

## Strategies for developing more sustainable cities

There is no 'one scheme fits all' approach towards achieving sustainability because the challenges faced by individual cities are diverse and depend on their population size, economic status, technological capacities and development priorities. However, some of the key strategies are summarised below:

- **Investment in infrastructure such as roads, water, sewers and electricity and services such as schools and healthcare:** Curitiba's credentials as a sustainable city are well documented. Its integrated bus system is just one part of the Curitiba Master Plan introduced in the 1970s. An extensive network of dedicated bus lanes provides a service comparable to underground or subway systems but at a cost estimated to be about 200 times less. The associated reduction in traffic has led to a significant reduction in carbon emissions.
- **Green investment in low-income countries can help poorer cities 'leapfrog' from high-carbon energy use to a zero-carbon development path:** This could provide employment for the 'youth bulge' within these cities.
- **Investment in the production and use of renewable energy sources as well as the renovation of infrastructure, retrofitting of buildings and improved electricity and water efficiency:** In the city of Freiburg in Germany, solar investment subsidies are given to residents installing solar panels and 'plus energy' homes have been constructed which create more energy than they consume. Low-energy construction standards have also been introduced in a bid to reduce CO<sub>2</sub> emissions by 40 per cent by 2030.
- **Investment in the reduction of waste production and improvement of waste collection and recycling:** The 'Garbage that is not garbage' scheme in Curitiba promotes recycling through the separate collection of different waste components, while the 'Garbage purchase' programme encourages residents in the favelas to sell their rubbish back to the city in exchange for food, bus tokens and

football match tickets. The scheme has helped clean up densely populated areas that the rubbish vans cannot reach.

- **Provision of more 'green' areas:** The British environmental charity Groundwork published a report in 2012 entitled 'Grey places need green spaces' in which they outlined the benefits of green spaces in cities. These include greater public health, better personal well-being and economic prospects and reduced violence and aggression.
- **Investment in more sustainable and affordable housing:** Low carbon housing developments include the experimental BEDZED development and Greenwich Millennium Village in London. Environmentally sustainable, recycled and local materials were used in their construction and the accommodation comprises a mix of social housing and private units.
- **Adoption of a local currency:** Local currencies such as the Bristol Pound serve the needs of local people because they keep money within the local economy. Research by the New Economics Foundation has found that for every local currency pound spent in a local business, £1.73 is generated through the multiplier effect. In contrast, for every pound spent in a chain store, only 35 pence is re-spent in the local economy. Local currency can also encourage a sense of community and can include a mechanism to generate donations for local schools and social services.
- **Active participation of different city stakeholders including government, residents and local businesses in urban planning.**
- **Disaster risk reduction:** Schemes such as tidal barrages and early warning systems can help mitigate the impacts of floods, storm surges and other hazards to which some cities are vulnerable.

Finally, it has been argued that greater investment in rural areas is important to reduce the rural – urban migration that has put increasing pressure on cities in the last few decades.

## Case study of an urban area: London



Figure 9.63 London's skyline

London is the capital and most populous city of the UK. In 2015, the Greater London Authority reported that the population had topped 8.6 million. This figure is expected to reach 11 million by 2050. London has a history stretching back to Roman times when it was named Londinium. From then it developed as a port around the navigable River Thames and eventually became the seat of political power and government. It has been suggested that London currently holds the role as the most important world city. This is due to a number of factors:

- Economically, London is a global financial centre with a growing reputation as a technological hub and top rankings for software and multimedia development. Its reputation as an economic powerhouse means that it is particularly successful in attracting direct foreign investment.
- London performs very well globally in terms of the number of people in higher education, the quality of universities and access to libraries.
- More than 300 languages are spoken by the people of London, and the city has at least 50 non-indigenous communities with populations of 10,000 or more. Virtually every race, nation, culture and religion in the world can claim at least a handful of Londoners.
- According to the World Cities Culture Forum, London is seen as one of the most cosmopolitan and tolerant cities in the world, attracting a large diversity of people – from activists to business leaders, intellectuals to fashionistas. The city is also a major centre for art forms including music and dance, while its leading museums and galleries are among the most visited in the world.
- London is one of the most visited cities in the world due to a combination of history, heritage, art and culture.

