Mok, N. H. B. (1959) *A Study of Population of Hong Kong*, Demographic Training and Research Centre, Bombay.
Morrison, N. (1998) The compact city: theory versus practice – the case of Cambridge, *Netherlands Journal of Housing and the Built Environment*, **13(2)**, pp.157–179.
Newman, P. (1992) The compact city: an Australian perspective, *Built Environment*, **18(4)**, pp.285–300.
Prescott, J. A. (1971) Hong Kong: the form and significance of a high-density urban development, in *Asian Urbanization: A Hong Kong Casebook* (ed. D. J. Dwyer), Hong Kong University Press, Hong Kong.
Tse, R. Y. C. (1995) City growth and land policy: special reference to Hong Kong, *Australian Land Economics*, **1(2)**, pp.34–39.
Tung, C. H. (1999) *Policy Address by the Chief Executive the Honourable Tung Chee Hua*, Government Printer, Hong Kong.
Wong, D. O. Y. (1975) *The Future of the Hong Kong Habitat*, University Archive, University of California, Los Angeles.
Wu, C. L. (1984) A high land price policy in Hong Kong?, Discussion Paper 19, Department of Economics, University of Hong Kong, Hong Kong.

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The Compact City of Hong Kong: *A Sustainable Model for Asia?*

Introduction

Traditionally, European cities that are dense and fine-grained have been considered efficient (Montgomery, 1998). By contrast, dispersed cities suffer from inefficient transport management and long commuting trips, which leads to a high dependency on automobiles (Wegener, 1995; Newman, 1992; Newman and Kenworthy, 1989). Many Asian cities have developed with little initial infrastructure investment, so they have evolved a 'compact' urban form in which to manage urban activities, and one that seems to enhance the sustainability of the city. However, although urban compaction has become a policy direction in a number of European countries in the 1990s, it is arguable whether 'compact' is a sustainable pattern for a city (Burton *et al.*, 1996; Breheny, 1996 and 1992; Robertson, 1990).

A context of *laissez-faire* policies has determined Hong Kong's past and present economic development, and is shaping its future. Hong Kong has acted as a fulcrum for China's prosperity and as a link to the rest of the world. It has played the role of entrepreneur through successive changes from a primary to a secondary and then a tertiary service provider, both regionally and internationally. Hong Kong's urban form has reflected these successive changes in urban functions. Its urban form has also developed within the constraints of its topography and the shortage of land for development, and has been affected by the high economic and real-estate gains through limited land availability. Today, Hong Kong is a crystallisation of high-density urban forms and developments that are pragmatic and profitable for its economy, reflecting its importance as a world city. The resulting compact form is advantageous for the environment, as almost 70% of Hong Kong's territories have been left green. Hong Kong can be seen as the product of accidental circumstances as well as intentional interventions that have combined to produce an economically and environmentally viable urban model.

This chapter reviews the underlying factors and policies that have influenced the compact city pattern of Hong Kong. The arguments for and against this compactness in Hong Kong are discussed, followed by a discussion about its environmental sustainability. Finally, future sustainable urban development strategies are reviewed.

Hong Kong's urban morphology

The shortage of flat land and the high rate of immigration from Mainland China during the early 1980s have led to the remarkably high densities of both buildings and population in Hong Kong. It is one the most densely populated areas in the world, with an overall population density of 6,160 persons/km^2. Within this figure there are many even more densely populated districts, for example Kwun Tong with 54,030 persons/km^2 (Hong Kong SAR Government, 1998), but the highest density is in the Mong Kok District, with a population density of 116,000 residents/km^2 (Gilchriest, 1994).

Hong Kong's urban developments are constrained along the two sides of Victoria Harbour – Kowloon and Hong Kong Island (Fig. 1). Due to the angular coastline, the developments are highly concentrated at the tip of the Kowloon Peninsula, especially those for commercial use. Another strip of dense development is located along the northern shore of Hong Kong Island, with an area of 22.5km^2 in an area which is 17km long and on average 1.3km wide. This small area, however, houses approximately 1 million people and provides 700,000 jobs (Tong and Wong, 1997). It includes the central business district, shopping complexes, residential buildings, and governmental, institutional and community facilities.

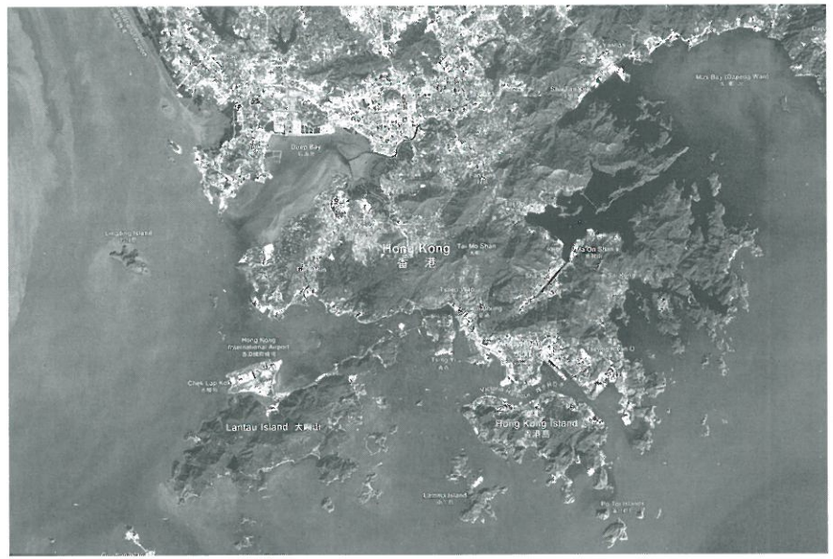


Fig. 1. The satellite image of Hong Kong.
Source: Modified form WorldSat International Inc., 1997.

