

### 3.2.3 Contemporary urban environments

Consider this from AQA “This optional section of our specification focuses on urban growth and change which are seemingly ubiquitous processes and present significant environmental and social challenges for human populations. The section examines these processes and challenges and the issues associated with them, in particular the potential for environmental sustainability and social cohesion. Engaging with these themes in a range of urban settings from contrasting areas of the world affords the opportunity for students to appreciate human diversity and develop awareness and insight into profound questions of opportunity, equity and sustainability. Study of this section offers the opportunity to exercise and develop observation skills, measurement and geospatial mapping skills, together with data manipulation and statistical skills, including those associated with and arising from fieldwork.”

#### 3.2.3.1 Urbanisation

##### Urbanisation and its importance in human affairs.

This topic is called “**Contemporary urban environments**”; urban environments are those built up areas where people live in density. However, there is HUGE variety in the types and styles of urban areas and how “built up” they are. Some urban areas are highly urbanised, such as Dubai (2%), Istanbul (2.2%), Mumbai (2.5%), Shanghai (2.8%), Taipei (3.6%), but others have large areas of greenery such as Moscow (54%), Singapore (47%), Sydney (46%), Vienna (45.5%), Shenzhen (45%).<sup>1</sup>

Urbanisation represents the demographic transition or change from rural areas to urban areas. Urbanisation is defined as “**the increasing PROPORTION of people that live in towns and cities**” and can be viewed at regional, national, continental and International scales.

- Urban growth is the increase in the TOTAL POPULATION of a town or city
- Urban expansion is the increase in SIZE or geographical footprint of a city

The word **contemporary** also appears in the title. This word means **modern or current**. When studying this unit, you need to consider the processes occurring currently in relation to the world’s towns and cities.

In 2010 a key date was passed, the World’s urban population passed 50% for the first time in history. The World Health Organisation of the UN estimate that “By 2030, 6 out of every 10 people will live in a city, and by 2050, this proportion will increase to 7 out of 10 people.” This poses fundamental questions and issues for the global population and its leaders, and this unit is designed to explore some of those issues.

##### So why is urbanisation important in human affairs?

1. The GDP of some cities is bigger than countries! This means that their **ECONOMIC pull** and influence is massive.
2. If more people live in towns and cities than rural areas, then they are **DEPENDENT** upon rural areas for their services – the provision of food and important resources for energy and construction
3. Urban areas are also dependent on rural areas to **absorb the waste** they produce, rural areas absorb urban air pollution, accept and deal with municipal waste and are affected by local changes to climate and hydrological systems
4. Urban areas serve as **global “nodes” – centre points in the world economic system**. There are huge manufacturing cities that produce goods for worldwide consumption such as Shenzhen and others that provide services such as London. Either way they help promote the global movement of goods and services and hence promote globalisation
5. Many people in urban areas live in substandard accommodation, particularly in LICs (Low Income Countries). These areas are known as **Squatter settlements**, Bustees (in India), Favelas (In Brazil) and shanty houses. Whatever the name these areas serve to get people into city areas for economic opportunity but also mean people live mired in poverty in appalling conditions.
6. **Immigration** occurs at a large scale in many cities, this makes cities large melting pots of culture and values.

7. There are many issues facing cities across the globe that people must put up with – air pollution, congestion, lack of job opportunities, environmental pollution etc. all impact people in various ways.
8. **Urban sprawl** has occurred, where cities have spread over huge distances making them less efficient at delivering their aim, the production of goods and services to improve the quality of life of the people who live in them.
9. The exchange of ideas and creative industries often occurs in urban areas, at universities and in research parks
10. Urban areas have POLITICAL influence, and often have seats of national or local government in them.

All these areas are explored in detail throughout this unit



Guangzhou, China in 2011 by chensiyuan [CC BY-SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>)]<sup>2</sup>

### **Sources**

1 – Dave Lawler, 2018, “The global cities with the most and least green space” Axios. Accessed 11<sup>th</sup> March 2019 from <https://www.axios.com/the-cities-with-the-most-green-space-around-the-world-f92a437f-1de8-41e8-b534-6a9a00aa09d5.html>

2 -\_Guangzhou, China in 2011 by chensiyuan [CC BY-SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0/>)] accessed at [https://commons.wikimedia.org/wiki/File:Guangzhou\\_dusk\\_panorama.jpg](https://commons.wikimedia.org/wiki/File:Guangzhou_dusk_panorama.jpg) March 11 2019

## Global patterns of urbanisation since 1945.

*“Cities have a transformative power. A New Urban Agenda is required to effectively address the challenges and take advantage of the opportunities offered by urbanization.”*

*Dr Joan Clos, UN, 2016*

In 2010 a key date was passed, the World’s urban population passed 50% for the first time in history. The World Health Organisation of the UN estimate that “By 2030, 6 out of every 10 people will live in a city, and by 2050, this proportion will increase to 7 out of 10 people.”<sup>1</sup> This poses fundamental questions and issues for the global population and its leaders, and this unit is designed to explore some of those issues.

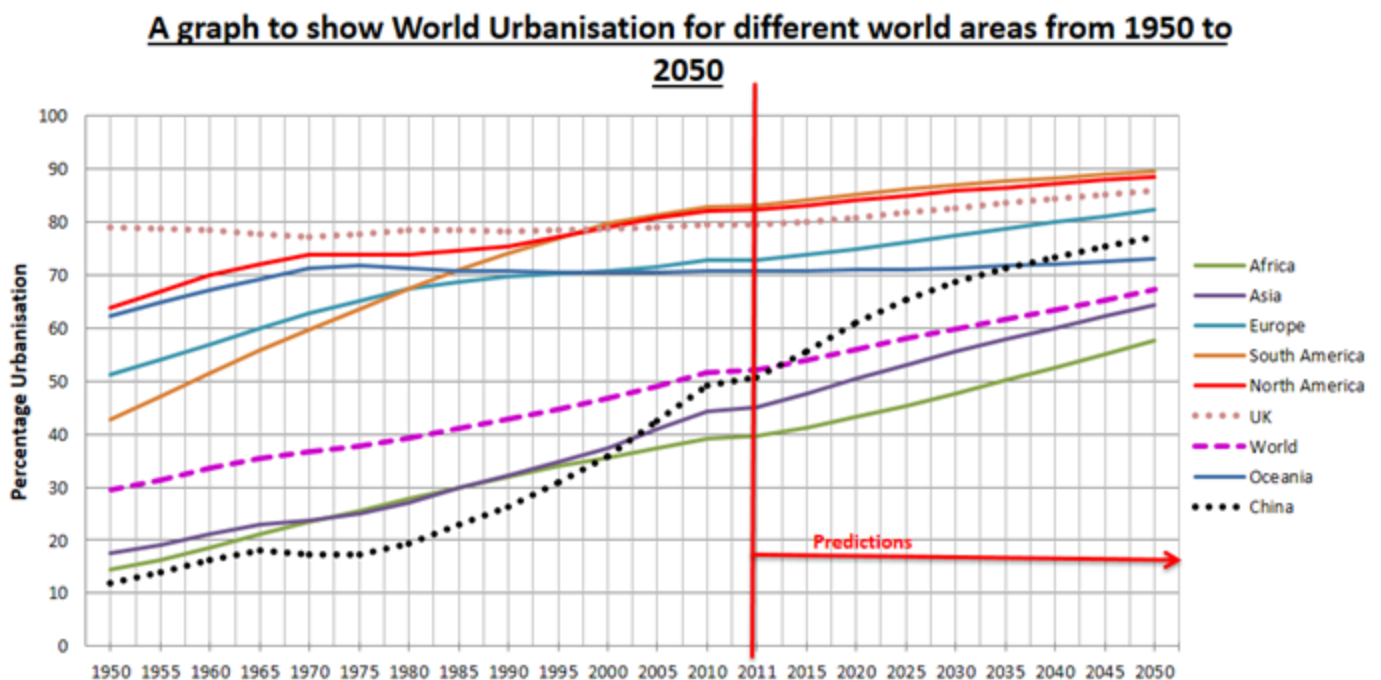
In 2018, the UN estimates that the percentage of people living in Towns and cities is 55.3% with 4.219Billion of the World’s 7.632 Billion people living in urban areas.<sup>2</sup>

Although it can seem like our expanding cities take up a lot of land, only around 1% of global land is defined as built-up.<sup>3</sup>

Urbanisation represents the demographic transition or change from rural areas to urban areas. Urbanisation is defined as *“the increasing proportion of people that live in towns and cities”* and can be viewed at regional, national, continental and International scales. The word proportion in this definition is very important, because it indicates that we must judge urbanisation by looking at both the numbers of people living in both rural AND urban areas. It is also important to remember that world population has grown massively since 1945 (the global population was estimated at 2.556 billion in 1950 and is over 7.5 billion in 2019<sup>4</sup>), so not only have the % of people living in urban areas gone up but so has the absolute number of people in them.

### Variation in urbanisation around the world

Urbanisation varies from place and from time to time. There are clear patterns in WHEN urbanisation has occurred and WHERE in different parts of the world. This is shown clearly below;

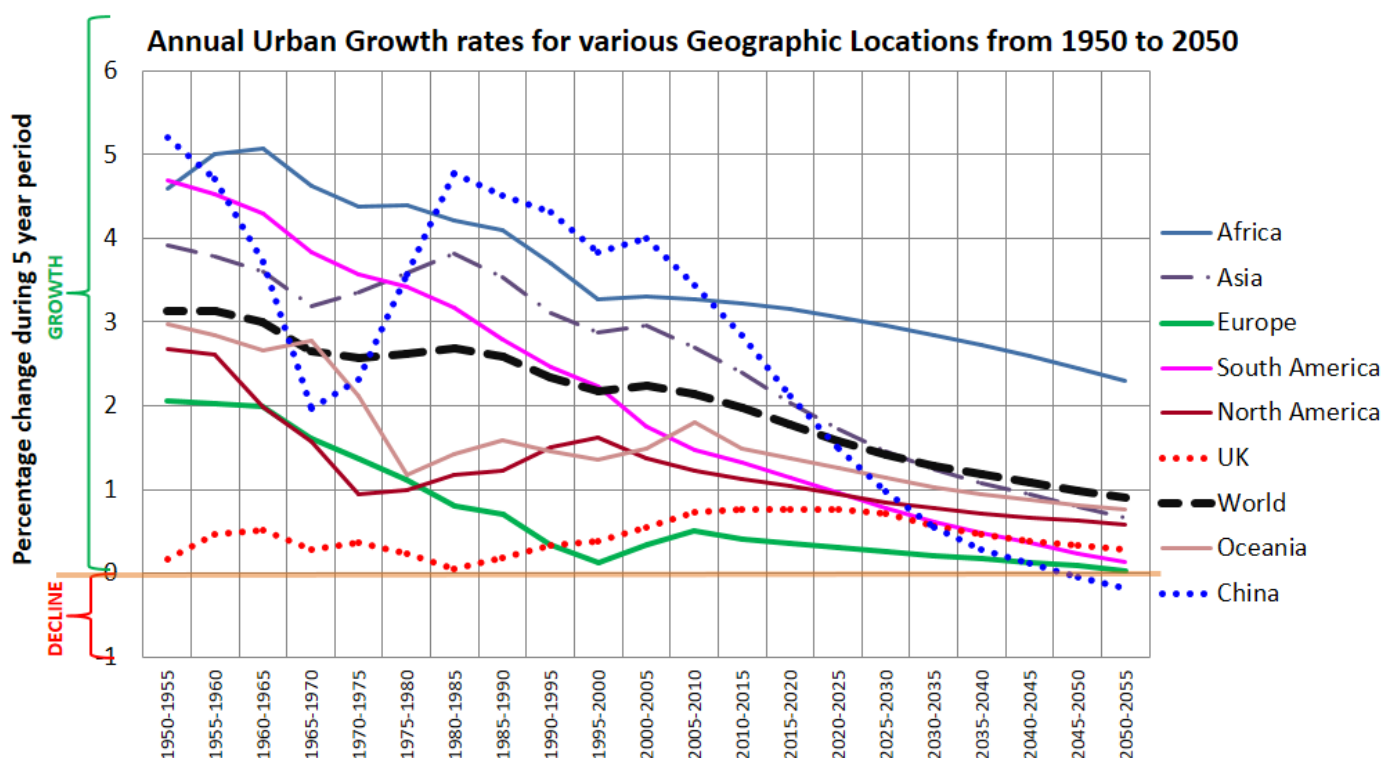


Source: United Nations<sup>5</sup>

As can be observed on the graph urbanisation has occurred at different times for different continents and at different rates (speeds).

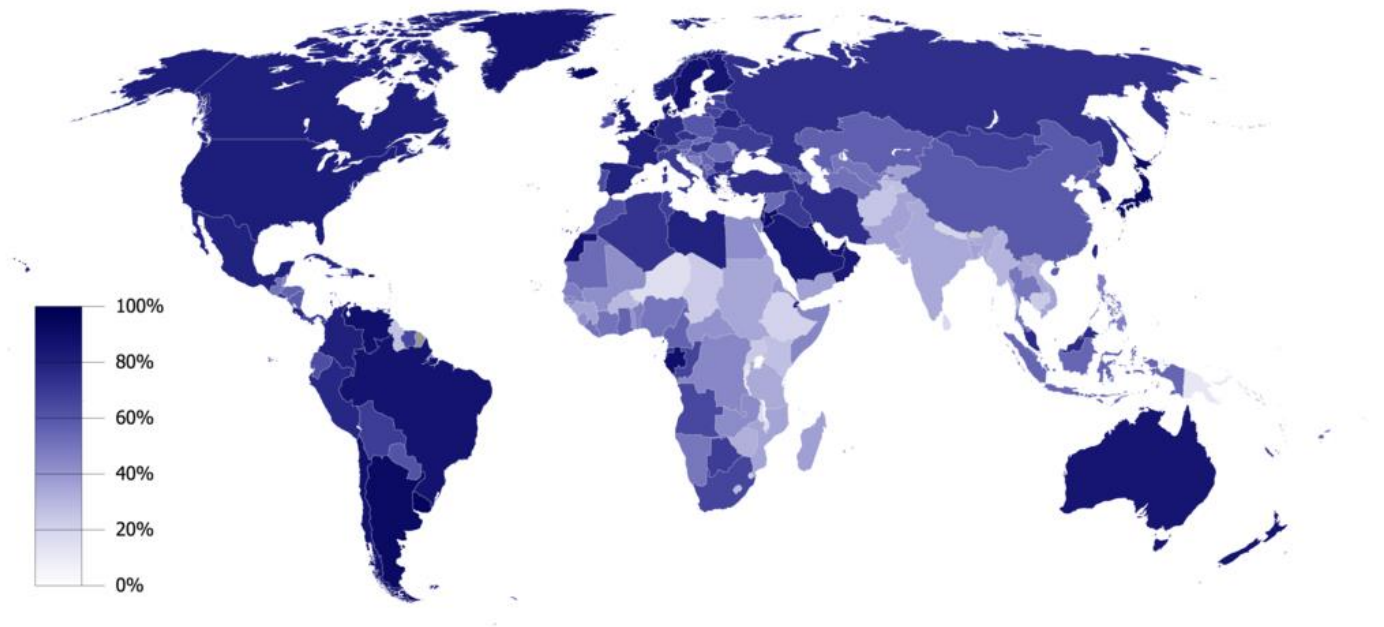
1. The most urbanised places on planet Earth are the most economically developed, with North America, Europe and Oceania all displaying high percentages of urbanisation and all starting with high levels after 1950 (all over 50%). These have all continued to urbanise, but rates have slowed down as these areas approach their peak for urbanisation. The UK line on the graph is a good country example of this pattern.
2. Asia contains many Newly Industrialising Countries (NICs) such as India, and China, and Asian Tigers such as Malaysia, Thailand and South Korea. These areas have had a phenomenal rise in urbanisation from 18% to 45% in 2011 and are predicted to continue to do so. These changes go hand in hand with rapid industrialisation (as seen in China's special enterprise zones) and changes in agriculture in those countries. This is evidenced clearly on the China line on the graph.
3. Africa is a more complex case, and some countries are urbanizing whilst industrializing, whilst others are urbanising based on the exportation of primary resources.

### RATES of urban growth



Source: United Nations <sup>5</sup>

Rates of urban growth are slowing down however, in all continents and globally. This means that urban areas, whilst still growing, are doing so at a slower pace. This is shown by the graph above and is predicted by the United Nations to continue to do so. Even China is expected to experience a decline in growth, and eventually a shrinking in urbanisation. Growth in Africa remains strong, but declining, whilst European Urban growth rates are declining towards zero.



Source – Wikipedia <sup>6</sup>

Urbanisation has a geographic distribution. This is shown above, on the choropleth map. The highest rates of urbanisation are in North America, Western Europe, South America and Australasia. Lower rates of urbanisation are found in Africa and across Asia, but as mentioned previously urban growth rates are high in these areas and their overall percentage urbanisation is catching up with other areas.

### CAUSES of urban growth

Urbanisation is caused by rural to urban migration and natural changes in population.

### MIGRATION

**Migration** is the movement of population from one area to another. Some migrations are forced, voluntary, permanent and temporary, international and regional. The type of migration that we are principally interested in in this unit is Rural to urban migration, which is the movement of people from countryside to city areas. However, international migration is also important for many cities as the first port of arrival for many international migrants are major cities.

### HICs

Rural to Urban migration happened in HICs from the 18th Century onwards on a large scale and has gradually slowed down. In fact, in many HICs the movement of people has reversed, and people are moving from urban areas back into the countryside as they search for the quiet life (this is known as **counter-urbanisation**).

### LICs

However, in many LICs cities are experiencing massive rural to urban migration, mainly of young males, into the major cities. The major reasons for this movement can be classified into push and pull factors.

A **Push factor** is something that can force or encourage people to move away from an area. Push factors can include famine (as in Ethiopia in the 1980s), drought, flooding (as in Bangladesh, where people are becoming climate change refugees and having to move to Dhaka, watch an animation of Dhaka's growth here), a lack of employment opportunities, population growth and over population, and civil war (as in Darfur now).

A **Pull factor** is one in which encourages people to move to an area. Pull factors include the chance of a better job, better access to education and services, and a higher standard of living.

These factors have contributed to millions of people in LICs moving to cities in LICs, creating mass URBANISATION.

## NATURAL INCREASE

Changes in Natural Increase can also cause urbanisation – cities tend to help to lower mortality rates as access to imported medical care and technology, better access to food and improved sanitation bring down death rates. This means that birth rate can exceed death rates and populations grow naturally.

There are many positives and negatives of Urbanisation, which become more pronounced as urbanisation becomes extreme, cities become larger and the pace of change is rapid. Many of the positive and negatives obviously apply to different time periods for different countries at contrasting states of development.

## SOURCES

1. World Health Organisation , 2018, *Urban population growth* - accessed the 11<sup>th</sup> of March 2019 from [http://www.who.int/gho/urban\\_health/situation\\_trends/urban\\_population\\_growth\\_text/en/](http://www.who.int/gho/urban_health/situation_trends/urban_population_growth_text/en/)
2. United Nations Population Division, *World Urbanization Prospects 2018*, accessed on the 11<sup>th</sup> of March from <https://population.un.org/wup/Download/>
3. Hannah Ritchie, 2018, *How urban is the world?*. Our world in data. Accessed on the 11<sup>th</sup> of March from <https://ourworldindata.org/how-urban-is-the-world>
4. U.S. Census Bureau, International Database. Accessed 11<sup>th</sup> March 2019 from <https://www.infoplease.com/world/population-statistics/total-population-world-decade-1950-2050>
5. United Nations, Department of Economic and Social Affairs, Population Division (2012). *World Urbanization Prospects: The 2011 Revision, CD-ROM Edition*.
6. Wikignuthor [CC BY-SA 4.0 (<https://creativecommons.org/licenses/by-sa/4.0>)], *Wikipedia, map of Urbanized population 2006*  
[https://en.wikipedia.org/wiki/Urbanization\\_by\\_country#/media/File:Urbanized\\_population\\_2018.png](https://en.wikipedia.org/wiki/Urbanization_by_country#/media/File:Urbanized_population_2018.png)

## The global pattern: millionaire cities, mega cities and world cities.

Part of the global pattern of urbanisation and perhaps one of the most astonishing has been the rise of the MEGACITY. It is important to distinguish between world cities, millionaire cities, megacities and metacities;

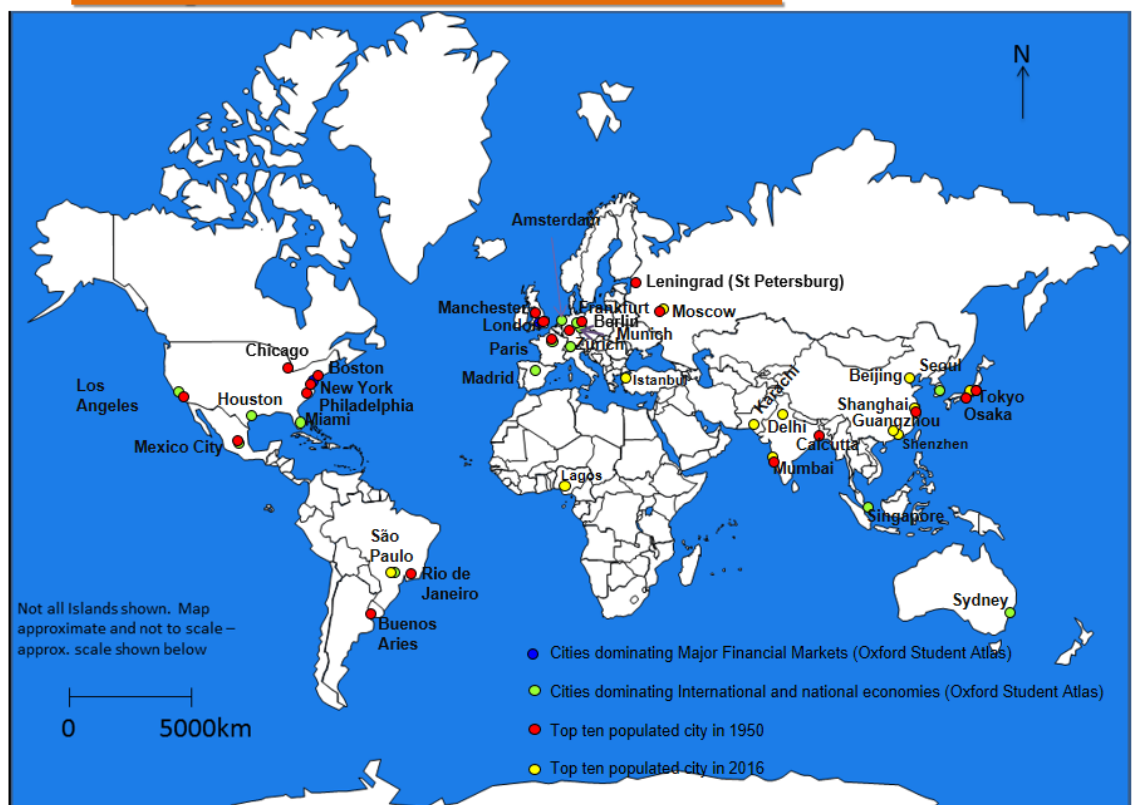
1. **Millionaire cities** are those that have over a million residents.
2. **Megacities** which are far larger, they have at least 10 million people. Some definitions also set a minimum level for population density (at least 2,000 persons/square km). In 1950 only 3 cities satisfied this definition – London, New York and Tokyo, today this number is far greater. The distinction between the 2 is simply based upon size, whereas World or global cities are different.
3. **Metacities** are any urban area or conurbation with more than 20 million people e.g. Tokyo and Mexico City
4. **World cities** are those that exert a dominant influence over continental and global economies and processes. This is **INDEPENDENT of population size**, as world cities do not have to have huge populations (but usually do) to exert such a huge influence. Indeed, a world city (also called global city or world centre) is a city generally considered to be an important node (FOCAL POINT) in the global economic system such as London, New York and Tokyo.

There are also problems with defining population size of cities, as it often depends upon where researchers draw the boundary of the city. Do researchers count just within the city boundaries, or do they count all the suburbs, or do they also count all of the surrounding satellite towns as well (as a conurbation)? You could try to search for the world's largest cities online, you will find different lists on different websites due to this.

### Patterns of world cities, millionaire cities and megacities

## A map of the World Urbanisation

1. In 1945 the world's biggest cities were predominately in Europe and North America
2. Today, the vast majority of the world's biggest cities are found in Asia, with megacities found on every continent
3. Asia also has the largest number of millionaire cities today, whilst Europe and North America struggle to make it onto the largest cities list

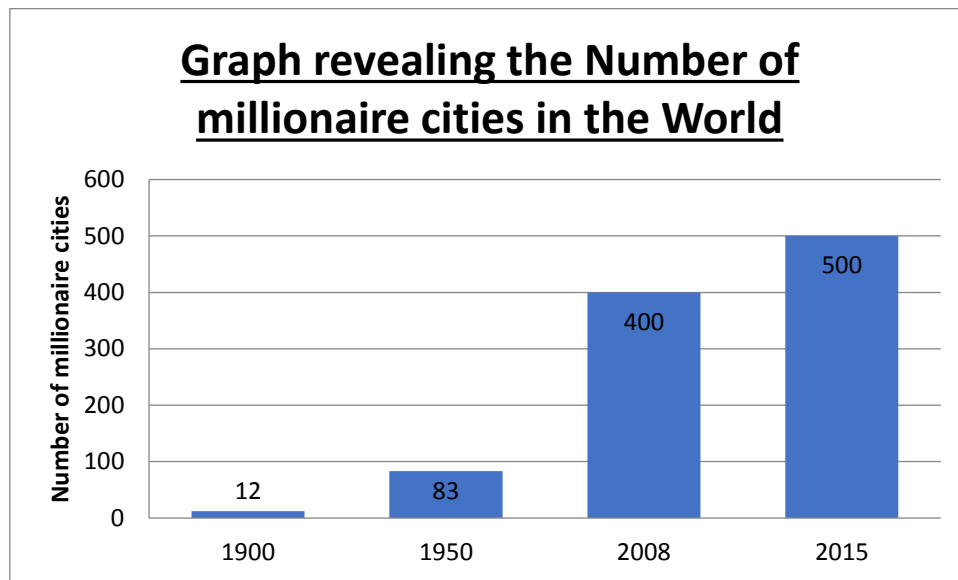


4. The world cities have changed slightly but less than the location of megacities. Despite dropping off the top ten list of most populous areas London and Paris remain dominant world cities with huge influence over European and world economies and politics.

5. The number of millionaire cities has risen rapidly, in 1900, only 12 cities had 1 million or more inhabitants, by 1950, the number of cities with over 1 million people had grown to 83. In 2015, there were more than 500 cities over 1 million people in them. <sup>1</sup>

6. In 1950 only 2 cities had megacity status, New York and Tokyo. <sup>2</sup> In 2017 this number had risen to 37! <sup>3</sup>

7. Rates of urbanisation are also in change. Many LDCs and LICs have very rapid rates of urban growth, whilst richer HICs have some cities, which are growing (e.g. Toulouse in France), some cities which are stagnating, and even have cities in decline (e.g. Middlesbrough)



### Why have some cities EMERGED as Megacities and world cities?

There are many reasons why some cities develop into major megacities, but not all megacities go on to dominate international markets and politics so are not world cities. These are some of the factors pushing city growth and urbanisation;

1. **Changes in Natural Increase** – cities tend to help to lower mortality rates as access to imported medical care and technology, better access to food and improved sanitation bring down death rates. This means that birth rate can exceed death rates and populations grow naturally.
2. **Push factors - agricultural change and revolution** – to encourage megacity growth and the increase in urbanisation people often have to move or migrate from rural areas to urban areas. In Britain we had an Agricultural revolution from 1750 to 1850 which forced people from the land into newly emerging industries in rapidly growing cities.
3. **Cities are declared capital cities** – Governments can change the capital city if they wish. Brasilia in Brazil was declared capital in 1960 after being planned in 1956. It now has 2.5million inhabitants from nothing in the 1950s!
4. **Ports and trading cities** – coastal locations are advantageous as they allowed increased global trade, Shenzhen became China's first Special Enterprise Zones on its South East Coastline. Shenzhen's modern cityscape is the result of the vibrant economy made possible by rapid foreign investment since the institution of the policy of "reform and opening" establishment of the SEZ in the late 1979, before which it was only a small village. Shenzhen is now considered one of the fastest-growing cities in the world and has a population of over 10 million people.
5. **Colonial influences** – colonial powers such as the UK and France created many urban areas, often in coastal areas as the sought to exploit resources within their new territories. Lima was created by the Spanish in Peru, whilst Rio de Janeiro was established by the Portuguese in Brazil.
6. **Economic reasons** – TNCs and the global economy have focused production in urban areas, and this causes many cities to grow into centres of production globally, that can be used to create wealth for governments and create import substitution of goods.

