



### The Population Conundrum Roundtable On Singapore's Demographic Challenges 3<sup>rd</sup> May 2012



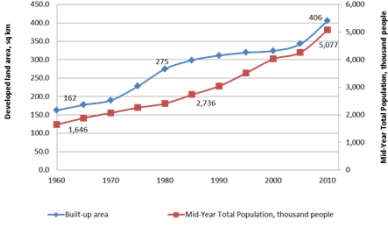
## Limits to Growth: Population, Density and Urban Stress

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## Population Growth and Density



2011 (mid-year)  
Population: 5,183,700  
Land Area: 714.3 sq. km.  
Density: 7,257 persons per sq. km



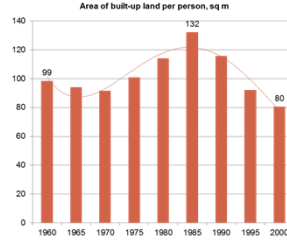
Source: Singapore Department of Statistics, 2010

## Land Consumption

### Proportion of Built-Up Land

Source: Yearbook of Statistics (various years)

Year	Land Area, Square Km	Built-up area, Square Km	Non built up land, Square Km	Land balance, Percentage	Non built up land, Percentage
1960	581.4	162.4	419.0	27.9	72.1
1965	581.4	177.4	404.0	30.5	69.5
1970	586.4	189.9	396.5	32.4	67.6
1975	596.8	228.4	368.4	38.3	61.7
1980	617.8	275.1	342.7	44.5	55.5
1985	620.2	298.5	321.7	48.1	51.9
1990	639.1	312.4	326.7	48.9	51.1
1995	647.5	319.3	328.2	49.3	50.7
2000	682.7	324.0*	358.6*	47.5*	52.5*



These figures are the 1999 figure but published in 2000

## Land Use Distribution

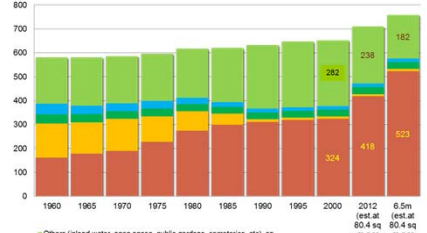
	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
		Build-up, sq. km	Agriculture, sq. km	Forest, sq. km	Marsh and Tidal Waste, sq. km	Others (water, open space, gardens, cemeteries), sq. km
1960		162.3	141.7	37.8	45.9	193.8
1965		177.4	131.6	35.0	35.0	202.5
1970		189.9	134.0	32.4	32.4	197.7
1975		228.4	105.9	32.4	32.4	197.7
1980		275.1	80.9	30.0	26.0	205.8
1985		298.8	47.1	28.6	18.5	227.5
1990		311.6	10.8	28.6	15.7	266.4
1995		319.3	9.3	28.6	15.7	274.6
2000		324.0*	9.3*	28.6*	15.7*	282.0*
2012 (est. at 80.4 sq m per person)		418.4	9.3	28.6	15.7	238.2
At 6.5m (est. at 80.4 sq m per person)		523.0	9.3	28.6	15.7	182.4

\* These figures are 1999 figures published in 2000


Source: Singapore Yearbook of Statistics

Note: Singapore currently has 33.5 sq. km. of protected nature reserves, and another 18 Nature Areas are also recognized in the Special & Detailed Control Plan, which is a non-statutory plan under the Master Plan with special guidelines.

## Land Use Distribution




2012 (est. at 80.4 sq m per person)  
2012 (est. at 80.4 sq m per person)



## Density Scenarios for 6.5 million

Population: 6.5 million Land Area: 759 sq. km.	Built Up Land	Built-Up Land (%)	Gross Density Persons per sq. km	Net Density Persons per sq. km	Land Consumption Sq. km. per person
<b>Scenario 1</b>	523.0	69%	8,600	12,400	80
Meet Population Growth by drawing on Greenfield Land					
<b>Scenario 2</b>	455.4	60%	8,600	14,300	70
Control Land Balance at 60-40 (Developed: Greenfield)					
<b>Scenario 3</b>	493.4	65%	8,600	13,200	76
Graduated Increase of Land Balance to 65-35 (Developed: Greenfield)					