Compact urban form in Hong Kong

Topographic constraints to urban development

The compact urban form of Hong Kong has not emerged by design but rather by default. It has a total land area of 1,096km^2, most of which is covered with mountainous terrain. Only 17% of the land area is intensively developed. This topography has induced high-density high-rise design solutions for housing as well as for other developments. To get more land for development near the existing developed areas, large-scale reclamation is taking place: it will produce up to 32% more new land by complementing the existing 1,053 hectares of reclaimed land

along the harbour. In old urban areas, large-scale old block renewal is the only option to increase space, with low to medium-rise developments converted into high-density high-rise developments. Reclamation and urban renewal are two of the planning strategies the government is currently implementing in urban development.

Land sales and income revenue for the Hong Kong Government

The government performs a dual role in Hong Kong's urban development. It is the biggest landlord and also an administrator that determines the development agenda in an executive-led policy in the territory. Land is leased, or otherwise held, by the Hong Kong Special Administration Region (HKSAR).[1] Historically, Hong Kong's urban development was regulated by the restricted release of land at a rate of 50 hectares per year, together with the limited buildable land. The demand for housing and urban activities has made land very expensive, and land sales have become a major source of revenue for the government. In the early 1980s, the land-related revenue amounted to more than one-third of the government's total revenue. The HKSAR Government Land Fund Trust[2] gathered 11.5% of the total government revenue (US$93.6 billion or HK$729.7 billion) collected at this time (Hong Kong Government, 1996).

Since land is a scarce resource, efficient land-related development becomes a major concern in the development agenda. The government has given priority to 'economic space' rather than 'life space' (Friedmann, 1988) and this has become the main thrust of land-use planning in Hong Kong (Ng and Cook, 1996). One reason why the formulation of a balanced and comprehensive development strategy for the whole territory may have been hampered is the income raised by land sales. There is always a debate whether the government is practising a 'non-intervention' policy or a 'high land price' policy, since land is leased to the highest bidder through public auction.

Reclamation-based urban development strategy

Since Hong Kong became a British colony, reclamation has been used as a solution to accommodate urban growth. In 1885, a Land Commission was established to find solutions for alleviating the congested living environments. It considered land reclamation to be the principal solution. Reclamation was designated along Victoria Harbour, as it was an important frontier to Mainland China and an economic gateway to the outside world. By 1924, a total of 500 hectares of land had been reclaimed (Ng and Cook, 1996).

In the period from the 1950s to the 1970s, the government shifted the focus towards urban decentralisation through the development of new towns. There was a great demand for land and housing, resulting from the unexpected inflow of immigrants and the 'transfer of industrialisation' from southern China in the 1950s. The government studied the possibilities of building new towns after a review of land demand for industry and housing in the mid-1950s (Bristow, 1989; Territorial Development Department, 1994). Reclamation expanded to New Kowloon and the New Territories. The major new towns, Tsuen Wan; Tuen Mun; Sha Tin; Tai Po; and Tseung Kwan O, are built primarily on reclaimed land. The total reclaimed land for the various new towns now exceeds 3,000 hectares (Territorial Development Department, 1994).

From the 1980s onwards, reclamation has concentrated on the shores of the harbour. China's Open Door Policy has led to the relocation of Hong Kong's manufacturing factories into the Pearl River Delta Region in China, with its cheap land and labour resources. Hong Kong has restructured into a service economy, a process which has reinforced the concentration of jobs and office developments in the urban areas. The government undertook a number of planning studies: the Territorial Development Strategy (TDS), the Study on Harbour Reclamation and Urban Growth and the Metroplan in formulating Hong Kong's urban strategy. The TDS considered the job–housing imbalance in new towns and proposed shifting the strategic development from new towns back to the harbour. A further 23km² of new land was filled in from the harbour, as proposed by these studies. The figures of total reclaimed land (Fig. 2) show that the government recognised the increasing importance of reclamation as a solution for accommodating urban growth between the 1970s and the 1990s.

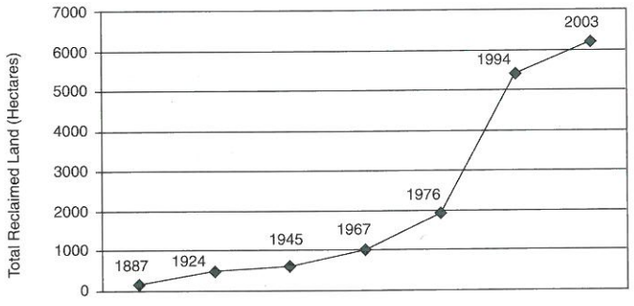


Fig. 2. Total and projected land reclamation in Hong Kong.
Source: Lands Department, Hong Kong.