7. **Agglomeration factors** – these are factors that make it cheaper to produce goods when things are located close together. For example, goods can be moved quicker between industries and labour can be pooled between different firms allowing ideas to flow more freely.
8. **Technological changes** – changes in building construction design and technology have allowed buildings that are of huge sizes. The Burj Al Khalifa is a great example of this.

### **The role of megacities and world cities in global and regional economies.**

Megacities and world cities have a huge role to play in both the global and regional economies in which they are situated. This is because of 4 factors;

1. **Production** – manufacturing takes place in many cities in LICs and NEEs, but research and development and decision making is often done in HICs by TNCs who have their headquarters there.
2. **Migration** – flows of migrants tends to be INTO major urban centres, so they directly affect the global and regional economies through LABOUR and BRAIN DRAINS. Many workers tend to be unqualified but don't forget that many are also highly qualified, and these migrants have the most flexibility and least barriers to movement. These large cities can take advantage of global flows of information and communication.
3. **Globalisation of the economy** – there are major connections between world and megacities and this means trade, business and transport flows between these areas or nodes. These world and megacities are therefore central to the world economic system.
4. **Governance** – many political decisions take place in world and megacities at both national and regional level. This means that these cities exert a massive influence globally and regionally.

### **SOURCES**

1 – Teach it Geography (2016) – The growth of world cities, AQA. Accessed 11<sup>th</sup> March 2019 from <https://www.teachitgeography.co.uk/attachments/26512/the-growth-of-world-cities.pdf>

2 – Map of world city populations - Accessed 11<sup>th</sup> March 2019 from <http://luminocity3d.org/WorldCity/#2/40.3/23.9>

3 – Demographia (2018) *World urban areas*, Accessed 11<sup>th</sup> March 2019 from <http://demographia.com/db-worldua.pdf>

Contemporary characteristics of mega/world cities.

The 2014 revision of the World Urbanization Prospects by UN DESA's Population Division notes;

- In 1990, there were ten “mega-cities” with 10 million inhabitants or more, which were home to 153 million people or slightly less than seven per cent of the global urban population at that time.
- In 2014, there are 28 mega-cities worldwide, home to 453 million people or about 12 percent of the world’s urban dwellers.
- Of today’s 28 mega-cities, sixteen are located in Asia, four in Latin America, three each in Africa and Europe, and two in Northern America.
- By 2030, the world is projected to have 41 mega-cities with 10 million inhabitants or more.

Tokyo remains the world’s largest city with 38 million inhabitants, followed by Delhi with 25 million, Shanghai with 23 million, and Mexico City, Mumbai and São Paulo, each with around 21 million inhabitants. Osaka has just over 20 million, followed by Beijing with slightly less than 20 million. The New York-Newark area and Cairo complete the top ten most populous urban areas with around 18.5 million inhabitants each. <sup>1</sup>

Although megacities are very different in their character, sense of place and make up, these cities do have some common economic, political, cultural and infrastructural characteristics;

Economic	Political
<ul style="list-style-type: none"> <li>• Serve as the corporate headquarter sites for multinational corporations, international financial institutions, law firms, conglomerates, and stock exchanges that influence the world economy. Such as the FTSE in London and Barclay’s Bank</li> <li>• Contribute significant financial capacity/output to the city's, region's, or even nation's GDP</li> <li>• House the major stock market indices/market capitalisation</li> <li>• Provide a variety of international financial services, notably in the FIRE industries, banking, accountancy, and marketing</li> <li>• Appear near the top of cost of living lists and have significant agglomerations of personal wealth, e.g. in the number of billionaires residing within the city</li> </ul>	<ul style="list-style-type: none"> <li>• Active influence on and participation in international events and world affairs.</li> <li>• Hosting headquarters for international organizations such as the World Bank, NATO, or the UN.</li> <li>• A large proper, population of the municipality (the centre of a metropolitan area, typically several million) or agglomeration</li> <li>• Diverse demographic constituencies based on various indicators: population, habitat, mobility, and urbanisation</li> <li>• High quality of life standards</li> <li>• Expatriate communities</li> </ul>
Cultural	Infrastructural
<ul style="list-style-type: none"> <li>• International, first-name familiarity. Cities such as New York City, Los Angeles, Tokyo, Paris, and London are commonly referred to without needing to specify their country.</li> <li>• Renowned cultural institutions (often with high endowments), such as notable museums and galleries, notable opera, major ballet companies, orchestras, notable film centres and theatre centres. A lively cultural scene, including film festivals (such as the Toronto International Film Festival), premieres, a</li> </ul>	<ul style="list-style-type: none"> <li>• An advanced transportation system that includes several highways and/or a large mass transit network offering multiple modes of transportation (rapid transit, light rail, regional rail, ferry, or bus), for example, the Tokyo Metro.</li> <li>• Extensive and popular mass transit systems, prominent rail usage, road vehicle usage, major seaports</li> <li>• A major international airport that serves as an established hub for several international</li> </ul>

<p>thriving music scene, nightlife, an opera company, art galleries, street performers, and annual parades</p> <ul style="list-style-type: none"> <li>• Several influential media outlets with an international reach, such as the BBC, Thompson Reuters, The New York Times, or Agence France-Presse</li> <li>• A strong sporting community, including major sports facilities, home teams in major league sports, and the ability and historical experience to host international sporting events such as the Olympic Games, FIFA World Cup, or Grand Slam tennis events</li> <li>• Educational institutions; e.g., renowned universities, international student attendance, research facilities</li> <li>• Sites of pilgrimage for world religions (for example, Mecca, Jerusalem or Rome)</li> <li>• Cities containing World Heritage Sites of historical and cultural significance</li> <li>• Tourism throughout</li> <li>• City as site or subject in arts and media, television, film, video games, music, literature, magazines, articles, documentary</li> </ul>	<p>airlines, for example, Los Angeles International, Atlanta, Tokyo, and Chicago O'Hare. Airports with significant passenger traffic and international passengers, traffic or cargo movements.</p> <ul style="list-style-type: none"> <li>• An advanced communications infrastructure on which modern trans-national corporations rely, such as fiberoptics, Wi-Fi networks, cellular phone services, and other high-speed lines of communications. For example, Seoul and Tokyo are known as the digital and technology capitals of the world.</li> <li>• Health facilities; e.g., hospitals, medical laboratories</li> <li>• Prominent skylines/skyscrapers (for example Chicago, Hong Kong, New York, Sao Paulo or Tokyo)</li> <li>• Cities' telephone and mail services, airport flights-range, traffic congestion, availability of water, train facilities, nearby parks, hospitals, libraries, police stations, etc.</li> </ul>
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Megacities do have a huge impact upon the environment in many ways. They have a huge **ECOLOGICAL FOOTPRINT (the size of area that is required to sustain the megacity population)** – drawing in resources and distributing waste well beyond their boundaries.

1. For example, the population consumes food and energy and produce waste in solid, liquid, and gaseous form. This is so that they can sustain themselves and pursue business activities such as manufacture or services. The high population density in cities means that only small quantities of food nor raw materials or energy can be produced locally. As a result, additional impacts on the environment occur through transportation of goods and waste products in and out of the cities. <sup>2</sup>
2. They produce atmospheric pollution locally that have a short-term impact such as Ozone
3. Cities also emit to the atmosphere gases that have a longer term impact, such as carbon dioxide (CO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), and sulphur dioxide (SO<sub>2</sub>). <sup>2</sup>

According to Folbertha et al <sup>2</sup> “the Tokyo metropolitan area extends over 2188 km<sup>2</sup> with a total population of 13,189,000 inhabitants amounting to a population density of 6028/km<sup>2</sup> ([Tokyo Metropolitan Government, 2011](#)). Assuming a biocapacity of the Earth of 1.8 persons per hectare...the Tokyo metropolitan area would require 237,402 km<sup>2</sup> or roughly two thirds of Japan to sustain itself.”

## **SOURCES**

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2 - Gerd A. Folbertha et al (2015) - *Megacities and climate change – A brief overview*, Environmental Pollution, Volume 203, August 2015, Pages 235-242. Accessed on 28<sup>th</sup> December 2019 at

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**Urban PROCESSES - Urbanisation, suburbanisation, counter-urbanisation, urban resurgence.**

**Generally, there are 4 processes associated with the growth of urbanisation. They follow a general time order of;**

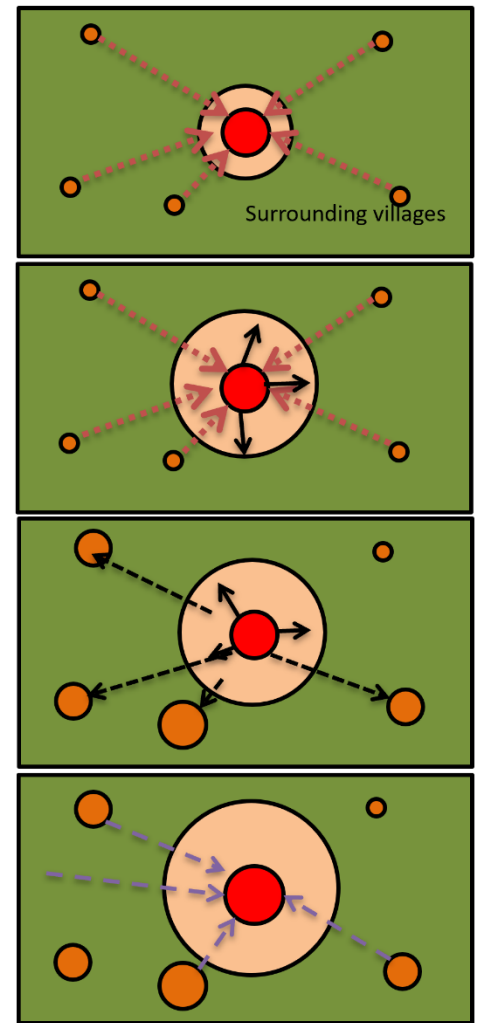
1. A period of initial **urbanisation** where a settlement starts to grow as a result of physical and human factors
2. A period of **suburbanisation** where the city grows outwards from its central core to sprawl or spread out into the surrounding environment
3. A period of decline in either population or industry or both during **counter urbanisation**, where people and businesses move because of push factors within the city and attractive pull factors in surrounding areas OUTSIDE of the city limits
4. A new phase of **URBAN RESURGANCE**, where economic or political decisions make the urban area attractive again, dragging people and businesses back to the urban core/area.

**Urbanisation** – people move into a settlement, often accompanied by industrialisation

**Suburbanisation** – City spreads outwards into surrounding hinterland

**Counter urbanisation** – people move out of the city and back into surrounding rural areas and villages

**Reurbanisation** – regeneration/redevelopment in cities brings people back into the urban area



**Economic, social, technological, political and demographic processes associated with urbanisation and urban growth.**

**Urbanisation.**

**Urbanisation in HICs**

HICs in the World's economic core have experienced Urbanisation for hundreds of years. In the UK, this was largely following the **Industrial Revolution** in late eighteenth and early nineteenth centuries. In addition, population densities in HIC cities tend to be lower than in the developing world. Growth in cities in developed world cities has either stabilised or some cities have even gone into decline.

**Urbanisation in LICs and NEEs**

Urbanisation is a more recent arrival in LICs and NEEs. The growth over the past fifty years of many developing world cities has had major implications for the people living there and the management of those issues. NEEs (Newly Emerging Economies) have urbanisation that takes place with rapid industrialisation, as has been witnessed in Brazil and South Eastern China, whilst in some LDCs (Least Developed Countries) urbanisation takes place in the relative absence of industrialisation, people forced to cities to live in poor conditions with limited opportunities for jobs. <sup>3</sup>

**Indeed, we must consider to what extent are the two processes of urbanisation and industrialisation mutually dependent? In other words, does urbanisation rely upon the growth of industries, or are there other factors that drive urban growth?**

**The UK, industrialisation and deindustrialisation**

In cities in the UK industrialisation went hand in hand with urbanisation, as evidenced by the coal and then shipping industry in Newcastle-upon-Tyne fuelling the growth of the city. Lancashire had huge growth in its towns around mills, towns such as Blackburn and Bolton owe their growth to this industry. Middlesbrough grew up around the steel industry, ship building and petro-chemicals. Indeed, Britain is a great example of a place that exemplifies the HISTORICAL link between industrial growth and decline, and urbanisation.

More recently, the movement of heavy industry and textiles to other countries that can produce goods more cheaply has resulted in the **deindustrialization of many urban areas** particularly in the North of England, and population levels have fallen as a result. Most of the growth of settlements in Britain is found in settlements further South, or in places that have active high technology industries and services industries such as Edinburgh.

However, modern urbanisation is not necessarily associated with traditional industrialisation in the UK. There are **Post Industrial cities** in the UK that are growing due to the growth of the knowledge and service sectors of the economy.

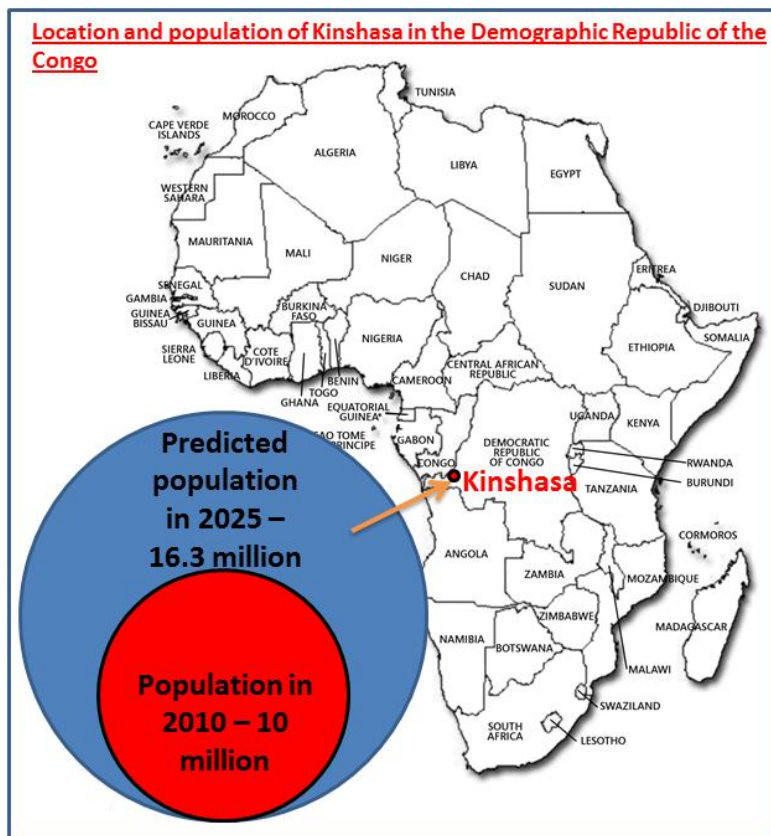
### CONSUMPTION CENTRES VERSUS PRODUCTION CENTRES

However, many places grow without industrialisation, and many people end up as slum dwellers. Greg Hoare notes that “There were more than one billion slum dwellers in 2005 (even using the UN’s most restrictive definition). There are probably more than 200,000 slums on earth, ranging in population from a few hundred to more than a million people. Slum populations, according to the UN, are currently growing by a massive 25 million each year. In 2003, China had 194 million and India 158 million slum dwellers; the USA had 12.8 million. A third of the global urban population live in slums. In the least developed countries, this figure stands at four in five.”<sup>4</sup>

These types of development are known as consumption centres rather than production centres (cities that grew up around industrialisation and hence production).<sup>3</sup>

### LICs e.g. Kinshasa in DRC

For example, Kinshasa in the Congo has a 6.29 million predicted increase in population by 2025. Its current population (2010) is over 10 million, up 4 million since 2001. It is a sprawling megacity in the Democratic Republic of Congo and is ill prepared for its place as one of the world’s fastest-growing cities. That’s because Kinshasa is still rooted in the primary economic sector, trading in natural resources (copper, cobalt, diamonds, gold, zinc, and other base metals) that are quickly being depleted. Aside from the city’s lack of preparedness, violence is a daily occurrence in Kinshasa, as the entire nation reels from years of lawlessness and civil war. This has swelled the growth of the city over recent decades, as people flee to the city, again, urbanisation in the absence of industrialization for many of the residents of Kinshasa. A dangerously high crime rate is poised to keep rising as the disparity between rich and poor continues to increase. Housing takes the form of sprawling slums, infrastructure is hardly maintained, and civil services in Kinshasa are virtually non-existent — all of which means the city will need to make huge strides to bolster the weight of its expanding population.<sup>1</sup>



Positives of urbanisation	Negatives of urbanisation
Urban areas tend to have a much better provision of education and services, basic infrastructure (roads, availability of piped water, electricity etc.) as it is easier to deliver these services en masse to large populations	Encourages the growth of unplanned and illegal shanty towns. The <b>land occupied by shanty towns is often unsuitable</b> for dense urban settlement and, as the shanties continue to grow, the risk of environmental damage e.g. landslides (favela's) of <b>Rochina in Rio de Janeiro</b> and flooding (Dhaka in Bangladesh). In Dharavi the slum is built on an old swamp around sewage pipes.
Cities in LICs can have large informal sectors (jobs that are easy to set up and in which the employees are not covered by employment law and do not pay tax). This provides opportunities for local people. Informal industries can also formalize over time, and eventually contribute to tax bases as seen in the case of Dharavi in Mumbai, India.	Informal sector employment rarely receives support from government and is often subject to harassment. A complete lack of business support and credit often restricts legitimate development.
Infant mortality is lower in cities and life expectancy tends to be higher than in rural areas. The concentration of education, health care and family planning services allows more efficient delivery of, for example, literacy campaigns and campaigns focusing on children and women.	Universities and health centres are usually located in wealthier areas and as such are inaccessible to most of the population, resulting in continually deteriorating health quality in the city.
Industry and finance services can concentrate in cities allowing <b>agglomeration</b> of these industries and cost savings. Those industries which are advantageous to one another cluster together in the urban area where there is both a ready market and access to external markets and labour.	Environmental problems can be found in cities that are rapidly urbanizing. This was true in the industrial revolution in the UK and it is true today in China's growing cities. Water pollution can be a major problem as seen in cities along the Ganges, and local water shortages can also occur. <b>Mexico city has actually subsided because of</b> over abstraction from the aquifer beneath the city has led to widespread subsidence.
Shanty towns can actually solve housing issues in rapidly urbanizing poorer nations. Allowing people to construct their own homes with help and guidance as seen in self-help housing schemes offers a solution to housing shortages.	Huge <b>INEQUALITIES</b> in wealth often exist in rapidly urbanizing cities. This is not healthy socially and can breed resentment within the city between wealthy ruling classes (often in gated communities as seen in Lima) and poorer classes of people.
The mega-city becomes a magnet for immigration, often as the primary city in the country (e.g. <b>Lagos</b> in Nigeria) when rural employment opportunities decrease (through mechanisation of agriculture and surplus rural labour) and inward investment is concentrated in the urban areas.	Overpopulation can occur when the inward movement of people is faster than the pace of economic and social development in the urbanizing area.

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## Suburbanisation: characteristics, causes and effects.

Suburbanisation can be defined as the outward growth of urban development which may engulf surrounding villages and towns into a larger urban agglomeration. Indeed, the suburbs are the outlying areas of a city which are close enough to the city centre to be accessible by commuters.

**Both people and businesses can be involved** in this suburbanisation process.

Essentially it is a part of urbanisation, in that it increases the proportion of people that live in towns and cities in comparison to those in rural areas. As suburbs grow they attract both people from rural areas AND from inner city and CBD areas, who are attracted by the greater amount of space within the suburb.

Suburbanisation results in the physical spreading of a city into surrounding countryside areas, known as **URBAN SPRAWL**, and this puts pressure on greenfield sites and on nature. In Britain the suburbs are predominantly residential in nature and have often rural characteristics such as larger gardens and tree-lined avenues.

### Types of suburbs

Not all suburbs are the same, and there are several distinguishable types. Although many suburbs are populated by the urban middle class, they are not uniform in many respects.

In the UK, the **TIME** when they were built, the planners that were involved and the physical surroundings of the environment can all influence the characteristics and layout of a suburb.

1. During the **industrial revolution**, richer classes fled to suburbs away from industrial areas, living in large **terraced town houses** (e.g. Jesmond in Newcastle is North of the city and well away from the old industrial areas south along the river).
2. During **the interwar period** plot sizes were ample and **semi-detached and detached housing** was favoured in many locations, High Heaton in Newcastle is a good example of this. Recreational facilities, local shops and low building densities were characteristic features.
3. **More recently** land prices have risen, and land is at a premium as population grows in Britain, so building densities have increased and many modern suburbs include flats and taller town houses with smaller gardens. Cunning developers can also market detached houses with little space between the buildings.
4. **Councils also built social housing estates at the edge of cities, such as Kenton in Newcastle.**

### Causes of suburbanisation

1. Suburban house building has also been affected by transport and communication innovations - continuing improvements of routes to the city centre, the development of underground railways, tram lines, etc. have all affected the suburbs and their development. <sup>1</sup>
2. The development of telecommunications including the internet allows people to home work
3. High housing prices in the centre of cities forces people to look elsewhere
4. Push factors from the inner city could also be a cause, with populations seeking to escape possible crime and perceptions of low quality environments. <sup>2</sup>

All of these factors mean that suburbs may actually be quite varied in their size and type of housing. Newcastle Great Park, for example, is perfectly placed alongside the A1 in Newcastle.

These patterns are further complicated in Britain because we have huge social housing projects (council housing) that have provided affordable housing for people generally on lower incomes, also in suburban locations.

In addition, it should be considered that suburbs in Britain are not the same as suburbs in other European cities and suburbs in the USA and Australia. These tend to be much lower density and increase dependency upon the car.

### Positives and negatives of suburbanisation:

	Positives	Negatives
Inner city	<p>Suburbs mean that there is less need for high-rise, high-density housing, such as in deindustrialised areas of Newcastle, leading to clearance and replacement by low-rise, low-density housing. This is better for residents.</p> <p>The greater availability of space created by clearance of inner-city areas allows for improved communication networks</p> <p>Derelict land can be cleared in the Inner city allowing for increased opportunity for environmental improvement of that land to create recreational open spaces.</p>	<p>Suburbanisation can lead to the decline of inner-city areas as skilled people and businesses move away.</p> <p>This means that the suburbanisation of jobs leads to employment opportunities, leading to lower employment opportunities which leads to a spiral of decline.</p> <p>Communities are split up and damaged as people migrate out to the suburbs.</p> <p>Suburbanisation means that more buildings are left vacant. These buildings might be dangerous, look bad and stop people investing in the area (inward investment).</p> <p>The large income gaps between suburb and inner city lead to polarisation and resentment. This results in <b>SOCIAL EXCLUSION and SEGREGATION</b>, as many people cannot afford to live in the suburbs</p>
Rural urban fringe	<p>The local tax base increases which means that councils can afford to develop new facilities and services in the expanding suburbs.</p> <p>As wealthy people move in there is increasing demand for recreational facilities such as golf courses and gyms</p> <p>Wealthy people also want to shop, and in Britain this has created demand for retailing which has resulted in the development of retail parks at the edge of the city</p> <p>There are increasing employment opportunities in offices and shops such as at Baliol Business park in Longbenton</p>	<p>Land increases in price as demand increases at the city edge.</p> <p>The green belt, designed to limit city growth, is put under increasing pressure</p> <p>There is increased commuting therefore increased congestion and pollution.</p> <p>Decay of local village community atmosphere</p> <p>The city increases in size as the demand for low density housing increases.</p> <p>Urban SPRAWL occurs, low density urban development that damages the environment and increases commuting.</p>

### The housing and suburbanisation issue

Suburbanisation is a big issue in the UK because it is a reasonably small country in terms of surface area which has a large and growing population (the ONS thinks we could hit **70 million people** in 2033)<sup>3</sup>. This gives Britain a high population density, particularly in the South of the country. The result of this is housing shortages and high property prices. The number of households has risen by 30% in the UK since 1971 and in part this is because more and more people live on their own. This is coupled with rising life expectancies and high levels of immigration, all combining to produce a housing shortage.

The UK has a housing crisis, the National Housing Federation released a report in 2019 stating that *“the country needed 340,000 new homes every year, including 145,000 social homes, to meet the housing demand”* <sup>4</sup>

WHERE SHOULD THESE HOUSES BE BUILT?

**There are 2 possibilities, on brownfield sites or on greenfield sites.**

Green belt– a tract of open land consisting of farmland woodland, and open recreational areas surrounding urban areas. They are protected by law from new building, unless the government deems it necessary to build there.

Greenfield site– a term used to describe any area of land that has not been developed previously.

Brownfield site – an old industrial or inner city site that is cleared for a new building development.

Advantages of building on Greenfield sites	Advantages of building on Brownfield sites
<ul style="list-style-type: none"> <li>1) There is no need to clean up the site from previous land uses therefore can work out cheaper.</li> <li>2) Existing road networks are not in place so don't restrict planning</li> <li>3) They are often on the edges of cities where land is cheaper</li> <li>4) Planners and architects have a blank canvas to work with</li> <li>5) More space is available for gardens</li> <li>6) The edge of city countryside environment can appeal to buyers and businesses.</li> <li>7) Sites on the edge of the city are often close to major motorways providing great access</li> </ul>	<ul style="list-style-type: none"> <li>1) It is more sustainable as existing developed land is being used</li> <li>2) They stop city expansion as they are already within the city - this stops the loss of countryside and reduces journey times as the city is more compact</li> <li>3) Road networks already exist, as do electricity and gas networks, although these may need updating</li> <li>4) It is easier to gain planning permission as councils are keen to reuse the brownfield sites.</li> <li>5) The sites are closer to the CBD for shopping and job opportunities</li> </ul>

Building in the green belt on undeveloped green field sites is a very controversial and contentious issue. The fact that land is cheaper and often more accessible at the edge of the city has meant that Light industry (e.g. Atmel at Silverlink), High Tech Industry (e.g. Sage at Newcastle Great Park) and retail (e.g. the Metro Centre) like to locate there.

One such controversial scheme was developed at the Northern Edge of Newcastle upon Tyne, at Newcastle Great Park.

## Case study of Urban Sprawl and the Brownfield versus Greenfield debate – Newcastle Great Park and Scotswood

Newcastle Great Park is controversial housing and high tech industrial scheme developed at the Northern edge of the city within the greenbelt. Building of the suburb started in 2001.

It is located in the north of Newcastle next to Gosforth and the government gave special permission for this development to go ahead. There are many different interest groups who think the development should go ahead including the developers (Persimmons homes), the government and the council and some homeowners.

Conservationists and environmentalists, some homeowners and some urban planners think the scheme is a bad idea.



*Homes at Newcastle Great Park*

Newcastle Great Park (NGP) is also close to the A1 road. It is a major development with land allocated for:


- A Business Park
- Housing
- Town Centre
- Schools
- Nursery Provision
- Community Facilities
- Open Space
- Play Areas and Outdoor Sport

The scheme is being delivered by the **Great Park Consortium**, which includes the house builders Persimmon Homes, and Taylor Wimpey. Parts of the development have also been built by Barratt.



