



THE WALKABILITY EFFECT



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It is very simple; walkability is an urban design term entailing the ability to walk from a place of residence or a transit stop to any daily destination including retail shops, grocery, and work. Why is walkability the keystone in the fantastic notion of sustainability?

DENSITY

In urban design, density refers to the number of residential units per unit of land area (typically measured in units per acre). There is a direct correlation between increasing density and increasing walkability, thus the notion of walkability and density are symbiotic.

There are numerous societal advantages in having high density non-farmer populations. One of the first and most fantastic examples of the advantages of urban density is ancient Athens. Athens flowered because of small random events that then multiplied through urban interaction. One smart person met another and sparked a new idea. That idea inspired someone else, and all of a sudden something really important had occurred. The ultimate cause of Athenian success may seem mysterious, but the process is clear. Ideas move from person to person within dense urban spaces, and this exchange occasionally creates miracles of human creativity.¹

Cities of antiquity in particular illustrate the advantages and disadvantages of urban density. The main disadvantages of urban density in antiquity are the same few disadvantages that urban density has always suffered from. Ancient cities were breeding grounds for disease which spreads easily through urban proximity, and urban density provides concentrated targets for hostile attack (ex: 9/11/01). These disadvantages have been mitigated through advancements in technology and knowledge (generated by joint production of knowledge that occurs in urban density itself). These negative aspects of urban density have been rectified to the extent that they are virtually negligible compared to the impending economic and societal decimation that sub-urban sprawl will cause if society does not realize and act on the advantages of high density and the disadvantages of sub-urban sprawl. There are four primary advantages to urban density (elaborated in the following paragraphs):

1. Mitigation or elimination of oil based mobility through walkability and mass transit feasibility;
2. Embodied efficiencies in the built environment;
3. Lower amount of infrastructure (and its maintenance costs) per capita;
4. Maximization of land area for feeding increasing population (increasing maximum sustainable population)

Not jumping off a cliff is easier than turning back in mid-fall.² To assume electric vehicles will become feasible for the sprawling mass market and that electricity plants will adapt mostly non-fossil fuel generation methods before oil becomes too expensive is a potentially catastrophic assumption. Fossil fuel based economies will cease, whether intentionally or unintentionally, as scarcity and demand (primarily in developing economies) will force the price of oil beyond economic viability. Densification allows alternatives to sub-urban oil-based mobility and the embodied efficiency of high density reduces the demand for fossil fuel generated energy. As population density increases, transit use increases too, until a certain high level is reached, at which point the graph begins to flatten. The reason the graph flattens is that, once development becomes sufficiently compact, even trains and buses begin to seem inefficient for many trips, and people simply walk or ride bikes. Reaching that point is a worthy goal, in places where it can be achieved, because from an environmental and economic point of view, walking and bicycling are the ideal form of public transportation. Walkers and cyclists require less energy than public transit systems and require a far less complicated

infrastructure. The greatest environmental and economic gains from population density arise once destinations become so close to one another that people elect to get around all by themselves. Despite the obvious environmental benefits of leg power, there are few places in the United States where walking is a major form of transportation. Walking is dependent upon density. If you dilute the concentration of people and destinations, walking stops. Walking by adults in the U.S. dropped 40 percent between 1977 and 1995. That decline is a result of the way we have chosen to arrange the places where we live and work and shop.²

Environmentalists have long characterized large urban buildings as intrinsically wasteful, primarily because they represent high levels of “embodied energy” - energy that was consumed in the fabrication and transportation of the materials from which they were made and that was expended in the process of construction - and because so much interior space has to be given over to elevator shafts and other mechanical systems, and also because such buildings place intensely localized stresses on sewers, power grids, and water systems.² This characterization is despicably narrow. When speaking of buildings in high density - rather than using the term *embodied energy*, a more critical term would be *embodied efficiency*, which refers to a buildings environmental impact over its lifetime rather than the moment of construction. The embodied efficiencies of buildings in high density may completely over-shadow (pun intended) the “sustainability” of buildings in low density; these are some reasons:

