Cities & Sustainability: A Midcourse Correction

12 Nov. 2012
Wendell Cox
\textbf{DEMOGRAPHIA}
Lafayette College
Web-seminar

Demographia World Urban Areas
(World Agglomerations)

Demographia International Housing Affordability Survey
Cairo to Madrid:
2100 Miles

Cairo to Mumbai:
2700 Miles
<table>
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<tr>
<th>Topic</th>
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<tr>
<td>Cities in Perspective</td>
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<td>The Evolving Urban Form</td>
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<td>Cities &amp; Transport</td>
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<td>The Dimensions of Sustainability</td>
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<td>Current Urban Planning Myths</td>
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<tr>
<td>Conclusion: Poverty not an Option</td>
</tr>
</tbody>
</table>
… compact development should not automatically be associated with the preferred spatial growth strategy.
The city is like an elephant: The bigger, the more productive.
City
(Urban Organism)

Metropolitan Area or Labor Market
(Functional Expanse)

Urban Area or Agglomeration
(Physical Expanse)
Definition of Urban Terms
PARIS METROPOLITAN AREA (AIRE URBAINE)

PARIS URBAN AREA

Ville de Paris (Core Municipality)
Exurban Area (Rural)

PARIS METROPOLITAN AREA

Goussainville Urban Area (Exurb)
Figure 10
The raison d'être of large cities is the increasing return to scale inherent to large labor markets. The cities’ economic efficiency requires, therefore, avoiding any spatial fragmentation of labor markets.
Jobs-Housing Balance (UK)
BALANCED ACHIEVED, BUT NOT IN COMMUTING

Example
Average Work Trip Distance
(Exurban London)
2x Town Diameter

Average Work Trip Length: 2001
World’s Largest Cities (Urban Areas)
650 BC TO PRESENT

From Chandler

Figure 13
GDP/Capita: Richest Nation: 2000$
Economics: A History of Poverty
CANNOT TAKE AFFLUENCE FOR GRANTED

Mumbai: Airport East Slum
Urban Area Average Population Densities

DHAKA & SELECTED (METRIC MEASURE)

Population per Square Kilometer

- Dhaka
- Mumbai
- Karachi
- Hong Kong
- Manila
- Seoul
- Jakarta
- Paris
- Los Angeles
- New York
- Vancouver
- Portland
- Atlanta

Less Developed World
More Developed World
Neighborhood Densities: Examples (WITHIN CITIES)

Population per KM²

- **Kowloon Walled City** (1990)
- **Dhaka-Ward 28**
- **Hong Kong: Tsueng Wan Centre**
- **New York: Highest 1910**
- **Mumbai Marine Lines**
- **Paris 11 Arr.**
Kowloon Walled City (Hong Kong) Nearly 5M/Square Mile
Dhaka Shantytown
Up to
2M/Square Mile
THE EVOLVING URBAN FORM
Double city size, 15% productivity improvement (density not an issue)
As Cities Become Larger They Become Less Dense
Planet of Cities

Coming to Terms with Global Urban Expansion

SHLOMO ANGEL

The Evolving Urban Form
Development Profiles of World Urban Areas
Cairo Urban Area: Evolution 1972-2010
Mexico City Spatial Expansion: 1910-2000
Shanghai Population by Sector

CHANGE: 2000-2010

Population Increase in Millions

- Inner Core
- Outer Core
- Suburban
Shenzhen Inner & Outer Area Population
1982 - 2010

Population in Millions

1982 1990 2000 2010

CORE DISTRICTS

OUTER DISTRICTS

Figure 28
Jakarta: Growth by Sector
2000-2010

- Outer Suburbs & Exurbs: 53%
- Inner Suburbs: 31%
- Jakarta: 16%
Core & Suburban Population: 1950-2010
MANILA URBAN AREA

MANILA (CORE)

SUBURBS

Population in Millions

Moscow Area Population Growth by Sector
2002-2010

Substantial Urban Spatial Expansion Planned
High Income World: 1960s-2000s
NEARLY ALL URBAN GROWTH IN SUBURBS: 35+YEARS