- The hosting of the 2012 Olympic Games further raised the profile of London as a world city and led to the huge redevelopment of formerly run-down areas.

### Cultural diversity in London

London is often referred to as 'the world under one roof' because of its multicultural population. Its function as a port has resulted in a long history of immigration and this has led to a rich ethnic and cultural diversity. Many see the arrival of hundreds of West Indian men aboard the *Empire Windrush* in 1948 as the start of mass immigration into the UK. Many of these men were answering adverts offering employment and intended only to stay a few years. In fact, the people of the *Windrush* and subsequent immigrant groups have played a vital role in creating a new concept of what it means to be a Londoner.

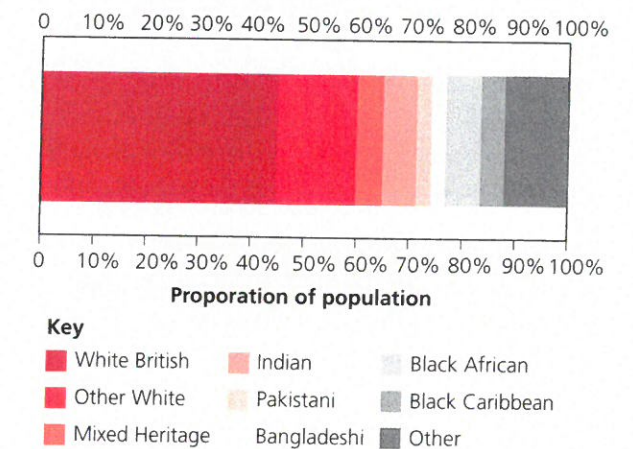


Figure 9.64 Ethnicity in London, 2011

In 2015, just over 3.8 million of London's residents (44 per cent) were of a black and minority ethnicity origin. This is expected to increase to 50 per cent by 2038. In spite of some instances of hostility towards immigrant groups, London is regarded as a welcoming city and residents generally recognise the positive social and economic contributions immigrants make to life in the capital.

### Economic and social well-being

In spite of its status as an international financial centre, London has huge areas of poverty and the gap between rich and poor continues to widen.

In 2015, the London Fairness Commission reported that for every £1 of wealth owned by the bottom 10 per cent of London households, the top 10 per cent own £172.

Inability to get on to housing ladder (ever) due to low income and inflated London house prices

Long commutes on buses because of inability to afford the tube fare

Jobs, sometimes paying below the minimum wage

Multimillion pound houses

Fine dining and theatre experiences

Holidays abroad

Well-paid jobs with six-figure bonuses for some

Use of private schools and hospitals

Fear of crime and gang violence

Lack of leisure time due to holding down more than one job to make ends meet

Overcrowded high-rise flats

Large proportion of monthly income spent on renting low-cost accommodation a long distance from work



Figure 9.65 A city of two halves

**Key points from London's Poverty Profile, 2013**

- Incomes in London are more unequal than in any other region, with 16 per cent of the population in the poorest tenth nationally and 17 per cent in the richest tenth.
- The richest 10 per cent by financial asset wealth have 60 per cent of all assets. The richest 10 per cent of households by property wealth have 45 per cent of that wealth.
- The top tenth of employees in London earn around four-and-a-half times as much as the bottom tenth. This ratio is an increase over the last decade and higher than any other English region.
- Among London's boroughs, Kensington and Chelsea has the greatest imbalance between high and low earners. The top quarter earn at least £41 per hour, three-and-a-half times the level of the lowest quarter at £12 per hour or less, which is in turn higher than the lowest quarter for England as a whole.

**Skills focus**

To see how these figures have changed over time and how different boroughs compare, go to [www.londonpovertyprofile.org.uk/key-facts/](http://www.londonpovertyprofile.org.uk/key-facts/) It is also worth looking at the 2015 Index of Multiple Deprivation data for London which measures relative deprivation. This can be viewed at <http://maps.cdrc.ac.uk/>.