### Existing Density in HDB Towns

New Town	HDB Land Area		HDB Dwellings		Population Density	
	Gross land area (sq km) (Total)	Net land area (Residential)	Given at 2011	No. of Units	Gross Density	Net Density
Punggol	9.57	4.22	20,518	96,000	6,803	15,427
Bedok	7.08	3.17	38,421	80,000	9,619	21,481
Paya Ris	6.05	3.18	27,514	44,000	18,301	34,941
Chennai	4.08	1.98	24,802	35,000	18,236	37,536
<b>Bukit Merah</b>	<b>7.205</b>	<b>2.83</b>	<b>31,715</b>	<b>47,000</b>	<b>19,408</b>	<b>38,868</b>
Yishun	6.90	1.72	13,543	22,000	9,471	21,419
Yishun	8.10	4.39	47,708	84,000	21,611	40,073
Queenstown	9.87	2.10	30,208	60,000	9,551	40,190
Selegie	10.55	3.97	46,022	90,000	15,185	40,951
Woodlands	11.98	5.25	58,525	88,000	19,432	44,343
Cayong	6.78	2.14	30,863	49,000	15,366	45,534
Bukit Merah	8.58	3.12	50,247	88,000	17,226	43,732
Tampines	12.00	5.80	62,837	83,000	18,817	47,660
Serangoon	7.37	1.26	21,291	29,000	20,258	48,482
Jurong East	3.84	1.45	22,299	29,000	21,068	48,030
Hougang	12.76	3.54	48,488	88,000	13,668	45,206
Bedok	9.17	4.28	19,139	74,000	21,612	49,453
Bukit Panjang	4.89	2.28	29,954	43,000	23,190	49,737
Tua Payoh	4.63	2.10	20,414	48,000	23,045	50,810
Choa Chu Kang	5.83	3.07	39,441	62,000	26,900	51,140
Other Estates	-	1.26	22,897	25,000	-	52,222
Jurong West	9.87	4.80	49,639	92,000	25,724	52,896
Ang Mo Kio	6.38	2.83	48,955	58,000	23,900	53,993
Kulung Whampoa	7.99	2.00	36,954	54,000	13,554	54,150
<b>Total</b>	<b>182.28</b>	<b>72.82</b>	<b>901,971</b>	<b>1,418,000</b>	<b>17,217</b>	<b>43,919</b>



### Land Utilization in Hong Kong 2011

Class	Approximate area (sq km)				
	2007	2008	2009	2010	2011
<b>Residential</b>					
Private residential (i)	15	15	15	15	15
Public residential (ii)	16	16	16	16	16
Rural settlement (iii)	34	34	35	35	35
<b>Commercial</b>					
Commercial/Business and office	3	4	4	4	4
Industrial	7	7	7	7	7
Industrial estates	3	3	3	3	3
Warehouse and open storage	14	13	13	13	13
<b>Recreation/Open Space</b>					
Government, institution and community facilities	24	24	24	24	24
Open space (iv)	23	24	24	24	24
<b>Transportation</b>					
Roads	41	41	42	40	40
Railways	3	3	3	3	3
Airport	13	13	13	13	13
<b>Other Urban or Built-up Land</b>					
Cemeteries and crematoriums	7	7	8	8	8
Utilities	7	7	7	7	7
Vacant development land/Construction in progress	19	17	16	16	16
Others	20	21	21	21	22
<b>Agriculture</b>					
Agricultural land	91	92	91	91	91
Fish ponds/Sea walls	16	16	17	17	17
<b>Woodland/Marshland/Creepland/Wetland</b>					
Woodland	247	243	234	234	249
Shrubland	237	238	243	243	243
Grassland	259	258	250	179	191
Mangrove and swamp (v)	5	5	5	5	5
<b>Barren Land</b>					
Barren land	5	5	5	5	5

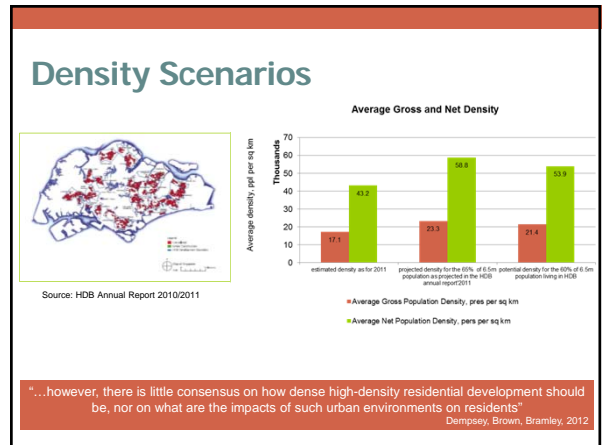
Population: 7.07million (mid 2010)  
 Land Area :1108 sq.km  
 Gross Density: 6,540 persons per sq. km.  
 [Kwun Tong: 54,530 persons per sq. km]  
 Built-Up Land = 24%  
 Net Density: 26,882 persons per sq.km



### Key Statistics FY 2010/2011

#### TOWN DEVELOPMENTS

HDB TOWN	LAND AREA (HECTARES)		DWELLING UNITS	
	TOTAL*	RESIDENTIAL**	UNDER MANAGEMENT AS AT 31 MARCH 2011*	PROJECTED ULTIMATE**
Ang Mo Kio	658	283	45,955	58,000
Bedok	997	408	59,199	74,000
Bedok	690	172	19,543	32,000
Bukit Merah	786	291	31,731	47,000
Bukit Merah	899	312	50,247	88,000
Bukit Panjang	489	228	29,954	43,000
Choa Chu Kang	583	307	36,841	62,000
Chennai	408	198	24,021	38,000
Cayong	679	214	30,863	49,000
Hougang	1,276	354	48,488	88,000
Jurong East	384	145	22,299	29,000
Jurong West	987	480	59,639	92,000
Kulung Whampoa	789	200	36,954	54,000
Paya Ris	601	318	27,514	44,000
Punggol	987	422	20,518	36,000
Queenstown	687	210	30,208	60,000
Selegie	708	317	18,421	30,000
Sengkang	1,055	397	48,022	80,000
Serangoon	737	166	21,291	29,000
Tampines	1,200	500	62,837	83,000
Tua Payoh	463	210	20,414	48,000
Woodlands	1,188	625	58,525	88,000
Yishun	870	438	47,708	84,000
Other Estates <sup>†</sup>	-	126	22,897	25,000
<b>Total</b>			<b>901,971</b>	<b>1,418,000</b>