Australia: 97%
Canada: 94%
United States: 93%
Western Europe: 114%
Japan: 92%

Moscow
New York Urban Area Expansion
POPULATION & URBAN LAND AREA 1950 - 2010

Urban Land Area
Population
Paris Urban Area Population Growth
1950 - 2010

Population in Millions

VILLE DE PARIS

SUBURBS
Zürich Urban Area Population Growth
CITY & SUBURBAN RINGS: 1950-2010

Source: Statistik Stadt Zürich & FSO
Largest Employment Center in Canada
EDGE CITY: TORONTO PEARSON AIRPORT AREA

Mexico City: Santa Fe (#3)
Sao Paulo: Luis Berrini (#3)
Addis Abeba: Bole
The Organic Growth of Cities

Curitiba and Metropolitan Region

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<thead>
<tr>
<th>YEAR</th>
<th>POPULATION</th>
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<tr>
<td>1955</td>
<td>360,000</td>
</tr>
<tr>
<td>1965</td>
<td>550,000</td>
</tr>
<tr>
<td>1975</td>
<td>1,140,000</td>
</tr>
<tr>
<td>1985</td>
<td>1,700,000</td>
</tr>
<tr>
<td>2000</td>
<td>2,700,000</td>
</tr>
<tr>
<td>2010</td>
<td>3,224,286</td>
</tr>
<tr>
<td>2020</td>
<td>3,758,358</td>
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CURRENT URBAN PLANNING MYTHS
Not “Returning to the Cities”

MAJOR METROPOLITAN AREAS: CORE & SUBURBAN

Net Core to Suburb Domestic Migration Continued 2010-2011

<table>
<thead>
<tr>
<th>Period</th>
<th>Share of Population Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990-2000</td>
<td>10.0%</td>
</tr>
<tr>
<td>2000-2010</td>
<td>90.0%</td>
</tr>
</tbody>
</table>

Historical Core Cities

Suburbs
No Move from Suburbs to Core
US MAJOR METROPOLITAN AREAS: 2000-2010

Data from Census Bureau
Younger Not Moving to Cities
MAJOR METROPOLITAN AREAS: CORE & SUBURBAN

35-44 Population in 2010 Compared to 25-34 in 2000
Source: US Census Data
Age 55-64 Not Moving to Cities

MAJOR METROPOLITAN AREAS: CORE & SUBURBAN

Change in Population: 2000-2010

- Historic Core Cities: -14.0%
- Suburbs: -4.0%
- Other: 4.0%

55-64 Population in 2010 Compared to 65-74 in 2000

Source: US Census Data
Housing Preferences: Not Changing

CALIFORNIA (2000s)

- Supply
- Modeled Demand: 2010: Nelson
- Actual Demand 2000-2008: Cox

SCAG, ABAG, SANDAG & SACOG Planning Areas

Housing Preferences: Not Changing

Detected Conventional Lot
Detected Small Lot
Multi-Family

For some time, many in the urban planning community have been preaching a ‘new’ message to housing policy makers: zero growth in demand for housing in the United States. Perhaps now is a more challengable time for the ‘growth’ phase. The Nelson Institute for Environmental Studies has provided updated demand estimates for California, in a paper published by the Urban Land Institute. The paper highlights California’s housing shortage and offers recommendations for future planning and development.
Driving Down: 16-25: But Not to Work
UNITED STATES: 2000 & 2011

Share of the Market

Drive Alone 66.9% 69.7%
Car Pool 17.4% 12.6%
Transit 5.4% 5.8%
Walk 6.7% 6.8%
Other 2.2% 2.6%
Work at Home 1.4% 2.6%

From 2000 CTPP & 2011 ACS
CITIES & TRANSPORT
Democratization of Prosperity
ASSOCIATION BETWEEN MOBILITY & AFFLUENCE

“Time is Money”