Inequality impacts on everyday life. Compare the map showing average incomes in Figure 9.66 with life expectancy in Figure 9.67. The figure varies by about 5 years between the extremes. The difference between Hackney and the West End is the same as the difference between England and Guatemala.

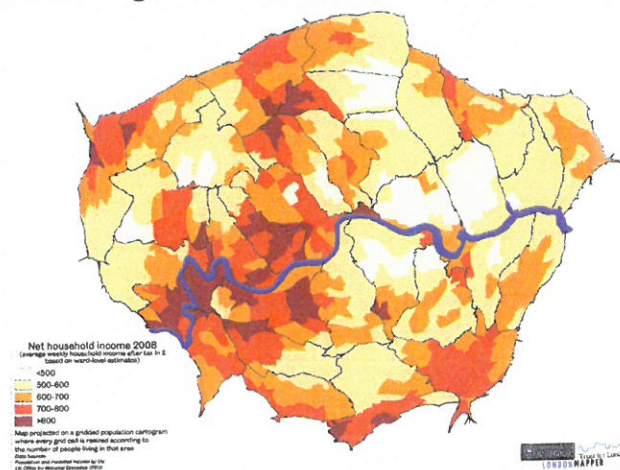


Figure 9.66 Average household income after tax (before housing costs) based on ward-level estimates for 2008 projected on a gridded population cartogram (Data source: Office for National Statistics, 2011)



Figure 9.67 Average life expectancy based on ward-level estimates for 2007 projected on a gridded population cartogram (Data source: Greater London Authority, 2011)

**The nature and impact of physical environmental conditions**

In the first half of the twentieth century, 'smog' events became so strongly linked to the city of London that the term 'London particular' was and still is used in reference to smogs. Since then, air quality has improved significantly. The introduction of the Clean Air Act in 1956 and more recent legislation, along with the introduction of greener buses, taxi age limits and the Low Emission Zone (LEZ), has reduced CO<sub>2</sub> emissions in particular. However, nitrogen dioxide levels still breach EU legal limits and Figure 9.68 shows that London still suffers higher levels of air pollution than surrounding rural areas. The 2014 Public Health England report on air pollution says that 5.3 per cent of all deaths in people age 25 and over are now linked to air pollution. These figures vary geographically but the highest percentage of deaths linked to air pollution are in London. More specifically, the boroughs of Kensington & Chelsea and Westminster have the highest rates, where 8.3 per cent of deaths can be attributed to air pollution.

Linked to air quality is the impact of London's urban heat island, shown in Figure 9.30 (page 408). With the centre of London already up to 10°C warmer than the surrounding rural areas and average summer temperatures predicted to rise further, summer heat waves pose a threat to homes, workplaces and public transport. They have a negative effect on health, particularly that of vulnerable people, and lead to greater consumption of water and energy.

The London Climate Change partnership has suggested that extremely high demands on London's power supply network may lead to 'brownouts', due to the high cooling demand, and increases in electricity demand for cooling could negatively affect London's sustainability.

One further concern linked to London's physical environment is the threat of flooding. This comes from five sources – tidal, fluvial (from rivers and tributaries), surface (from rainfall), sewer and groundwater flooding. Climate change will bring wetter winters and more frequent heavy downpours, as well as rising sea levels and higher tidal surges, all of which pose a major threat to London. Fifteen per cent of London is on the flood plain, protected by flood defences. Residential areas are located within this area but it also includes much of the infrastructure Londoners rely on daily: 49 railway stations, 75 underground stations and 10 hospitals. The Thames Estuary 2100 (TE2100) project is one response to the risk of flooding but other strategies are being adopted. Go to <http://climatelondon.org.uk/> for more information on these.