There remains a question: is the main objective of harbour reclamation to encourage economic growth rather than to improve the quality of life, since the land premium and value of urban areas is higher than in the New Territories? The government asserts that the harbour-based reclamation can best provide the most needed economic space for expanding the hub functions (such as ports) of Hong Kong within Pacific Asia and supporting Hong Kong's status as an international city.

New town development: decentralisation

The new town idea originated in the 'Garden City' proposed by Ebenezer Howard (1898), with his vision that city growth should involve the gradual transformation of existing centrally concentrated cities into decentralised towns. In the 1960s, the Hong Kong Government began to examine the possibilities of a long-term new town programme to decentralise congested development and overcrowded populations into suburban areas.

The Territorial Development Department (TDD) was set up in 1973 to implement the New Town Programme. At that time, the main objective was to provide land for developing public housing in the New Territories. The basic concept of new town development was to create balanced and self-contained communities through the provision of infrastructure, community facilities and basic needs. The first generation new towns were targeted at housing 1.8 million people. To date, about 3 million, more than 40% of the total population of Hong Kong, live in the nine new towns (Fig. 1), with a target of accommodating 4 million people.

The new towns were intended to provide more land at reasonable costs to manufacturing industries, but due to the China's Open Door Policy, they were restructured towards the service economy. Employment in the service sectors[3] increased from 47% (1.26 million) in 1987 to 65.5% (2.1 million) in 1998 (Census and Statistics Department, 1999 and 1991), strengthening the concentration of jobs in the urban core.

Residential density planning policy

Before the Second World War, Hong Kong's buildings were governed by the Building Ordinance Regulations that limited building height to five storeys. Together with site coverage clauses, this resulted in a plot ratio of about 3 (Gilchriest, 1994).[4] In 1963, the concept of density zoning was introduced in Hong Kong and is still in use today (Planning Department, 1996). Table 1 shows the maximum domestic plot ratios and Fig. 3 the density zoning of residential developments in these metropolitan areas. The main objectives of the density zoning are to maximise intensity of people and jobs with close proximity to high-capacity transport systems, and this assists in shaping the Hong Kong's high-density urban form. The new towns, excluding Tsuen Wan, are classified into four density zones for residential developments and the maximum plot ratios range from 8 to 0.4.

Density Zone	Type of Area	Location	Maximum Domestic Plot Ratio
R1	(1) Existing Development Area: i. well served by high capacity public transport systems	Hong Kong Island Kowloon & New Kowloon	8/9/10 (i) 6/7.5
	ii. often incorporate commercial space on the lower one to three floors	Tsuen Wan, Kwai Chung & Tsing Yi	8
	(2) New Development Area and Comprehensive Development Area		6.5
R2	i. less well served by high capacity public transport systems		5
R3	i. with very limited public transport capacity ii. subject to environmental constraints		3

Note: (i) Maximum domestic plot ratio of 8, 9 and 10 depends on Site Classification.

Table 1. Maximum domestic plot ratios: Metroplan area.
Source: Planning Department, 1996.

Urban renewal favouring urban intensification

In the early 1960s, the government carried out a pilot redevelopment scheme with the objectives of redeveloping the old buildings and improving the congested conditions of old residential areas. Sheung Wan was chosen as an 'Urban Renewal District' in 1965. This pilot scheme fulfilled its objectives, but it took more than one decade to complete. Long lead-time is still the main problem of recent redevelopment schemes, because of the difficulties in land acquisition.

The existing private housing stock is ageing rapidly, especially in the urban areas. It is estimated that more than 40% of the public housing stock (about 260,000 units) in urban areas will be over 30 years old by 2005, compared with 20% (about 113,000 units) in 1999 (Planning, Environment and Lands Bureau, 1999). In 1988, the Land Development Corporation (LDC) was established to speed up the pace of urban renewal in order to solve the problem

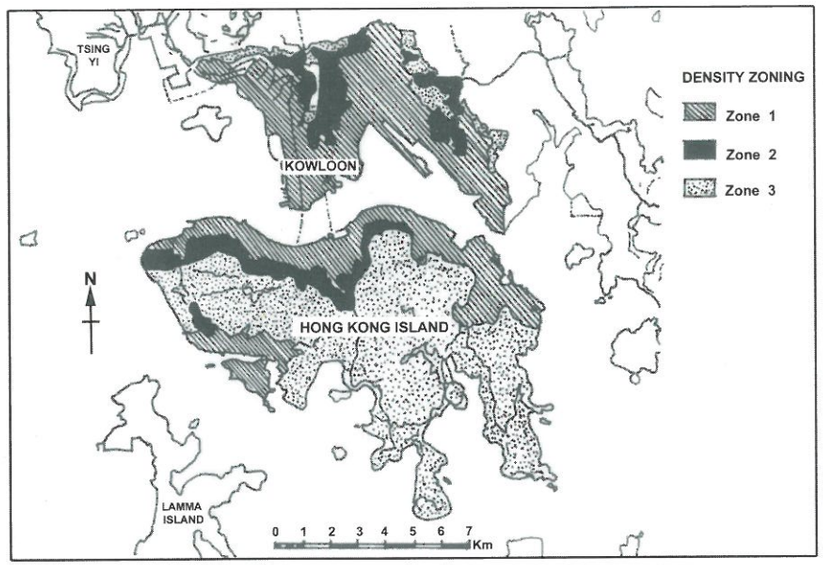


Fig. 3. Density zoning in the Hong Kong Island, Kowloon and New Kowloon.
Source: Planning Department, 1996.

of urban decay and resolve under- or over-utilisation of land. The LDC estimates that over 80 hectares of the urban areas with 46,926 units accommodating 59,235 households merit priority redevelopment (Planning, Environment and Lands Bureau, 1999). In the past decade, the LDC has taken action on 52 urban renewal projects, of which only 15 were completed (Land Development Corporation, 1998). Residential redevelopment was the main component of these 52 projects (Table 2).