1. Tall multistory buildings have much less exposed exterior surface per square foot of interior space than broader, lower buildings do, and that means they present relatively less of themselves to the elements, and that their compact roofs absorb less heat from the sun during cooling season and radiate less heat from inside during heating season.² (The average single family detached home consumes 88% more electricity than an average apartment in a five-or-more-unit building¹).
2. Tall buildings, furthermore, help to create the concentrations of people and uses which are necessary to sustain walkability and efficient transit systems, and also eliminate the reckless waste created by the helter-skelter duplication of freeways, schools, fire departments, power stations, postal delivery routes, sewage-treatment facilities, and innumerable other high-cost, high-energy public amenities.²
3. Although the elevator shafts required by tall buildings fill significant amounts of interior space, elevators, because they are counterweighted and thus require less motor power, are among the most energy efficient passenger vehicles in the world. Moving people vertically through a city requires less energy and less infrastructure than moving them horizontally.² (The true efficiency of moving people vertically is that vertical commutes typically mean the building is in a dense, walkable urban context in which no personal automobile has to be used).

An embodied efficiency of high density that is worth making a separate point about is the concentration of infrastructure. No building is an isolated environmental or economic phenomenon, even if 100% of the electricity it uses is generated on-site. Every human structure is just a single element in a large, interrelated energy-and-emissions network, and its impact goes far beyond the energy and resources consumed directly or that were consumed during construction.² The cost of constructing, upgrading, and maintaining the infrastructure strung out to service sub-urban densities is devouring public and private money that could otherwise be used for education, better funded public services, and generally circulating in the economy creating a higher quality of life and prosperity.

The last and perhaps most important advantage of high density when looking to the future is availability of land as the human population on this finite planet continues to grow. It is difficult for many people, in America particularly, to accept this point because land is still vast and plentiful. However, this conception is missing a critical point: there is much less land viable for growing food. Low density sprawl pervasively occurs on land previously used for agriculture because sprawl radiates from cities and out onto land originally established by farmers to feed the city inhabitants. The generally flat and structurally undeveloped farmland that

ring urban centers are magnets for automobile driven sprawl. For each person transported, cars need more space than omnibuses or elevated rail lines or walking. Nine square feet is plenty for a pedestrian walking down New York's Fifth Avenue, and on a busy day, walkers will put up with much less. A mid-sized car takes up about 100 square feet. That space can easily increase to three or four hundred feet on a highway. The fortyfold increase in space that accompanies the shift from walking to cars explains why so much land in car-based cities is given over to highways.¹ Population growth and availability of land for agriculture and natural preserve will conflict with the low-density life style. The notion of a maximum sustainable population is directly related to the amount of land needed to feed a certain population. High density concentrations of non-farmer populations will allow more land to be used for growing food for civilization.

WALKABILITY

Many of the benefits of high urban density stem from the **ability to walk to everyday needs**. Some of the benefits of being able to walk include (elaborated in the following paragraphs):

1. No dependence on the automobile;
2. Active shared walking and gathering space allows sharing of knowledge and ideas;
3. The social aspect of walkability has positive effects on mental health, which can translate to better productivity;
4. When the amount of active walkable social space increases, crime decreases;
5. Walking is healthier than driving in almost every way, which would lower the costly burden of health care for the walking individuals, and for society which inevitably pays the price of rampant health issues.