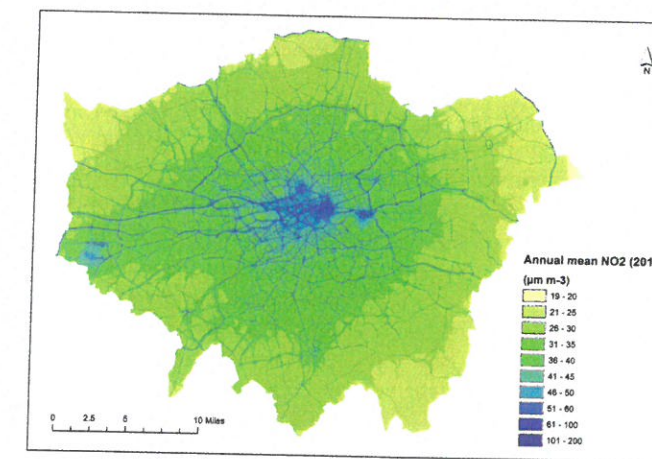


Figure 9.68 Concentrations of nitrogen dioxide are higher along the roads in London and at key transport hubs such as Heathrow Airport and City Airport. Over the course of the day, NO<sub>2</sub> levels are particularly high during rush hour as they predominantly come from vehicle emissions

**Moving towards greater urban sustainability**

The London Sustainable Development Commission was established in 2002 to advise the Mayor of London on making London a 'sustainable world city'. Various strategies have since been implemented to tackle key issues such as inequality, air pollution and urban deprivation. A snapshot of strategies is shown below. There are many more to investigate and evaluate.

As the urban area of London continues to expand, greater pressures will be placed on the services and infrastructure. Strategies encouraging greater urban sustainability will be key to the city's future viability. Proposals to make London into the world's first National Park City are being discussed.

### Further research

There are numerous areas of London's geography to research. The Olympic legacy, inequality and the success of strategies to tackle environmental problems are just three areas which merit more attention. Look also at the place study of East London in Chapter 8 for information on the Bangladeshi diaspora, and the impacts of gentrification and urban resurgence. Useful websites include [www.london.gov.uk](http://www.london.gov.uk) and [www.tfl.gov.uk](http://www.tfl.gov.uk). The

London mapper website visualises data in a variety of different ways: [www.londonmapper.org.uk/](http://www.londonmapper.org.uk/) Likewise, the 2014 book, *London: The Information Capital* includes 100 maps and graphics on all aspects of London living. Both sources are excellent examples of GIS. Finally, a useful resource for looking at the extent and impact of inequality in London is geographer Danny Dorling's *The 32 Steps: the Central Line*.

Table 9.11 Urban sustainability strategies adopted in London

Social developments	Economic developments
Urban renewal has brought economic investment and growth to parts of London previously suffering urban decline. For example, Olympic regeneration in Newham has provided additional social housing, leisure facilities and greater investment in education. The Queen Elizabeth Olympic Park provides parklands, waterways and leisure activities. From 2016, the Olympic Stadium will be home to West Ham United FC	The London Living Wage is a calculated hourly rate of pay which gives the wage rate needed for a worker in London to provide their family with the essentials of life, including a cushion against unforeseen events. It is not compulsory but a voluntary commitment made by employers. It has been estimated that over 10,000 London families have been lifted out of working poverty as a direct result of the Living Wage
A focus on improving education in the capital through the London Challenge initiative has continued to improve outcomes for pupils in London's primary and secondary schools at a faster rate than nationally. Pupils in London do better in school than the rest of the country	When Crossrail opens in 2018, it will increase London's rail-based transport network capacity by 10 per cent. It is hoped this will cut journey times across the city, ease congestion and encourage regeneration
In Newham, the Every Child programme offers children the chance to learn a musical instrument or take part in cultural events. Children in this area also benefit from universal free school meals, which have been linked to greater attainment and better health. Similar schemes operate in other boroughs	At a borough level, schemes such as Workplace in Newham have been introduced to help people find jobs. Workplace provides residents with free advice about employment options and training. Since 2007, Workplace has supported over 20,000 Newham residents into employment, and helped more than 900 businesses fill their vacancies
Environmental developments	Urban governance
The Congestion Charge was introduced in 2003 to discourage driving in central London to reduce congestion and pollution. More recent 'green' transport policies have included Routemaster buses with green electric hybrid engines, a fleet of eight hydrogen fuel buses, more than 1,400 charge points to support the use of electric vehicles, zero emission taxis from 2018 and a central London Ultra Low Emission Zone (ULEZ) from 2020 with the objective of reducing air pollutant and CO2 emissions from road transport	The role of the Mayor of London was created under the Greater London Authority Act 1999 as part of the government's commitment to restore a city-wide government for London
Cycle superhighways and the cycle hire scheme more commonly known as 'Boris Bikes' have helped to increase cycling in London by 173 per cent since 2001. The aim is for a 400 per cent increase by 2025, although there are continued concerns about cycling safety	Mayors are important to ensure that a city has a strong voice and can attract investment from home and abroad. Devolved powers include planning, transport, employment, economic development, health and policing
In response to the UHI effect in London, targets have been set to increase green cover in central London by 5 per cent by 2030	