Land Use	Area (m^2)	Percentage of Total Area (%)
Residential	1,184,183 (1)	54
Office	521,038	24
Commercial	327,760	15
G/IC Facilities	89,420	4
Open Space	76,640	3
Total	2,199,041	100

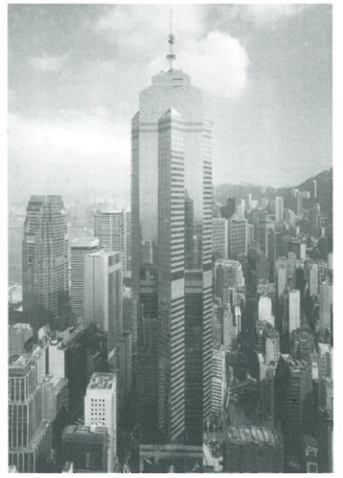
(1) Comprises 20,000 units

Table 2. Land use mix of the 52 redevelopment projects in Hong Kong 1998.
Source: Land Development Corporation, 1998.

However, the LDC has had to face two basic problems. It is extremely difficult to assemble land lots for redevelopment since they are in multiple ownership, and the process of relocating the affected residents and businesses involves very high financial and social costs.

Urban renewal is heavily dependent on the private sector. Due to high costs, redevelopment projects have to be high-rise, with a high plot ratio, in order to make projects financially viable. Old buildings have been demolished and redeveloped into high-rise and high-density buildings (Figs 4 and 5). One of the typical examples is The Center, an 80-storey skyscraper, which was completed in 1998 (Fig. 5). It has only 8,816 square metres of site area, and at the time of construction was Hong Kong's third tallest building. It offers 122,126m^2 gross floor area (GFA) for high-quality office space, 4,798m^2 for commercial space,

3,108m^2 for government, institutional and community (G/IC) facilities, and 5,927m^2 for open space (Land Development Corporation, 1998). Urban renewal intensifies development by increasing the plot ratio through the high-rise built form and it achieves an efficient land use.



Left: *Fig. 4. Sheung Wan: old areas (prior to redevelopment).*
Right: *Fig. 5. Sheung Wan: The Center (after redevelopment).*

High-density development: a sustainable urban form?

Some argue that a compact urban form may cause an intermix of incompatible land uses and conditions of overcrowding and congestion. However, the reason that Hong Kong's high-density living environment has not generated many social conflicts is perhaps explained by the high tolerance of the Chinese to congested conditions (Pun, 1994). The compact urban form of Hong Kong has manifold advantages: the economic use of land through vertical space utilisation; the high accessibility enjoyed by residents and short journeys-to-work; few roads and commercially viable public transport (Tong and Wong, 1997). It is thus a highly convenient and efficient city, since the locations of activities and dwellings are close to each other both horizontally and vertically.

High-density development in Hong Kong allows economies of scale for utilities and transport infrastructure. As more people are accommodated through it, the government's per capita expenditure for infrastructure provision is proportionately lower. It helps to make public transport systems such as the Mass Transit Railway (MTR) more efficient and financially viable because more passengers per km reduce the marginal cost of construction and operation. The more the revenue collected, the better the service and the greater its use.

As developable land is such a scarce resource, and the population increases, there is a continuous increase in demand for sites for development. It does not seem physically and financially feasible to provide land in the New Territories and the islands, which would involve large investments because of the physical constraints in developing these areas. Accommodating more people and buildings in the developed urban areas through high-density urban form helps minimise urban encroachment into the countryside. High density, in this case, prevents urban sprawl that would otherwise threaten the recreational and ecological importance of the country parks and rural areas.

Air quality

There has been growing concern over Hong Kong's deteriorating environment, and it is open to question whether or not this is related to its compact urban form. The nitrogen dioxide (NO_2) level has risen 20% in the 5-year period to 1997. The air quality monitoring results for 1997 (Environmental Protection Department, 1998) indicated that six of the nine air quality monitoring stations did not meet the annual average Hong Kong Air Quality Objective for respirable suspended particulates (RSP). The highest annual level at the street site of Mong Kok was almost 36% above the permissible limit. The concentrations of these pollutants are believed to be associated with higher respiratory illness. Some argue that the high concentrations of these pollutants are mainly due to the surrounding tall buildings. But is this true?

The emission of air pollutants within Hong Kong territory is generated by different sectors: residential, commercial, industrial, transport, and the power industry. It is estimated that transport contributed approximately 65% and 75% of the street level emissions of nitrogen oxides and RSP in 1997, respectively (Environmental Protection Department, 1998). Hong Kong's transport sector is dominated by two sub-sectors: road and rail transport. Rail transport is mainly driven by electricity[5] and therefore emissions by rail transport are part of the power sector emissions. Road transport is at present entirely driven by internal combustion engine vehicles and its general trend of emission is rising for the air pollutants: RSP, oxides of nitrogen (NO_X), and hydrocarbons (HC) (Fig. 6). Diesel vehicle emissions were the major cause of the high RSP concentrations.