Automobile ownership becomes optional, not necessary. No personal automobile means less cost - both personally and environmentally. Even with electric vehicles - mined, shipped and processed material is required to construct the thing responsible for inducing land devouring sprawl. (A dramatically downsized auto business would be offset by the additional personal wealth spent on other business). In walkably dense areas, mass transit becomes economically feasible to serve those who need to travel more than comfortable walking distances or need to move faster. Many Americans ridicule the idea of not having a personal automobile, claiming that freedom would be taken away, and that they would feel imprisoned. This is unthoughtful and perhaps evidence of a lack of experience of walkable urban density. To say you are more free when you live in suburbia with an automobile is to overlook a number of counterpoints including the substance that automobiles require to move which you can afford or not afford according to the whims of geo-politics, occurrence of disasters (natural or man-made) in oil producing and/or refining areas, and the accelerating demand for oil in developing countries. How free are you to *have* to drive and perhaps sit in traffic, to get groceries, drive to the theater, drive to a shop, drive to a restaurant, or drive to work? What happens when your automobile breaks down? The freedom that petroleum fueled automobiles provide is granted by Arabian Sheiks, who can revoke that freedom by deciding to cut production of oil, or use other means of raising the cost of oil, therefore, the freedom of sprawling automobile dependent America is governed by foreign oil producing nations as much as our own constitution. It is difficult to deny that there is more freedom if we were to rely on our legs rather than oil and live in a walkably dense area. A typical 200 yard spur road in suburbia may harbor 12 houses; in a walkable city, that same 200 yards of street would harbor dozens of plausible daily destinations along with hundreds of homes providing inhabitants to socialize and do business with.

Humans are an intensely social species that excels, like ants or gibbons, in producing things together. Just as ant colonies do things that are far beyond the ability of isolated insects, cities achieve much more than isolated humans.¹ It is important to define "city" in this text as a dense place that fosters walkability. An example of a place called a city, but that does not actually

have urban density is Baton Rouge, Louisiana. Baton Rouge's density is fairly consistent throughout the "city" area, even including the downtown. The Baton Rouge downtown is a measly 0.7 square miles with a residential population of about 4,000, which live in 1,100 dwelling units which is a pitiful, sub-urban density of about 2.5 dwelling units per acre. With the low density and poor dispersal of residence and business, only 11% of the small downtown population of Baton Rouge walks to work (downtown has 35,000 employees, 50% are government jobs).³ **The typical threshold density for active urban walkability is 7 dwelling units per acre (requiring ample mixing of businesses and residence).** Walkably dense cities enable collaboration, especially the joint production of knowledge - mankind's most important creation. Ideas flow readily from person to person in dense urban places, and people are willing to put up with high urban prices just to be around talented people, some of whose knowledge will rub off.¹

The third point about walkability made at the beginning of this section should be naturally understandable. A healthy social life, whether that be a large network of friends around the city, or a comforting feeling of being around other strangers as they walk amongst you on the streets or lounge beside you at the park, is beneficial to mental health. Good mental health improves productivity. Also, there are more romantic encounters in a walkable environment rather than an automobile dominated environment (this may actually decrease productivity).

A widely held misconception of cities and high density is that they are havens for crime. This is only true where streets are not actively walked at all times of day and night. The great urbanist Jane Jacobs observed what she called the "eyes on the street phenomenon" in which active streets self police when people use them for daily business and nightly leisure. The crimes that occur in cities overwhelmingly occur where the density or street activity is low, such as parks or *single use areas* like business districts, industrial areas, and residential areas. Active walkability that self polices the streets requires diversity of area uses, such as places of entertainment (night activity), employment (day activity), and residency (to provide regular walkers). Parks can harbor criminal activity if they are too big, too vegetated, or not designed to attract pedestrian through traffic from active streets around them. Higher density can also foster strong communities of people which take care of their streets in many ways, including crime prevention.

The sprawl-generated decline in walking may have consequences for health as well as for energy consumption. The life expectancy for a New York City resident is nine months longer than that of an average American, and daily walking may be part of the reason.² (A nine-month average extension of life is actually quite small, but if you consider the elevated air pollution that New Yorkers inhale over their lifetime, nine months becomes significant, especially considering the vast potential to alleviate much of that air pollution with electric vehicles and clean electricity generation plants). Clive Thompson, in a New York magazine article pointed out that New York is "literally designed to force people to walk, to climb stairs- and to do it quickly."² While many sub-urbanites drive to the gym two or three times a week to exercise, or run around their subdivision, many urbanites also go to the gym or run the streets and parks. Thus, the health advantage still goes to walkable urban area dwellers, who get exercise not just at the gym, but walking to the gym, walking to work, walking to get groceries or go shopping, and probably climbing stairs to reach their apartment or subway and elevated train stops. A British study concluded that every minute spent walking extends life expectancy by three minutes.² Also, people walk farther in dense, active urban areas because the perception of distance is altered. This phenomenon can be seen in the most walkable place in America - Manhattan. Few New Yorkers would think twice about walking west on Forty-second Street from Lexington Avenue, on the east side of Grand Central Terminal to Times Square, a distance of about three-quarters of a mile. But many would choose not to walk from Fifth Avenue on the east side of Central Park, to Lincoln Center, on the West Side, even though the distance is the same. The reason is that the first route follows one of the city's liveliest streets, while the second transects Central Park, whose broad empty spaces make all walks seem far longer.² The health advantage that urban