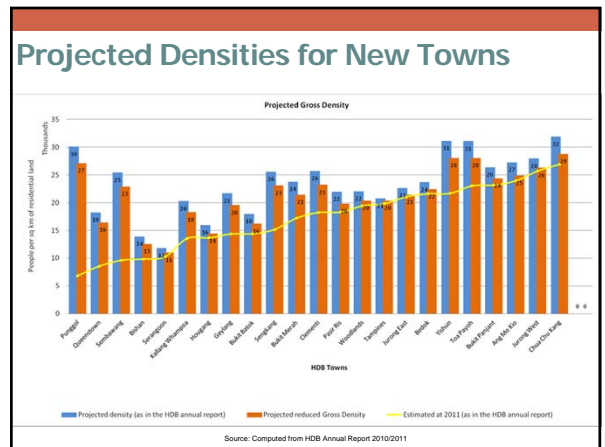
"...however, there is little consensus on how dense high-density residential development should be, nor on what are the impacts of such urban environments on residents"  
 Dempsey, Brown, Bramley, 2012

**New York (2011)**

- Population: 8,244,910
- Area : 790 sq. km.
- Density: 10,436.59 persons per sq.km

**Manhattan (2010)**

- Population: 1,585,873
- Area : 59.5 sq. km.
- Density: 26,924 persons per sq.km



### Model city Singapore shows symptoms of urban stress

By Philip Lim (AFP) - Aug 24, 2010

**Urban Stress:**  
A state of bodily or mental tension developed through city living, or the physical, chemical, or emotional factors that give rise to that tension (Source: MED)

SINGAPORE — Flash floods along posh Orchard Road. Packed subway trains. Traffic gridlock in the morning and evening rush hours. Intensifying competition for public flats. What happened to squeaky-clean, smooth-flowing Singapore?


Widely acclaimed as one of the world's most "liveable" cities, Singapore is now experiencing urban growth woes as it moves to expand its population to 6.5 million in 20 years, up 30 percent from the current level of five million.

The target was first cited in 2007 as an optimal population size for long-term economic competitiveness, but strains are already beginning to show as more immigrants and guest workers jostle for space with the locals.


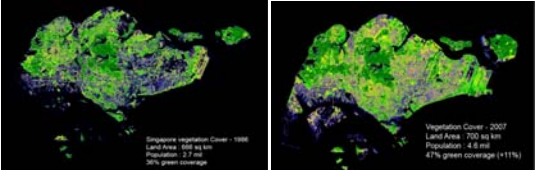
Not to mention an invasion of tourists, with arrivals surpassing the one million mark in a single month for the first time in July, thanks to two new massive casino resorts that opened a few months ago.

Singapore, one of the world's richest cities, has a land area of just 710 square kilometres (274 square miles) but until recent years, it had avoided the congested feeling of places like Hong Kong and Tokyo.

**It's crowded, very crowded:** commuter Anthony Chua, a 47-year-old accountant, said after getting off a train near the banking district.

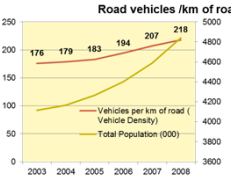


### Green Space

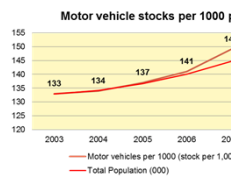
Source: National Parks Board. Singapore's 4<sup>th</sup> national report to the Convention of Biodiversity. <http://www.nparks.gov.sg/ncp/ncp04-en.pdf>

### Road vehicles /km of road



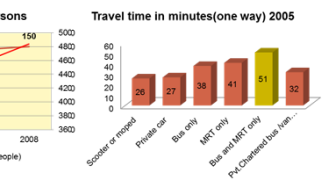
Source World Bank <http://data.worldbank.org/indicator/IS.VEH.ROAD.K1.countries>

### Motor vehicle stocks per 1000 persons



Source World Bank <http://data.worldbank.org/indicator/IS.VEN.NVSH.F3?page=1>

### Travel time in minutes (one way) 2005



Source: <http://www.singstat.gov.sg/info/openinfo/ghs2/chap1.pdf>

### Health, wellbeing, neighborliness

#### Communicable diseases vs. population density in Singapore



Source: MOH report on communicable diseases 2010

#### IN WHOSE BACKYARD?



Source: Straits Times

**Well-being requires meeting various human needs, some of which are essential (e.g. health and education), and some relating to pursuing one's goals, to thrive and feel satisfied with one's life (OECD, 2011).**

THANK YOU