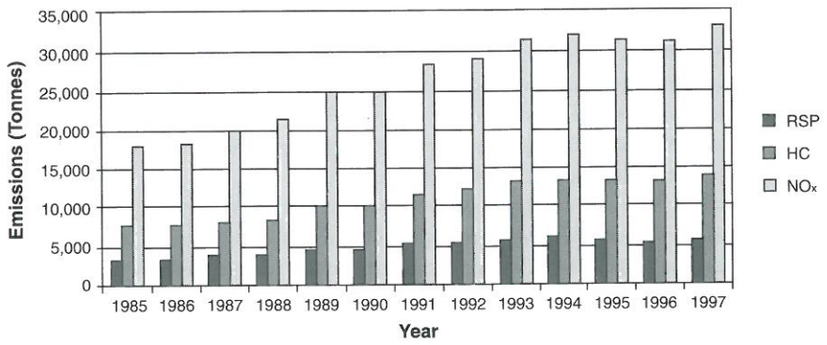


Fig. 6. The major pollutants from the road transport sector.
Source: Barron and Steinbrecher, 1999.

Fig. 7 shows the annual emission level of carbon dioxide (CO_2) in Hong Kong. Although CO_2 does not pose a direct threat to human health, increasing CO_2 emission affects world sustainability as it is one of the greenhouse gases directly contributing to global warming. The overall level of CO_2 emission is now comparatively lower than in the early 1990s. The power sector generates the largest part of CO_2 emission; however, this has fallen from 73.1% in 1990 to 59.4% of the total in 1997. This is mainly due to the partial switching from coal to natural gas for electricity generation. By contrast, the emissions from the transport sector increased from 9.8% in 1990 to 17.5% in 1997.

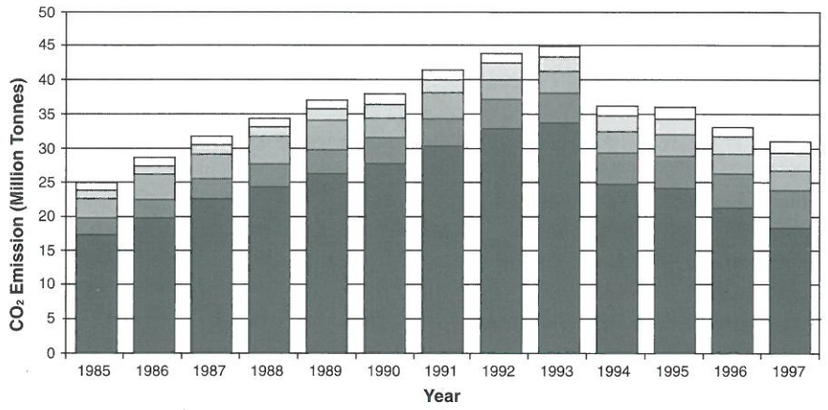


Fig. 7. Total annual emissions of CO_2 in Hong Kong.
Source: Barron and Steinbrecher, 1999.

It is undeniably true that high-rise buildings trap some of the air pollutants produced by the vehicles and the pollutants remain at the street level. However, emphasis should be placed on the sources of these pollutants and the means of reducing them, especially those emitted at the street level. Diesel-fuelled vehicles from the road transport sector produce a large proportion of these pollutants. In Hong Kong, the rail systems are comparatively environmentally friendly since the pollutants are produced from power plants, where it is easier to adopt mitigation measures. The compact urban form favours the use of rail systems because high-density developments ensure passenger flow. Commuters benefit from reliable services that encourage more people to use mass transit. This has resulted in a low dependency on private vehicles because urban form influences transport choices. The following section focuses on two major issues: policies to reduce the physical separation of land uses in both existing urban areas and sub-centres in order to reduce travel needs (polycentric urban growth patterns), and the development of a long-term sustainable transport sector.

The future for Hong Kong's sustainable development

Sustainable development in Hong Kong is targeted to 'balance the social, economic, and environmental needs for the present and future generations to achieve a vibrant economy and better environmental quality locally and internationally' (Hong Kong SAR Government, 1999, p.3). Research on sustainable development for the twenty-first century was commissioned in 1997 with the aim of:

- developing an improved system to incorporate a defined set of sustainability goals into Hong Kong's future developments;
- considering the areas within Hong Kong's sustainability 'footprint'; and
- minimising adverse environmental impacts.

It was argued that urban form, transport, and environmental impacts should be integrated in order to develop a comprehensive planning framework and policies that would achieve an economic–environmental balance.

Improvement of the existing urban areas through redevelopment

The process of redevelopment has been prolonged by the LDC because of difficulties in self-financing, negotiations with property owners, and the shortage of rehousing resources for the affected residents. To overcome these problems, a statutory body, the Urban Renewal Authority (URA) is to be established in 2000 to implement the government's urban renewal strategy in the twenty-first century. The URA will replace the LDC with legal powers, and take over all its assets and liabilities. One of the purposes of the URA will be to achieve better utilisation of land in the old areas and to make land available to meet various development needs. It aims to reduce the lead-time of redevelopment projects and in turn to intensify the urban areas and to maximise the opportunities for improvement to the existing urban areas.

