GEOACTIVE 537

Urban issues and management in Singapore

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A case study about the management of the densely populated and urbanised city-nation of Singapore

This case study looks at the generally successful small state of Singapore in Southeast Asia. Since its independence in 1965, it has managed its resources carefully, and with successful planning has enabled its people to enjoy strong economic growth and social stability. The economy depends heavily on exports and refining imported goods, especially in manufacturing. At the same time, the land is carefully safeguarded to support continued sustainable economic progress and future development.

This case study covers:

- transport issues: road and rail
- urban planning and land reclamation
- issues of immigration, waste and water.

Key vocabulary

sustainability, congestion pricing, park-and-ride, mass rapid transit, land reclamation

Learning outcome

At the end of this case study, you will have learned about the issues involved in managing a small urbanised city-nation.

Relevance to specifications

AQA A	Unit 2: Human Geography, Section A, Changing Urban Environments, page 17 http://filestore.aqa.org.uk/subjects/AQA-9030-W-SP-14.PDF
AQA B	Unit 3: The Human Environment, Section A, the Human World, the Urban Environment, pages 10–12 http://filestore.aqa.org.uk/subjects/AQA-9035-W-SP-14.PDF
Edexcel A	Unit 3: Geographical Skills and Challenges, Section B, Challenges for the Planet, Topic 2, Settlement Change, page 32 http://www.edexcel.com/migrationdocuments/GCSE%20New%20GCSE/9781446911907_GCSE_Lin_Geog_A_Issue_5.pdf
Edexcel B	Unit 2: People and the Planet, Section C, Large-scale People and the Planet, Topic 7, the Challenges of an Urban World, page 29 http://www.edexcel.com/migrationdocuments/GCSE%20New%20GCSE/9781446911914_GCSE_Lin_Geog_B_Issue_5.pdf
OCR A	Unit A731: Contemporary Themes in Geography, Similarities and Differences in Settlements and Population, pages 20–22 http://www.ocr.org.uk/Images/82576-specification.pdf
OCR B	Unit B563: Key Geographical Themes, Theme 2, Population and Settlement, pages 14–15 http://www.ocr.org.uk/Images/82581-specification.pdf
WJEC B	Unit 2: Development and Problem Solving Geography, Theme 1, Challenges of Living in a Built Environment, pages 14–15 http://www.wjec.co.uk/uploads/publications/17213.pdf
CCEA	Unit 2, Living in our World, Theme A: People and Where They Live, pages 17–18; a copy of the specification can be downloaded from: http://www.rewardinglearning.org.uk/microsites/geography/gcse/index.asp
Cambridge IGCSE	Theme 1, Population and Settlement, page 12 http://www.cie.org.uk/images/128378-2015-syllabus.pdf
Edexcel International GCSE	Section D, Global issues, Topic 9, Development and human welfare, page 18 http://www.edexcel.com/migrationdocuments/International%20GCSE%20from%202011/UG030050-International-GCSE-in-Geography-master-booklet-spec-SAMs-for-web-220212.pdf

Urban issues and management in Singapore

Introduction

What is Singapore – is it a city or a state? Singapore is at the southern end of the Malay peninsula (Figures 1 and 2). It used to be a British colony. In 1963 it became part of the Malaysian federation and then became an independent state in 1965. Today it is one of the few city-nations in the world with its own government. It is a collection of 63 islands spread over an area of 704 km^2. This area has increased in recent decades through land reclamation, which has included joining up some of the smaller islands. (At this stage you should complete Activity 1 and complete the fact file on Singapore. It is also useful to make comparisons with the UK.)

Singapore has made immense strides in terms of economic, educational and industrial growth in a comparatively short span of time and it is now, measured by GDP per capita, the fourth richest nation in the world. It is also the world's fourth-leading financial centre, and its port is one of the five busiest in the world. The economy depends heavily on exports and refining imported goods, especially in manufacturing. Its people have a good quality of life and severe poverty is rare. The country has the third highest per capita income in the world and the world's highest percentage of millionaires.

Singapore is a very urbanised country and very little primary rainforest remains (Figure 3). It has a high population density, limited space and a generally affluent population with high aspirations. Economic growth has also been rapid. This has created a number of issues and problems, all of which require careful management. Sustainability is an important theme in this unit – meeting the needs of the present population without compromising the needs of future residents and visitors to Singapore.