walkability has over sub-urban car-dependent areas is an easy observation to make. How many overweight people do you see walking around Manhattan, or downtown Chicago, or several other active walkable downtowns such as San Francisco, Philadelphia, or Boston? There is less than 45% overweight people in those walkable areas. How many overweight people do you see perusing a sub-urban Wal-Mart? There is an average of more than 60% overweight in suburbia (and a higher percentage of sub-urban overweights are obese, compared to urban overweights). The US Department of Health and Human Services published a report on increasing healthcare costs: between 2001 and 2006, the costs of medical care for people with normal or overweight BMIs increased by 30% (a Compound Annual Growth Rate, or CAGR, of 5.5%). The costs for those who have a BMI that ranks them as obese increased by 82% (a CAGR of 12.7%). It is known that the most significant factor in increasing healthcare costs is the increasing obesity rate. Medical treatment of the problems associated with obesity, including type 2 diabetes, hypertension and cancer, is a major component of the bloated healthcare cost base in the United States. While there are a number of factors contributing to obesity such as cheaper and more available food, having the ability and convenience to walk rather than drive to destinations is undeniably advantageous for health.

HOW IS WALKABILITY ACHIEVED?

High densities that are mixed use which contain at least 7 dwelling units per acre foster walkability. Again, density and walkability are symbiotic - unfortunately for America, many municipalities and federal policies have created anti-incentives for high density living, and too much enticing incentive to own single family detached homes on big pieces of land.

The centerpiece of federal housing policy is the home mortgage interest deduction, which allows home owners to deduct from their taxes the interest on up to a million dollars of mortgage debt. Because more than 60% of Americans are home owners, this policy has become politically inviolate, but it is deeply flawed. The home mortgage interest deduction encourages Americans to own big suburban houses.¹ The rampant incentives for home ownership versus the lack of incentives for renting favors sub-urban living since 85% of city dwellers rent, and more than 85% of sub-urbanites own (due to the complications of owner-occupied cooperatives in multi-family complexes). As long as owner-occupied housing remains disproportionately non-urban, then subsidizing ownership will hurt density.¹

Another incentive to live in low density areas is the low cost of housing due mainly to housing supply. This may seem at first to be a free market issue, but if it were completely up to the free market, housing prices would be relatively even throughout the transect of sub-urban to urban densities because development would occur where more profit would be made - creating more of a price equilibrium, and the high demand for housing in cities makes it profitable to build housing, if the city governments allow it. Many cities have created costly dis-incentives for building more housing supply in downtowns because of rampant historic preservation, onerous permitting processes, and lobbies from fans of lower density. The city of Chicago is an example of good urban construction policy, meaning urban construction is encouraged. Chicago allows construction of large amounts of residential and office space, which makes living and conducting business in Chicago considerably cheaper than in other cities like Boston or New York which have hindered new construction for some time now, and their economies are beginning to suffer from their anti-growth policies. Chicago, a great walkable city, is growing its dense population and economy because it has become financially attractive to live and work there due to housing and office supply that can more easily keep up with demand. Cities must lower the barriers to new construction: build more dwelling units in walkable areas (or areas to become walkable). More dwellings equal lower housing cost, and higher population to support active streets. Cities must increase the number of properties that can be transformed

into high density new construction. Also, lower housing costs in cities will allow employers to pay lower wages, thus bringing more jobs into the cities and increase walkability.