Reduced Minority Unemployment With Cars
U. of California

PRUD’HOMME Mobility Improves Productivity
U. Of Paris

HARTGEN-FIELDS Mobility Improves Productivity

Chicago
Why are all these people in cars?
Transit: Strong Downtown: Weak Elsewhere
6 CSA’S WITH STRONGEST DOWNTOWNS: 2000

**EMPLOYMENT**

- Downtown: 16%
- Elsewhere: 84%

**# OF TRANSIT COMMUTERS**

- Downtown: 57%
- Elsewhere: 43%

All Major CSA’s Downtown
Employment: 10%
Public Transport: 7 US Largest Markets
ACCESS TO TRANSIT STOPS/ACCESS TO JOBS

- **90.3%**

- **NY, CHI, LA, WDC, SF, BOS, PHI**

**Average work trip travel time:**
- **Car alone:** 24.0 minutes
- **Public transport:** 47.4 minutes

- **8.1%**

**Public Transport within Walking Distance**

**45 Minute Job Access**
Transit & Auto Access: 30 Minutes
FROM CENTRAL VANCOUVER
Paris Suburbs: Cars Provide Quicker Travel
FROM MAJOR SUBURBAN RAIL STATIONS: 1 HR TO JOBS

- Auto: 84% Jobs Accessible, 16% Not Accessible
- Transit: 59% Jobs Accessible, 41% Not Accessible

Paris Suburbs: Cars Provide Quicker Travel
FROM MAJOR SUBURBAN RAIL STATIONS: 1 HR TO JOBS

- Auto: 84% Jobs Accessible, 16% Not Accessible
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Travel by Transit Takes Longer
6 MAJOR METROPOLITAN AREAS: CANADA

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<tr>
<th>Mode</th>
<th>One Way Work Trip Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>30</td>
</tr>
<tr>
<td>Car</td>
<td>27</td>
</tr>
<tr>
<td>Transit</td>
<td>44</td>
</tr>
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Autos in Western Europe & North America
MAJORITY OF MOTORIZED TRAVEL IS AUTO IN ALL CITIES

Example
PORTLAND
Transit +Cycle+Walk
Market Share Down
9% 1980-2011
Transit’s “Last Kilometer” Problem
ELSEWHERE TRANSIT IS SLOWER FOR MORE TRIPS

Annual Cost: More than gross annual income of metropolitan area

An auto competitive system for Portland?  
½ Mile Metro Grid Required
Higher Density Means More Traffic Congestion

DENSITY & TRAFFIC VOLUMES: INTERNATIONAL

$R^2 = 0.8856$

$\leftarrow$ Vehicle Hours/KM$^2$.  

$\leftarrow$ Population/ KM$^2$  $\rightarrow$

Hong Kong
Density & Traffic Congestion
UNITED STATES, CANADA & EUROPE

Average Urban Density

USA
Canada
Europe

Traffic Congestion (Excess Travel Time)

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### THE DIMENSIONS OF SUSTAINABILITY

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<th>Dimension</th>
<th>Question</th>
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<tr>
<td>1. POVERTY ALLEVIATION</td>
<td>Does the strategy contribute to poverty alleviation?</td>
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<tr>
<td>2. COST EFFECTIVE SUSTAINABILITY</td>
<td>Can the strategy reduce GHG emissions at a cost within the $50 ceiling per ton?</td>
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<td>Is the strategy without serious potential for public rejection or evasion?</td>
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<td>5. ENVIRONMENTAL SUSTAINABILITY</td>
<td>Does the strategy have the potential to achieve the GHG emission reduction objective?</td>
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POVERTY ALLEVIATION

Rio +20 Declaration

Eradicating poverty is the greatest global challenge facing the world today and an indispensable requirement for sustainable development.
COST EFFECTIVE
SUSTAINABILITY

Not an Issue of Fair Share
The most cost effective means
Must be used regardless of sector
Cost Effectiveness is Crucial

UN IPCC MAXIMUM RANGE PER METRIC TON

Market
Less than $15

Above $50 is wasteful
Detracts from efforts to reduce GHGs
& unnecessarily reduces employment & economic growth

McKinsey Average $17

Shenyang, China
Wendell Cox: Global warming bill could become big pork barrel

By WENDELL COX / Principal of Demographia, an international public policy firm in the St. Louis, Mo., area

No radical lifestyle changes needed...no change in thermostat settings or appliance use, no downsizing of vehicles, home or commercial space and traveling the same mileage...no shift to denser housing.