Increasing the level of self-containment of new towns

The Hong Kong Government's decentralisation policy based on new town development has weaknesses. Insufficient job opportunities within the new towns, combined with a lack of rail access to central urban areas, have led to a high dependency on road-based public transport and private automobile use.

Instead of balanced and self-sufficient developments, most of the new towns are housing-led. The mismatch between job availability and housing provision has led to a high travel demand between the new towns and existing urban areas. The Travel Characteristics Survey showed that the percentage of workers who lived and worked in the same area was only 33% for Tuen Mun, and 20% for Sheung Shui and Fanling in 1992, compared to 77% and 67% for the Hong Kong Island and Kowloon respectively[6] (Transport Department, 1993). In 1996, about 50% of the total population lived in the New Territories, but 70% travelled a long distance to their place of work (Census and Statistics Department, 1996).

There is a clear need to diversify land uses and locate mixed-use developments in the new towns in order to create a 'multinucleated' city pattern (concentration decentralisation) with self-sufficiency in terms of job opportunities and supply of basic needs. Decentralising the office and commercial space into the new towns appears one of the workable solutions to reduce commuting trips between urban areas and new towns, and to reduce the pressure on the congested urban areas.

Sustainable transport system

The predominance of public transport

Hong Kong's public transport system is operated both by private operators and by public corporations with a high degree of autonomy. The MTR and the KCR (East Rail), both heavy rail systems, are operated commercially by statutory public bodies. The other transport carriers are operated by private operators, which are driven by market forces. This has resulted in a cost-effective and efficient transport system which is one of the best transport systems in the world. The current system serves around 11 million passengers boarding daily (Transport Department, 1999) and about 90% of the population in Hong Kong depend on public transport. As one of the world's most densely populated cities, Hong Kong faces challenges with rising travel demands which could result in further adverse environmental impacts unless planning policies boost the development of high-capacity and energy-efficient public transport systems.

Shifting the energy base in the transport sector

Reducing negative environmental impacts has given a major direction to the future planning of Hong Kong. The shift from diesel fuel to Liquefied Petroleum Gas (LPG), which produces fewer pollutants, is one of the means used to reduce harmful emissions. Licensed diesel vehicles accounted for only about 30% of the total number of vehicles in Hong Kong in 1996; however, they were responsible for 60% of vehicle kms travelled (VKT) and were the source of a major proportion of the pollutant emissions (Fig. 8).

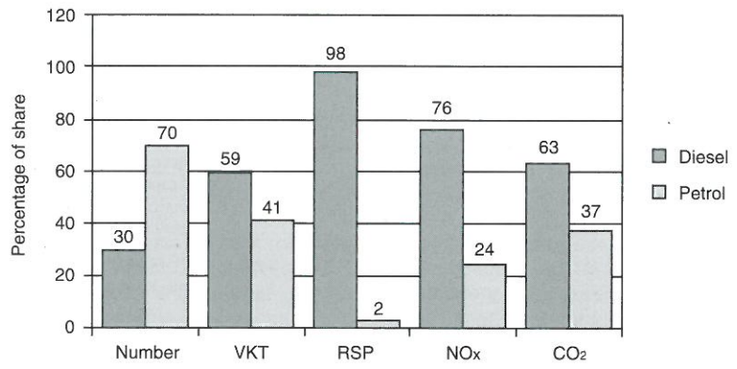


Fig. 8. Comparison of licensed diesel and petrol vehicles of Hong Kong in 1996.
Source: Barron and Steinbrecher, 1999.

Hong Kong's public road transport system at present relies too heavily on diesel-fuelled modes that account for two-thirds of the total, of which 53% are buses and 12% taxis. The Third Comprehensive Transport Study, completed in September 1999, evaluated the environmental benefits and costs of various transport development options in order to identify a comprehensive transport framework which would enhance sustainability in Hong Kong (Transport Department, 1999). Options included the mandatory use of LPG for all new taxis registered from 2001 and possibilities for using alternatively fuelled vehicles such as electric trolley buses.

Higher priority to rail transport

Transportation accounts for 40% of the total energy consumption in Hong Kong (Hung, 1992), and the government has recognised the significant role of railways, specifically of heavy rail systems, amongst all the different transport modes. These can be ranked in a modal hierarchy based on function, efficiency, and carrying capacity, in order to assess how well they serve different types of commuting (Table 3).

Due to their high capacity, low marginal cost, and less polluting service, rail systems are given a high priority in the long-term infrastructure strategy. Heavy rail systems are planned to form the backbone of Hong Kong's passenger transport network since they provide fast, reliable services to commuters, are comparatively friendly to the environment, and at the same time reduce the pressure on roads. The rail network also helps in locating strategic developments along the rail corridors, which will reduce road-based transport. The rail network will be expanded by 40% from 143 kilometres to 200 kilometres over the next five years. There is already extensive planning of the rail network to meet Hong Kong's needs up to 2016. By that time, it is expected that 40 to 50% of all public transport journeys will be made on the railway system compared to 33% now. Five rail projects are expected to be completed between 2002 and 2004, at an approximate cost of HK$ 100 billion (Transport Bureau, 1999).