Densification to achieve walkability is severely hindered in most American sub-urban areas, intentionally or unintentionally. (Many sub-urban municipalities wish to preserve low density and large amounts green space and yards, which is a cultural problem too deep to tackle in this text). For much of the United States, municipal zoning codes make mixed use and walkable density development illegal, and some sub-urban towns actually have minimum lot sizes that are, of course, too big for walkable density to occur. Zoning law reform, on all levels of development policy, should at least allow mixed use development and encourage high density, if not make these two walkability ingredients *the* law.

Low, unwalkable densities must be onerous areas to live and work relative to walkably dense areas. Nature and the free market will create burdensome fuel prices. But the incentive to live in walkable areas cannot count solely on this. For individual commuters in developed countries, cars save a lot of time. In the United States, in 2006 the average car commute lasted 24 minutes, the average commute by mass transit took 48 minutes.¹ The longer commute time that is typical for mass transit users is a disincentive for urban living. However, the ultimate commute is walking, which averaged less time than car commutes, and it has been determined that people would rather be able to walk to destinations rather than take transit. (A commute sequence of *walk - destination* is preferred over *walk - transit - walk - destination*). Therefore, cities should create shorter commutes than sub-urban commutes through sometimes radical walkability in which pedestrianism and living proximal to work and other daily destinations is highly designed into the urban plan.

While unwalkable densities must be onerous areas to live relative to walkably dense areas, those walkably dense areas must be made attractive for those who are not particularly inclined to live in high density. Many Americans consider it almost a cultural duty to own their own property and free-standing single family house. For sustainability reasons, that ideal must change, and to make that change bearable for people with land ownership ideals, urban density should be designed to be compatible with those ideals, at least in some areas of cities. Townhouses or row houses with small yards that are also proximal to parks that allow a diversity of outdoor activities is a way to attract the traditionally sub-urban peoples into high density. Also, many traditionally non-urban people feel overwhelmed by the scale of places like Manhattan, so it is important to restrict the scale of development on streets to a more "human scale" in select areas of cities. It is also important to note: many currently sub-urban towns can be condensed into European style small and completely walkable communities around commuter rail stops. This is what is most likely to happen over the centuries to come in America, as this way of densification fosters the advantages of urban walkability, while also being near non-park nature, which is something many Americans highly value.

Increasing density and thus increasing walkability is the surest path to creating a sustainable human civilization, and increasing Earth's maximum sustainable human population.

CITATIONS

1. Glaeser, Edward. *Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier*. New York: Penguin Group, 2011. Print.

Glaeser's essential contention is that "cities magnify humanity's strengths." They spur innovation by facilitating face-to-face interaction, they attract talent and sharpen it through competition, they encourage entrepreneurship, and they allow for social and economic mobility. Glaeser takes us on a world tour of urban economics, collecting passport stamps in Athens, London, Tokyo, Bangalore, Kinshasa, Houston, Boston, Singapore and Vancouver. Along the way, he explains how urban density contributed to the birth of restaurants, why supermarket check-out clerks demonstrate the competitive advantage such density confers and how the birth of Def Jam Records illustrates the way cities spur artistic innovation. (From NY Times Book Review by Diana Silver 2/11/11)

2. Owen, David. *Green Metropolis: Why Living Smaller, Living Closer, and Driving Less Are Keys to Sustainability*. New York: Riverhead, 2009. Print.

Owen is matter-of-fact: The facts alone are so discouraging that no rhetorical flourishes are necessary to underscore their urgency. Cars and sprawl: you can't have one without the other, and the rest of the country has both in amounts so vast as to make a "noncatastrophic resolution" of the nation's (and the world's) environmental challenges almost entirely unlikely. "The real problem with cars is not that they don't get enough miles to the gallon," Owen writes. "It's that they make it too easy for people to spread out, encouraging forms of development that are inherently wasteful and damaging. Most so-called environmental initiatives concerning automobiles are actually counterproductive, because their effect is to make driving less expensive (by reducing the need for fuel) and to make car travel more agreeable (by eliminating congestion). What we really need, from the point of view of both energy conservation and environmental protection, is to make driving costlier and less pleasant."

3. http://www.downtownbatonrouge.org/downloads/pdf/Market_Analysis.pdf (5/14/11)