Co-sponsors included: NRDC, EDF, Shell
ECONOMIC SUSTAINABILITY

Economic Growth: Required For Social Cohesion
World Population: 1950-2100
BY INCOME: ACTUAL AND PROJECTED

Goal:
All should live as well as in the West
Can you imagine 400 million people who do not have a light bulb in their homes?" ... You cannot, in a democracy, ignore some of these realities and as it happens with the resources of coal that India has, we really don't have any choice but to use coal.
Europe: Protests Against Austerity
ATHENS: 18 OCTOBER 2012
Protests Against Raising Retirement Age
FRANCE: 18 OCTOBER 2012
# 5: ENVIRONMENTAL SUSTAINABILITY

Cannot be achieved without 1-4

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Planning Realities

Seoul
### Table 2. Canadian Fleet Representative Penalty Function

<table>
<thead>
<tr>
<th>Driving Cycle</th>
<th>Approximate Average Speed (km/h)</th>
<th>AQ Emission (g/veh-km)</th>
<th>Fuel (ml/veh-km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial LOS A-B</td>
<td>45</td>
<td>CO: 8.99</td>
<td>HC: 0.81</td>
</tr>
<tr>
<td>Arterial LOS C-D</td>
<td>30</td>
<td>CO: 10.70</td>
<td>HC: 1.01</td>
</tr>
<tr>
<td>Arterial LOS E-F</td>
<td>20</td>
<td>CO: 15.48</td>
<td>HC: 1.49</td>
</tr>
<tr>
<td>Freeway High-Speed</td>
<td>105</td>
<td>CO: 9.48</td>
<td>HC: 0.59</td>
</tr>
<tr>
<td>Freeway LOS A-C</td>
<td>95</td>
<td>CO: 9.29</td>
<td>HC: 0.55</td>
</tr>
<tr>
<td>Freeway LOS D</td>
<td>85</td>
<td>CO: 9.25</td>
<td>HC: 0.67</td>
</tr>
<tr>
<td>Freeway LOS E</td>
<td>50</td>
<td>CO: 8.63</td>
<td>HC: 0.82</td>
</tr>
<tr>
<td>Freeway LOS F</td>
<td>30</td>
<td>CO: 10.56</td>
<td>HC: 1.00</td>
</tr>
<tr>
<td>Freeway LOS G</td>
<td>20</td>
<td>CO: 11.28</td>
<td>HC: 1.09</td>
</tr>
</tbody>
</table>

Source: Simulation results using CMEM model coefficients
Density: GHG’s May Not be Lower
INCLUDING COMMON ENERGY EMISSIONS

No US data
HUGE RESEARCH GAP

Source: Energy Australia Study

- Annual GHG Tons/Capita

- Multi-Unit
- Single Family

Sydney

9+ Floors
4-8 Floors
<4 Floors
Townhouse
Detached
Higher Suburban Density: Travel the Same
TRAVEL PATTERNS NO DIFFERENT THAN LOW DENSITY

Statistics Canada: High Density 6+ Miles From Downtown Relies on Cars

Suburban Toronto (Newmarket)
Densification and Travel
US RESEARCH

Per Ewing & Cervero (2010)
CO₂ Emissions: Impact of Smart Growth

2005-2035 DRIVING & MOVING COOLER MID-POINT

2005 Driving Baseline & MPG Reduction from “Moving Cooler” Land Use & Transport

JAPA Growing Cities Sustainably

Does Urban Form Really Matter?
How Compact City Policy Destroys Housing Affordability
Anthony Downs
(Brookings Institution Economist)

Principle of a Competitive Land Supply
LAND PRICES....

