

# Briefing: The environmental paradox of cities: getting around Dubai



**Douglas Kelbaugh** FAIA

Professor of Architecture and Urban Planning, University of Michigan, USA

**This briefing on transportation in Dubai is based on the environmental paradox of cities: when humans cluster in dense, mixed-use urbanism, they decrease their impact on the global environment more than they increase their impact on the local environment; in other words, the ecological and carbon footprints per capita are smaller than in low-density sprawl.**

## 1. Introduction

The environmental paradox of cities means the same number of people living in low density patterns of development have a bigger ecological and carbon footprint than if they lived in dense, mixed use, transit-oriented urbanism. In wealthy societies, there is a big footprint in either case, but in the city it is smaller than in the suburbs on a per capita basis, which is currently the sustainability index that has the most meaning and equity on a global basis. Some experts have put a numerical value on **this remarkably universal phenomenon**, when a city doubles in population, its infrastructure and resource consumption increase by only 75–80% rather than by 100% (similar to the metabolic rate of animals as they increase in weight). So, today's rapid global urbanization, if it is not low-density sprawl, is generally a positive trend for the planet. It is especially good news if cities are dense and have the right mix of land use and transportation modes.

Increasing the size, density and mix of uses has related salutary effects, such as promoting walking, biking and transit, which often enhance the public realm and sense of community in today's increasingly diverse cities. Also, it offers more convenience, with fewer and shorter trips, especially by automobile. Productivity and innovation, as measured in inventions and patents per capita, also rise, as does economic, cultural and social opportunity. Also, a compact city keeps the surrounding countryside more intact, whether it's agrarian or wild. In short, compact cities are good for nature – human nature and 'mother nature'.

In its lightning fast and audacious development, Dubai, much to its credit, has managed to get half the equation right: it is dense enough to begin to partake of the paradox. Its next challenge is to embrace the other half of the equation – mixed use – with lots of worthwhile destinations within walking distance of lots of people, supported by transit and a well-connected grid of streets and roads. Its low-rise residential areas are typically single use and separated by an array of gates, walls, cul-de-sacs and open land. The high-rise clusters are also often single use and difficult to get to.

The chorus line of high-rises along Sheik Zayed Road, like fanciful perfume bottles competing with each other for attention, is stunning at night (Figure 1), but these trophy towers often ignore their context on the ground, making urban space that can be alienating and scale-less. There are some wonderful exceptions, like the new development, ironically called Old Town, with the shimmering, tallest ever Burj Khalifa elegantly punctuating both the sky above and the complex below; this includes a world-class fountain and gigantic mall. The Walk at Dubai Marina and the Dubai Financial Centre are also delightful on foot, **the latter** during the day and the former on evenings and at weekends.

As an architect, the present author could rant about the architectural excesses and superficialities, but, as an urban designer and planner, the intention is to focus on getting around the city. Despite the new and impressive metro system – a momentous step in the right direction – the city is still mired in the superblock/superhighway/supergrid transportation model. Like all such systems, it privileges mobility over accessibility; in other words, it is designed to move as many vehicles as fast as possible, rather than enabling as many people as possible to get to where they want or need to be. The vaunted mobility is also compromised by frequent traffic jams and pervasive 24/7 construction traffic, although both have slackened since the recession. It goes without saying that the roads and streets are inhospitable to pedestrians and bicyclists.

## 2. No left turn – the paradox of intersections

The superblock pattern is a result of vast tracts of land granted to public or private developers by the ruling Sheik Mohammed to promote growth. With the relentless drive for fast build-out and no comprehensive regional plan, these large parcels have been typically developed as self-contained if not gated communities, creating an archipelago of independent neighbourhoods and districts. Most of them act like large lakes that people are forced to drive around. This makes for a less permeable network of public roads, resulting in longer, less direct trips, adding to



Figure 1. Stylised high-rises line and shine on Sheikh Zayed Road, Dubai's ultra-wide and ultra-long high street

traffic, gasoline consumption and greenhouse gas emissions. There simply are not enough intersections, especially ones that allow left turns, which is the point of greatest conflict – the Achilles heel – of any vehicular network.

Traffic roundabouts have reduced the friction inherent in the left turn. However, widening them to three or four lanes has proved very dangerous for drivers, and impossible for pedestrians. The lack of intersections that allowed left turns extended the present author's nightly commute home – 5 km as the crow flies – to 18 km (see Figure 2). Fortunately, for any car but the many Porsches or Ferraris, this ridiculous route could be cut in half by



Figure 2. The lack of places to turn left tripled the distance of the author's evening commute home. The morning commute was one-third as long, because there were more places to turn right (© 2010 Googlemaps)

illegally cutting across several hundred metres of sand. The paradox here is that more intersections increase accessibility by shortening routes and travel times, even though vehicles turning slow the speed of traffic. Network connectivity, and its sibling proximity, are usually of greater value in driving around cities than are high travel speeds on the road. A network is better than a tree; accessibility trumps mobility.