*Red dot shows the location of Newcastle Great Park*



Arguments for NGP	Arguments against NGP
<ol style="list-style-type: none"> <li>1. Originally 2,500 new homes in a parkland setting of 442 hectares have been completed. An extra 1,200 homes were announced to be built from 2018.</li> <li>2. There will be 80 hectares of commercial development which could generate jobs. Newcastle computer group Sage have their £50m headquarters there. The software firm's 575,000 sq ft building headquarters provides jobs for 1,500 workers.</li> <li>3. Income has been generated for the developers</li> <li>4. There is an integrated transport plan which will see every home not more than 400 metres from a bus stop, 27km of cycle routes in and around NGP, a discount cycle purchase scheme for residents and a car share database on the Internet. 5</li> <li>5. A full-time ranger will be employed to manage the country park to ensure local wildlife conservation.</li> <li>6. The development lies adjacent to the A1, which will be widened and improved, and is within easy reach of the airport, providing excellent opportunities for national and international travel.</li> <li>7. Originally, it was hoped that the scheme will slow down the net loss of 1,500 people per year who migrate from Newcastle.</li> <li>8. There has been money put into landscaping and Sustainable urban drainage in the park, wetland and reed bed areas designed to reduce the amount of flooding.</li> </ol>  <ol style="list-style-type: none"> <li>9. Brunton First School opened in September 2009 and there are plans for a 1,200 pupil secondary school.</li> </ol>	<ol style="list-style-type: none"> <li>1. The three-storey properties priced from £200,000 are well beyond the average wage of people in Newcastle.</li> <li>2. Environmentalists are concerned about the impact upon Red Squirrel (an endangered species) and deer populations which inhabit this area North of Newcastle.</li> <li>3. The NGP housing plans contradict the principles of no/little development in the Green Belt. The greenbelt was designed to prevent urban sprawl into countryside areas which have recreation and agricultural uses.</li> <li>4. There is space for around 20,000 high quality homes on brownfield sites near to the city centre in the East and West end of the city. These areas (e.g. Scotswood, Benwell and Walker) are in decline since the loss of the shipping industry and are in need of a boost.</li> <li>5. There is no guarantee of job creation. Sage opened there in 2004 but in 2019 announced they will move to another part of the city at Cobalt business park.</li> <li>6. Traffic volumes in Gosforth and Newcastle city centre will increase.</li> <li>7. Improving inner-city areas could slow down out migration.</li> <li>8. Over 8,000 people signed a petition against the 2018 extension, with Save Newcastle wildlife arguing that there would be massive impacts on red squirrel populations</li> <li>9. There is still no town centre! According to the Great Park Action Group – “For the past 10 years, the Great Park Consortium has promised all current and prospective residents 18 retail units, a supermarket, a pub and a beautiful landscaped area. As of yet NONE of this has been delivered.”<sup>6</sup></li> <li>10. The areas being built on since 2018 are prone to flooding.</li> </ol>

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## Counter-urbanisation

Whilst urbanisation and suburbanisation have resulted in large scale urban area growth, counter-urbanisation has **had the opposite effect**.

Indeed, counter urbanisation is when large numbers of people move from urban areas into surrounding countryside or rural areas. It is both a demographic (population driven) and social process; and has to a lesser extent also involved the movement of some businesses and economic activities. Radstats state that “the 20 major UK cities lost 500,000 jobs between 1981 and 1996, while the rest of the country has gained 1.7 million jobs.”<sup>1</sup>

### Causes

The cause of counter-urbanisation is linked to the push and pull factors of migration. It first took place because of flight from the Inner cities in Britain, often because of economic problems in those areas. The collapse of inner-city industries resulted in large scale unemployment and a cycle of decline and deprivation in those areas. Newcastle-upon Tyne is no stranger to this process, as its heavy industries of armaments and ship building led to dereliction of inner-city communities along the river side. Poor quality housing and low environmental quality can also force people away from the inner city.

**Pull factors** can also play a role. People want a better quality of life and they want to be able to live in a clean and quiet area. An area without air and noise pollution from heavy industries, the crime of urban environments and the lack of opportunities found in some parts of cities. They also aspire to having larger houses with more land for cheaper prices compared to the large towns and cities.

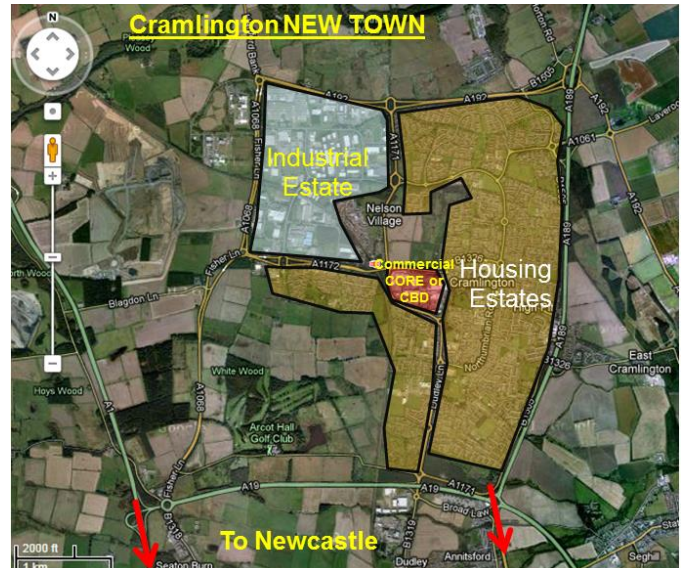


### Government Policies

The Government of the UK also promoted this movement through its Green belt and New Towns policy (New Towns Act of 1946)<sup>2</sup>. The green belt policy restricted growth within the city boundaries and forced developers to look just outside of the city boundaries for other villages to develop. These new towns develop into **commuter towns** or **suburbanised villages**, also known as **dormitory towns** as people sleep and live in those towns but work elsewhere. Milton Keynes is a good example next to London, whilst Crumlington and Washington act as new towns for Newcastle upon Tyne and Sunderland respectively. There are 21 New Towns in England, established by statute and designated between 1946 and 1970. The father of the British New Town movement was the Victorian Ebenezer Howard, who wrote the book Garden Cities of Tomorrow and created the garden cities of Letchworth and Welwyn. Of the 11 New Towns designated in Britain between 1946 and 1955, eight were London ‘overspill’ or satellite towns and were welcomed by the London County Council.

## Cramlington New Town

Cramlington is just 8 miles north of Newcastle but is outside of its greenbelt. It was originally a coal mining pit village but followed the New Town model in the 1960s and 70s. It received the go ahead in 1963 at the cost of £60million.<sup>3</sup> It was massively expanded around its old core; and can be viewed as square in structure in between major transport links (the A19 to the South and the A189 to the East) with a railway link running through it. The square structure was divided into 4 quarters, with an industrial sector in the North West away from the residential areas in the East and a commercial area in between. Many of the classic new town features can also be observed, including cycle and walk ways, leisure facilities, good schools, road access and great transport links.



Indeed, according to [parliament.uk](http://parliament.uk) “the 1946 New Towns Act established an ambitious programme for building new towns. It gave the government power to designate areas of land for new town development. A series of ‘development corporations’ set up under the Act were each responsible for one of the projected towns. Stevenage, in Hertfordshire, was the first new town created under the Act, with ten others following by 1955. Most were intended to accommodate the overspill of population from London. Since the 1950s, Parliament has authorised further developments in England, Scotland and Wales”.<sup>2</sup> You can see a public information film (great archive footage!) about new towns here ([http://www.nationalarchives.gov.uk/films/1945to1951/filmpage\\_cint.htm](http://www.nationalarchives.gov.uk/films/1945to1951/filmpage_cint.htm))

In addition to these reasons, the growing popularity of the 'out-of-town' industrial and business parks as industry also became unsatisfied with inner city areas has promoted the growth of counter-urbanisation. Around Newcastle there are several good examples of this. Recently, improvements in rural transport infrastructures and increased car ownership have allowed a greater freedom of choice when people choose where to live. In addition, the growth in Information Communication Technology (E-mail, Video-conferencing, Broadband) has allowed further freedom as people can home work.

## The effects

1. Cities can shrink in size, and the demographic and economic of their areas can undergo significant change.
2. Country villages are becoming increasingly suburbanised, they can therefore grow quickly and lose their original character and charm.
3. Second homes are often bought in this counter-urbanisation process, often in more scenic areas of the countryside such as National Parks. In this case, people buy an additional property for use as a holiday home, but do not move there permanently. This has a negative impact on communities as houses can stand unoccupied for most of the year.
4. House prices can be pushed up locally as migrants sell expensive city properties and earn higher city wages. The net result of this is that locals and in particular the young can be forced away as they are priced out of their own communities.
5. Supermarkets and other businesses that are attracted to suburbanised villages that result from counter-urbanisation can have a massive impact on local services. Traditional rural services start to close as the new population will be reliant on the services of the urban environment such as the supermarket. The closures of village stores and post offices have caused major problems in many rural areas.
6. Public transport goes into decline because the new residents are car owners. This can be a major problem for village residents without their own transport, particularly the elderly.

7. Traffic congestion increases as a large percentage of the migrants will be commuting to work traffic congestion increases.
8. Counter-urbanisation affects the layout of rural settlements, modern housing is built on the outside of the area and industrial estates are built on large main roads leading into the settlements. This has been the case in Cramlington, where the old core of Cramlington of the old pit village has been surrounded by housing estates and industrial estates.
9. Inner city areas are left with derelict buildings, struggling shops and a cycle of decline.
10. Middle class immigrants – social structure changes -local resentment caused
11. Improvement in services in counter urbanised areas– e.g. gas mains, cable TV, supports local schools
12. Supports some local facilities (e.g. pub, builders etc.) – although others may close
13. Primary schools might flourish (or close) – young population - increase nursery provision
14. Housing fabric improved, new housing, barn conversions.
15. Light industry may develop, B&B, small hotels, bistros

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## Urban resurgence: characteristics, causes and effects.

The rise of the motorcar and the cheapness of land at the edge of the city led to a rise in out of town shopping centres and the suburbanisation of people from the 1960's to 1980's. Shopping centres such as Meadowhall in Sheffield, Lakeside in Essex and the Metro Centre Gateshead all developed and posed a threat to city centre shopping. At the same time, a lack of investment in the CBD (central Business District) led to the dereliction of some buildings and a general decline in the shopping environment. In addition, city centres suffered from crowding, poor air quality, a crime ridden image and poor parking availability. There was genuine concern that many CBDs and inner cities would not survive and that we would experience the **urban doughnut effect (also known as the Polo effect)**

### Urban Resurgence Initiatives

Initiatives were put into place in order to try and protect and revitalise the CBDs of many cities, this is known as urban resurgence. Urban resurgence, also known as reurbanisation, involves improving the social, economic and environmental fabric of inner city areas by;

1. Pedestrianisation was one method - restricting motor vehicle access along shopping streets and allow shoppers to feel safe and have good air quality.
2. CBD shopping centres were covered to prevent people being exposed to adverse weather - Eldon Square in Newcastle is a good example of this.
3. Money was spent on the public realm - all of the street furniture and paving, to ensure that the shopping environment looks nice.
4. Grants were made available to retailers to take on derelict buildings. This happened in Grainger Town in Newcastle.
5. Investment was made in Gentrifying (making buildings look nice!) the outside of old and historic buildings, as happened along the Quayside area of Newcastle.
6. Large scale clearance and rebuilding of areas – essentially starting again in the most deprived and derelict areas

There are some major policy initiatives from the UK in the past 30 years that have resulted in many but not all British CBDs staged a revival as places to live, work and shop. Not all city centres have recovered in the same way, Newcastle's CBD has been very successful in becoming a thriving place, but nearby Gateshead has suffered long periods of empty shops and low tenancy ratios (a recent revamp to the city centre may change this!).

Many urban resurgence schemes are linked to urban policies since 1979 in the UK and are covered later



## Urban change: deindustrialisation, decentralisation, rise of service economy.

Urban areas in the UK and many other HICs have endured great change over the past 60 years, some evolutionary and some revolutionary. Some of these changes have evolved slowly whilst some have been revolutions of rapid change.

**Urban Change** involves any change within the urban environment associated with growth or decline of an urban area. Some changes are for the benefit of people, whilst others are negative. The Industrial revolution which took place during the late 1700s and early 1800s saw the mechanization of agriculture and textile manufacturing and a revolution in power, including steam ships and railroads, this resulted in massive city growth across Europe. A newer set of process are occurring in HICs today with Inner city locations suffering as they are avoided by newer manufacturers and service industries in favour of edge of city sites resulting in Urban decline.

### Deindustrialisation

One of the major causes of urban change in the past 50 years have been Deindustrialisation and the relocation of manufacturing industry and jobs. Deindustrialisation is a process involving the loss of manufacturing industries in many HICs. This has occurred because of a multitude of factors, including;

1. **Competition from abroad** – this resulted in deindustrialisation in British cities, particularly from emerging industrialising economies such as the Asian Tigers and BRIC economies
2. **Mechanisation** -the process of changing from working largely or exclusively by hand or with animals to doing that work with machinery. Resulted in unemployment in many manufacturing industries and continues to this day with increasing use of robotics, computers and automation.
3. **Reduced demand** of certain manufacturing products also led to deindustrialisation resulting in urban decline.
4. **Greater value-added and productivity in the service industries** – this prompts businesses and governments to focus in those areas. <sup>1</sup>

The table below shows how the number of workers involved in manufacturing has changed in the UK over the years;

	Number of manufacturing worked in UK
1978	6.711 Million
2010	2.563 Million
2017	2.685 Million

Source <sup>2</sup>

This deindustrialisation process has been accompanied at the same time by the decentralisation of industries and the rise of the service economy.

### Decentralisation & the rise of service economy

**Decentralisation** is the movement of population, shops, offices and industry away from urban centres in HICs and NICs into housing estates, retail and business parks in the suburbs and on the fringes of cities. This has occurred at the same time as the rise of service economy (the increased importance of the service sector in industrialized economies).

These service industries are not tied to transport links and major raw materials in the same way as traditional heavy industries that arose in the industrial revolution and thereafter. Their products and raw materials are light or non-existent if they are based in the knowledge industries. This means that the Service industries can be said to be **Footloose**. Footloose relates to commercial, industrial, or financial operations that are unrestricted in their location or field of operations and able to respond to fluctuations in the market. This applies to many service industries and to many TNCs. The service industries fall into 2 broad categories;

#### **Key words**

##### **Urban decline**

The deterioration of the inner city often caused by lack of investment and maintenance. It is often but not exclusively accompanied by a decline in population numbers, decreasing economic performance and unemployment.

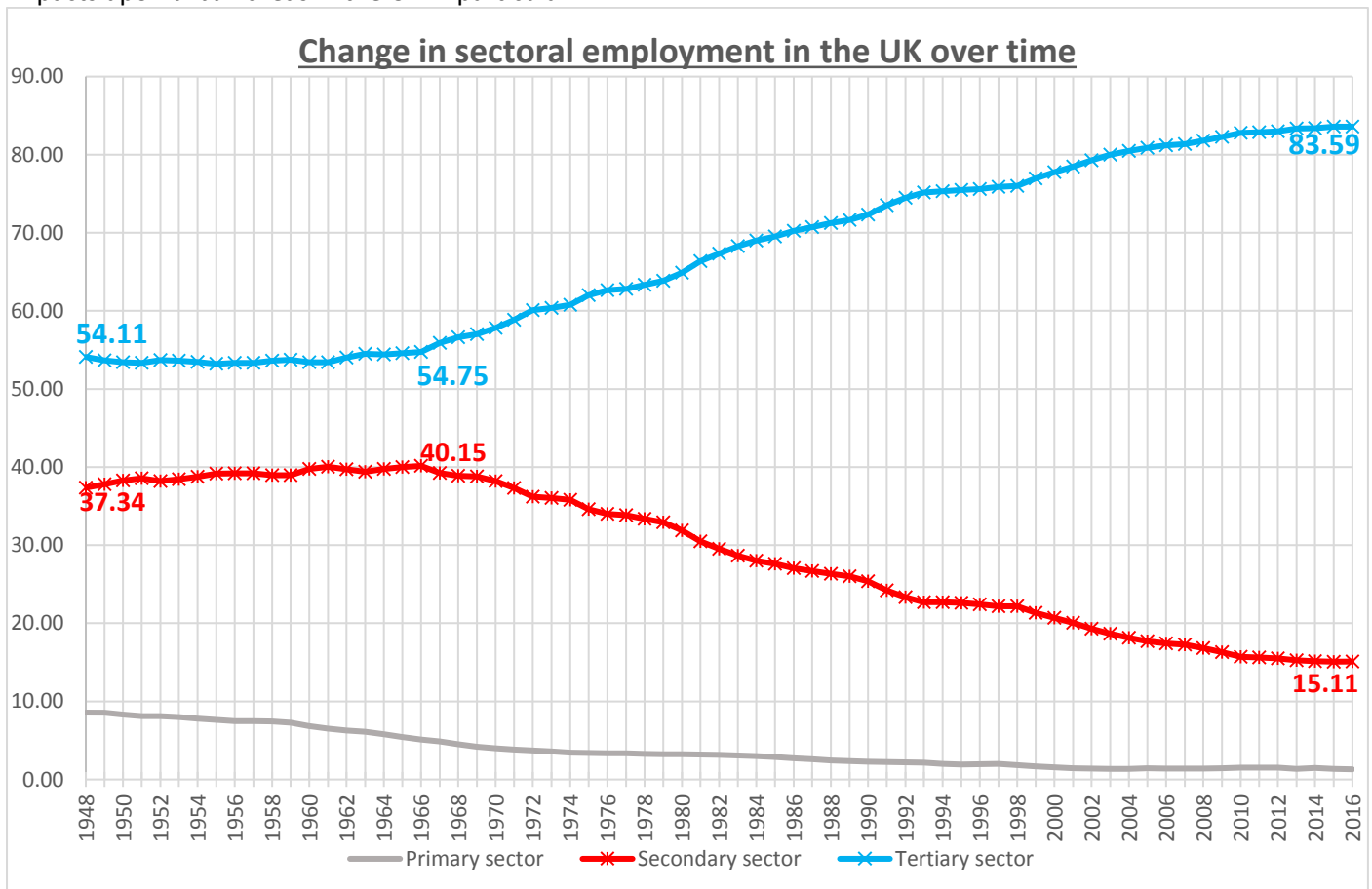
##### **Urban deprivation**

A standard of living below that of the majority in a particular society that involves hardships and lack of access to resources. Places suffering from urban deprivation have visible differences in housing and economic opportunities between the rich living alongside poor people.

1. **Tertiary industries** - Part of a country's economy concerned with the provision of services such as retailing, finance, transport, health and education
2. **Quaternary industries** - involves the intellectual services: research, development, and information. Massive growth industry in the UK with large economic output

The current list of Fortune 500 companies contains more service companies and fewer manufacturers than in previous decades.

All of these changes are summarised below, showing the change in % employment over time in the UK. Service industries rise significantly, whilst secondary manufacturing industries decline. These changes had significant impacts upon urban areas in the UK in particular.

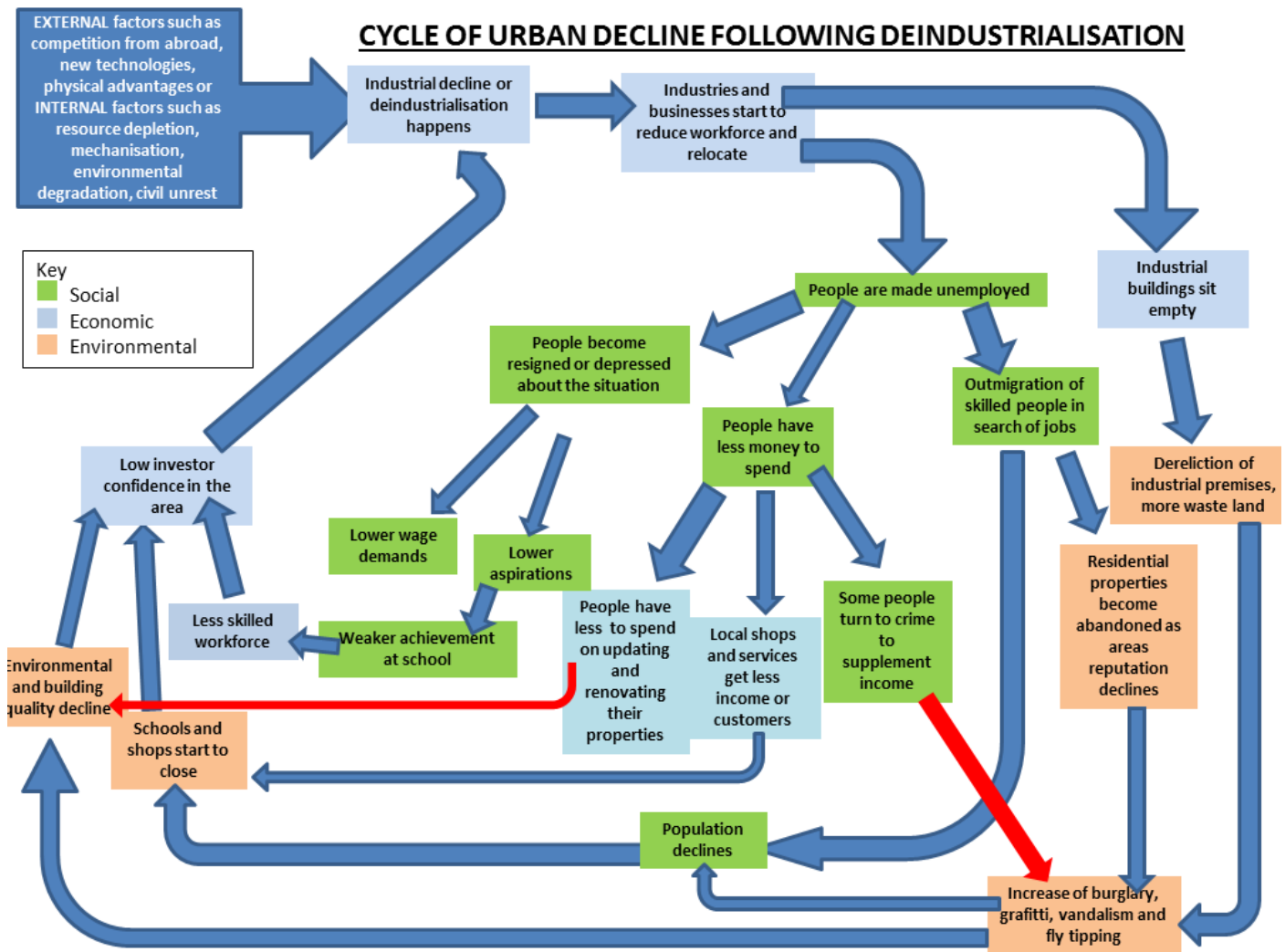


### **Impacts of decentralisation, deindustrialisation and the rise of the service economy.**

Social Impacts of deindustrialisation in urban areas include an increase in unemployment, higher levels of social issues such as crime, drug abuse and family breakdown, and the out migration of skilled population. This had had an economic impact too, with a **de-multiplier effect**, decline in property prices, loss of jobs, lower disposable incomes, loss of local tax base. The environment of central areas suffered too, with dereliction of buildings, land pollution, reduced housing maintenance, positives of lower environmental impact cause by lower population levels and lower economic activity.

Unemployment has also been an issue for people in areas worst hit by these processes, 2 major problem kinds are recognised;

1. Long term unemployment - Refers to people who have been unemployed for 12 months or more (OECD), happens in deindustrialising areas as people made jobless do not have skills needed to move into new industries.
2. Structural unemployment- A form of unemployment caused by a mismatch between the skills that workers in the economy can offer, and the skills demanded of workers by employers



## URBAN DERELICTION

The cycle of decline outlined above and deindustrialisation are one of the causes of **urban dereliction**. Other causes include;

- The ageing and decay of buildings with the passage of time.
- The movement of urban activities to more profitable or more convenient locations
- Other changes to the urban economy than deindustrialisation

Urban dereliction is when areas of cities are abandoned and the buildings become dilapidated. There is a sizeable supply of brownfield land in all UK cities including Newcastle, which to date remains in part untapped. Figures published by Newcastle Council identified 123 brownfield or derelict sites that have the potential for development covering 131 hectares. A new housing development in Scotswood opposite the Metro Centre is a good example of how derelict land can be brought back into use. The solutions to dereliction are regeneration and use of Brownfield sites, which are covered in other sections of this chapter.

## Urban decline in Scotswood, Newcastle upon Tyne

The case study of this is covered by the West end of Newcastle-upon-Tyne. It is an area that has suffered urban decline and Urban deprivation (standard of living below that of the majority in a society that involves hardships and lack of access to resources). Places suffering from urban deprivation have visible differences in housing and economic opportunities been the rich living alongside poor people. Scotswood endured long term unemployment and the loss of manufacturing industries along the River Tyne, and the city Council tried many strategies to break the cycle of deprivation. From constructing new schools (Excelsior Academy), building community centres (the John Marley Centre) and attracting government funds in the West End City Challenge, many things have been attempted. The council's most recent action has been to completely demolish parts of Scotswood to replace with a £265 million redevelopment in partnership with home builders to create sustainable affordable housing units at The Rise. It is hoped that 1,800 sustainable homes will be created, rejuvenating Newcastle's west end. All of the properties constructed will incorporate eco-friendly features, with hot water and heating supplied from a neighbourhood energy centre. The project will also include community and commercial facilities, parks and public open spaces.<sup>3</sup>



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## Urban policy and regeneration in Britain since 1979.

Urban policies relate to the strategies chosen by local or central government to manage the development of urban areas and to reduce urban problems.

Deindustrialisation and decentralisation posed huge problems such as urban decline and urban deprivation for many of the UK's Inner cities and CBDs. The UK and local governments were forced to act throughout the 1970s to the present day.

The **inner city**, also known as the twilight zone, was particularly affected. It is typically found next to the CBD and has mainly terraced houses in a grid like pattern. These were originally built to house factory workers who worked in the inner-city factories. Many of these factories have now closed. Unemployment and other socioeconomic problems have led to periods of unrest in many inner-city areas in the UK.

Key words/concepts:

- Urban regeneration - is the attempt to reverse that decline by both improving the physical structure, and, more importantly and elusively, the economy of those areas. In all **regeneration** programmes, public money is used as an attempt to pump prime private investment into an area.<sup>1</sup>
- Gentrification - the restoration of run-down urban areas by the middle class people (resulting in the displacement of lower-income people). This is a private people led form of regeneration, not government led.
- Property-led regeneration schemes - an approach to regeneration that involved the improvement or reconstruction of industrial and residential property

There have been many urban policies in the UK since 1979, these have been summarised in the table.