Mode [1]	Capacity	Usage[2]	% of Total[3]	Costs to Build[4]	Costs to Operate	Flexibility	Use in Hierarchy
Heavy Rail MTR/KCR	Very High	2,923,000	27.18	Very High	Low	Low	Provides major trunk services in corridors with very high demand.
Light Rail (LRT)	High	314,000	2.92	High	Low	Low	Provides trunk services in high demand corridors. May feed heavy rail or ferry.
Bus	Medium	3,912,000	36.38	Low	Medium	High	Provides trunk services in medium demand corridors. May feed heavy rail, light rail or ferry.
Minibus	Low	1,755,000	16.32	Low	High	Very High	Provides services in low demand corridors. May feed heavy rail, light rail or ferry.
Tram	Low	255,000	2.37	Medium	Medium	Low	Provides services for short trips where the low speed is unimportant and the low fare is a major advantage. May feed heavy rail.
Taxi	Low	1,307,000	12.15	Low	Very High	Very High	Provides specialised personal door-to-door services.
Ferry	Medium	171,000	1.59	Low	High	Low	Provides essential services for the outlying islands and supplements other modes in the inner harbour.

Notes:
(1) Non-franchised buses (residential coaches) and the Peak Tram are excluded from the table because of their varying service characteristics.
(2) Average daily boarding in 1998.
(3) The percentage of average daily passenger journeys by each mode of public transport journeys. The figure of total daily passenger journeys (10.754 million) includes the Peak Tram and non-franchised buses.
(4) Costs to build are for new systems; those for existing systems should be considered as sunk.

Table 3. Hierarchy of Hong Kong's public transport modes.
Source: Modified from Transport Department, 1999.

Pedestrianisation

Pedestrianisation can help reduce the number of short motorised trips and the pollutant emissions; however, very few people travel on foot because of the unfriendly walking environment and the busy roads. Consideration is being given to a system of grade-separated walkways to encourage walking for short-distance trips, providing direct access to buildings and transport interchanges. High-density urban forms help fulfil the prerequisite of the provision of pedestrian links, since compact developments reduce the distance between different activities. For example, an escalator and walkway system was constructed in 1993 to link the central business district (Central) and residential areas (Mid-Levels). It is 800 metres in length and rises 135 metres. This system was used by an average of 34,000 people daily in 1997 (Hong Kong SAR Government, 1998) and it has helped to reduce commuting trips by vehicles.

Conclusion

Sustainability and urban form are closely connected in a way that fits the local context. Hong Kong's inherent compact city form supports the current belief in the need to reduce the physical separation of activities. Its high-density mixed-use urban form favours public transport, particularly for less-polluting rail systems. The transit-oriented developments contribute to public transport patronage, which

benefits commuters.

Most of the large cities in Asia have experienced the problems of unplanned population growth spreading into suburban areas which then expand outwards, leading to long commuting times, serious traffic congestion, and environmental deterioration. Hong Kong faces challenges to improve its environmental sustainability for its increasing population. In order to accommodate this increasing population and related activities, a concentration/decentralisation strategy is being adopted, to create balanced and self-sufficient sub-centres (multinucleated pattern), linked by energy-efficient and economically viable mass transit systems.

Notes

1. Land lease varied from different periods of time – 999, 99 and 75 years prior to the handover to China. New leases of land are granted for a term of 50 years from the date of grant, at a premium. Government land is usually sold by public auction. Sale by public tender is adopted when the user is strictly defined and the sale is unlikely to attract interests such as petrol filling stations.
2. Land premium income has been split between the Hong Kong Government and the Hong Kong Special Administration Region (HKSAR) Government. The HKSAR Government Land Fund Trust was established on 13 August 1986 to manage the HKSAR's share of revenue obtained from land sales during the period from the entry into force of the Joint Declaration (27 May 1985) until the establishment of the HKSAR. On 1 July 1997, the assets of the Land Fund Trust were vested in the HKSAR Government. When the Land Fund was first established, it had a value of net assets of US$ 99 million (HK$ 772 million). As at 31 December 1997, the total assets of the Land Fund stood at US$ 25 billion (HK$ 196 billion). The Chief Executive of the HKSAR appointed the Financial Secretary as the public officer to receive, hold and manage the fund, as part of the HKSAR Government reserves.
3. Services sectors cover three main groups: (1) wholesale, retail and import and export trades, restaurants and hotels; (2) financing, insurance, real estate and business services; and (3) community, social and personal services.
4. 'Plot ratio is defined as the ratio between the gross floor area [GFA as defined under Building (Planning) Regulations – B(P)R] of a building and the area of the site on which it is erected [the Net Site Area]. Plot ratio controls govern the amount of GFA in buildings but affect population density only indirectly due to the interplay of other factors like, flat size and person per flat ratio' (Hong Kong Planning Department, 1992). A plot ratio of 3 means that the GFA of a residential building is three times the Net Site Area.
5. In Hong Kong, all passenger rails are electrified, while a small level of freight rail is diesel-based.
6. The Travel Characteristics Survey was commissioned by the Transport Department of Hong Kong to study the travel characteristics and establish a database for transport planning in 1992. The study applied a stratified sampling approach for the detailed survey of a 2% sample of total households in Hong Kong, approximately 31,640 households for March 1991, when the total number of households was 1,582,000.