### Case study of a contrasting urban area: Mumbai

Although not its capital, Mumbai is India's largest city with a population in excess of 20 million. It is the financial and commercial centre of India as well as home to the popular Bollywood movie industry.



Figure 9.69 The location of Mumbai

Mumbai is located on the west coast of India and is the capital of the state of Maharashtra. It developed as a trading centre selling local goods such as gold, jewellery and textiles. The arrival of the East India Company in the early seventeenth century led to the establishment of the British Raj (Empire) and goods such as raw cotton were regularly shipped to England for manufacturing. Originally, Mumbai was a series of seven islands separated by swamps, but by 1845 these had been filled in and Mumbai occupied one large island. Mumbai has a natural deep-water harbour and has been the main port in the Arabian Sea since the opening of the Suez Canal in 1869.



Figure 9.70 Mumbai's skyline resembles that of a wealthy city. The Bandra-Worli Sea Link shown in the photo is a cable-stayed bridge that connects central Mumbai with its western suburbs.

Following India's independence from the British in 1947, Mumbai developed rapidly. High-rise, modern architecture, the Bombay Stock Exchange, tarred roads and a boom in manufacturing and services have changed the city's status and brought it on to the world stage. In 2015 it accounted

for 33 per cent of India's income tax, 6.16 per cent of GDP (the largest single contributor in India), 25 per cent of industrial output and 40 per cent of foreign trade. Mumbai is now a megacity and while its population growth may be slowing, by 2020 it will have an estimated 24 million people with the highest population density of any city in the world. Such numbers place an inevitable strain on the urban infrastructure.

### Economic and social well-being

Mumbai's population has nearly doubled since 1991 and this is largely due to the influx of migrants from other parts of India seeking better employment opportunities. The resulting population is very diverse and 16 major languages of India are spoken here. Poverty and inequality are two of the big issues, however. It is estimated that around 60 per cent of Mumbaikars live in 'slums' and the average Indian would need to work for three centuries to pay for a luxury home in Mumbai.

### Dharavi slum

There are many informal slum areas in Mumbai but Dharavi in central Mumbai is perhaps the most famous, brought to the attention of many by the Oscar-winning film *Slumdog Millionaire* in 2008. Until the late nineteenth century, this area was mangrove swamp inhabited by Koli fishermen. When the swamp filled in (with coconut leaves, rotten fish and human waste) the Koli people lost their fishing ground, but there was more land area for others. The Kumbhars came from Gujarat to establish a potters' colony, Tamils opened tanneries and thousands more travelled from areas such as Uttar Pradesh to work in the rapidly expanding textiles industry. The result was a very diverse neighbourhood in a very diverse city.