Government period	Overall focus	Year	Example Policies	Concept	Examples
1979 to 1992 Conservatives under Margaret Thatcher	Allow the market to drive improvement in run down areas, private companies investing so that money “trickles down” to those in need. A <b>TOP DOWN</b> approach	1981	UDCs – Urban Development Corporations	These schemes were established to completely redevelop areas that had suffered from Britain’s rapid deindustrialisation in the 1960s and 1970s. The UDCs worked in areas that were losing population and industries, which had large amounts of polluted and derelict land and buildings, and huge social problems. <sup>2</sup> They were established under the Local Government Planning and Land Act 1980. Under this act, urban development corporations (UDCs) had a broad remit (job) to: <ul style="list-style-type: none"> <li>• create an attractive environment</li> <li>• ensure the regeneration of an area achieved by bringing land and buildings into effective use</li> <li>• encourage the development of existing and new industry and commerce</li> <li>• ensure housing and social facilities are available to encourage people to live and work in the area.</li> </ul>	London Docklands was established in 1981 along with the Merseyside UDC, and 11 more followed between 1986 and 1993, including the Tyne and Wear Development Corporation. UDCs had powers to compulsory purchase properties and land even if the owners did not want to sell, planning powers and a general power to do anything necessary or expedient in the interests of their objectives. The UDCs tended to acquire land, clear it and clean it up (in the case of industrial sites), build infrastructure and then encourage the public sector to invest in the area and finish the job. They were very much a public – private partnership but were heavily criticised for their lack of consultation with, and consideration of local people and their needs.
		1981	Enterprise Zones (EZs)	For areas of high unemployment. They offered lower taxes to businesses and companies and eased planning restrictions.	The Metro Centre Gateshead was established as an enterprise zone on an old industrial site (a power station) in which the land was bought for just £100,000 by a Sir John Hall company. It was launched in 1984 and the first mall opened in 1986. <sup>3</sup> The Metro Centre has grown and become a big success, but like many enterprise zones was criticised for not creating new jobs, just encouraging existing firms to relocate to take advantage of the tax breaks. In addition, some sites like the Metro centre were found on the edge of cities, so actually act against the resurgence concept!
1992 to 97 Conservatives under John Major	Investment is more targeted in certain areas and there is a move towards <b>PARTNERSHIPS</b> . These partnerships include government money, local government, businesses and local people.	1991	City Challenge	Government allocated funding via a bidding process rather than deciding who had the most need. Local authorities were given a much larger role in regeneration than was previously the case. Principles of Thatcher’s approach were still present, including involvement of the private sector, and the very idea of competitive bidding. A total of 31 City Challenge areas were funded around England over two rounds, with certain success in terms of leveraging private-sector funding. An independent evaluation showed £3.78 of private-sector finance was invested for every £1 of public expenditure. <sup>2</sup>	Newcastle’s West End profited from this initiative, with the building of local community centres such as the John Marley centre. This scheme attracted £37 million. The West End of Newcastle is a large area stretching three miles along the northern bank of the River Tyne from the western edge of the city centre to the A1 Western By-pass. It covered 580 hectares with about 35,000 population, including the wards of Benwell, Elswick, West City, Scotswood and Moorside. The West End had been an area of concentrated disadvantage for a long period of time, and hence, has been the location of several regeneration schemes. <sup>4</sup>
		1992	European Regional Development Fund	This is an EU fund that went into regions lagging behind. This included lots of old UK industrial cities	
		1997	Single regeneration budget	As below	
1997 to 2010 Labour government under Tony Blair then Gordon Brown	Some Conservative policies continue, more Quasi Non-Governmental Organisations (Quangos) formed. Sustainability becoming more important.	1997	Single regeneration budget	These budgets were part of a bidding process that allowed councils to bid for a central pot of cash held by the UK government, started in 1997 with the election of a Labour government. This money was then distributed to the “winners” who would spend the money locally on improving run down inner-city areas. The scheme was slightly different in that it pulled together several funding “pots” into one allowing local governments more control and say over how to spend the money.	The Ouseburn Valley in Newcastle owes its cultural and housing regeneration to this funding stream. It gained £2.4 million in funding which kick started the regeneration of this run-down industrial area of the city. <sup>5</sup>
		1997	Regional Development Agencies	Labour focussed on various regions across the UK via RDAs. They had to coordinate economic development and regeneration across regions	One North East
		1999	English Partnerships	Now defunct, English Partnerships (EP) was the national regeneration agency for England, performing at a regional level a similar role to the national Regional Development Agencies.	They had a responsibility and active role in redeveloping the Thames Gateway and expanding Milton Keynes. In 2008 it ceased to exist and passed its powers passed to a successor body, the new Homes and Communities Agency.
2010 to 2015 Coalition government between Conservatives and Liberal Democrats	Local regeneration sought as government looks to give more power to local councils and regions. This is a <b>DECENTRALISED</b> approach	2010	Local Enterprise Partnerships (LEPs)	Designed to forge an alliance between local business and the public sector via the local authority, there were 38 Local Enterprise Partnerships in total. <sup>6</sup> Their role was to determine local economic priorities and undertaking activities to drive economic growth and job creation, improve infrastructure and raise workforce skills within the local area.	The NE LEP wants to create 100,000 jobs in Digital, Advanced Manufacturing, Health and Life Sciences, and Energy by 2024
		2010	New Homes Bonus	A grant paid by central government to local councils to reflect and incentivise housing growth in their areas. It is based on the amount of extra Council Tax revenue raised for new-build homes, conversions and long-term empty homes brought back into use. There is also an extra payment for providing affordable homes.	

## **SOURCES**

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### 3.2.3.2 Urban forms

#### Urban characteristics in contrasting settings.

#### Physical and human factors in urban forms. Spatial patterns of land use, economic inequality, social segregation and cultural diversity in contrasting urban areas, and the factors that influence them.

**Urban form** is the physical characteristics that make up built-up areas, including the shape, size, density and configuration of settlements. This is linked to urban morphology, which is the study of the form of human settlements and the process of their formation and transformation, with reference to the spatial structure and organisation. Many settlements have their form and morphology controlled by a mixture of both physical and human factors. Valleys, the coastline and mountains can restrict the growth of urban areas in some ways whilst also promoting their growth in others by offering transport and communication links or natural resources. Human factors including political decisions or economic factors such as land value.

Technology has in many ways allowed humans to conquer some of the physical restrictions to city growth, urban growth is today strongly influenced by human factors such as land value.

#### The bid rent theory

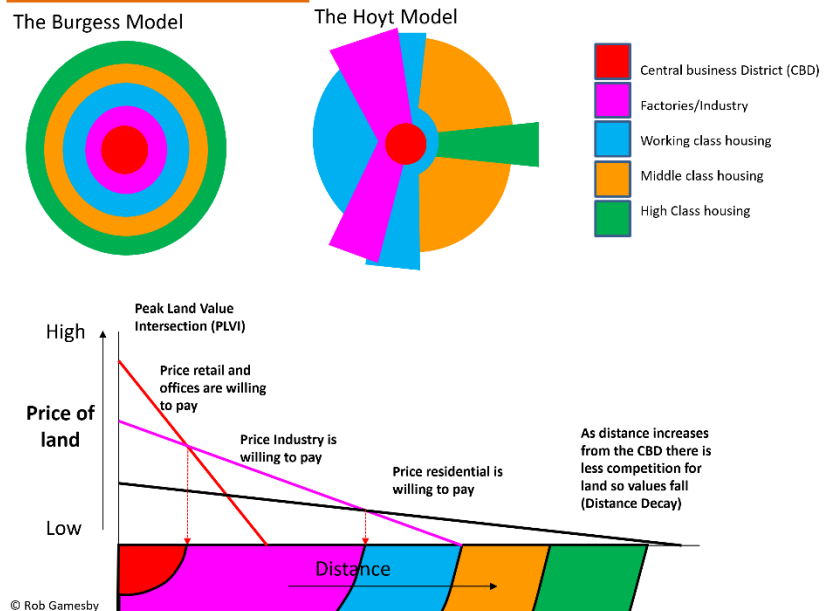
The Bid Rent Theory refers to how the price and demand for real estate change as the distance from the central business district (CBD) increases. It states that different land users such as industry, residential and retail, will compete with one another for land close to the city centre. This is because central areas tend to have the best land and communication links allowing certain industries and retailers to maximise profits.

The whole theory revolves around **LAND VALUE**, which is the amount someone is willing to pay to own or rent a set area of land. Generally, the theory states that;

*With increasing distance from a central point known as the Peak Land Value Intersection (PVL), land value declines.*

The **PVL** is the region within a settlement with the greatest land value and commerce. As such, it is usually located in the central business district of a town or city, and has the greatest density of transport links such as roads and rail. This zone often coincides with the Central Business District (CBD), which is characterised by High/multi-storey buildings, expensive land values, department stores or specialist shops, like jewellers, shopping malls and pedestrian precincts, cultural/historical buildings, museums and castles, Offices, finance, banks, administration, town hall (business sector), bus and railway stations (transport centres). The densities tend to be big to maximise the use of the land in a zone of high rents. It is usually only the most successful industries and retailers that can succeed in this area of high rents.

#### LAND-USE MODELS



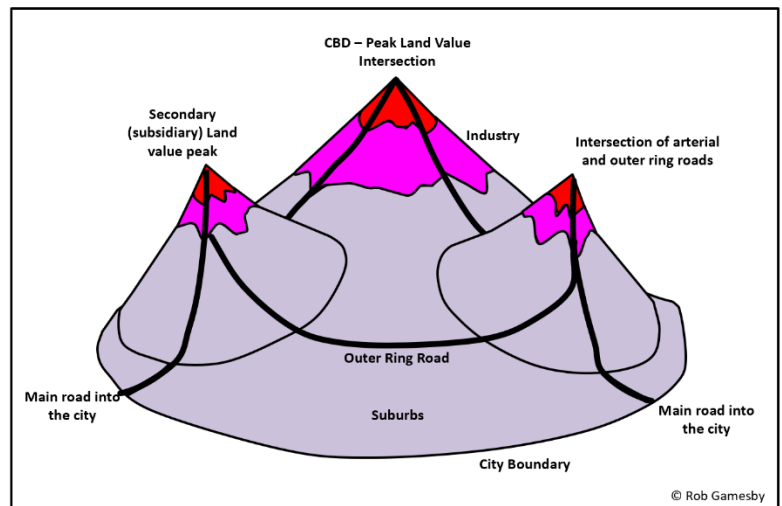
From this point land value declines – known as **Distance Decay**. This means that the interaction between two locales declines as the distance between them increases. In this case, that land price decreases with distance from the CBD.

The next zone outwards is Industry and the **Inner City** – Industry required large areas of land and tend to be towards the edge of cities where land was cheaper or on land where another cost advantage could be found e.g. along rivers for cheaper transport. Their workers lived in mainly terraced houses in the UK in a grid like pattern. These were originally built to house factory workers who worked in the inner-city factories. Many of these factories have now closed down. This zone is also known as the Twilight zone, an urban zone of a city where industry and residential areas mix and the population is often transitory and constantly moving.

Following that area is residential land uses for housing, spread around the city in a band. The concept of Bid rent relates to 3 land use models by Burgess, Hoyt and Harris and Ullman.

The idea is that rent value determines the form of many of the world's major cities today. However, since it was developed the world has changed considerably and other factors need to be considered;

1. Many retailers now prefer to be out of town in a large specially built area at the edge of a town or city, where there are a lot of large shops and sometimes other facilities such as cinemas and restaurants. This has resulted in **Secondary Land Value Peaks**, areas of elevated land prices towards the edge of cities often where key transport routes converge increasing accessibility e.g. Silverlink retail park on the A19 and A1058 on Tyneside
2. Regeneration and urban resurgence of CBDs and the Inner City has increased residential property prices in that location and pushed rents up.
3. Green areas are not included despite existing in all of our cities. These areas have rent value but more importantly have social value in aiding people's health and well-being. There are many areas of green space within UK cities including gardens, parks, ornamental gardens and even farmland. Distribution tends to be uneven do some groups of people have more access than others
4. Modern industries such as business or science parks are now found at the edges of cities close to green space and transport routes. Often affiliated with a university so that knowledge can be shared, innovation promoted, and research outcomes progressed to viable commercial products. This is not the traditional zone for this in the model.
5. The model does not work as well for LICs where we have informal Squatter Settlements lacking adequate infrastructure, including proper sanitation, safe water supply, electricity, hygienic streets, or other basic necessities to support human settlements.



## SOURCES

See also - <https://www.s-cool.co.uk/a-level/geography/urban-profiles/revise-it/central-place-and-bid-rent-theories>

## New urban landscapes: town centre mixed developments, cultural and heritage quarters, fortress developments, gentrified areas, edge cities.

It is clear that despite basic theories about how physical factors and human factors control the shape and form of cities, things have changed massively in the latter 20<sup>th</sup> century and the start of this one. There are a whole range of **new urban landscapes** that impact upon the character and feeling of different urban places. Indeed, this section links nicely with the Changing Places unit, as it explains how urban areas are currently adjusting and adapting as places.

The City Centre is an area in many contemporary cities where major changes take place. Land values are high, and they tend to be the most accessible areas due to the high concentration of road, rail and light rail communication links that converge there. This provides an incentive for companies to invest in this area, so change can be large and rapid.

### Town Centre Mixed Developments

Town centre mixed developments are common throughout the UK and are a response by city centres to the combined impacts of suburbanisation of industries and people, and the rise of out of town retailing and Internet shopping.

Town centre mixed development is **any urban development that blends residential, commercial, cultural, institutional, or entertainment uses**, where those functions are physically and **functionally integrated**, and that provides pedestrian connections. Some of these may have;

1. **Flagship attractions** - any major attraction in an urban development with distinct qualities, including uniqueness, location, international reputation, and outstanding media attention, making it a 'must-see' attraction and relatively large in size and economic impact. E.g. Centre for Life Newcastle
2. **Leisure facilities** - Such as cinemas, theatre, gyms, restaurants offering services to people in mixed use developments
3. **Investment in the Public realm** -the space around, between and within buildings that are publicly accessible, including streets, squares, parks and open spaces. Investment in things like seating areas etc. encourage people back into city centres as places for socialising etc.
4. **Accessible public space** - places that is generally open and accessible to people. Roads (including the pavement), public squares, parks and beaches are typically considered public space. Very important within urban areas
5. **Residential areas** - Have been added to town centre mixed developments to increase use of other features such as leisure and retail facilities
6. **Cultural events** - often take place in town centre mixed developments to attract people into the city- such as winter markets

### Trinity Square, Gateshead

Trinity Square is a great example of a town centre mixed development in Gateshead, Tyne and Wear. It replaced an iconic car park used in the film "Get Carter" in a zone suffering serious economic decline as a result of competition from Newcastle upon Tyne and The Metro Centre on the edge of Gateshead.

Trinity Square has regenerated Gateshead Town Centre with a new Town square. It provided a variety of retail units (45), a Tesco Extra store, student accommodation with associated social facilities for Northumbria University, a multiscreen cinema, a health centre, and a car park with over 700 spaces. <sup>1</sup>

There are 7 key elements;

1. 8 student accommodation blocks having a total gross internal floor area of 30,082m<sup>2</sup> (993 bedrooms), built on a podium deck over:



2. A 'Tesco' store
3. 35 adjoining retail units, management offices, potential restaurants and public facilities
4. A 'Primary Care Trust' building floor area 1608m<sup>2</sup>
5. An Office block having a total gross internal floor area of 2,615m<sup>2</sup>
6. Low Level and Basement car park providing 749 spaces
7. Enabling works to facilitate the design and construction of the mixed-use development and Public realm works comprising hard and soft landscaping including Tesco Service Yard and ramp.

#### **Why Trinity Square was built:**

1. **Poor quality physical environment** - This relates both to the form and quality of open space and to the negative impact of buildings and structures. The lack of enclosure at the northern and southern end of High Street and West Street means the town centre 'leaks' into the surrounding area, space is poorly defined and traffic dominates in these areas. Additionally, areas of 'lost space' in the town centre need addressing to create development opportunities or better-quality public space.
2. **Vacant property** - The town centre has an ageing building stock, which, in most cases, has had low levels of investment in recent years. A number of properties are either vacant or under-used and are unattractive for modern town centre uses.
3. **Poor quality retail and commercial offer** - The predominantly secondary or tertiary retail and commercial offer primarily serves a low-income local population. This makes it difficult to attract high value tenants and the low rental levels provide little incentive for investment. The retail area is too strung out from north to south and needs to be made more compact.
4. **Limited range of 'town centre' facilities** - Gateshead is deficient in a number of facilities which contribute to a vibrant, mixed use town centre and encourage 'linked' visits, in particular leisure, health and community facilities. This limits the range of people who wish to visit the town centre and the number of hours per day when activity is taking place, as there is little to attract people during evening hours.
5. **Poor connectivity for pedestrians** - Despite recent improvements, the town centre core is poorly connected with surrounding areas, especially to the north and east, with a major barrier created by the volume of traffic bypassing the town centre. This means that the town centre in its current form is unlikely to achieve maximum benefit from the range of commercial, arts and leisure, and residential developments taking place around its periphery.
6. **Through-traffic** – The main roads both around the edge, and through the town centre carry a high volume of traffic, to the detriment of pedestrians and cyclists. Traffic heading for other destinations passes through the heart of the town centre along Regent Street and Charles Street as well as around the edges. There is an aspiration to separate through-traffic from access traffic in the town centre, though recent traffic modelling work may establish that significant change would need to occur to the surrounding distributor road network prior to removal of through-traffic from the town centre.

#### **Positive factors, which create opportunities for the town centre:**

1. **Gateshead's central position** within the conurbation provides the potential for a larger catchment area, and for attracting facilities, which complement those in the nearby Newcastle City Centre and Gateshead Quays.
2. **The town centre has good public transport connections** and a recently improved bus/Metro Interchange which is one of the most heavily-used in Tyne and Wear. There is also a sizeable local population in densely developed areas to the south and west. A redeveloped town centre needs to retain the existing customer base as well as attracting customers from a wider catchment area.
3. **The new leisure and cultural developments at the Quays** are attracting new people to the area - the town centre can share in this success if safe and attractive connections are created and there is sufficient reason e.g. visitor attraction, high quality public space and public art, good shopping facilities for people to visit.
4. **Elsewhere, within walking distance of the town centre, new residential developments and the Baltic Business Quarter** will bring more people into the area to live and work - again it is imperative that connections are improved and the right type and balance of facilities is created to attract people in significant numbers.

5. **The town centre contains significant listed buildings, conservation areas and other historic buildings.**  
When these areas are preserved and/or enhanced, buildings improved and occupied with suitable long-term users, and public spaces improved, they can make a positive contribution to the town centre, providing variation in building and townscape form, connection with the past and a sense of place. <sup>1</sup>

**SOURCE –**

**1** - Gateshead Town Centre Planning Strategy, (2007) accessed on 29<sup>th</sup> December 2019 at [https://www.newcastle.gov.uk/sites/default/files/wwwfileroot/planning-and-buildings/planning/05.24\\_gateshead\\_town\\_centre\\_planning\\_strategy.pdf](https://www.newcastle.gov.uk/sites/default/files/wwwfileroot/planning-and-buildings/planning/05.24_gateshead_town_centre_planning_strategy.pdf)

## New Urban Forms - Cultural and heritage quarters

This is a slightly different approach to regenerating urban areas that focusses upon **culture and heritage**. A cultural quarter is one that has the presence of cultural activity, and, where possible, this should include cultural production (making objects, goods, products, and providing services) as well as cultural consumption (people going to shows, visiting venues and galleries). These could be developed in partnership with or as a separate entity to **Heritage quarters**. These areas focus more upon the historical uniqueness of areas based around small scale industries. Both can be used to attract tourists and people into a place and help areas to develop a unique **SENSE of PLACE**. **The Cardiff Docklands offer the Dr Who experience and the Welsh Assembly for example.**

**Ouseburn Valley** in Newcastle is an excellent example of a cultural and heritage quarter, with Seven Stories (the National Museum for Children's literature, art galleries such as the Biscuit factory, local breweries such as Tyne bank brewery and pubs such as the Cluny (enticing some of the best up and coming bands in the country) replacing old manufacturing of glass, lead, paints etc.



## New Urban forms - Gentrification

Gentrification is the process by which wealthier (mostly middle-income) people move into, renovate, and restore housing and sometimes businesses in inner cities or other deteriorated areas formerly home to poorer people. The key point here is that **this process is done by INDIVIDUALS**, rather than government led regeneration schemes seen in urban resurgence. It basically involves the movement of young, affluent, middle income people into traditionally run-down areas of an inner city where prices are cheaper. Once moved in these people upgrade and invest in their properties, this boosts house values. They also look for different shops and services which allows a different type of service to develop such as cafes and wine bars. The trickle-down effects of this can be positive and negative, and there are protest movements against gentrification in New York and London.

Positives of gentrification	Negatives of gentrification
<ul style="list-style-type: none"> <li>• Increases tax income for local councils and brings wealth into an area.</li> <li>• Creates greater employment opportunities in new areas such as design.</li> <li>• Exposure to poverty in those gentrified neighbourhoods declines <sup>1</sup></li> <li>• Creates new housing opportunities <sup>2</sup></li> <li>• The environment improves</li> <li>• It can reduce suburban sprawl within a community.</li> </ul>	<ul style="list-style-type: none"> <li>• Traditional businesses face increased competition from incoming newer businesses.</li> <li>• Original locals can be priced out of the area as rent and house prices increase. This is called community displacement <sup>1</sup></li> <li>• It changes the cultural standards of the neighbourhood. <sup>2</sup></li> <li>• It can cause low-income households to move to a poorer neighbourhood.</li> </ul>

Gentrification is caused by;

1. **House price rises** – housing in many parts of the world has increased beyond the level to which younger people can actually afford to buy it. This means they are forced to look for properties that they can afford and improve over time.
2. **The rent gap** - where a property has fallen below its actual value due to poor maintenance or upkeep, this makes it more affordable and may encourage property developers to buy the property too
3. **Commuting costs** - gentrification occurs in Inner city areas so people who buy in these areas can reduce their commute to work.
4. **Pioneer image** - where individuals consider it cool and creative to move into more difficult neighbourhood
5. **Changing preferences** for inner city living <sup>3</sup>
6. **Lack of housing supply**



### Fortress landscapes

This is the idea that urban developments can be constructed with people's safety in mind. Developments are deliberately landscaped and designed around security, protection, surveillance and exclusion. This planned and physical use of space creates very strong boundaries around our urban spaces and can lead to the POLARISATION of society between different groups of people.

### **Examples of fortress landscape strategies;**

1. Gated communities – where people live in housing estates surrounded by walls and with security personnel at the front gate
2. CCTV to monitor people in public areas

3. Mosquito alarms o shops which give out a high pitch sound and stops people congregating in some public spaces. Some shops use these alarms to stop youths gathering around them.
4. Fences and railings – many school fields in the UK have been fenced off from the general public. This prevents damage during non-school hours and protects students during school hours. However, it also reduces the amount of accessible open space for people too.
5. Anti-homeless spikes are used in doorways to stop people sleeping rough in them, these again have been controversial
6. Street lighting is used to make people “feel” safe within an urban area
7. “Designing out crime – This is where architects reduce the amount of crime by providing defensible space, high visibility policing and changing road layouts

Many of these strategies are controversial, none more so than that of gated communities. These are common in many countries that are NEEs such as Brazil and South Africa. They create a sense of alienation for the people who live outside of them and create a polarisation of society between the haves and the have nots. People feel excluded, and this can lead to other urban problems. **Social segregation** can occur as a result, which exists whenever the proportions of population rates of two or more populations are not homogenous throughout a defined space (these groups could be ethnic, based on social classes, age and gender). This links nicely with concepts of “insiders” and “outsiders” from the changing places unit.

A sad example of a gated community comes from South Africa. The famous Paralympic and Olympic sprinter Oscar Pistorius shot dead his then girlfriend through a closed bathroom door inside his house in a gated community. In Pistorius’ defence he claimed he had mistaken her for an intruder into his home.

### Edge cities

Some American Urban Geographers think that suburbanisation may have ended. This is because the suburbs have developed into urban centres in their own right. These are known as edge cities which are relatively large urban area situated on the outskirts of a city, typically beside a major road. These are often self-contained. E.g. Santa Monica, Los Angeles and have;

- Office space
- Industry
- Leisure and green spaces
- Communication links
- Retail centres

### SOURCES

1 – Brummet and Reed (2019) *The Effects of Gentrification on the Well-Being and Opportunity of Original Resident Adults and children*. Accessed the 29<sup>th</sup> December 2019 at <https://www.philadelphiafed.org/-/media/research-and-data/publications/working-papers/2019/wp19-30.pdf>

2 – Regoli (2019) *21 Gentrification Pros and Cons* accessed on 29<sup>th</sup> December 2019 at <https://vittana.org/21-gentrification-pros-and-cons>



3 – Dealing with Gentrification (2019) accessed 29<sup>th</sup> December 2019 at <http://dealingwithgentrification.org/causes/>

**New Urban structures - The Post-Modern western city**

To understand the concept of the Post Modern Western City you must first consider the idea of Modernism in urban areas.

- **Modernism was how urban architects** sought to maximize the **utility** of limited spaces in urban areas as towns and cities grew. **The design of urban areas was FUNCTIONAL**, the design stemmed entirely from its use. This philosophy in architecture was summed up as 'form follows function'. This occurred in the late 19<sup>th</sup> century and through the mid twentieth century, with a key architect being Le Corbusier.
- **Post modernism** is the mixing of architecture, art, literature and even the nature of the economy in urban developments. It has occurred from the 1960s and continues to occur today. It emerged in the 1960s as a reaction against the austerity, formality, and lack of variety of modern architecture. <sup>1</sup>

The differences between modern and postmodern architecture focus on issues of utility (or use), originality, and the struggle between local and cosmopolitan values.

Post Modern Architecture	Modernist architecture
	 <p data-bbox="815 1066 1498 1115">By Gunnar Klack - Own work, CC BY-SA 4.0, <a href="https://commons.wikimedia.org/w/index.php?curid=57028093">https://commons.wikimedia.org/w/index.php?curid=57028093</a></p>
<p data-bbox="108 1122 517 1155"><b><u>The Guggenheim Museum Bilbao</u></b></p> <p data-bbox="108 1193 788 1512">Designed by Canadian American architect Frank Gehry, the Guggenheim Museum Bilbao building represents a great example of the most groundbreaking 20th-century architecture. With 24,000 m<sup>2</sup>, of which 9,000 are dedicated to exhibition space, the Museum represents an architectural landmark of innovative design. Gehry’s design creates a spectacular sculpture-like structure, perfectly integrated within Bilbao’s urban pattern and its surrounding area. <sup>3</sup></p>	<p data-bbox="815 1122 1458 1155"><b><u>The Beinecke rare book &amp; manuscript library at Yale</u></b></p> <p data-bbox="815 1160 1498 1406">University is a typical Modernist building, built in 1963. Large windows would be a risky inclusion to the building design and necessitate careful planning to protect a remarkably fragile collection. Therefore the façade was constructed of thick Vermont marble panes for muted light that would not put the building’s contents at risk. <sup>2</sup></p>

**Features of Post Modern Urbanism;**

**Characteristics of post modern Western Cities:**

- **Urban Structure** - High Tech Corridors and post suburban developments such as edge cities. They also have a multi-nodal structure which is chaotic.
- **Architecture and landscapes** – There is a mix of different styles of buildings with different meanings, plus historical references help to celebrate the past
- **Government** - Services provided by the market rather than by public services, plus there are many partnerships between public and private sectors. Mobile international capital is also encouraged.
- **Economy** – This would be dominated by quaternary and tertiary services, the city would be highly globalised and orientated towards consumption of goods and services

- **Planning** - Stakeholders views incorporated into the decision making process and the city would be in spatial fragments rather than homogenised sectors for aesthetic reasons
- **Culture and ethnicity** – A highly polarised society that is highly fragmented and diverse – offering a diaspora

Many international cities exhibit many of the characteristics above, including Vancouver and London.

#### **SOURCES**

- 1- Accessed 29<sup>th</sup> December 2019 from - [https://en.wikipedia.org/wiki/Postmodern\\_architecture](https://en.wikipedia.org/wiki/Postmodern_architecture)
- 2- Docomomo US (2019) - *Beinecke Rare Book and Manuscript Library* accessed 29<sup>th</sup> December 2019 at <http://www.docomomo-us.org/register/beinecke-rare-book-and-manuscript-library>
- 3- Guggenheim Museum website, accessed 29<sup>th</sup> December 2019 - <https://www.guggenheim-bilbao.eus/en/the-building>

### 3.2.3.3 Social and economic issues associated with urbanisation - inequality, social segregation and cultural diversity in contrasting urban areas.

