a-modern-mideast-economy.

> 66 'Polycentrism' is a question of cities sorting out their complex economic interdependencies and cultural identities through selective concentration of mixed uses where there is available land, an intersection of transport routes, or both. 99
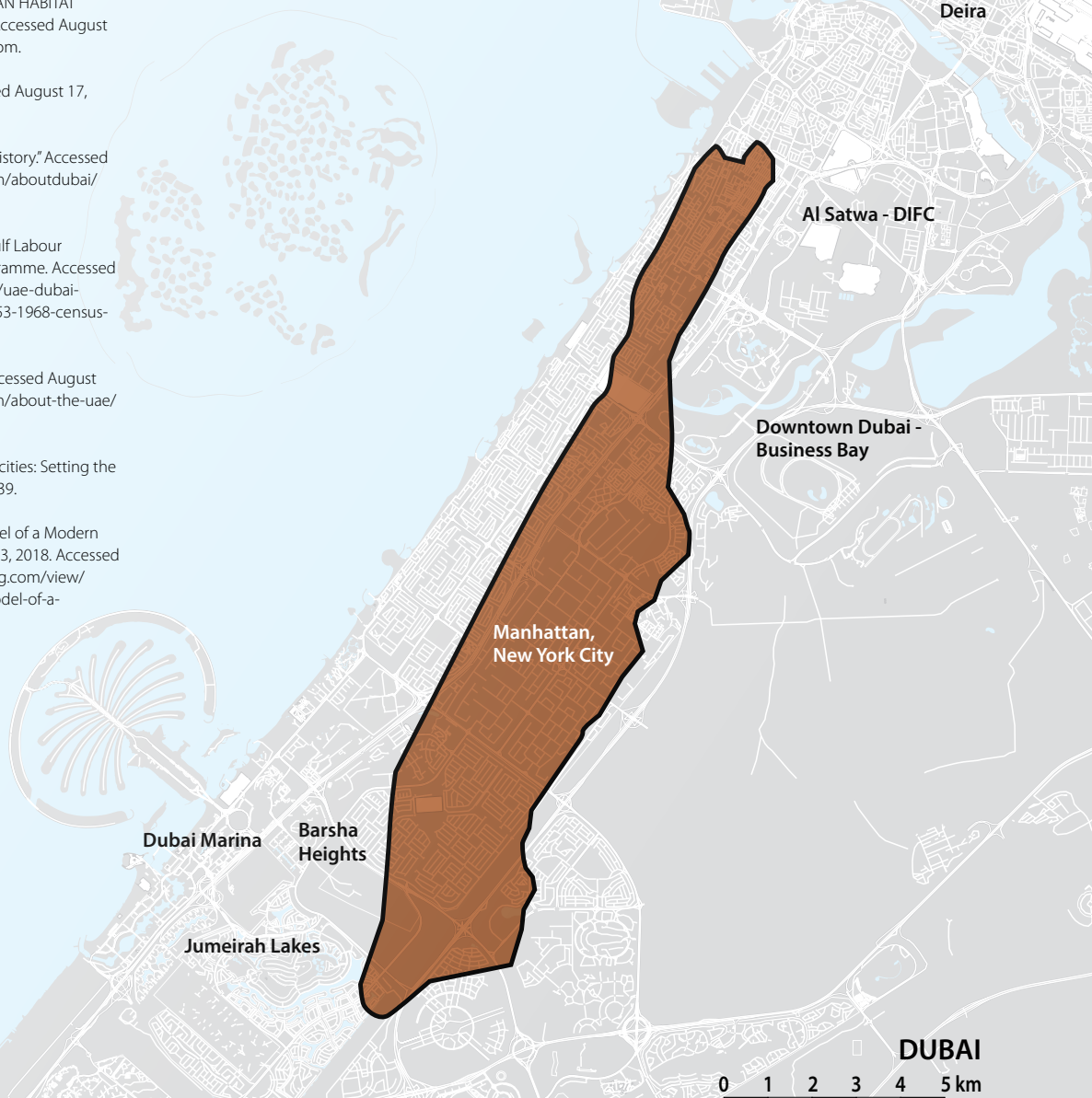

Figure 12. Map of Manhattan superimposed over Dubai. The scale difference of two cities with the same number of tall building clusters (6) is apparent here.