....that in the absence of ample and accessible land for expansion on the urban periphery, artificial shortages of residential land will quickly extinguish any hope that housing will remain affordable, especially for the urban poor..."
Land Rationing is the Issue
DESTROYS HOUSING AFFORDABILITY

... the affordability of housing is overwhelmingly a function of just one thing, the extent to which governments place artificial restrictions on the supply of residential land.

Donald Brash, Governor,
Reserve Bank of New Zealand
1988-2002

Introduction to
4th Annual Demographia International Housing Affordability Survey
Historic Median Multiple: 3.0 or Less
Median House Price/Median Household Income

House Price to Income Ratios*

* Various combinations of median and mean measures of house prices and incomes used depending on availability

Sources: ABS; BIS; Bureau of Economic Analysis; Central Statistics Office
Ireland; Communications and Local Government (UK); National
Statistics website; OECD; REIA; Reserve Bank of New Zealand;
Statistics Canada; Statistics New Zealand; Thomson Financial
Housing Affordability 1950-2011

MAJOR US METROPOLITAN AREAS: MEDIAN MULTIPLE

Median Multiple: Median House Price divided by Median Household Income

1950 – 1970: From Census Bureau
1980-2009: From Harvard University
2010: From Demographia
Annual Data Begins at 1980

Less Restrictive Markets
More Restrictive Markets: Outside California
More Restrictive Markets: California
Strong Land Regulation: Less Growth
EUROPEAN & US RESEARCH

Reduced employment in Amsterdam/Rotterdam
-Vermuelen & Ommeren
Netherlands Bureau of Econ. Rsch.

Higher unemployment in the UK
-Mayo & Angel
World Bank

20% less job growth than expected in metropolitan areas with strongest land use regulation
-Raven Saks
US Federal Reserve Board
even with urban expansion, there are

"adequate reserves of cultivatable land sufficient to feed the planet in perpetuity"
Zero Emission House: Japan
2,100 SQUARE FEET: DETACHED

- Roof vegetation
- High Performance VIP hybrid PU Insulation Board
- Small Wind Turbine Generator
- PV (photovoltaic) systems
- High efficient heat pump hot-water supply systems
- Residential Fuel Cell systems
- Vacuum Insulation Glass
- Electric vehicles
- Ecocement

CONCLUSION
POVERTY IS NOT AN OPTION
The raison d’être of large cities is the increasing return to scale inherent to large labor markets. The cities’ economic efficiency requires, therefore, avoiding any spatial fragmentation of labor markets.
A well governed city delivers:

Economic growth (mobility facilitates)

Higher discretionary incomes (housing affordability)
## Comparing Toronto & Dallas-Fort Worth

**URBAN AREAS COMPARED (2010 & 2011)**

<table>
<thead>
<tr>
<th></th>
<th>Toronto</th>
<th>Dallas-Ft. Worth</th>
<th>Toronto/DFW</th>
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<tbody>
<tr>
<td>Population (Population Centre/Urban Area)</td>
<td>5,132,794</td>
<td>5,121,892</td>
<td>0.2%</td>
</tr>
<tr>
<td>Land Area (KM²)</td>
<td>1,751</td>
<td>4,606</td>
<td>-62.0%</td>
</tr>
<tr>
<td>Density</td>
<td>2,931</td>
<td>1,112</td>
<td>163.6%</td>
</tr>
<tr>
<td>One Way Work Trip (Min.)</td>
<td>33</td>
<td>26</td>
<td>26.9%</td>
</tr>
<tr>
<td>Reach Work in 30 Minutes</td>
<td>48%</td>
<td>59%</td>
<td>-18.6%</td>
</tr>
<tr>
<td>Median Multiple (House Price/Household Income)</td>
<td>5.5</td>
<td>2.9</td>
<td>89.7%</td>
</tr>
<tr>
<td>Transit Work Trip Share</td>
<td>21%</td>
<td>2%</td>
<td>935.0%</td>
</tr>
</tbody>
</table>
Planning: Facilitating the How People Want to Live

Rail Station: Suburban Paris

People ➔

←The Plan