In addition, there is the superhighway supergrid, the American model on hormones. With up to six or even seven lanes in either direction and the world's largest and most baroque interchanges, it can be hair-raising to drive and hair-pulling to navigate. If you miss your exit, you might well miss your meeting. It can take 15–30 min to recover, and that is only if you have a co-pilot or GPS; and neither map nor electronics can quite keep up with the changing roads and construction detours.

### 3. More roads, not more lanes

It is to be hoped that the road and transport authority's (RTA) plan to carpet the entire Emirate with this supergrid is no longer on the table (Figure 3). The hubris and absurdity of **this vision** is enough to make Los Angeles or Houston blush. The automatic policy of adding more lanes to decongest roads needs to give way to adding more roads, especially the missing links in a grid that is too coarse and incomplete. Those empty 12-lane bypass roads, which feel like a future whose time has passed, should give way to investment in the UAE's proposed national rail system.



Figure 3. An RTA plan to carpet the entire Emirate with a supergrid of superhighways is well over the top and past its shelf life (© 2010 Googlemaps)

There are other smaller discontinuities in the road network, most notably the cul-de-sac, which contribute traffic to the network without providing additional capacity to it. People living on these dead ends may enjoy their quiet privacy, but they are transportation parasites within the larger network. Low traffic on cul-de-sacs means more traffic elsewhere. A city has two basic options: to spread out its traffic across a close-grained network of many streets to share the traffic burden equitably, or to channel it on a more hierarchical network of cul-de-sacs, collectors, arterials and highways (which typically spares the wealthy neighbourhoods). The former strategy favours accessibility and the latter mobility (so long as the major roads are not overloaded with traffic). In fact, the connected grid has greater capacity per lane mile, because the many intersections allow turning left without traffic signals, by slipping between oncoming cars, whereas the arterial grid requires dedicated left turn lanes and multi-phase traffic signals, with a red light that not only seems longer but actually is longer than the green light (Figure 4).

In Dubai, the preferred traffic-calming device is the speed bump. They are more than a constant pest – they shorten the life of a vehicle's suspension system and the length of the driver's cervical spine, and can be a literal pain in the neck. (There were several dozen speed bumps on the author's daily commute.) Sometimes they are placed sensibly on neighbourhood streets, to warn the driver of an upcoming pedestrian crosswalk or intersection, but too often they are used on arterials and even highways, simply to slow drivers down, who are all assumed to be speeders if unchecked. This assumption may be true for many individuals, but there are less tyrannical ways to put the

brakes on fast drivers. Research has shown that driving speed is determined more by street and lane width than by posted speed limits. Narrower roads not only slow traffic, they cut the consumption of land, asphalt and energy, as well as reduce stormwater run-off, road maintenance and the flooding and erosion that often follows rainstorms. Why build wide roads that are engineered for high speed, and then impede that speed with jarring bumps? It is like putting one foot on the gas pedal and the other on the brake pedal at the same time.

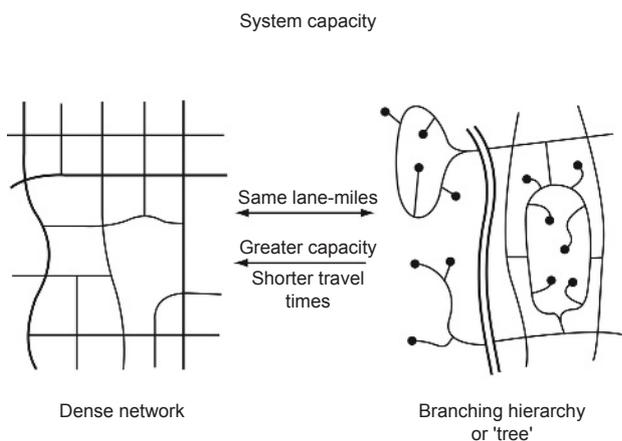
#### 4. Transit – public and private

The RTA has made significant progress in public transit, now operating the first line of the world's largest automated metro, as well as a growing fleet of handsome standard and double-decker buses (Figure 5) There are even gleaming (if under-insulated) air-conditioned bus shelters, which are welcome for the half of the year that is intensely hot and humid. The seldom-discussed transportation back story, however, is private transit, or the many private vans, mini-buses and buses that ferry workers to and from their workplaces (mainly construction sites) and their often remote, segregated and very crowded (eight men to a room) living quarters. These vehicles total about 200 000! They are everywhere, mostly vans, but over 10 000 light and heavy buses – ten times the number of public buses. It is rarely mentioned, but it is this private transit that is doing the lion's share of moving workers around the city. This system results in much lower vehicle miles travelled (VMT) and tailpipe emissions (although some of these buses are old and polluting) than if the workers were commuting in private cars, or even in public buses, which are not usually as packed as the company buses. The poorly paid, over-worked army of construction labourers are the unsung transportation, as well as construction heroes of Dubai.