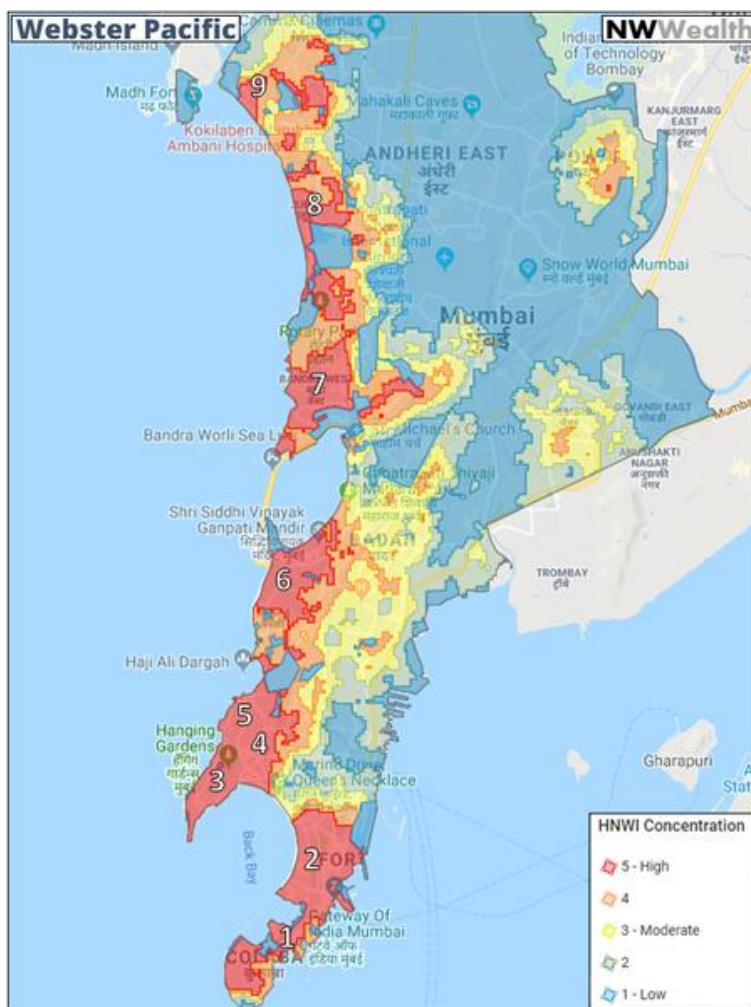
Urban areas around the world face major issues providing adequate economic opportunities and social opportunities for people. Many cities face similar issues whilst the scale and type of those problems can vary from place to place. The issues in LICs are often different from those found in HICs like the UK.

#### Economic Inequality

Economic Inequality is the difference found in various measures of economic well-being among individuals in a group, among groups in a population, or among countries. There can be huge differences in wealth within cities. Some parts of cities can have great wealth, and others have poverty. In LICs these contrasts can be stark, but they exist in HICs too, with the very wealthy living very different lives from the very poor.

Inequality is therefore extreme differences between poverty and wealth, as well as in peoples' well-being and access to things like jobs, housing and education. Inequalities may occur in: housing provision, access to services, access to open land, access to employment opportunities and education. These inequalities can massively affect people's life chances.

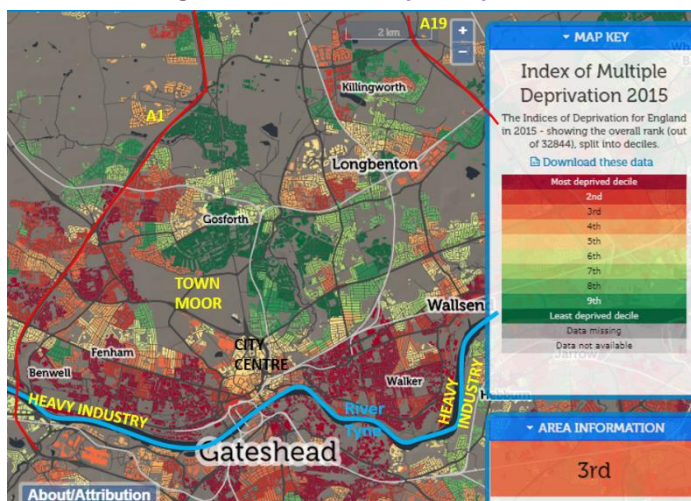
The map opposite shows the concentration of High Net Worth Individuals in Mumbai, India.<sup>1</sup>



#### Poverty and deprivation

Even in the UK we have people living in poverty, an absolute standard based on a minimum amount of income needed to sustain a healthy and minimally comfortable life, in this case, within an urban area. The UK government is often concerned about **multiple deprivation**, when different types of deprivation e.g. lack of education, poor health, high crime levels, high unemployment are combined into one overall measure of deprivation. This is measured using an **Index of Multiple Deprivation - a UK** government qualitative study of deprived areas in English local councils. It includes 7 factors: Income, Employment, Health deprivation and Disability, Education Skills and Training, Barriers to Housing, and Services, Crime, Living Environment.<sup>2</sup> A map<sup>3</sup> of this for Newcastle upon Tyne can be observed opposite. This map correlates to other indices such as median house price, access to green space and life expectancy.

In the 2019 report on "The English Indices of Deprivation" it can be seen that the 10 most deprived places in England are dominantly in the Geographic North and are all major urban areas that have suffered deindustrialisation. That is not to say that multiple deprivation occurs only there, but these are the most deprived places.



**Most deprived local authorities based on Rank**

1. Blackpool
2. Manchester
3. Knowsley
4. Liverpool
5. Barking and Dagenham
6. Birmingham
7. Hackney
8. Sandwell
9. Kingston upon Hull
10. Nottingham

**Most deprived local authorities based on Score**

1. Blackpool
2. Knowsley
3. Liverpool
4. Kingston upon Hull
5. Middlesbrough
6. Manchester
7. Birmingham
8. Burnley
9. Blackburn with Darwen
10. Hartlepool

**Most deprived local authorities based on the Proportion of LSOAs in the most deprived 10% nationally**

1. Middlesbrough
2. Liverpool
3. Knowsley
4. Kingston upon Hull
5. Manchester
6. Blackpool
7. Birmingham
8. Burnley
9. Blackburn with Darwen
10. Hartlepool

Source<sup>2</sup>

**Affordable housing**

Another major issue in HICs is access to affordable housing. This is a major cause of urban exclusion and governments have targeted housing at lower income groups in certain parts of cities for those on lower incomes. The impacts of these schemes is variable. At present, it is very difficult for public sector key workers like nurses and fire fighters to live in London for example, as costs of accommodation are simply too high. The UK Government has built key worker housing and also provides an **Urban subsidy, which basically** provides a higher wage for key workers in the most expensive areas. There is a wage supplement for Teachers in London for example. This is still insufficient. A **living wage** is another possibility. This is a wage that is high enough to maintain a normal standard of living, designed to tackle urban poverty. Newcastle upon Tyne City Council operates this system.

**Economic and social Inequality in London**

London is an incredibly unequal city. Billionaires live in very close proximity to people who survive on less than a living wage. Indeed, incomes in London are more unequal than ANY other region of the UK, according to <http://www.londonspovertyprofile.org> ;

- 16% of Londoners are in the poorest tenth nationally, whilst 17% are in the richest tenth of people in the country
- The richest 10% of people in London have 60% of all assets whilst the poorest 80% of the population share just 20% of all asset wealth in London
- The top tenth of employees in London earn around four and a half times as much as the bottom tenth.

These huge differences in wealth result in big differences in people's access to and success with in housing, education, health and employment. House prices and rents are higher in London than any other part of the country. More people in London rent than own their house and those that rent pay more than half their weekly pay in rent. At the same time as those who live in poor quality, small rented accommodation, there are people living in some of the most expensive properties on the planet.

Children across London do not get equal exam grades, but some of the school's in London's poorest boroughs are amongst the fastest improving schools in the country. Generally, the schools in the poorest areas score the lowest number of GCSE points per pupil.

The people in wealthy areas tend to live longer than those in the poorer areas of London. The census 2011 showed that the % of people reporting themselves as in "Not good health" was also highest in the areas of lowest income.

Despite the huge wealth found in London unemployment remains a major issue. London’s employment rate was just 67.5 per cent in the period October to December 2011, below the average of 70.3 per cent for the UK. The unemployment rate was 10.0 per cent compared with 8.4 per cent for the UK.

### Economic Inequality in LICs

LICs and NEE s often have even bigger inequalities and a wider range of problems that in HICs. The rapid pace of urban growth and the magnitude of that growth make it difficult for councils to maintain public services at an accessible level.

### Squatter settlements

These any collection of buildings where the people have no legal rights to the land they are built upon. The people are living there illegally and do not own the land. They provide housing for many of the world's poorest people and offer basic shelter. The issue here is not unaffordable housing as in HICs, but inadequate shelter. The other issue in LICs is that many people work in the **informal economy** – an economic activity that is neither taxed nor monitored by a government; and is not included in that government's Gross National Product; as opposed to a formal economy.

### Social segregation

Social segregation exists whenever the proportions of population rates of two or more populations are not homogenous throughout a defined space. This takes place in many formats, it happens with ethnic groups, social classes and gender groups.

Coupled with this is the concept of **urban social exclusion**. This is where people in society are excluded from parts of their own city by social and economic factors, and is often faced by people in areas of multiple deprivation.

Social segregation can also occur when groups of people disperse or spread from their original homeland, they often congregate in similar areas within a city due to linguistic, religious or cultural reasons.

### Cultural diversity

**Cultural Diversity** is the existence of a variety of cultural or ethnic groups within a society, has increased in cities via migration. This happens because: cities are the first point of entry for immigrants, more immigrants due to mobility and humanitarian crisis, economic opportunity, communities of similar ethnicity already established in area. This can result in **inter culturalism**, where there is support for cross-cultural dialogue and challenging self-segregation tendencies within cultures. However, it can also result in **ethnic segregation**, where ethnic groups congregate together to take advantage of specialist shops and facilities, protection against prejudice and racial abuse, support of friends and near relatives, and maintenance of language and culture.

There are various positives and negatives of cultural diversity in cities

Negatives of cultural diversity	Positives of cultural diversity
Racism and conflict, Pressure on urban services such as education and health care, language difficulties, failure to integrate	Different foods, music, languages and religion all available, e.g. Mela in Newcastle



Figure 1 Dharavi Slum By Leonora Enking via Wikimedia Commons

## **SOCIAL AND ECONOMIC CHALLENGES IN MUMBAI**

Mumbai is a city that faces many challenges and those challenges are large because of its immense size and rapid growth. Physical Geography also plays a role, as Mumbai has been limited in where it can grow because it originally grew at the southern end of an island surrounded by the Arabian Sea and 2 rivers.

The major problem in Mumbai is the growth of squatter settlements known in India as SLUMS. These slums come with many issues for people including the lack of planned access to clean water and sanitation systems, poor health, lack of education, unemployment and the prospect of crime.

One of the world's most infamous slums is Dharavi slum, which is the largest squatter settlement located in Mumbai (formally Bombay) in India. There are a million people crammed into one square mile in Dharavi. At the edge of Dharavi the newest arrivals come to make their homes on waste land next to water pipes in slum areas. They set up home illegally amongst waste on land that is not suitable for habitation. In the wet monsoon season these people have huge problems living on this low-lying marginal land.

1. **Lack of sanitation is the MAJOR ISSUE** - people have to go to the toilet in the street and there are open sewers because 500 people share one public latrine. Children play amongst sewage waste and doctors deal with 4,000 cases a day of diphtheria and typhoid.

2. **Lack of access to clean water** – there are few water pipes in the slum and those that exist only have the supply switched on for 2 hours a day by the city authorities. This means people have to queue for water and have LIMITED SUPPLY. In addition, next to the open sewers are water pipes, which can crack and take in sewage. Dharavi slum is based around this water pipe built on an old rubbish tip.

3. **Lack of legal rights** - The people have not planned this settlement and have no legal rights to the land. In addition, the slum houses have little in the way of security. Mumbai as a whole has a problem with crime, such as pick pockets and organised begging.

4. **POOR HEALTH** – life expectancies in the squatter settlements are low because of these conditions, poor quality water, mosquitoes which thrive in nearby mangrove swamps and dangerous jobs (There are toxic wastes in the slum including hugely dangerous heavy metals) all serve to impact on people's health.

5. **UNEMPLOYMENT and POOR QUALITY WORK** - Many people have poor jobs, such as those who work to sift the rubbish in the tips where children and women sift through the rubbish for valuable waste. They have to work under the hot sun in appalling conditions. They earn around a £1 a day for their work.

Many architects and planners claim this slum could hold the solution for many of the problems of the world's largest cities.

## **SOURCES**

1 - World Wealth Report (2019), accessed 30<sup>th</sup> December 2019 at <https://worldwealthreport.com/>

2 – Penney (2019), The English Indices of Deprivation 2019, Ministry of Housing, Communities and Local Government, Accessed 30<sup>th</sup> December 2019 from - [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/835115/iod2019\\_Statistical\\_Release.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/835115/iod2019_Statistical_Release.pdf)

3 - Consumer Data Research Centre – accessed September 2019 at <https://maps.cdrc.ac.uk/>

4 - <http://www.londonpovertyprofile.org>

### 3.2.3.4 Urban climate

#### The impact of urban forms and processes on local climate and weather.

Human activity has a big influence on the climate of an urban area. Climate is the long-term behaviour of the atmosphere in a specific area, with characteristics such as temperature, pressure, wind, precipitation, cloud cover and humidity etc. An urban area is an area with a high density of human created structures in comparison with the areas surrounding it. In this topic we will look at how the climatic characteristics of an urban area are affected by human factors such as pollution, the colour of buildings, people themselves and factories etc. Urban microclimates are perhaps the most complex of all microclimates. With over 82% of the UK population<sup>1</sup> being classed as urban, it is no surprise that they are also the most heavily studied by students of geography and meteorology.

#### **Key words:**

**Urban microclimate** - Human activity chemically and physically alters air and weather characteristics over and around urban areas, making it different from air and weather over rural areas

**Microclimate** - Climate within a small area that differs significantly from the climate of the surrounding area

#### General climatic changes caused by urban areas in comparison to rural areas;

Weather characteristic		Comparison with rural environments
Radiation	Ultraviolet, winter	30% less
	Ultraviolet, summer	5% less
	Sunshine duration	5-15% less
Temperature	Annual mean	1°C More
	Sunshine days	2-6°C More
	Greatest difference at night	11°C More
	Winter maximum	1°C More
	Frost free season	2-3 weeks more
Wind speeds	Annual mean	10- 20% less
	Gusts	10- 20% less
	Calms	5-20% more
Relative Humidity	Winter	2% less
	Summer	8-10% less
Precipitation	Total	5-30% more
	Number of rain days	10% more
	Snow days	14% less
Cloudiness	Cover	5-10% more
	Fog, winter	100% more
	Fog, summer	30% more
	Condensation nuclei	10 times more
	Gases	5-25times more

Source of information<sup>2</sup>

## URBAN HEAT ISLANDS

Due to human activity, the **temperature** in an urban microclimate is higher than that of the surrounding areas. Urban areas are said to be urban heat islands as under calm conditions, temperatures are highest in the built-up city centre and decrease towards the suburbs and countryside. There are several reasons why this pattern occurs.

1. In urban areas, the building materials are non-reflective and therefore absorb heat.
2. Also, road surfaces such as tarmac and concrete have a **high thermal capacity and low albedo** (the fraction of solar radiation that is reflected off the surface of an object, it tends to be lower in urban areas where surfaces are more likely to absorb radiation) therefore also absorb large amounts of heat due to their dark colour. This heat is absorbed during the day and then released slowly at night, increasing the temperature.
3. Further heat is given off by the presence of factories and increased car use within the city, causing pollution which causes smog and a pollution dome to form. This pollution dome allows short-wave insolation to enter, but traps outgoing terrestrial radiation due to its longer wavelength, therefore increasing the amount of heat obtained.
4. The reflection of solar radiation by glass buildings and windows. The central business districts of some urban areas can therefore have **quite high albedo rates** (proportion of light reflected).
5. The emission of hygroscopic pollutants from cars and heavy industry act as condensation nuclei, leading to the formation of cloud and smog, which can trap radiation. In some cases, a pollution dome can also build up.
6. The relative absence of water in urban areas means that less energy is used for evapotranspiration and more is available to heat the lower atmosphere.
7. The absence of strong winds to both disperse the heat and bring in cooler air from rural and suburban areas. Indeed, urban heat islands are often most clearly defined on calm summer evenings, often under blocking anticyclones.

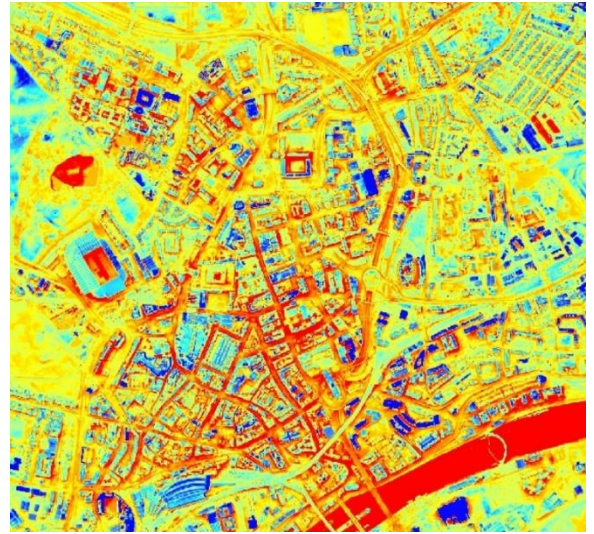


Figure 2 - Potential Urban Heat Island in Newcastle upon Tyne captured by thermal image

Due to these reasons, the mean winter temperatures are on average 1-2 degrees Celsius higher in urban areas, in comparison to rural areas. The mean summer temperature may be on average 5 degrees Celsius higher than surrounding rural areas. This can be seen in **London's Heat Island below**<sup>3</sup> and has noticeable impacts upon atmospheric pressure in urban areas. The Heat Island for London shows temperatures in excess of 6°C warmer than

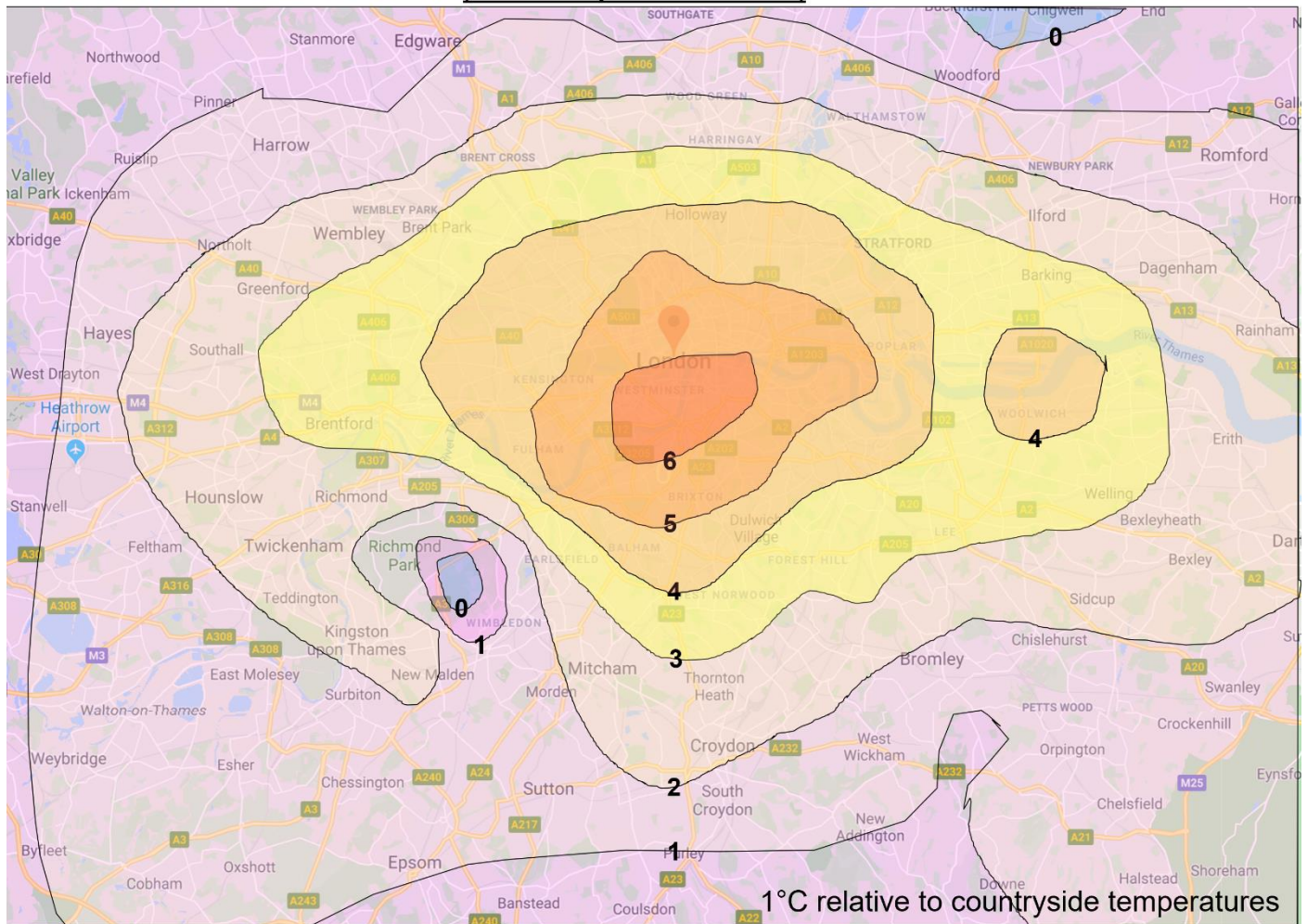
### **Air temperature of London's heat island under dry and calm conditions for six nights (2-3am) during the summer of 2000 (source – Mayor of London 2006)**



1°C relative to countryside temperatures

surrounding rural areas, and a decline in those excess temperature away from the high-density built-up area of central London. Local features, such as Richmond Park, have a dampening effect on temperatures.

**Air temperature of London's heat island under dry and calm conditions for six nights (2-3am) during the summer of 2000**  
**(source – Mayor of London 2006)**



**Temperature inversions**

A temperature inversion is a **reversal of the normal decrease of air temperature with altitude**. It occurs where a layer of warm air lays on top of colder air underneath effectively trapping it and preventing it from rising. This can happen in cities trapping pollutants. Physical geography plays a role as temperature inversions can occur in cities that are closely surrounded by hills and mountains, or on plains which are surrounded by mountain chains, which makes an inversion trap the air in the city.

During a severe inversion trapped air pollutants form a brownish haze that can cause respiratory problems. For example, the Great Smog of 1952 in London, England, is one of the most serious examples of such an inversion. It was blamed for an estimated 8,000 to 12,000 deaths. <sup>4</sup>

**AIR PRESSURE AND WINDS**

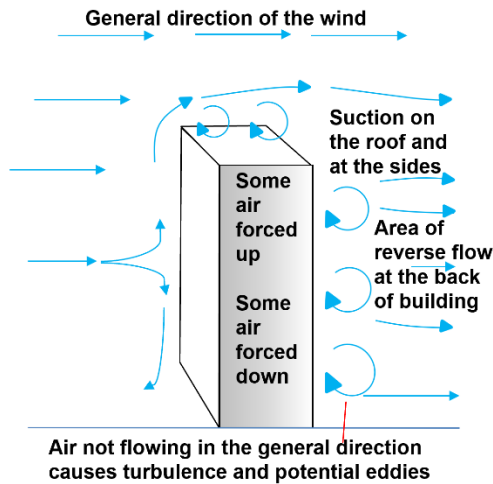
Urban heat islands can also have an effect on air pressure. Locally as warm air rises over an urban area it draws in heat and air from the surrounding area and creates an area of localised low pressure. **Strong pressure gradients** develop between the windward and leeward side of buildings and can lead to severe eddying winds. Pressure gradient is the main driving force that causes the movement of wind from areas of high pressure to areas of low pressure. In effect the winds are equalising pressure differences across the Earth's surface. This means winds converge on central areas and consequently may bring pollution from outer areas, into the city centre. There are

often patterns and differences between rural and urban areas and these comparisons are greatest seen under calm high-pressure conditions. Indeed, urban winds are different from rural ones in terms of their speed and direction.

### Winds - the effects of urban structures and layout on wind speed, direction and frequency

Winds in an urban microclimate are affected by its surroundings. The general pattern is that **wind speeds decrease** in urban areas than in suburbs or rural areas. The speed of winds is lower in altitudes in built up areas are slower because winds are deflected over high buildings and are slowed by the friction of urban surfaces.

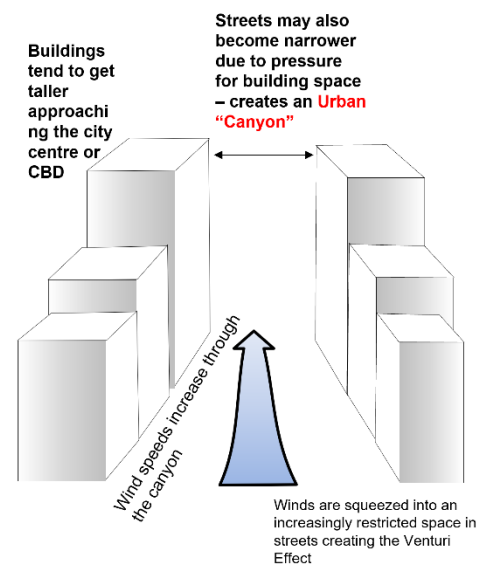
#### Air flow around buildings is complicated



Buildings affect the winds due to their size, shape and spacing. Tall buildings provide frictional drag on the movement of air. The **frictional drag creates turbulence**, which gives rapid changes in the direction and speeds of the wind. Pressure gradients are set up between the windward and leeward side of buildings which causes severe **eddying of the winds**. The windward side (the side facing the direction of the wind) of a building tends to have high pressure due to the air pushing against it, the leeward side which blocks the straight path of the wind has an area of low pressure and the wind moves around the building to the area of low pressure causing a steep localized pressure gradient. The steep pressure gradient causes these winds to be strong. When high pressure conditions occur in rural areas breezes move towards the low pressure created in the urban area by the rising convective heat currents, the air therefore moves from the high

pressure in the rural areas to low pressure in the city.

The spacing of buildings can also affect winds. Single buildings which are widely spaced apart, act on the wind by themselves. Closely spaced buildings work together with each other creating more frictional drag causing winds to skim over the top and eddy in between them. Buildings also act as wind channels where the wind moves at faster speeds causing pedestrians to be blown over and causing a lot of litter. This is known as the Venturi effect, where acceleration of wind occurs as winds are forced to move through narrowing terrain, buildings in this case. These are known as **Urban Canyons** - a place where the street is flanked by buildings on both sides creating a canyon-like environment, can increase wind speeds as wind is funnelled down the canyon.<sup>5</sup>



### Cloud Cover

In urban areas cloud cover is changed and influenced by human activity. There tends to be more cloud cover over urban areas, and they receive thicker and up to ten per cent more frequent cloud cover than that compared to rural areas. The reason for this is because there is more convection caused by higher temperatures and **a larger number of condensation nuclei** which will therefore form more clouds. The amount of hygroscopic nuclei is greater, and this is all a result from the greater amounts of pollution in the urban area, with more dust from cars fuel, industry and quarrying which contribute to the **hygroscopic nuclei** making them larger.

Cloud cover may also often be the result of **smog, a mixture of fog and smoke**, as this causes smoke which will appear as low-lying clouds. The increase or decrease in amount of cloud cover can directly impact the precipitation levels in urban areas.

### Precipitation

The mean annual precipitation total in an urban area and the number of days with less than 5mm of rainfall can both be between 5-15% greater than in rural areas; what this means is that they get a larger amount of dry days, yet have

more rainfall when they do have rain. This happens because of convection currents which are generated by the higher temperatures, and due to an increased amount of microscopic condensation nuclei. Precipitation levels are also increased by more thunderstorms. However, warmer city temperatures turn snow coming from rural areas into sleet, meaning the number of days with snow laying on the ground is decreased by 15%.