Cottage industries have thrived in Dharavi. It is home to thousands of micro-industries, including garment-makers, tanners, welders and potters, which produce over \$650m annually. However, the living and working conditions remain very poor. Years of government neglect have resulted in inadequate hygiene standards and it is said to have the highest population density in the world at over 300,000 people per square kilometre. Housing quality is poor and the slum lacks basic infrastructure. Each toilet is shared by over 1,000 residents and services such as water and electricity are not always available.

Due to the northward expansion of the city of Mumbai, Dharavi found itself occupying an area of prime land in the new business district of India's richest city. This made it a key target for developers eager to make money from the construction of luxury apartments, while the government has been keen to improve the appearance and reputation of the area. The government-led Dharavi Redevelopment Project will see all residents who can prove residency since

2000 provided with a new, 300-square-foot house for free. The scheme has not been without controversy. The main concern has been the potential loss of the community networks and businesses which have built up there.

### The nature and impact of physical environmental conditions

Mumbai has a tropical climate. The south-west monsoon brings heavy rainfall to the city between June and September and although Mumbaikers adapt to the wet conditions, the rains can be devastating for the city, which is mainly built on low-lying land. On 26 July 2005, Mumbai received 944 mm of rainfall – the average amount for the entire season and a 100-year high (Figure 9.71). This, combined with high tides, caused a devastating flood. Electricity, water supply, communication networks and public transportation were totally shut down; more than 400 people died; and over 10,000 homes were destroyed. The city suffered losses amounting to £1.2 billion. Urban growth was of course partly to blame. There was nowhere for the rainwater to go as rapid and often uncontrolled development had replaced most of the public parks, private gardens, beaches, mangrove swamps and wetlands with a built environment.



Figure 9.71 Mumbai commuters walk through floodwaters in 2005 after torrential rains paralysed the city

**The Greater Mumbai Disaster Management Action Plan** was created in response to the 2005 flooding. It identified the risks and vulnerabilities the city could face in

the future, including earthquakes and cyclones; it created the Disaster Management Cell to co-ordinate relief and rescue efforts; and it widened and deepened the Mithi River which drains out into the Arabian Sea. The plan is clearly a positive strategy for Mumbai and shows the government is keen to address the major flood issue, but environmentalists are concerned that there are still too many factors which make Mumbai vulnerable to flooding again: continued construction on the floodplain, removal of mangrove forests and the clogging of storm drains and waterways with plastic rubbish. In addition to this, the Intergovernmental Panel on Climate Change (IPCC) has predicted that the increase in rainfall, heat, humidity and sea-level rise associated with climate change will make Mumbai the second most at-risk city in the world.

### The future?

Economic growth has clearly brought wealth to many in Mumbai and new housing projects are trying to address the shortage of housing. However, this megacity is struggling to cope with its rapid growth. Services are stretched or non-existent, air and water supplies are polluted, inequality is growing and over half the population still lives in slums. The Indian government has pledged to make cities like Mumbai 'smarter' in terms of the economy and environment. In addition, non-government organisations have been working towards improving the lives of slum dwellers in Mumbai. However, as Figure 9.72 shows, Mumbai faces considerable environmental pressures and much greater investment and long-term planning are essential if the city is to become truly sustainable in the twenty-first century.

### Further research

Mumbai has been well-documented in geographical magazines. Further useful information can be gathered from the World Bank ([www.worldbank.org/](http://www.worldbank.org/)) which funds a number of projects in Mumbai. In March 2015, *The Guardian* newspaper's Guardian Cities Team did a five-day feature on Mumbai.