It is no secret that the traffic fatality rate, especially for pedestrians, is among the highest in the world. This is often blamed on poor drivers who hail from many different countries and cultures, but surely the excessive width of the local roads and the number of high-speed roadways contribute to this statistic. Other fallout of Dubai's automobile-dependent lifestyles is the lack of physical exercise and the fast-food culture of roadside eateries. **Both** factors contribute to the native Emiratis' rate of obesity and diabetes, perhaps the highest in the world. But Dubai's worst stigma is the planet's highest per capita ecological footprint, pumped up by the high vehicle usage (as well as by a construction economy, which continues despite the economic downturn, albeit at a much slower pace).

#### 5. Infill the missing fabric and links

Dubai, having built an extensive infrastructure and many high-density areas, is now in a position to get the second half of the urban paradox right. It can infill existing development, and build more mixed-use, walkable urbanism on the open urban land that has been leapfrogged, as well as add the missing links in the



**Figure 4.** A dense network of roads/streets (left) has greater capacity than the tree-like hierarchy of the superhighway and superblock arterials with collectors and cul-de-sacs (right). Travel distances and times are shorter with a network, while moving more vehicles on an equivalent amount of roadway (which also means less pavement to install and maintain)



**Figure 5.** Cars, taxis, vans, buses, trucks and the metro stream by the world's tallest building

transportation network. Just as important as connecting the dots, the existing single-use dots need to be transformed into more complete and complex districts and neighbourhoods. New and retrofit development is best located near metro stations, with the highest densities within a quarter-mile radius. To be fair, this type of infill is exactly what many US cities also need to do, if they are to overcome the equally unsustainable imprint of single-use zoning and the leapfrog development of endless suburbs.

If these places are well-designed, interesting, humane environments, people will live, work, shop and recreate there, not only because of proximity, but because they want to be there. They will enjoy being footloose pedestrians on pleasant days and evenings, just as they now flock to The Walk in Dubai Marina or mob the dancing fountain at Dubai Mall. Walking is the healthiest, greenest, safest, cheapest, friendliest and most enjoyable way to move around a city. With a rich mix of uses and a pedestrian scale, walking will flourish, even in less than perfect weather. And transit, which always starts and ends with a walking leg, enables the pedestrian to get around the whole city.

A city without mixed use is simply a dense high-rise sprawl, which is the worst of both worlds: high-rise sprawl offers neither the stimulating life of cities nor the quiet privacy and greenery of suburbs. If suburban sprawl is boring to 'Gen X-ers' and 'Y-ers', dense sprawl is not only boring but crowded and noisy. Monocultures, like over-specialised species and ecosystems, are inherently less sustainable. In social, economic and environmental terms, they are less resilient, and less able to adapt and co-evolve with changing conditions. They are also less culturally vibrant, architecturally rich or spatially interesting.

The government-owned company in Dubai that the present author worked for while on leave from university had an international portfolio of projects that embodied **these principles**. Alas, like most developers in the global recession, it was forced to radically downsize and cancel most of its projects well before it could help reshape the prevailing development model. On the other hand, this hiatus in the economy's breathless pace of growth – whether for several years or a decade – is precisely what is needed in Dubai and other overheated, overleveraged economies and in cultures of excess, including the author's home country. Except for the unequal distribution of economic pain across society, the interlude provides this small Emirate the opportunity to take stock of its breakneck trajectory from a creekside pearling village to a world metropolis in half a century. To its credit, this remarkable explosion of an instant city in an empty desert was fuelled as much by raw gumption and vision as by the petro-dollars flowing through it. Like many countries the world over – including and in some cases especially in the industrialised West – now is the time for Dubai to harness that energy and bravura to a new vision, one that is not short-sighted or naively futuristic but more measured and mature. It can become more sustainable, strategic and, in more ways than one, streetwise. It is poised to embrace a more complex urbanism, with its paradoxical environmental dividends. Its survival – like that of every metropolis – depends on it.

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