### Thunderstorms

Furthermore, higher temperatures of urban areas mean that the likelihood of thunderstorms is increased by 25%. Thunderstorms develop in hot humid air and are accompanied by violent rain, lightning and thunder. They are particularly common in the late afternoon when heat energy has had the chance to build up in the atmosphere. Thunderstorms are created by;

1. Heating of the air causes uplift of the air which rises through the troposphere
2. The air cools rapidly as it rises, causing condensation and rapid cloud formation
3. This results in the formation of towering cumulonimbus clouds
4. Rapid cooling leads to the formation of water droplets, hail and ice
5. Coalescence of water droplets or fusion of ice crystals makes them bigger when they will fall
6. As raindrops are split in the uplift of air, positive electric charge is released into the air
7. This electrical charge builds up until high enough to overcome resistance in the cloud, released to areas of negative charge on the ground or in the cloud.
8. This is known as lightning.
9. Thunder occurs as a result of the sudden increase in pressure and temperature from lightning which produces rapid expansion of the air surrounding it.

Intensity, frequency and length of fogs are much greater in urban areas particularly under anticyclone conditions. For example, Kew in the middle suburbs of London has 79 hours of very dense fog, with visibility being less than 40metres. Whereas, London Airport on the outer suburbs has only 46 hours, and south east England (the mean of 7 weather stations) has 20 hours. This shows that further away from the urban areas of a city, towards rural areas, fog density decreases.

Obviously, the larger the city and the greater the quantity of urban structures and materials the greater the impacts of these microclimatic changes.

### London Skyscraper melts car parts;

A London skyscraper dubbed the "Walkie-Talkie" was blamed for reflecting light which melted parts of a car parked on a nearby street. The 37-storey skyscraper is at 20 Fenchurch Street, and has been nicknamed the "Walkie-Talkie" because of its shape.

Martin Lindsay parked his Jaguar on Eastcheap, in the City of London, on Thursday afternoon. When he returned about two hours later, he found parts of his car - including the wing mirror and badge - had melted. The building was fitted with a sun shade on its windows to rectify the problem. Source<sup>6</sup>

### Urban microclimates management strategies

1. **Trees and Vegetation** - Increasing tree and vegetation cover lowers surface and air temperatures by providing shade and cooling through evapotranspiration. Trees and vegetation can also reduce storm water runoff and protect against erosion.
2. **Green Roofs** - Growing a vegetative layer (plants, shrubs, grasses, and/or trees) on a rooftop reduces temperatures of the roof surface and the surrounding air and improves storm water management. Also called "rooftop gardens" or "eco-roofs," green roofs achieve these benefits by providing shade and removing heat from the air through evapotranspiration.
3. **Cool Roofs** - Installing a cool roof – one made of materials or coatings that significantly reflect sunlight and heat away from a building – reduces roof temperatures, increases the comfort of occupants, and lowers energy demand.

4. Cool Pavements - Using paving materials on pavements, car parks, and streets that remain cooler than conventional pavements (by reflecting more solar energy and enhancing water evaporation) not only cools the pavement surface and surrounding air, but can also reduce storm water runoff and improve night time visibility.
5. **Smart Growth** - These practices cover a range of development and conservation strategies that help protect the natural environment and at the same time make our communities more attractive, economically stronger, and more liveable.
6. Building design – needs to be considered to limit the impact of winds on buildings. The **Burj Khalifa** stands 828m tall and has curved sides to deflect wind around the building and prevent the formation of whirlpools or vortices. It is also orientated towards the prevailing wind direction. The building is known to sway 2m at the very top!

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## Air quality: particulate pollution, photochemical smog and pollution reduction policies.

The quality of air within urban areas is often of a much poorer quality than that of surrounding rural areas. This is particularly pronounced in industrial cities and in cities within LICs and LDCs where environmental standards applied to heavy industries and vehicles are much lower than in richer nations. This is important because;

- A. 40,000 early deaths a year (2015) are linked to outdoor air pollution in the UK, say the Royal Colleges of Physicians and of Paediatrics and Child Health. <sup>1</sup>
- B. 6.1 million global premature deaths occurred due to air pollution in 2017 according to a report into State of Global Air 2018. <sup>2</sup>

**Particulate air pollution** is a mixture of solids and liquid droplets floating in the air. Whilst **Photochemical pollution** is air pollution containing ozone and other reactive chemical compounds formed by the action of sunlight on nitrogen oxides and hydrocarbons, especially those in automobile exhaust.

### Types of pollutants

The major difference between urban and rural areas is the use of fossil fuels, which produces lots of waste gas and particulate matter such as;

- Particulate matter – this is fine grade material that can cause damage to human lungs, it is effectively the smoke and dust particles in the air.  $PM_{10}$  is the part of suspended particles that are only 10( $\mu$ M) micrometres in size.
- Carbon Monoxide (CO) – a poisonous gas to human beings, it is highly dangerous because it is colourless and odourless
- Sulphur oxides e.g.  $SO_2$  &  $SO_3$  – these are given out during the combustion of fossil fuels, they often mix with water in the atmosphere to give Sulphuric acids
- Carbon dioxide ( $CO_2$ ) – the most talked about pollutant, this gas can cause human enhanced global warming
- Ozone ( $O_3$ ) – this gas protects in the upper atmosphere, but is dangerous to humans when it occurs in high concentrations at ground level in the Troposphere
- Nitrogen Dioxide ( $NO_2$ ) – these cause the brown haze above of cities

Particulates are the deadliest form of air pollution due to their ability to penetrate deep into the lungs and blood streams unfiltered, causing permanent DNA mutations, heart attacks, and premature death.

These gasses can be found in huge concentrations in city areas compared to countryside areas, the most dramatic being  $SO_2$ , which can be found in concentrations 200 times greater than rural concentrations. Problems can be particularly pronounced in temperature inversions and during anticyclones, when air is prevented from rising which allows pollutants to build up in the lower atmosphere. There is a **clear geographic pattern shown** on the map, the safe level that should not be exceeded is 20 ( $\mu$ g/ $m^3$ ), and it is clear that in LICs, and LDCs there are major problems.

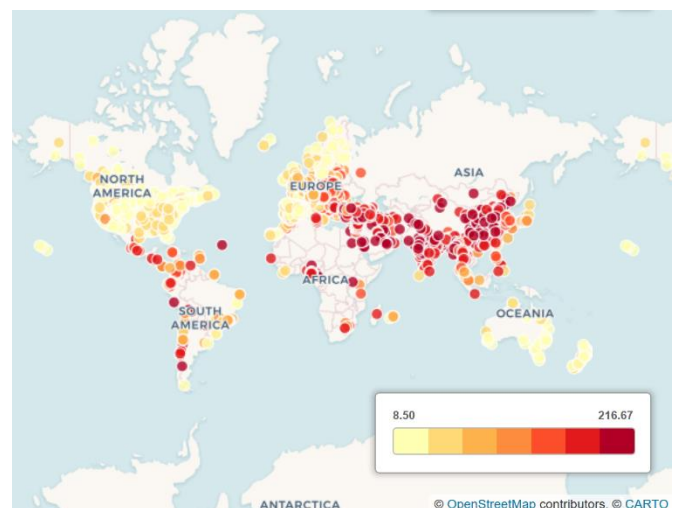


Figure 3 map of global pm2.5 pollution source - <sup>3</sup>

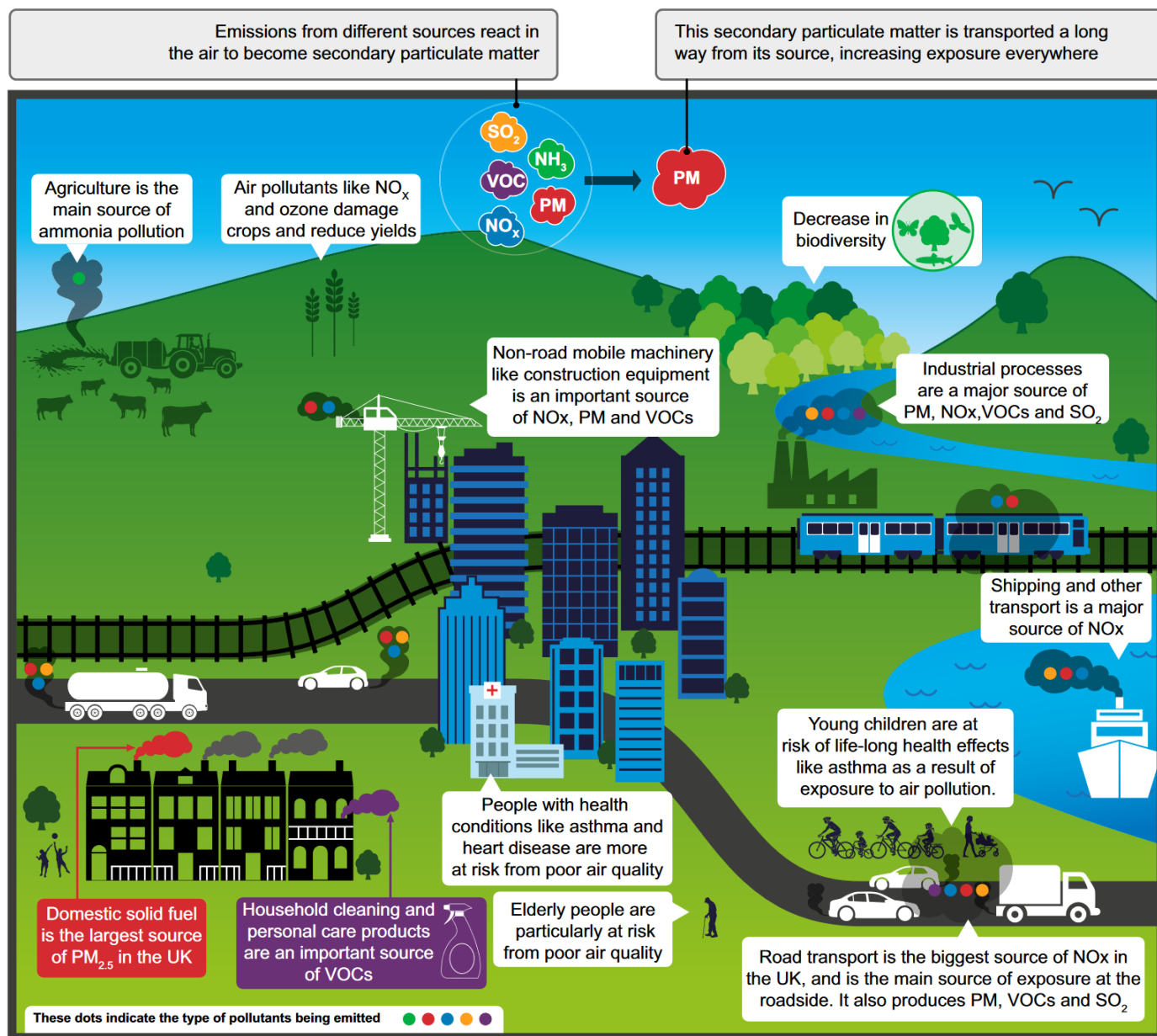
### Problems caused by poor air quality

As a native of Middlesbrough, I am well aware of the problems caused by the atmospheric pollutants above. In the North East of England, residents of my hometown are known as smogmonsters (!) because of the atmospheric pollution caused by the chemical and steel industries associated with Middlesbrough and Teesside. Smog is a mixture of smoke and fog; and can be particularly dangerous. Smoke and sulphur dioxide from burning are

condensation nuclei, and in the past in Britain and currently in Industrialising economies these extra nuclei encourage condensation at ground level which produces dense fogs. London was badly affected by “pea soups” in the past, huge smogs which covered larges areas and caused large scale disruption to our nation’s capital. The worst case was in 1952, when an anticyclone settled over London for over 5 days in December. This descending air caused a temperature inversion, the air was unable to disperse in the sheltered Thames basin and a fog developed as water vapour condensed on soot and coal dust. Over 12,000 people died, many from respiratory problems and a small number fell into the Thames, as a result of this thick fog. <sup>4</sup>

The diagram shows some of the problems posed by atmospheric air pollution by the UK government<sup>5</sup>;

## The sources of air pollutants and their effects



### Types of pollution

Nitrogen oxides (NO <sub>x</sub> )	Ammonia (NH <sub>3</sub> )	Primary Particulate Matter (PM <sub>2.5</sub> )
	Sulphur dioxide (SO <sub>2</sub> )	Volatile organic compounds (NMVOCs)

### Air pollution in London

London suffers from air pollution, mainly due to the sheer size of the city, a dense road network and high buildings. This means that central London tends to be one of the most polluted places in the UK. London has failed many of the

standards set by the EU and pollution can build up in London when anticyclones bring settled weather. London has problems with the following pollutants;

- Ozone pollution in spring and summer, this gas is a poison to the human body
- Particulate matter – these are tiny particles of solids or liquids suspended in the air. They come from carbon emissions from engines, small bits of metal and rubber from engine wear and braking as well as dust from road surfaces. They can come from natural sources and from building and industry. The tiny particles, referred to as PM<sub>10</sub>, can settle in the airway and deep in the lungs and cause health problems, premature death and the worsening of heart and lung disease.
- Nitrogen Dioxide from burning fossil fuels in cars and central heating boilers is another problem gas. It is harmful to human health giving respiratory problems such as shortness of breath and coughing. It can also lead to lung infections such as bronchitis.<sup>6</sup>

### Management of air pollution in London;

London is working hard to try and protect people and clean up the air by;

- a. Offering a free to download app that informs people of air quality
- b. Cleaning up London's bus fleet by making them less polluting
- c. Introducing a congestion charge in central London to reduce traffic volumes
- d. Set new and tighter standards for the London Low Emission Zone
- e. Invest record amounts of money in cycling and working with Sustrans

### Reducing pollution in UK cities

The UK is party to many international agreements concerning air pollution, and has its own internal laws and policies concerning the quality of air. Cars must have emissions tests on an annual basis as part of the MOT whilst industries are obliged to protect the environment as part of strict laws.

### Mumbai

Mumbai also has some very dirty air including dangerous levels of Nitrous Oxides and small dust particles called particulate matter. These are both hazardous to human health and can cause things like asthma. The causes of this pollution are industry, ever increasing numbers of cars and construction dust.

### Clean Air Strategy for the UK

The Clean Air Strategy for the UK sets out air quality standards and objectives for reducing levels of health threatening pollutants. All of the standards under this are subject to regulations under the Environment Act of 1995 and are the result of UK incorporation of European Union laws. This act focusses on air pollution from farming, industry, transport and the home. Since December 1997 all local authorities in the UK have to review and assess air quality in their area. If any standards are being exceeded, then an area is designated an Air Quality Management Area (AQMA) and the local authority (Newcastle City Council for example) must make and implement an action plan designed to reduce levels of the pollutant.

Domestic or home fires are also strictly controlled as part of the **Clean Air Act of 1993**, and Local Authorities can declare an area a Smoke Free Zone. Under this order, homes are banned from using fires that cause smoke unless they use smokeless fuel, or the appliance is exempt. Around 50% of households live in Smoke Free Zones in the UK.

### Industries

Industries are also controlled. They are regulated under Integrated Pollution Prevention and Control (IPPC) set up under the Pollution Prevention and Control Act of 1999. It is an offence for factories to emit dark smoke under the

Clean Air Act of 1993, except under unavoidable circumstances (e.g. lighting up). The amount of grit and dust emitted is also strictly controlled, and chimneys must have the most modern filters fitted.

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### 3.2.3.5 Urban drainage

#### Urban precipitation, surfaces and catchment characteristics; impacts on drainage basin storage areas; urban water cycle: water movement through urban catchments as measured by hydrographs.

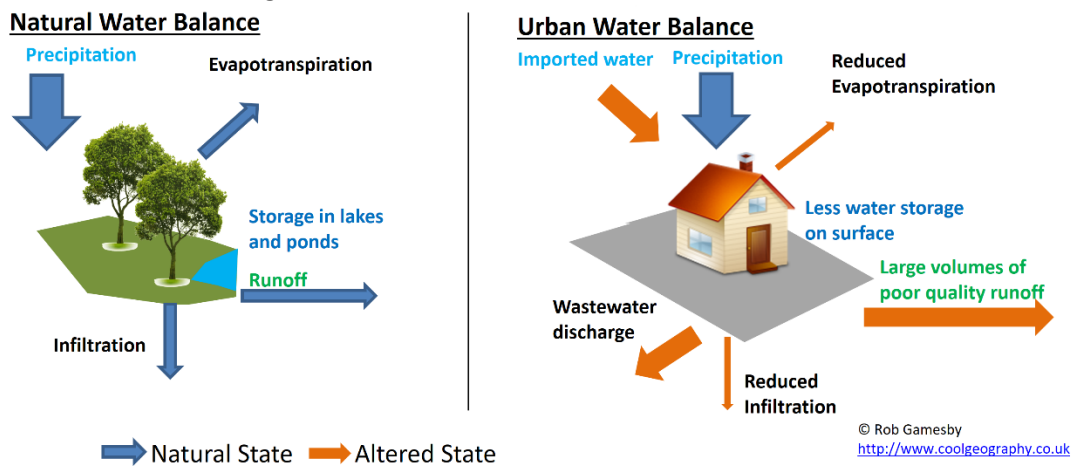
We have already seen that urban areas can drastically alter the climates of urban areas, but what of the drainage systems that exist in urban locations?

Precipitation is higher in urban areas due to increased presence of hygroscopic nuclei, and urban areas also experience more thunderstorms. These alter the INPUTS to the urban drainage system, but **other changes** also take place.

When looking at the changes in the urban drainage system, it is useful to consider the Urban water cycle and balance;

- A **natural water balance displays the RELATIONSHIP** between inputs (precipitation), stores (soils, rocks, surface, plants) and outputs (evaporation, transpiration, runoff) of a drainage basin system. This is significantly disrupted by the construction of urban areas
- The **urban water balance also displays the RELATIONSHIP** between inputs (precipitation), stores (soils, rocks, surface, plants) and outputs (evaporation, transpiration, runoff) of a drainage basin system BUT tends to have less infiltration and evapotranspiration, greater runoff than natural systems and also **has imported water and waste water losses** not present in natural systems

These changes are shown in the diagrams below;



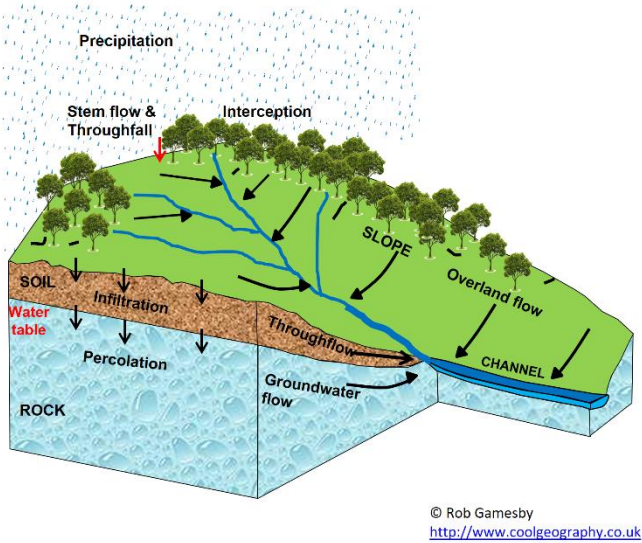
The main changes include:

1. **Greater inputs from precipitation** due to more hygroscopic nuclei
2. **Water is artificially imported** into the system adding extra water as an INPUT
3. **Greater water runoff** is evident due to the use of Impermeable surfaces (Any substance that will not allow water to pass through, such as concrete, used in urban areas to speed water away from areas of high property values)
4. **Runoff is of poor water quality** in urban areas as it picks up dust and pollutants created by urban processes like industry or transport.
5. **Evapotranspiration is reduced** in urban areas as there are fewer plants.
6. **Infiltration is reduced** in urban areas as concreted and tarmacked areas are impermeable and don't allow water to soak in.
7. **Wastewater discharge is an adjusted OUTPUT** to the system as liquid waste or sewage discharged into a river or the sea in urban areas (although much of this will be dealt with by a sewage system (the process of removing contaminants from wastewater, primarily from household sewage))
8. An **artificial drainage system is added** via a network of underground pipes and rains used to get rid of rainwater in urban areas
9. **Guttering** - channels water off buildings and into a drainage system
10. **Concrete driveways** - Have increased in popularity in the UK but increase localised flood risk as they do not allow water to infiltrate and exaggerate surface runoff

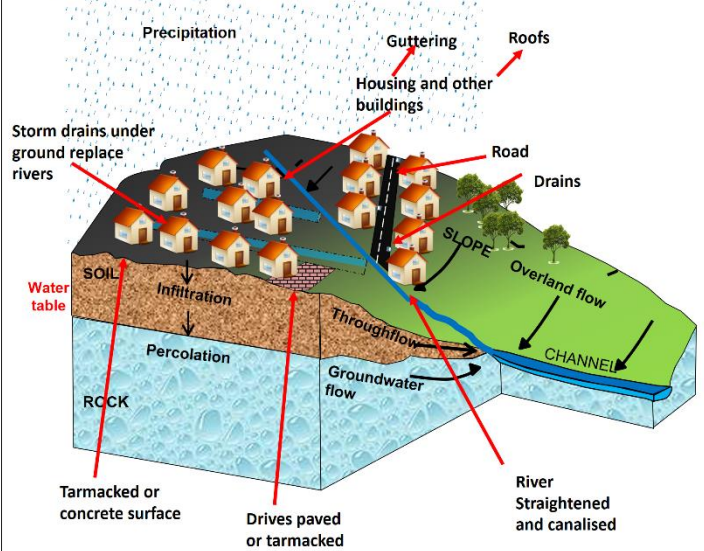
**11. Less water is stored in urban areas** as lakes and ponds are often drained and water is channelled underground. Less water is also stored in the soil and rock as less infiltrates.

These changes are more pronounced the more urban an environment, so as we progress from a rural urban fringe area into suburbs and on into the CBD the impacts on urban water budgets become more severe.

### The Rural Area Drainage Basin

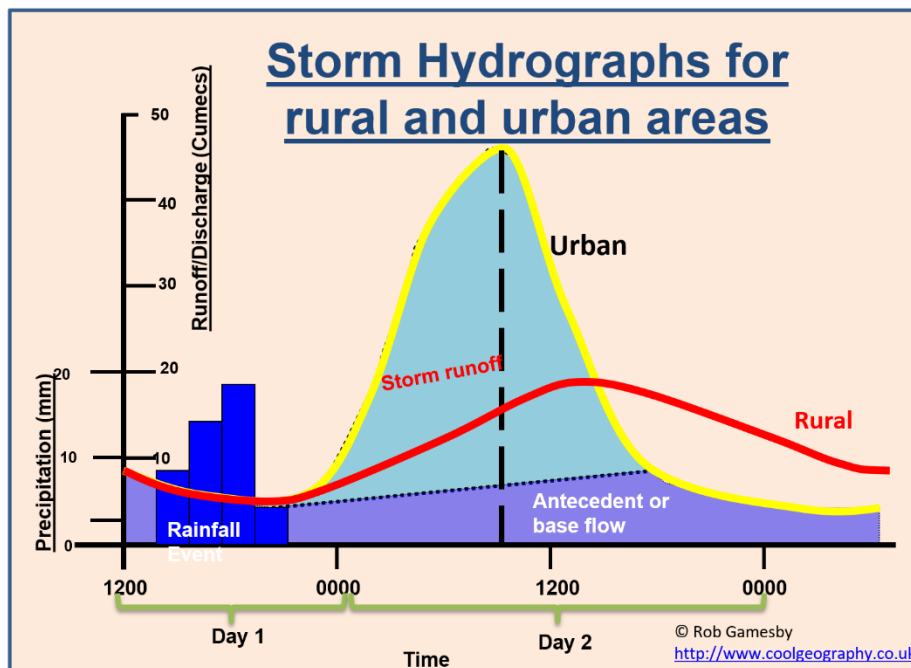


### The Urban Area Drainage Basin



### The Urban Hydrograph

A Hydrograph is a graph which shows the discharge of a river, related to rainfall, over a period of time. As a result of the changes to urban drainage basins, urban hydrographs tend to be flashy, where rivers are more likely to flood due to lower interception and infiltration rates. Although the base flow of rivers is lower in urban rivers than in rural rivers as less is fed into the system via soil and rock stores, these rivers fill quickly during rain events and are more likely to flood. The lag time of an urban river is shorter due to drainage systems which speed the flow of water through urban areas and a higher peak discharge is evident in urban rivers. These rivers also have steep rising and falling limbs as water reaches urban rivers quicker via drainage networks. The contrasts between a rural and urban hydrograph can be seen below.



## Issues associated with catchment management in urban areas. The development of sustainable urban drainage systems (SUDS).

### The need for sustainable drainage

Changes to drainage systems in urban areas occurred because of the need to channel water away from vital and expensive industry and housing. In the past little thought was given to the ecological impact of these changes and to the COST of taking such actions. Many rivers were straightened or channelised, or put into tunnels under the ground as culverts, or ponds and lakes drained without a thought for the longer-term consequences of those actions. Increased urban flooding as a result of using impermeable surfaces is also a major problem.

In the 20<sup>th</sup> Century hard engineering was used with the goal of drainage systems being **FAIL SAFE**, this is a design feature that in the event of flood failure, inherently responds in a way that will cause no or minimal harm to other equipment, the environment or to people. Many old concrete flood channels in urban areas were designed this way. **Channelisation** was often involved, a method of river engineering that widens or deepens rivers (and often uses concrete) to increase the capacity for flow volume at specific sections of the river. Used in urban areas to reduce flooding. An example of this is the **Los Angeles River**, which flows through a concrete channel on a fixed course, which was built after a series of devastating floods in the early 20th century.<sup>1</sup>



Figure 4 The Los Angeles River receiving the Tujunga Wash (right) near Colfax Ave. in Studio City, California. View is to the west by Junkyardsparkle [CC BY-SA 3.0 (<https://creativecommons.org/licenses/by-sa/3.0/>)], from Wikimedia Commons<sup>2</sup>

### The value of sustainable drainage

Drainage systems have an amenity value to people and cities, this means that they have value in terms of water resource management, provision of habitat for wildlife, recreational value for people, community facilities and even in moderating urban climates. Water quality is also regulated and moderated by drainage systems, and this is seen as an increasingly important aspect of urban drainage systems.

Now, in the 21<sup>st</sup> century, urban planners are paying far closer attention to the environmental and sustainability aspects of any changes they make to natural drainage systems in urban areas. There are 2 major areas to consider;

1. **Urban catchment management** - the management of urban water and surface water runoff within a given urban drainage basin
2. **SUDS - Sustainable Urban Drainage Systems**, designed to reduce the potential impact of new and existing developments with respect to surface water drainage discharges

Some of the major issues associated with the management of urban catchments include:

- Water Pollution - the degradation of urban water due to the addition of unwanted materials. The major pollutants found in runoff from urban areas include, and viruses
- Sources of water pollution in urban areas include sediment from construction, oxygen-demanding substances, road salts, heavy metals from cars and industrial processes, petroleum hydrocarbons, pathogenic bacteria, pesticides from parks and gardens
- Controlling increased river flows in urban areas during wet periods leads to flooding and increased erosion
- Decreased river flows in urban areas during dry periods causes extremely low flows and can damage fish spawning grounds and aquatic vegetation

- Higher water temperatures from increased urban air temperatures and discharged waste water can disturb ecological balance <sup>3</sup>

## SUDS

To combat these issues urban planners are moving towards Sustainable Urban Drainage Systems (SUDS). The idea behind SUDS is to try to replicate the drainage patterns of natural systems by using cost-effective solutions with low environmental impact to drain away dirty and surface water run-off through collection, storage, and cleaning before allowing it to be released slowly back into the environment, such as into water courses. This is to counter the effects of conventional drainage systems that often allow for flooding, pollution of the environment – with the resultant harm to wildlife – and contamination of groundwater sources used to provide drinking water. These SUDS provide **ecosystem services**, which are benefits obtained from the regulation of ecosystem processes, in this case urban river systems, such as climate regulation, flood regulation, water purification and waste management, pollination or pest control.