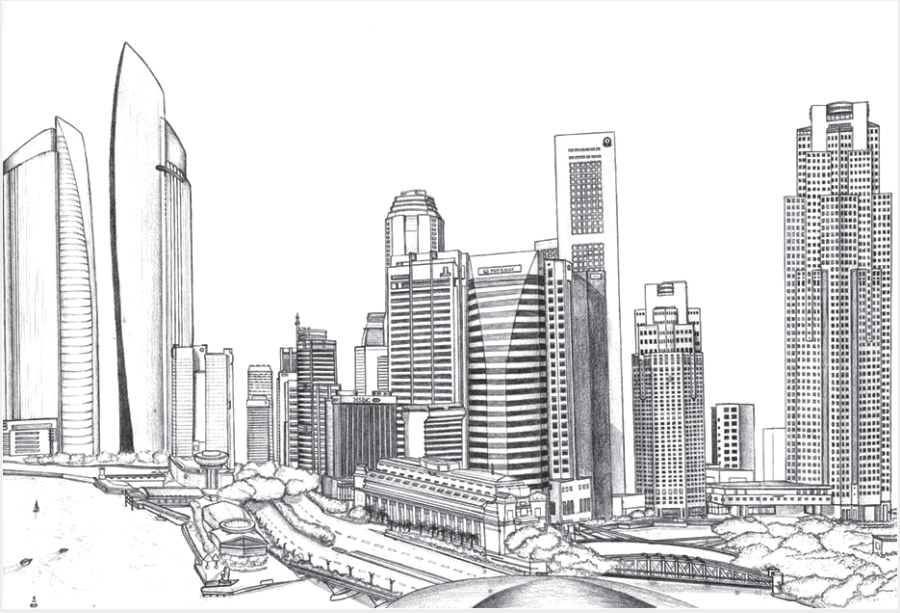

Figure 1 Singapore skyline

Source: Brendan Yang

Transport

Ease of movement is vital to any city. Singapore is a small country by area and has a high population density. We have seen that it is also a wealthy nation, and demands for travel have increased. Aspirations for car ownership are exceptionally high. Air pollution was once severe, and congestion has also been an

Figure 2 Location of Singapore in South East Asia

Figure 3 Singapore city-nation

issue. In recent years Singapore has hit the headlines due to exceptionally high levels of air pollution there – but much of this has come from the burning of forests in Indonesia.

Land is scarce in Singapore and it is not possible to continue building roads to serve the rising car ownership. Singapore has had to provide its people with high-quality, sustainable transport alternatives that offer convenience, speed, reliability and comfort.

Singapore's Area Licensing System

The Area Licensing System (ALS) was introduced in 1975 and was the first urban traffic congestion pricing system to be successfully implemented in the world. The scheme covered all roads entering a 6 km^2 area of the CBD – this was later increased to 7.25 km^2. Thirty-four overhead gantries were set up and these were monitored by auxiliary police officers. Drivers had to purchase a paper licence, which could be bought for example from post offices, convenience stores and petrol stations at a cost of S$3 a day. The licence had to be displayed on a vehicle, usually on the windscreen. In 1998 the scheme was replaced by the ERP (electronic road pricing) system which charges all vehicles (except for emergency vehicles) and means that vehicles can pass the gantries at normal traffic speeds. With the ERP, traffic levels have decreased even further, leading to a reduction of 176 tonnes of carbon dioxide per year.

In 1995, congestion pricing was also introduced in urban segments of three major expressways, starting with the East Coast Parkway (ECP). In the early years, passenger cars with four occupants, taxis, buses and public service vehicles were allowed into the zone free. Carpool vehicles were exempted too. This has gradually been changed, partly due to the volume of traffic but also due to abuse of the system. Exemptions for carpools, for example, were abolished because many private cars were picking up bus commuters just to avoid the charge! Part of the scheme involves heavy fines for those who break the rules and can include short prison sentences or embarrassing community service.

The ALS has been successful in controlling congestion now for over 20 years. After its introduction, the motor vehicle growth rate fell and the number of vehicles entering the restricted zone also fell.

Public transport and park-and-ride

It is not enough to only have restrictions on traffic. Alternatives need to be provided and Singapore has invested heavily in a diverse public transport system. Part of this included a park-and-ride scheme introduced in 1975, which was aimed at controlling the traffic flow in the CBD area. Motorists had to park their vehicles at 13 designated car parks outside the city area. They then had the option to take public transport into the city, which was mostly located near the car parks. However, the park-and-ride scheme was initially not very popular or successful. About 600 parking lots were used out of 7700 created; most people would enter the CBD area early or just take public transport. Most drivers found it not worthwhile to leave their vehicle parked outside the city and pay for the parking fees. The scheme has been fine-tuned and is still in operation but is now more closely linked to bus interchanges and the rapid transit system.

There are also boats and ferries to nearby islands of Malaysia and Indonesia.