References

Barron, W. and Steinbrecher, N. (eds) (1999) *Heading Towards Sustainability? Practical Indicators of Environmental Sustainability for Hong Kong*, The University of Hong Kong, Hong Kong SAR.

Breheny, M. (ed.) (1992) *Sustainable Development and Urban Form*, Pion, London.

Breheny, M. (1996) Centrists, decentrists and compromisers: views on the future of urban form, in *The Compact City: A Sustainable Urban Form?* (eds M. Jenks, E. Burton and K. Williams), E & FN Spon, London.

Bristow, M. R. (1989) *Hong Kong's New Towns: A Selective Review*, Oxford University Press, Hong Kong.

Burton, E., Williams, K., and Jenks, M. (1996) The compact city and urban sustainability: conflicts and complexities, in *The Compact City: A Sustainable Urban Form?* (eds M. Jenks, E. Burton

and K. Williams), E & FN Spon, London.
Census and Statistics Department (1991) *Hong Kong Annual Digest of Statistics*, Hong Kong Government, Hong Kong SAR.
Census and Statistics Department (1996) *Hong Kong By-Census 96*, Hong Kong Government, Hong Kong.
Census and Statistics Department (1999) *Hong Kong Annual Digest of Statistics*, Hong Kong SAR Government, Hong Kong.
Environmental Protection Department (1998) *Air Quality in Hong Kong 1997 – Results from the Air Quality Monitoring Network*, Hong Kong SAR Government, Hong Kong SAR.
Friedmann, J. (1988) Life space and economic space: contradictions in regional development, *Life Space and Economic Space: Essays in Third World Planning*, Transactions Books, Oxford.
Gilchriest, S. (1994) Planning for high density in Hong Kong, in *High Urban Densities: A Solution for Our Cities?* (eds V. Fouchier and O. Merlin), Consulate General of France in Hong Kong, Hong Kong.
Hong Kong Government (1996) *Hong Kong Year Book*, Hong Kong Government, Hong Kong.
Hong Kong Planning Department (1992) *Hong Kong Planning Standards and Guidelines*, Planning Department, Hong Kong Government, Government Printer, Hong Kong.
Hong Kong SAR Government (1998) *Hong Kong: A New Era*, Hong Kong SAR Government, Hong Kong SAR.
Hong Kong SAR Government (1999) *Sustainable Development in Hong Kong for the 21st Century: Second Stage Consultation Document*, Hong Kong SAR Government, Hong Kong SAR.
Howard, E. (1898) *To-morrow: A Peaceful Path to Real Reform*, Swan Sonnenschein, London.
Hung, W. T. (1992) *Transport Energy Policy and Consumption Trends in Hong Kong*, The Centre of Urban Planning and Environmental Management, The University of Hong Kong, Hong Kong.
Land Development Corporation (1998) *10 Years of Urban Renewal*, Land Development Corporation, Hong Kong SAR.
Montgomery, J. (1998) Making a city: urbanity, vitality and urban design, *Journal of Urban Design*, **3(1)**, pp.93–117.
Newman, P. W. G. (1992) The compact city: an Australian perspective, *Built Environment*, **18(4)**, pp.285–300.
Newman, P. W. G. and Kenworthy, J. R. (1989) *Cities and Automobile Dependence: A Sourcebook*, Gower Publishing Company Limited, England.
Ng, M. K. and Cook, A. (1996) *Are There Feasible Alternatives to the Reclamation-led Urban Development Strategy in Hong Kong?*, Occasional Paper No. 12, Centre of Urban Planning and Environmental Management, The University of Hong Kong, Hong Kong.
Planning Department (1996) *Hong Kong Planning Standards and Guidelines*, Hong Kong Government, Hong Kong.
Planning, Environment and Lands Bureau (1999) *Urban Renewal in Hong Kong*, Hong Kong SAR Government, Hong Kong SAR.
Pun, K. S. (1994) Advantages and disadvantages of high-density urban development, in *High Urban Densities: A Solution for Our Cities?* (eds V. Fouchier and O. Merlin), Consulate General of France in Hong Kong, Hong Kong.
Robertson, J. (1990) Alternative futures for cities, in *The Living City: Towards a Sustainable Future* (eds D. Cadman and G. Payne), Routledge, London.
Territorial Development Department (1994) *20 Years of New Town Development*, Hong Kong Government, Hong Kong.
Tong, C. O. and Wong, S. C. (1997) The advantages of a high density, mixed land use, linear urban development, *Transportation*, **24**, pp.295–307.
Transport Bureau (1999) *Hong Kong Moving Ahead: A Transport Strategy for the Future*, Hong Kong SAR Government, Hong Kong SAR.
Transport Department (1993) *Travel Characteristics Survey*, Territory Transport Planning Division, Hong Kong Government, Hong Kong.
Transport Department (1999) *Third Comprehensive Transport Study: Final Report*, Hong Kong SAR Government, Hong Kong SAR.
Wegener, M. (1995) The changing urban hierarchy in Europe, in *Cities in Competition: Productive and Sustainable Cities for the 21st Century* (eds J. Brotchie, M. Batty, E. Blakely, P. Hall and P. Newton), Longman Australia Pty Ltd, Melbourne, Australia.
WorldSat International Inc. (1997) *The Cartographic Satellite Atlas of the World*, Warwick Publishing Inc., Toronto and Los Angeles.