### The principles of SUDS solutions should be a drainage system;

1. storing runoff and releasing it slowly (attenuation)
2. harvesting and using the rain close to where it falls
3. allowing water to soak into the ground (infiltration)
4. Slowly transporting (conveying) water on the surface
5. filtering out pollutants
6. allowing sediments to settle out by controlling the flow of the water<sup>4</sup>

### Examples of SUDS

1. **Green roofs/rain gardens** – these cover the roof of a building with vegetation cover/landscaping. The roof is likely to consist of an impermeable layer, a substrate or growing medium and a drainage layer, designed to intercept and hold precipitation, reducing the volume of runoff and lowering peak flows.
2. **Paving** which allows rainwater to soak through the cracks between slabs so is better than concrete and tarmac
3. **Swales**, which are shallow, broad and vegetated channels designed to store and/or move runoff and remove pollutants. Can pass the runoff to the next stage of treatment and can be designed to promote infiltration where soil and groundwater conditions allow.
4. **Retention ponds** - small lakes that store storm water and allow for its treatment. Support emergent and submerged aquatic vegetation along their shoreline. Sediments settle out in the pond and plants can uptake pollutants.
5. **Wetlands** - can be built as part of SUDS to remove fine sediments, metals and particulates, and dissolved nutrients. Wetlands mainly treat polluted runoff, provide attenuation and deliver biodiversity and amenity. <sup>5</sup>



Figure 5 -Swale at Newcastle Great Park with Reeds

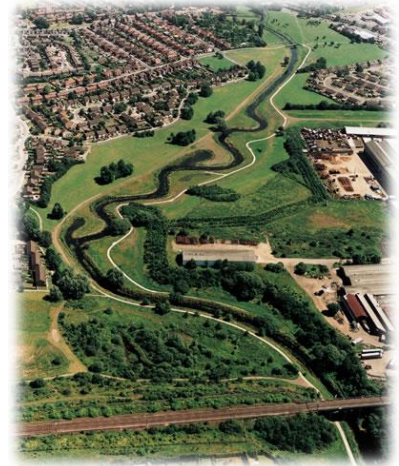
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## River restoration and conservation in damaged urban catchments

**River restoration** is the process of managing previous damaged rivers to reinstate natural processes to restore biodiversity, providing benefits to both people and wildlife. It has been needed due to the huge amount of damage done to urban rivers and the increasing awareness that drainage systems provide lots of amenity services to people and the environment. River restoration is part of **river conservation**, the protection, preservation, management, or restoration of wildlife and of natural resources such as forests, soil, and water. This can be observed on the photo opposite of the River Skerne, Darlington, restored between 1995 and 1998.



Aerial view of the new, meandering Skerne

Figure 6 the restored River Skerne in Darlington<sup>1</sup>

### The Cheonggyecheon River Restoration Project, Seoul, South Korea

Seoul is the capital and largest city in South Korea. It is situated in the northwest part of South Korea on the Han River which roughly bisected into northern and southern halves. It is one of the world's largest cities with a population of 10,197,604 million people (2017). The sprawling metropolitan area is much larger at 24.5 million people – the 5th most populous in the world. It is also noted for its population density (17,000 people per km<sup>2</sup>), which is almost twice that of New York and eight times greater than Rome.<sup>2</sup>

### Cheonggyecheon

Cheonggyecheon is a small region in a central area of the city. It contains the Cheonggyecheon River, which had been badly damaged in the past and was restored from 2003. The restoration was needed because of decades of human alteration of the river;

1918 – The Japanese administration dredge sediments out of the river and aimed to cover it over as the stream was viewed as a health and flood risk. Work halted because of the second World War

1958 to 1961 – the Cheonggyecheon stream was completely covered over

1971 - An Expressway was built that totally covered the river and prevented evapotranspiration, damaged river flows and enclosed the river system.

These changes had a **major impact upon the water balance** in this damaged urban catchment;

- There was virtually no vegetation so no evapotranspiration
- The river was totally enclosed preventing evaporation from the river and resulting in the only input into the system from an urban drainage system and waste water
- Flow rates were highly IRREGULAR which affects wildlife and sediment balances in the stream
- Water quality was very poor



The plan of the restoration scheme<sup>5</sup>

## The river Restoration project.

In 2003 a river restoration project was launched to bring environmental benefits back to the river. The overall aims were for;

1. An ecologically sensitive pedestrian corridor which improves the environment
2. To dismantle the elevated freeway and concrete deck above the stream
3. Improve the quality of life of people in Seoul
4. To remove the safety risks posed by the decaying freeway built over the top of the river
5. To increase business competitiveness and connectivity either side of the river (North and South)

The total length of the restored area is 5.8 km within an area of approximately 1,000 acres. This whole area has been turned into a green strip that is very beneficial for the citizens of Seoul. The cost of the restoration scheme was \$281million.<sup>3</sup> Features of the scheme included;

1. Car use was discouraged during the scheme and rapid bus lanes were added
2. 22 Bridges added in total including 12 pedestrian bridges and 10 motorist bridges to improve communications from North to South across the river
3. The Hanang River was used as source of water pumped into the Cheonggyecheon River to deal with variable flow rates and maintain a regular flow of 40cm depth. The pumped in water is treated to prevent pollution.
4. The historic central zone had underground waterways redirected and given a new stream bed and landscaped banks
5. The Middle zone of the project has fountains and waterfalls to increase biological oxygen supply
6. Final zone has the stream allowed to widen and designed to look overgrown and wild



Figure 7 The restored river - Nesnad [CC BY-SA (<https://creativecommons.org/licenses/by-sa/3.0/>)]<sup>6</sup>

The Hanang River marks the end point of the Cheonggyecheon River where the river flows into a wetland conservation area, and the end of the project.<sup>4</sup>



Cheonggyecheon before the reconstruction (2001, left) and after the reconstruction (2005, right)<sup>7</sup>

## Impact on the Urban Catchment

- a) Flow rates within the river were maintained at a constant rate - 120,000 tons of water are pumped in daily from the Han River, its tributaries, and groundwater from subway stations.
- b) Provides flood protection for up to a 200-year flood event and can sustain a flow rate of 118mm/hr

- c) Biodiversity Increased by 639% between the pre-restoration work in 2003 and the end of 2008 with the number of plant species increasing from 62 to 308 and fish species from 4 to 25.
- d) Reduction in average air temperatures by 2.5°C as a result of reducing the number of cars and reintroducing plants. This reduces the urban heat island effect.
- e) Evapotranspiration rates increased because of the introduction of plants to the system.
- f) Alteration to the inputs to the system, with added water from the Ham River and rainwater now present
- g) Biological oxygen supply improved via small waterfalls

**Evaluation<sup>5</sup>:**

Environmental	Social	Economic
<ul style="list-style-type: none"> <li>• Provides flood protection for up to a 200-year flood event.</li> <li>• Increased overall biodiversity</li> <li>• Reduces the urban heat island effect. This results from the removal of the paved expressway, the cooling effect of the stream, increased vegetation, reduction in auto trips, and a 2.2-7.8% increase in wind speeds moving through the corridor.</li> <li>• Reduced small-particle air pollution by 35% from 74 to 48 micrograms per cubic meter.</li> </ul>	<ul style="list-style-type: none"> <li>• 18.1 million visitors by 2008</li> <li>• Contributed to 15.1% increase in bus ridership and 3.3% in subway ridership in Seoul between 2003 and the end of 2008.</li> <li>• Foreign tourists visit the scheme who contribute up to 2.1 billion won (\$1.9 million USD) in visitor spending to the Seoul economy.</li> <li>• Before the restoration, residents of the area were more than twice as likely to suffer from respiratory disease as those in other parts of the city. Pollution reduction should reduce this number.</li> </ul>	<ul style="list-style-type: none"> <li>• Increased the price of land by 30-50% for properties within 50 meters of the restoration project. This is double the rate of property increases in other areas of Seoul.</li> <li>• Increased number of businesses by 3.5% in Cheonggyecheon area during 2002-2003, which was double the rate of business growth in downtown Seoul; increased the number of working people in the Cheonggyecheon area by 0.8%, versus a decrease in downtown Seoul of 2.6%.</li> <li>• Some business owners were not happy with the project</li> </ul>

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### **3.2.3.6 Urban waste and its disposal**

Around the world, waste generation rates are rising. According to the World Bank<sup>1</sup> in 2012, the world's cities generated 1.3 billion tonnes of solid waste per year, amounting to a footprint of 1.2 kilograms per person per day. With rapid population growth and urbanization, municipal waste generation is expected to rise to 2.2 billion tonnes by 2025.

#### **Key words:**

- **Domestic waste** - waste generated from household rubbish.
- **Commercial waste** - waste produced by businesses such as offices, manufacturing industries, restaurants, schools
- **Unregulated waste disposal** - where waste is dumped without any laws, rules or regulations covering its safe disposal
- **Waste management** - the management of garbage through a variety of methods including reduction, recycling, composting, incineration, landfilling, etc.
- **MSW** - Municipal Solid Waste, covers household waste and waste similar in nature and composition to household waste consisting of everyday items that are discarded by the public
- **Waste** - Unwanted or unusable material, substances, or by-products.

Solid municipal waste services are provided within urban areas but the quality of those services and the way in which waste is handled varies massively. **The manner in which urban areas deal with waste really matters because;**

1. As waste decomposes it gives off Methane which is a powerful greenhouse gas. The waste sector accounted for 3.1% of total *greenhouse gas* emissions in the UK<sup>2</sup>
2. It costs a huge amount of money to deal with waste - globally, solid waste management costs will increase from today's annual \$205.4 billion to about \$375.5 billion in 2025<sup>3</sup>
3. Landfill space is running out
4. Whilst a valuable source of employment, some of the conditions that workers who deal with waste work in are appalling. The World Bank estimate that there are two million informal waste pickers globally.
5. Health problems such as Dengue fever, Cholera and Diarrhoea can result if waste goes untreated or uncollected

#### **The problem of waste in cities**

Human beings create an incredible amount of waste, and the problem seems to be even worse within our cities. If you think about your own home, you can consider the amount of waste that needs to be dealt with. On a weekly basis you or the council needs to deal with:

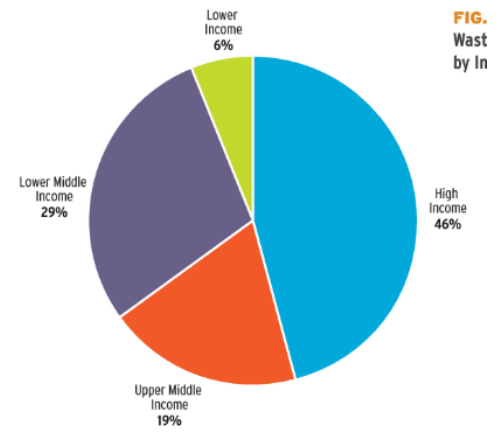
- Your refuse and general waste from your bins, plastics, metals, food wastes;
- Waste water from cleaning, dishwashers, washing machines;
- Waste Water from your toilet;
- Emissions from your energy needs.

Imagine now that this needs to be repeated for thousands of people in your town, or tens of thousands/ hundreds of thousands/millions of people in your city! As the world's population size has grown waste generation has increased rapidly. In the Twentieth century waste production increased tenfold due to urbanisation, industrialisation and rising population.

This doesn't include any of the wastes from the industrial processes that take place in cities either. In HICs our cities are not growing so fast or their growth has slowed, and we have had many decades to establish organised systems to get rid of our waste. In LICs the problem is much more difficult to deal with, especially given the rapid growth of these cities and the informal nature of some of the development, where people construct their own homes in squatter or shanty developments. One such LIC city is Mumbai. Can we continue to produce so much waste and not expect consequences?

### Waste generation patterns<sup>3</sup>:

- In 2002 - there were 2.9 billion urban residents who generated about 0.64 kg of MSW per person per day (0.68 billion tonnes per year).
- In 2012 - there were 3 billion residents generating 1.2 kg per person per day (1.3 billion tonnes per year).
- By 2025 - there will likely be 4.3 billion urban residents generating about 1.42 kg/capita/day of municipal solid waste (2.2 billion tonnes per year).
- According to the British Government we generate about 228 million tonnes of waste every year in England alone (based on 2012 figures). The UK dumps about half of its municipal rubbish into landfill sites, while Germany buries just 1% in holes in the ground.
- Low Income countries -generate 219kg of waste per person per year (2010)
- High Income Countries - generate 777kg of waste per person per year (2010)



### Sources of Waste in Urban areas:

Source	Typical Waste Generators	Types of Solid Wastes
Residential	Single and multifamily dwellings	Food wastes, paper, cardboard, plastics, textiles, leather, yard wastes, wood, glass, metals, ashes, special wastes (e.g., bulky items, consumer electronics, white goods, batteries, oil, tires), and household hazardous wastes (e.g., paints, aerosols, gas tanks, waste containing mercury, motor oil, cleaning agents), e-wastes (e.g., computers, phones, TVs)
Industrial	Light and heavy manufacturing, fabrication, construction sites, power and chemical plants	Housekeeping wastes, packaging, food wastes, construction and demolition materials, hazardous wastes, ashes, special wastes
Commercial	Stores, hotels, restaurants, markets, office buildings	Paper, cardboard, plastics, wood, food wastes, glass, metals, special wastes, hazardous wastes, e-wastes
Institutional	Schools, hospitals (non-medical waste), prisons, government buildings, airports	Same as commercial
Construction and Demolition	New construction sites, road repair, renovation sites, demolition of buildings	Wood, steel, concrete, dirt, bricks, tiles
Municipal/Urban Services	Street cleaning, landscaping, parks, beaches, other recreational areas, water and wastewater treatment plants	Street sweepings; landscape and tree trimmings; general wastes from parks, beaches, and other recreational areas, sludge

Source – <sup>(3)</sup>, page 22)

### Reasons for increasing production of waste:

1. Population is increasing globally, so there are more people to produce waste.
2. Many countries are industrialising and improving standards of living, wealthier people produce more waste
3. The development of a throw away culture - a human society strongly influenced by consumerism. The term describes a critical view of overconsumption and excessive production of short-lived or disposable items over durable goods that can be repaired.
4. Built in obsolescence - when a product is deliberately designed to have a specific life span. This is usually a shortened life span. This means that customers are inclined to replace products rather than repair them.

## Waste management:

The EU has a pyramid structure for waste management. This is known as the **waste management hierarchy** which is a priority list for disposal of waste in the following order - reduce and reuse, compost, recycle, waste to energy incineration, landfill

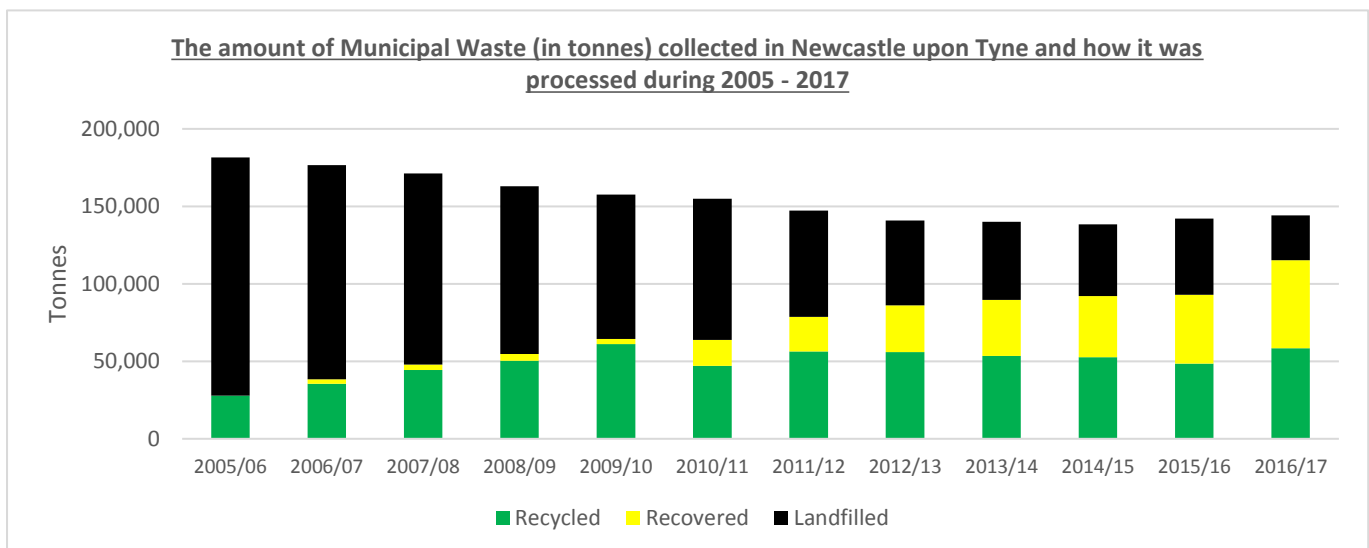
The methods at the top are the preferred methods and the ones at the bottom the least preferred. They also set clear targets over waste management and countries can be fined if they fail to meet those targets. This is a common method for many HICs. The key targets are to reduce the amount of waste in the first place that way there is less to deal with afterwards. Current campaigns against the use of single use plastics are examples of this, as are the use of a “bag for life”

## Methods of waste disposal

In High Income countries much waste is dealt with by either landfilling it or by incinerating it (often with some form of energy recovery). These methods are coming under increasing attack because they can be environmentally damaging and are considered unsustainable. In many LICs the major issue is with unregulated waste disposal, waste that is dumped and not controlled or regulated by the city authorities. This poses huge human health risks.

## Incineration

Incineration is a waste treatment process that involves the combustion of organic substances contained in waste materials. It can reduce the volume of waste by up to 90% leaving only ash that still needs to be disposed of. The environmental impacts of incineration are that it releases a wide variety of pollutants (e.g. particulate matter, metals, acid gases, oxides of nitrogen, and sulphur, toxic substances) depending on the composition of the waste, which leads to health deterioration and environmental degradation. It was used in the past in many countries but many HICs are shifting to **energy recovery or energy from waste**



## Energy recovery

Energy from waste or energy recovery is basically using heat derived from incinerators to heat buildings and/or generate electricity via steam produced by burning waste to heat water. It involves burning waste at very high temperatures to eventually reduce the amount of waste and then produce electricity. Municipal Waste is unloaded from collection trucks and placed in a rubbish storage bunker. An overhead crane is used to sort the waste and then lift it into a combustion chamber to be burned. The heat released from burning is used to convert water to steam. The steam is then sent to a turbine generator to produce electricity. The remaining ash is collected and taken to a landfill. Particulates are captured by a high-efficiency bag house (a filtering system).

It has numerous environmental advantages over simple incineration –

1. It disposes of solid, liquid and gaseous waste.
2. It is a practical method of disposing of certain hazardous waste materials (such as biological medical waste).
3. Ash residue from the furnace can be processed for removal of recyclable scrap metals.
4. Filters can remove many of the emissions
5. It reduces the amount of waste going into landfill.

However, the incineration process produces ash which still needs to be disposed of. This ash can be contaminated with toxins. These need special landfill for disposal. Emissions from incinerators can include heavy metals, dioxins and furans, which may be present in the waste gases, water or ash. The combustion of plastics, like polyvinyl chloride (PVC) gives rise to these highly toxic pollutants. Waste incineration systems produce a wide variety of pollutants which are bad for human health. Dioxins are the most lethal Persistent Organic Pollutants (POPs) which have irreparable environmental health consequences. The affected populace includes those living near the incinerator as well as those living in the broader region. People are exposed to toxic compounds in several ways:

- \* By breathing the air which affects both workers in the plant and people who live nearby;
- \* By eating locally produced foods or water that have been contaminated by air pollutants from the incinerator; and
- \* By eating fish or wildlife that have been contaminated by the air emissions.

### Landfill

Landfill is the disposal of refuse and other waste material by burying it and covering it over with soil. They are essentially hollows in the ground where rubbish is dumped. Historically no real strategies were put into place to prevent environmental damage were minimal or non-existent. **Modern landfills have linings of plastic** or compacted clay to prevent leachate (a mixture of materials from the waste in the landfill and rainwater) from running out of the landfill. This leachate is collected in pipes and transferred to leachate ponds where it can be treated to minimise damage to the environment. Gases such as Methane that are produced as the waste decomposes are also collected and reused as fuel. Successive layers of waste and earth are laid down, and landfills often have netting surrounding them to prevent windblown waste escaping. Many of the new landfills are built as lined facility with membranes or soil used to stop materials leaking, and with leachate collection and treatment on-site. The landfill is designed and built to store waste; this is thought to be a safe containment of our waste.

Environmentally, Methane gas can be collected at a number of waste landfills and some landfills have diesel/gas blended fuel fired electrical generation stations built on them. This gives electricity from waste materials which are free (except for collection etc.). Closed landfill sites can be recovered for other uses such as housing, golf courses etc. However, many older landfills that are in use are unlined. These landfills and other closed landfills are an environmental threat. This is because they contain hazardous materials and wastes, such as lead from batteries, domestic chemicals (e.g. bleach bottles), mercury from light bulbs, and heavy metals from electronic items. Rainwater can wash these chemicals into aquifers and into our drinking water as **LEACHATES**. Landfills are often constructed in low lying areas and cover large areas. They attract vermin such as birds and rats. These can be controlled with birds of prey. A final issue is that space for landfills is running out.

A similar type of waste disposal is **Submergence**. This is dumping waste in water bodies such as the sea, and is banned by international convention. However, it still occurs and this waste could spread across the oceans, be ingested by marine life and plastics can remain in the system for a very long time.

### Recycling and recovery

Recycling is nothing new and can take many forms. Within our homes we take old materials and transform them into other items. At council level or at national scale recycling becomes more important. Large scale recycling involves used products being collected, converted back into raw materials and remade into new consumer products. These

recycling plants are often very high tech, with magnets separating metals, hand recycling of other products and vents used to separate paper.

Recyclable materials include metals such as aluminum cans, paper, plastic containers, cardboard and wood are all commonly recycled often through municipal programs encouraging bulk household collections. When a recycled good is cheaper or weaker than the original product, it's known as **down-cycling** (or downstream recycling). In some cases, goods can be **up-cycled** or made into something more valuable than the original product. Recycling can lower costs for industry as there are lower manufacturing costs for products made from recycled rather than virgin materials.

Councils and urban areas are often interested in **total diversion rates** - the amount of material that is recycled and/or composted instead of going into a landfill.

There are several environmental impacts of Recycling and recovery

1. It saves mining and producing new resources,
2. It does require energy in many of the processes and uses water, but not as much as creating new products from raw materials
3. There is inherent value in conserving our natural resources.
4. It is less wasteful, as products are given extra life and there is less need to extract new raw materials.
5. Recycling also raises awareness of how much waste we generate, and therefore makes consumers put pressure on manufacturers to reduce packaging.
6. Some items can't be down cycled forever, for example, after being recycled a few times, paper is no longer usable.
7. Recycling requires energy and chemicals to recover the waste.

It would be better to use waste reduction - the purchase or production of materials and packaging that can be recycled or composted.

### **Global waste trade and electronic waste**

Some items rich countries don't wish to recycle, such as dangerous batteries or electronic equipment, often end up in poorer countries for processing. This is known as the global waste trade and includes electronic waste. The international trade of waste occurs between countries for further treatment, disposal, or recycling. Toxic or hazardous wastes are often exported from developed countries to developing countries, also known as countries of the Global South. Electronic waste is discarded electrical or electronic devices. Used electronics which are destined for reuse, resale, salvage, recycling, or disposal are also considered e-waste. The disposal of this waste is hazardous and can damage the environment, so unfortunately often waste from HICs ends up for processing in LICs.

Guiyu in China is thought to be the largest electronic waste (e-waste) site in the world. In 2005, there were 60,000 e-waste workers in the city who processed the more than 100 truckloads that were transported to the 52-square-kilometre area every day. The Nickname of Guiyu is the "Electronic graveyard of the world" due to the constant movement into and processing of e-wastes in the area leading to the harmful and toxic environment and living conditions, coupled with inadequate facilities.<sup>4 & 5</sup>

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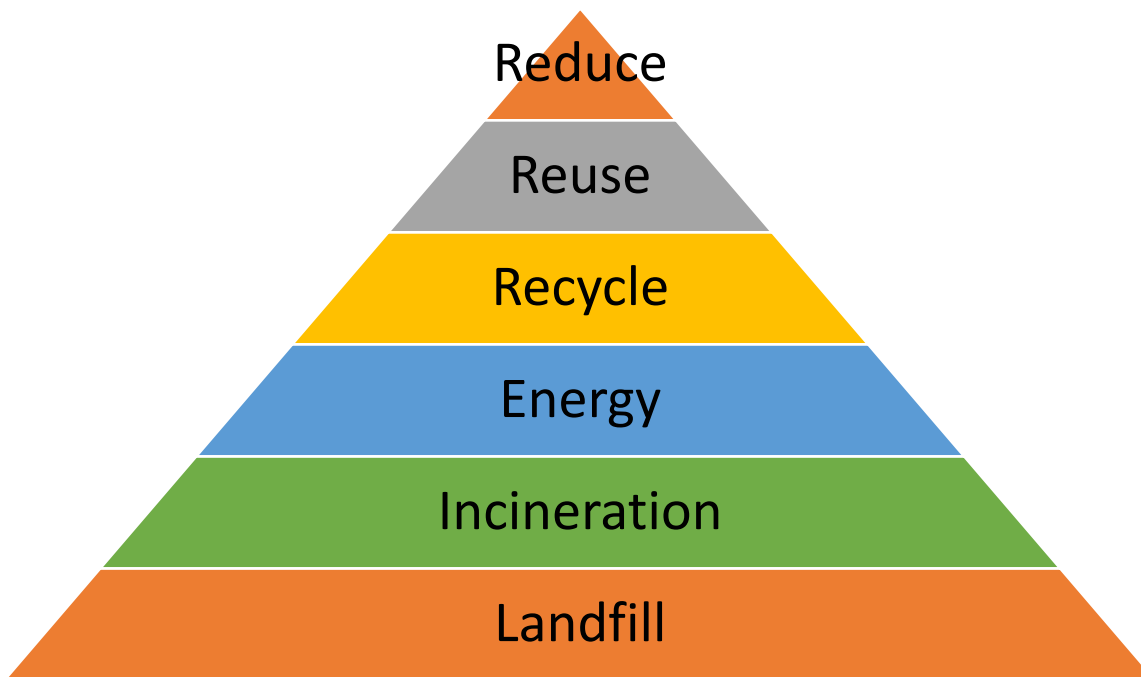
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## Comparison of incineration and landfill approaches to waste disposal in relation to a specified urban area.

The Netherlands is the most densely populated country of the European Union with a population of 17 million people and a population density of 488 people per km<sup>2</sup>. It is one of the most densely populated countries in the world. The total size of the Netherlands is small, at only 41,500 km<sup>2</sup>. Amsterdam is the capital, but the government resides in The Hague<sup>1</sup>. This posed a major problem for the government, as in a country with such limited space what could they do with their waste? The government also had to face the fact that as their residents became wealthier more goods were produced and consumed, leading to even greater waste generation.