Rapid transit and underground systems

Singapore's mass rapid transit (MRT) system is known as one of the most efficient and cleanest in the world (Figure 4). The initial section of the MRT, between Yio Chu Kang Station and Toa Payoh Station, opened in 1987, establishing itself as the second-oldest metro system in Southeast Asia. The network has since grown rapidly as a result of Singapore's aim of developing a comprehensive rail network as the main backbone of the public transport system. It

Figure 4 High-rise housing and part of the rapid transit system in Singapore
Source: Andres Lam; www.shutterstock.com

uses safe, modern, air-conditioned trains and is inexpensive.

The Singapore government is considering a proposal to build a massive network of underground tunnels that will connect the huge new port that is currently under construction in the western Tuas industrial zone, to sites throughout Singapore in order to help rapid movement of goods without adding to the city-nation's traffic.

Taxis

Taxis are available 24 hours a day and provide reasonably priced travel throughout the city. Singapore has more than 15 000 taxis, which can be flagged down or picked up from designated taxi stands located throughout the city. Taxis are clean, modern cars and all have air-conditioning.

Trishaws

This three-wheeled traditional form of chauffeur-pedalled transportation is a fun and exciting way to tour the streets of Singapore.

Trolley buses

The Singapore trolley bus provides a hop-on/hop-off service. It is a good option for exploring the cultural, entertainment and shopping areas of the city. The trolley bus is ideal for shopping during the day and pub hopping at night. In fact, the fare includes interesting discounts at the nightspots and some other local venues.

Urban planning and land reclamation

The Urban Redevelopment Authority (URA) is Singapore's national land use planning agency. It prepares long-term plans for development and more detailed local area plans. It then coordinates and guides these plans to reality.

In a state where land is scarce, the goal of urban planners is to maximise the use of land efficiently yet comfortably. Infrastructure (like roads and railways), environmental conservation, space for water catchment, housing and military use are all considerations for the planners. It is also important that as many people as possible are served for particular functions like housing or commerce, with exceptions for conservation efforts for heritage or nature. This has often involved high-rise and high-density buildings (see Figure 4). One pleasant side-effect is that many residents and workers have attractive views. Allocating primary functions in concentrated areas prevents land wastage.

The main approach to urban planning at present is to create partially self-sufficient towns and districts that are then served by four regional centres (serving the four regions of Singapore in addition to the central area). Each town or district has a variety of facilities, like shopping centres, while further facilities are available at the regional centres. This is all to reduce traffic and to take pressure from overcrowding, especially in the central area.

Land reclamation has also been an important part of Singapore's planning. Singapore has grown by at least 100 km^2 from the size it was before 1819, when it was founded.

Immigration

Immigration has become a major issue in Singapore. Faced with an ageing population and low fertility, Singapore's government has long encouraged foreigners to fill gaps in the workforce (Figure 5). In 1990, 86% of Singapore's 3 million people had been born there. Today, that share is 64% of about 5 million residents. More than one in three people are foreigners (permanent

Year	Total labour force	No. of foreign workers	% of total labour force
1970	650 892	20 828	3.2
1980	1 077 090	119 483	7.4
1990	1 537 000	248 200	16.1
2000	2 192 300	615 700	28.1
2010	3 135 900	1 088 600	34.7

Figure 5 Foreign workers in Singapore, 1970–2010
Sources: For 1970 and 1980: compiled from M. M. Rahman 'The Asian Economic Crisis and Bangladeshi Workers In Singapore', Working Paper No. 147 (1999), Singapore Dept of Sociology, National University of Singapore; for 1990: Singapore Dept of Statistics, 2001:43; for 2000 and 2010: Singapore Dept of Statistics, 2011:48

residents, known as PRs, and non-residents).

In the past, immigrants were concentrated at the top or bottom of the jobs ladder, performing work that Singaporeans could not or did not want to do. Today, foreigners compete on almost every level, and many bring in useful skills.

However, many fear that immigrants displace local skills, depress wages at the bottom end of the scale, and take housing and jobs away from Singaporeans. High immigration has also coincided with a widening income gap.

The Prime Minister has recently said that steps will be taken to defuse the pressure and slow down the intake of migrants while accentuating the privileges of citizenship. The government has also put S$10 million (US$7 million) into the new National Integration Council (NIC), which will try to promote interactions between different groups. The government has admitted that this will not be easy and it may take years before the benefits really show. Chung Wai-Keung of the Singapore Management University has argued that many Singaporeans are more concerned about their jobs and incomes than about more vague notions of integration.

Waste

Between 1970 and 2000 waste production in Singapore rose six-fold and Singapore continues to face the challenge of handling waste. Integrated planning aiming for zero waste and zero landfill are now turning the tide.

In the past three decades Singapore has set up an integrated solid waste management system that incorporates recycling, collection and disposal. Working with key groups in the private and government sectors and with the general public, Singapore's National Environment Agency (NEA) has developed a range of strategies and programmes to achieve its objectives for reducing waste and supporting sustainable waste management.