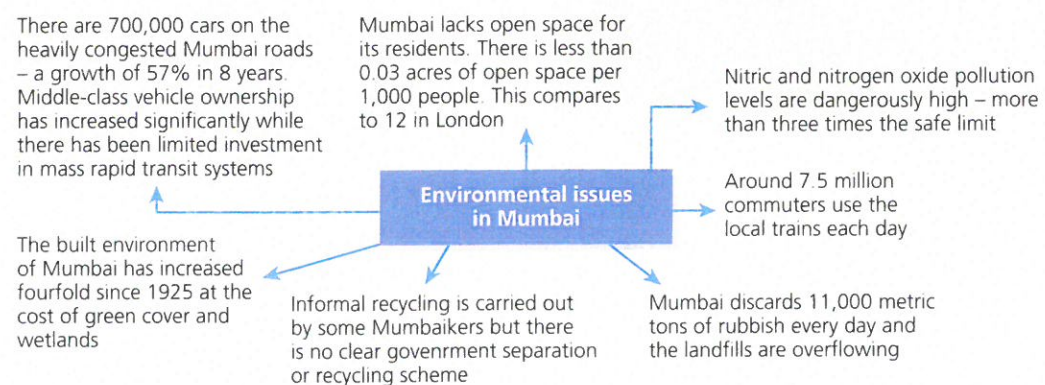


Figure 9.72 Environmental issues in Mumbai

### Review questions

- 1 What are the key problems facing urban areas in the twenty-first century and in what order should they be tackled?
- 2 Which are the most effective strategies for tackling inequality in urban areas?
- 3 What are the main influences on climate and drainage in a city? How can humans limit their impact on both of these?
- 4 Which aspects of urban sustainability do you think are most important and why?
- 5 How realistic is it to expect all cities, rich and poor, to adopt sustainable practices?

### Fieldwork opportunities

The Office for National Statistics ([www.ons.gov.uk](http://www.ons.gov.uk)) provides a range of data for different wards within urban areas. These statistics can be used alongside primary data on housing, land use, provision of services and environmental quality to compare different parts of an urban area. The Field Studies Council (FSC) has numerous useful documents and resources on their website to help you investigate the quality of urban areas and inequalities. Go to [www.geography-fieldwork.org](http://www.geography-fieldwork.org). It is also worth looking at the 2015 Index of Multiple Deprivation data which measures relative deprivation. This can be viewed at <http://maps.cdrc.ac.uk/> or <http://dclgapps.communities.gov.uk/imd/idmap.html>.

The redevelopment of King's Cross Station in London provides a new fieldwork venue in the UK capital. Disused railway land on the 27-hectare site is being transformed into a mixed-use site complete with homes, shops, offices, galleries and restaurants. The website below provides both historical and current information about the site as well as brochures and videos. Visit [www.kingscross.co.uk/discover-kings-cross](http://www.kingscross.co.uk/discover-kings-cross)

Changes in temperature and/or pollution levels can be measured and mapped across an urban area. Traffic counts at strategic points may show a correlation with such data.

Infiltration rates can be measured across a variety of urban surfaces. This could then be linked to a Sustainable Urban Drainage System.

### Further reading

Two relatively recent urban geography books:

Hall, T. and Barrett, H. (2011) *Urban Geography* (Routledge)

Pacione M, (2009) *Urban geography: a Global Perspective of* (Routledge)

See also Drake, G. and Lee, C. (2000) *The Urban Challenge* (Hodder)

The United Nations publishes a number of useful reports on cities. In 2014, a report entitled *World Urbanisation Prospects* was published outlining the key issues resulting from urban growth.

UN-Habitat – an organisation concerned with global urban issues has also published a number of reports entitled *The State of the World's Cities* which focus on sustainability issues. A new *World Cities Report* is due to be published by the UN in 2015/2016 ([www.unhabitat.org/](http://www.unhabitat.org/))

The Urban Geography Research Group (UGRG) of The Royal Geographical Society/Institute of British Geographers has a website with useful links and resources. ([www.urban-geography.org.uk/](http://www.urban-geography.org.uk/))

Hans Rosling's brilliant Gapminder website contains a wealth of data on socio-economic trends and variations around the world ([www.gapminder.org/](http://www.gapminder.org/))

For current urban trends and processes it is worth reading newspaper websites such as *The Guardian* and *The Independent*, which often have up-to-date features on cities. *The Guardian* has a twitter feed @guardiancities. It also has a resilient cities page supported by the Rockefeller Foundation.

Magazines such as *Geographical* magazine and *Geography Review* regularly include articles on specific cities and urban issues.