Starting at the top of the 'waste hierarchy', a key target has been to reduce waste production. About half the waste disposed of in Singapore comes from the industrial and commercial sectors. The main portion of Singapore's non-combustible waste comes from construction waste, stabilised industrial sludge and used copper slag from the marine industries, residues and ashes. Over the years, much of these have been diverted for reprocessing.

At the same time, the country has also adopted specific measures to minimise waste generation, such as the careful selection of design and construction methods. Companies also have to pay for the collection and disposal of their waste. This approach, coupled with encouragement by the NEA, has helped to motivate the industrial and commercial sectors to recycle wastes such as metals, construction and demolition waste, plastic and some types of food waste.

The second strategy the NEA adopted is to promote waste recycling in households as well as the industrial and commercial sectors. In April 2001, the NEA launched the National Recycling Programme (NRP) to provide a convenient means for residents of public and private housing estates to recycle. Under the NRP, recycling bags or bins are distributed to each household for residents to store their recyclables. The recyclables are collected once every two weeks by the appointed recycling companies.

Furthermore, almost 6000 public recycling bins have been placed at locations with high human traffic.

Singapore has four waste-to-energy refuse incineration plants and an offshore sanitary landfill for the disposal of non-combustible waste. Incineration reduces waste volume by 90% and only the ash remaining after incineration and the non-combustible waste, which constitutes 10% of waste disposed, is sent to Singapore's only landfill, at Semakau. The incineration plants are fitted with advanced pollution control equipment. Heat from combustion is used to generate steam in boilers which drives turbines to produce electricity. Although incineration offers the advantage of high waste volume reduction and helps to conserve landfill space, it is by itself not adequate if more waste is generated each year. This would then mean additional demand to build more incineration plants and landfills.

The Semakau landfill is lined with an impermeable membrane. Any leaching chemicals are treated and painstaking efforts have been made to protect the island's ecosystem and preserve its rich natural environment and biodiversity.

By adopting its waste strategies, Singapore has seen an increase in recycling rates and waste growth has also been reduced. As a result, the lifespan of Semakau landfill has increased while the need for additional incineration plants has been reduced from one in every 5–7 years to one in every 7–10 years.

Water

The irony of living on an island city-state in the tropics is that although Singapore is surrounded by the sea and has plenty of rainfall, water is a scarce resource due to the lack of space in Singapore to store water. In the last few decades, Singapore has overcome this vulnerability and turned it into a strength by

diversifying its water sources and conserving water.

Conclusion

The factors described above are not the only urban issues facing Singapore – you might like to carry out some further research, looking for example at its food supply, or the urban microclimate.

More than 60% of the world's population will live in cities by 2030, according to the United Nation's 'World Urbanisation Prospects'. The issues this shift brings, from spatial constraints to water scarcity and environmental degradation, make urban development and planning one of the great challenges of the 21st century.

Careful planning has enabled Singapore to enjoy strong economic growth and social stability. It also ensures that sufficient land is safeguarded to support continued economic progress and future development.

Activities

1 Complete a copy of Figure 2 using an atlas. Name the countries and oceans (first letter provided) and the lines of latitude.

2 Use the CIA's World Fact Database (www.cia.gov/library/publications/the-world-factbook/) or www.thebtr.com/pages/world_map.htm to complete a large copy of the table below.

SINGAPORE FACT FILE		
Facts	**Singapore**	**UK**
Area (km^2)		
Population total		
Population density		
GDP		
Life expectancy		
Literacy		

3 a Explain in your own words the meaning of the term *sustainability*.

b What aspects of Singapore's growth are not sustainable, or are less sustainable?

4 a Prepare a table with the three headings: Environmental, Economic, Social. Complete your table listing the damaging effects of traffic in cities.

b Explain how two of the strategies to manage traffic in Singapore are sustainable.

(You could do this activity again, for another issue like waste management.)

5 a Use the data in Figure 5 to plot a line graph showing the total labour force and the number of foreign workers. Use different colours for each line. Label each axis.

b Describe and explain the trends between 1970 and 2010.

6 Create a poster summarising the different approaches to managing issues in Singapore in a more sustainable way. You could structure your poster like a spider diagram, using suitable illustrations found on the internet.

Learning checkpoint

- The densely populated, urbanised city-nation of Singapore requires careful management.
- Management includes the movement of people and goods (transport), urban planning and land reclamation.
- Issues of water and waste management will continue with the city's development.

Remember this case study

To help you remember this case study, make notes under the following headings:

Management: transport, planning, land reclamation

Problems: waste and water

Is development sustainable?

Try to make your notes fit a single sheet of A4.

Glossary task

Write glossary definitions for these terms:

congestion pricing **park-and-ride**

land reclamation **sustainability**

mass rapid transit