The Dutch approach follows Lansink's ladder, after the priorities initiated by the politician Ad Lansink in the Dutch parliament in 1979. This means that the Dutch try to deal with waste in the following order;



Prevention and reusing waste are the top priority (avoidance). Recycling and high-quality energy recovery is the second priority (recovery). The least preferred is burning waste and dumping waste on landfills (disposal). This was brought into Dutch law in 1993.<sup>2</sup>

### Reducing landfill

In 2013 the Netherlands only landfilled 1.5 to 2 million tonnes of waste annually. That is only a 2% to 3% of the total waste generation of some 60 million tonnes per year. Essentially only wastes for which no recycling or incineration option exists, are landfilled.<sup>3</sup>

The Netherlands government achieved this through;

1. Introducing landfill bans in 1995 and gradually extended to 64 waste categories.
2. Introducing a landfill tax in 1996 and gradually increasing it until it was abolished in 2012. This has played a very important role in achieving the low landfill rates as it made it expensive to dump waste. The tax was ended in 2012 as it was thought that it was no longer needed because most waste was being recycled or used in energy recovery.
3. Increasing the amount of recycling taking place in the Netherlands

## Using energy from waste

In 1992, the City of Amsterdam created Afval Energie Bedrijf (AEB), a waste-to-energy enterprise that operates as a self-contained entity but is owned by the City. AEB's mission is to recover as much energy and materials as possible from municipal waste while protecting the environment

In 1993, AEB began operating a large incinerator on a site at the western end of the city in the area known as Westpoort. This incinerator has a capacity of 900,000 tons of waste and sludge, and produces about 525 GWh per year, which corresponds to a continuous capacity of around 64 MW. Currently;

1. AEB is the world's largest Waste-to-Energy company on one single location.
2. AEB has around 400 employees.
3. The company comprises the Waste-to-Energy Plant (AEC), the Waste Fired Power Plant (HRC), the Hazardous Waste Depot and the Amsterdam Waste Points.
4. They produce 1 million MWh of electricity annually, enough to service 320.000 households.
5. Also a lot of heat is generated: up to 600.000 gigajoule a year over the last years. This heat is used for district heating: hot water and central heating of Amsterdam households.
6. The design of the high efficiency Waste Fired Power Plant is partly based on our own technological innovations. Thanks to these innovations the energetic efficiency of the plant is over 30%, by far the highest in the world of waste to energy conversion.
7. AEB also harvest the waste they receive for a source of raw materials. Valuable metals such as iron, copper and aluminium are extracted before burning. The remaining matter is used as fill material in the construction of roads. And products are also extracted from the flue gas. These are used in the asphalt industry. Additionally, gypsum is extracted and can be put to use in construction.
8. AEB Amsterdam converts 99% of the 1.4 million tons of municipal and industrial waste that is being delivered annually, into sustainable energy and raw materials.
9. AEB has also helped to CUT CO<sub>2</sub> emissions because the plant has several functions at the same time – waste disposal, electricity generation and heat generation. <sup>4</sup>

The UK government is keen on energy from waste as a method of reducing the amount of landfill and the production of energy. The experience of the Netherlands is generally positive, but it needs to be considered that this method is more expensive than landfill and also leaves some wastes that need disposing of in the form of ash and potential air pollution.



Figure 8 - Source <http://www.aebamsterdam.com/>

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- 2- Ad Lansink and Steve Watson (2014) - *Ask Ad: climbing Lansink's Ladder* accessed August 2018 at <http://www.isonomia.co.uk/?p=3464>
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### 3.2.3.7 Water pollution.

#### Strategies to manage these environmental problems.

Water quality can be measured in terms of the **chemical, physical, and biological content** of water. The most common standards used to assess water quality relate to health of ecosystems, safety of human contact and drinking water. Water quality can be of particular concern in URBAN areas because of the various economic activities that take place there and the high population densities in them.

Water in the UK has generally improved in quality over time since the cleaning up of our industrial past. However, according to the EU, only 27% of our water meets its stringent water quality standards. This means that we have some work to do in ensuring that our open water areas are clean. However, many attempts have been made to keep improving our water.

There are many **sources of pollution** around the world that threaten the quality of our water including;

1. Agricultural runoff water, this picks up chemical pesticides and insecticides, nitrates and phosphates (found in fertilisers) and run into our lakes and rivers. This can cause eutrophication, where aquatic plants use fertilisers to grow, consume oxygen in lakes and kill other aquatic life. Although these sources are outside of urban areas the pollutants can flow into our towns and cities.
2. Historical wastes, water running through old mine workings and old industrial sites can pick up hazardous heavy metals
3. Runoff from roads and motorways including salt used for gritting, oil and heavy metals from car engines and exhausts
4. Sewage waste can end up in our water courses, despite our attempts to clean it
5. Discharge of untreated Raw Sewage from households and factories, this can cause cholera, hepatitis and typhoid
6. Chemicals and heavy metals (such as lead and cadmium) dumped from Factories
7. Human littering in rivers, oceans, lakes and other bodies of water. Harmful litter includes plastics, aluminium, glass and Styrofoam.



Figure 9 - A stream in the town of Amlwch, Anglesey which is contaminated by acid mine drainage from the former copper mine at nearby Parys Mountain. By Cls14 (Own work) [CC BY-SA 3.0 (<http://creativecommons.org/licenses/by-sa/3.0/>)], via Wikimedia Commons

#### Poor water quality affects urban areas because;

- It can potentially poison our water supply, essential for human life
- Eutrophication can occur – this is where fertilisers washed into our rivers and lakes encourage plants and algae to grow, starving other life of oxygen
- Sewage contains bacteria which can spread disease
- Heavy metals and toxins can poison wildlife. These toxins can then end up in people as they work their way up through the food chain in a process of bioaccumulation
- Insect and animal life can be killed unintentionally by pesticides and insecticides, affecting food chains

#### Management of urban water pollution

To combat water pollution, the UK government attempts to do lots of things.

- **Educate people** – the government having run campaigns for the public to show them the need to use as little water as possible and to not dispose of inappropriate items in our waste water. Not leaving the tap running when brushing your teeth is one way to save water, whilst not disposing of oils or baby wipes is a way to protect our disposal network.
- **Laws and legislation** – The EU and the UK have very strict laws for our water, which make sure that industries and farms do not pollute it. For example, phosphates contribute to eutrophication. The amount

of phosphates allowed in laundry detergent was reduced in 2013 and will be reduced for dishwasher products in 2017.

- **Treat our water** – we have invested huge amounts of money in new treatment plants to clean our water. This is shown on the flow chart below. This can cost a lot of money which creates bigger bills for consumers but ensures our clean water supply. We have also invested in our pipe and sewer network, to reduce losses of treated water from pipes and to prevent spills of sewage which lead to pollution.

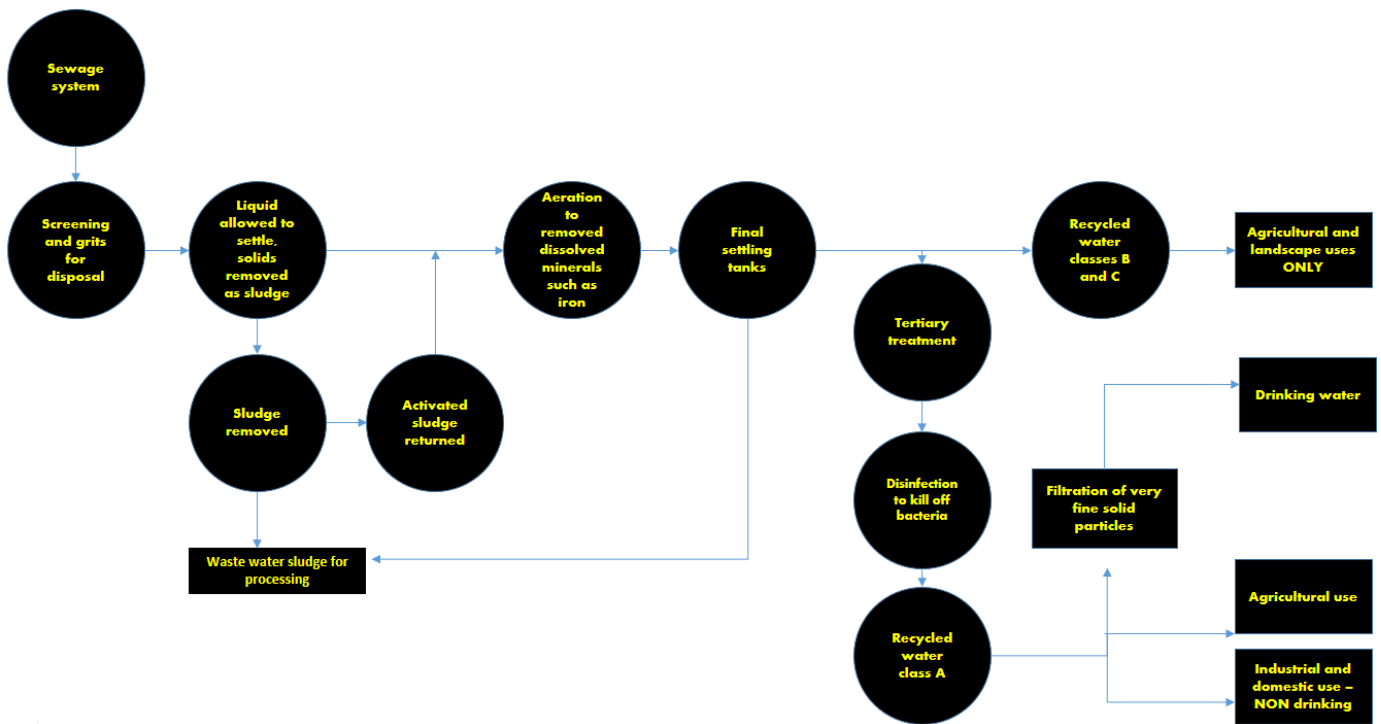


Figure 10 - How water treatment works

- **Improving our water courses** – the government have invested in pollution traps downstream of old sources of pollution such as old mine workings, or by using innovative schemes such as the Tees Barrage.

**Water pollution is also a major problem in Mumbai.** A major study revealed that 77% of households suffer from poor water quality in the city. This poor water quality is leading to water borne diseases occurring in people and levels of things like total dissolved solids (TDS) and nitrates are higher than safe limits. Toxic chemicals such as arsenic and lead and disease-causing bacteria are also contributing to the alarming increase in the water contamination. Deadly waterborne diseases like cholera, jaundice, typhoid, and diarrhoea are affecting people as a result.



Figure 11 The Tees Barrage By John Yeadon (Own work), [https://commons.wikimedia.org/wiki/File:Tees\\_Barrage\\_-\\_downstream\\_view-1080.jpg](https://commons.wikimedia.org/wiki/File:Tees_Barrage_-_downstream_view-1080.jpg)

### 3.2.3.8 Sustainable urban development

Contemporary opportunities and challenges in developing more sustainable cities.

Strategies for developing more sustainable cities.

**“If you want to make life better for people make the cities better for people.” Jaime Learner**

Urban sustainability is a massive issue both in the UK and globally. The goal of URBAN SUSTAINABILITY is ensuring that cities and towns have a minimal **ecological footprint** (they don't pollute too much and don't consume too many natural resources) on their surrounding area, allowing local people a say so that society and communities are sustainable and making cities pleasant places to live through the provision of adequate open spaces and recreation facilities. **Biocapacity** is the capacity of a given biologically productive area to generate an on-going supply of renewable resources and to absorb its wastes. **Unsustainability occurs if the area's ecological footprint exceeds its biocapacity.** This is generally the case for most urban areas.

In contrast a sustainable city can be defined as;

"Improving the quality of life in a city, including ecological, cultural, political, institutional, social and economic components without leaving a burden on the future generations. A burden which is the result of a reduced natural capital and an excessive local debt."

Urban21 conference in Berlin 2000<sup>1</sup>

#### Nature and features of sustainable cities.

You could consider urban sustainability considering the following dimensions;

Physical or Natural - - Human are part of nature, nature has limits, and communities are responsible for protecting and building natural assets.

Economy - Economic activity should serve the common good, be self-renewing, and build local assets and self-reliance.

Social - The opportunity for full participation in all activities, benefits, and decision-making of a society.

#### Concept of liveability.

The concept of liveability is simple: it assesses which locations around the world provide the best or the worst living conditions. <sup>2</sup> According to the Economist, “every city is assigned a rating of relative comfort for over 30 qualitative and quantitative factors across five broad categories: stability, healthcare, culture and environment, education, and infrastructure. Each factor in a city is rated as acceptable, tolerable, uncomfortable, undesirable or intolerable.” The scores are then weighted and a total score out of 100 is awarded. The results from 2019 are;

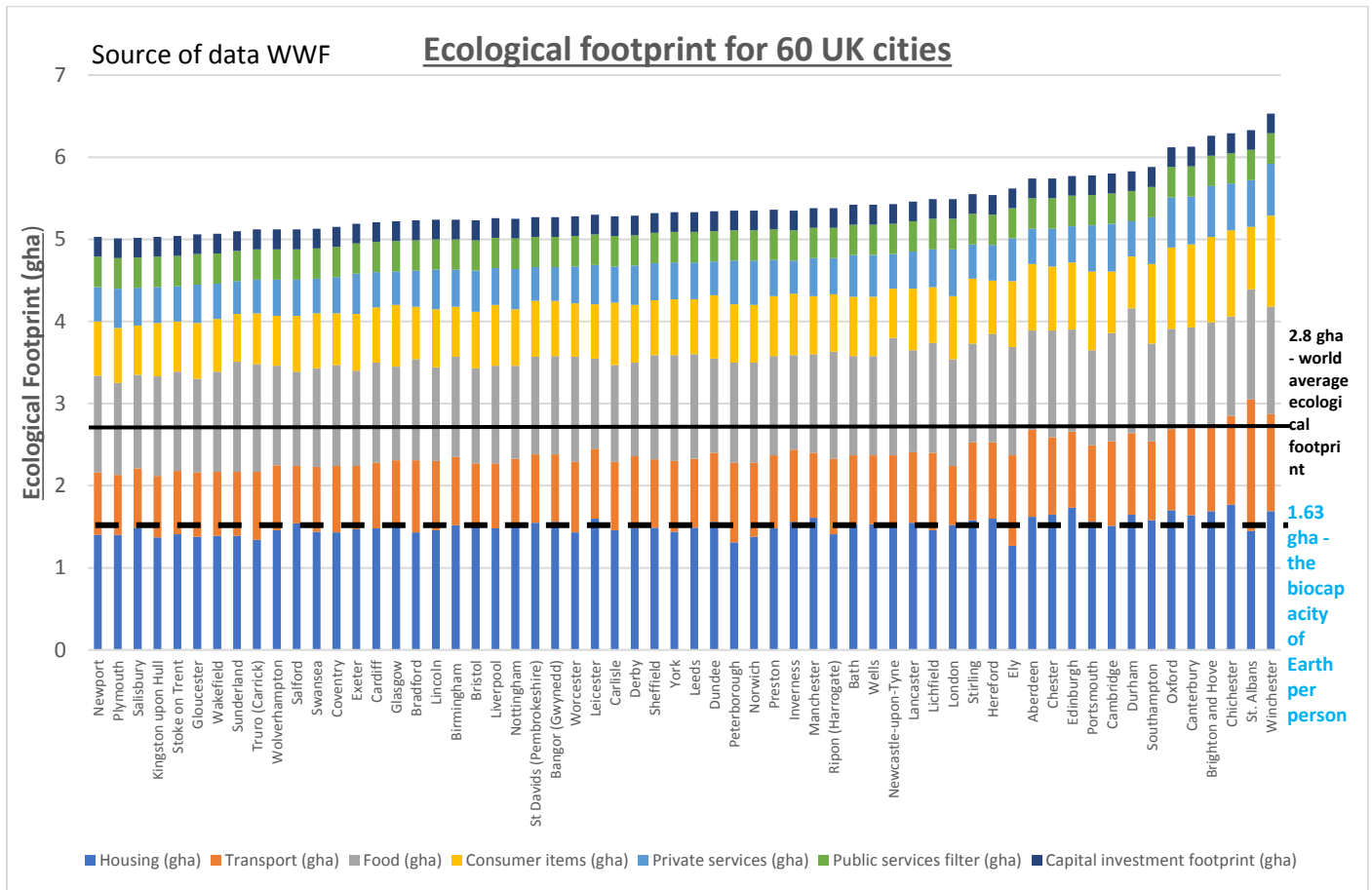
Rank 2019	City	Score
<b>1 (top)</b>	Vienna, Austria	99.1
<b>2</b>	Melbourne, Australia	98.4
<b>139</b>	Lagos, Nigeria	38.4
<b>140 (bottom)</b>	Damascus, Syria	30.7

#### Ecological footprint of major urban areas.

According to the Global Footprint Network<sup>3</sup> “The global effort for sustainability will be won, or lost, in the world’s cities, where 70 to 80 percent of the world’s population is expected to live by 2050.” Indeed, in many countries, one or two major urban centers are major contributors to the national Ecological Footprint. They also run significantly higher per capita Footprints than the average for their nations. In the graphic below, it is clear that whilst there is variation in the footprints of the cities shown (the data is old too so may have changed), all of the UK cities shown have footprints that are well above the biocapacity of the Earth so are UNSUSTAINABLE. Just one component,

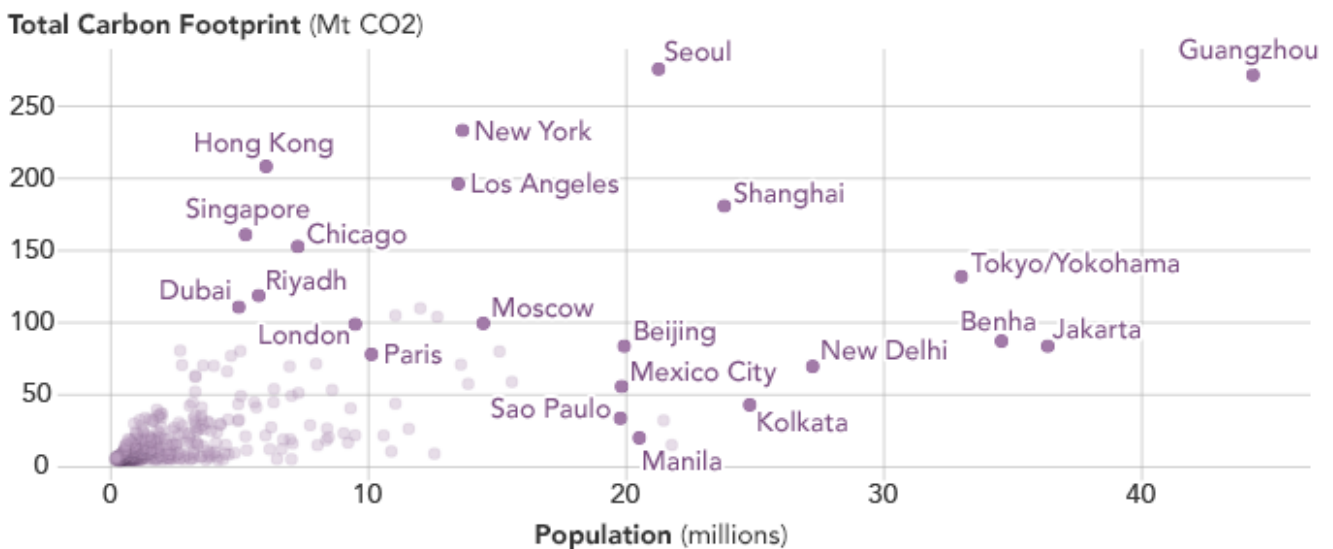
Housing, takes most of those cities above the 1.63gha available as the biocapacity of the Earth, without even considering transport, food, consumer items, private services, public services and capital investments!!!

<https://www.wri.org/our-work/project/world-resources-report/cities/post/6-questions-ecological-footprint-cities-mathis>



Data Source<sup>4</sup>

Another narrower way to consider sustainability of cities would be to exam their carbon footprint. NASA<sup>5</sup> produced the graph below and there is a loose relationship between population size and the total Carbon footprint of cities, especially those in high income areas with many industrial processes taking place.



## Newcastle upon Tyne

Every household in Newcastle has recycling bins, allowing local residents to recycle cardboard, plastics, metals and glass. In many areas there are also garden waste bins, allowing the council to produce its own compost. Local tips in Newcastle also force people to separate their waste whenever possible, further increasing recycling rates. Fires within the central area of Newcastle are banned under the Clean Air Act, improving the quality of Newcastle's atmosphere. Over time, Newcastle upon Tyne has reduced the amount of waste it produces and

Source

The Rio Earth Summit of 1992 said that there was the need to move away from the unsustainable development of recent decades, which took little account of the finite nature of resources or the damage being done to our environment. Sustainable development was seen as essential.

## CURITIBA

Curitiba is the capital of Parana State and is found on the South East of Brazil around 1,000km from Rio de Janeiro. In a recent survey 99% of Curitiba's residents said they were happy with their city. It has been transformed from an agricultural city to a manufacturing one through SUSTAINABLE PLANNING.

Curitiba has suffered from all the typical problems brought by rapid urban growth:

- Mass unemployment;
- Transport congestion;
- Lack of basic services and
- Uncontrolled growth of squatter settlements.

This is a good case study as the city was located in an LIC when it started its pathway to sustainability and shows what can be done on a budget.

In 2010 the Global Sustainable City Award was given to Curitiba. It has a population of almost 2 million people.

Transport

Curitiba has developed a high quality of life for its inhabitants by prioritising people over cars. Jaime Learner became mayor in the 1971 (until retiring in 2002) and when elected into office he faced a plan to widen the city streets to cope with an increasing number of traffic. Learner did the opposite, he paved the street and closed it to traffic – Boulevard de Flores has since spread to span 50 blocks and is a mall in the street. Learner also believes in participation of people in the life and development of the city, and that economic activity should not be separate from society.

Learner says that there are 3 main issues facing society in the future – "Mobility, sustainability, and identity". He feels that if all of these 3 things were addressed cities could be great places to live. By the 1970s the population of Curitiba had grown tenfold in just 50 years and was clogged with cars. Learner knew the solution was in public transport, but his city was CASH POOR.

He decided to go with SIMPLE methods and used a bus system to revolutionise transport in the city. He designed a system which features;

1. 5 main arterial traffic roads into and out of the city. These routes had a central bus lane that was totally dedicated to 2 directional public transport; not the car. This was to speed the journey for commuters on the bus. This boosts the number of passengers per bus from 1,000 per day to 2,000. The arterial roads were also used as growth corridors of the urban and economic growth of the city.
2. Triple articulated buses (bendy buses!); this further boosted the number of passengers per bus to an incredible 4,000 per day and Learner claims that it can move more people than a subway yet is 100 to 200 times cheaper.

3. The buses are coloured according to their function;
  - Red busses were express buses with fewer stops,
  - Orange busses bring people from outlying districts to the express routes,
  - Green buses bring suburban people to the express routes,
  - And grey buses take suburban dwellers direct to the city centre but make many more stops. There is only one fare and people can change busses on the same ticket. There are interchanges across the city so people can change directions and busses
4. Rapid implementation within 2 years.
5. Learner also improved this system by designing an elevated glass boarding tube, where people could shelter and buy their tickets, speeding up the journey. The bus doors are wider and open directly into the tube, maximising access for all types of users including the disabled. Faster loading and unloading on the bus means less idling and cuts the bus travel times.
6. The bus companies are paid per km driven not per passenger, this means the bus companies still want to run services on less popular routes, not argue over the more popular routes.

Source - Curitiba Brazil ([http://maps.grida.no/go/graphic/curitiba\\_city\\_map](http://maps.grida.no/go/graphic/curitiba_city_map))

Results:

During peak hours busses arrive every 60 seconds and are always full. Curitiba has one of the lowest rates of pollution as a result. An initial 25,000 passengers and that grew to over 2 million passengers. It is totally funded by the people who use it and has no government subsidy.

### **Parks and open space**

There are 28 parks and wooded areas in Curitiba, creating a city landscape which is unlike any other in a developing city. The parks were designed to be INTERCONNECTED and not isolated to maximise use. They were designed by Hitoshi Nakamura. The parks ring the city and some of the parks were built in 2 months.

The parks increase the value of surrounding land, and many of the parks are dual purpose.

One of the parks is used for flood control from the Iguazu River in the 1970s. Instead of putting a concrete channel around a river in Barigui Park to stop it flooding, they designed the park to absorb the flood water naturally instead, and created lakes to absorb flood water. This saved money from expensive hard engineering projects and the money could be used in social projects such as schools instead. The park covers 1.4 million m<sup>2</sup>.

The parks also stop squatters from creating shanty towns in the flood prone zones. The owners of skyscrapers alongside the parks were allowed to add extra stories to their buildings, if they added green space around the base of the building or paid extra tax that went to fund lower income housing.

Curitiba has 4 times the green space recommended – they even use sheep to “cut” some of the grass in the park!

### **Housing and social projects**

Curitiba still has slums filled with poor people. The city has a social charter designed to help them.

The slum dwellers have to cope with regular floods. The slums will be cleared but to solve this Curitiba has used Site and Service schemes, where the government offers low interest loans on the land and free house design for the people. The residents are trained to build the houses and make up a large part of the labour force. The houses have electricity, sewerage and running water.

“If you want to make life better for people make the cities better for people.”

Urban growth is also restricted to corridors of growth - along key transport routes. Tall buildings are allowed only along bus routes.

COHAB, the public housing programme, is providing 50,000 homes for the urban poor.

COHAB housing area - source

"Curitiba Centro" by Francisco Anzola - Flickr: Curitiba Centro. Licensed under CC BY 2.0 via Wikimedia Commons

Waste

The city has recycled waste since the late 1980s, well ahead of its time globally in terms of waste disposal. It has an organised waste disposal system the rival of any first world city. The garbage is separated into 2 categories – organic and non-organic, which are collected by 2 separate trucks.

Learner also introduced an “Equation of co-responsibility” involving the “green exchange” – this was Learner’s idea to help the urban poor. People in the slums collected rubbish, and the council paid for the weight collected using fruit and vegetables. The council gains here because the people collect the rubbish in narrower roads where the council’s collection trucks can’t get to. This also saves on expensive road widening.

The recyclable non-organic waste goes to a plant made of recycled materials! They are separated into plastics, paper, and metals and all are recycled. Curitiba recycles 2/3s of its waste. The scheme generates jobs, reduces landfill and is cheaper than landfill as it generates money. There is even a library of recycled books to be used by school children.

There are also "Lighthouses of Knowledge" in the city. These are free educational and internet centres.

## **Economy**

The economy of Curitiba is principally manufacturing. Volvo has a big factory there and in 1992 they developed the triple articulated busses. Volvo was attracted to the city by its educated work-force, Curitiba has one of the oldest universities in Brazil.

Brazil has developed rapidly since 1970 to become a NIC. Curitiba took advantage of these changes at this time and developed an Industrial City (Cidade Industrial de Curitiba or C.I.C.) 10 km WSW of the city

The goal of the C.I.C was to upgrade the city’s economic profile and provide jobs for its citizens. It had the following features;

1. In keeping with other developments in Curitiba SUSTAINABILITY was at its heart. The site was picked so that the dominant SE trade winds would blow any pollution away from the Curitiba city, and nearby water sources would be fully protected.
2. Integration of Industrial facilities with public transport and other services.
3. The industry was developed with parks around it limiting the impact on this green land (15% of the area is still greenfield).
4. 20,000 housing units have been built in the area, so workers could cycle to work.

Industry represents 34.13% and the commerce and service sectors 65.84%. The CIC is home to many transnational industries, such as Nissan, Renault, Volkswagen, Philip Morris, Audi, Volvo, HSBC, Siemens, ExxonMobil, Electrolux and Kraft Foods, as well as many well-known national industries, such as Sadia, O Boticário and Positivo Informática. By 2000, over 550 factories were operating in the industrial city, providing some 50 000 direct jobs and 150 000 indirect jobs.

As well as the industrial city, there are nearly 6000 other industrial enterprises in Curitiba, right across the full range of industrial activity. This high level of diversification is again very beneficial in sustaining the quality of life of Curitiba's citizens.

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### 3.2.3.9 Case studies

Case studies of two contrasting urban areas to illustrate and analyse key themes set out above, to include:

- patterns of economic and social well-being
- the nature and impact of physical environmental conditions

with particular reference to the implications for environmental sustainability, the character of the study areas and the experience and attitudes of their populations.

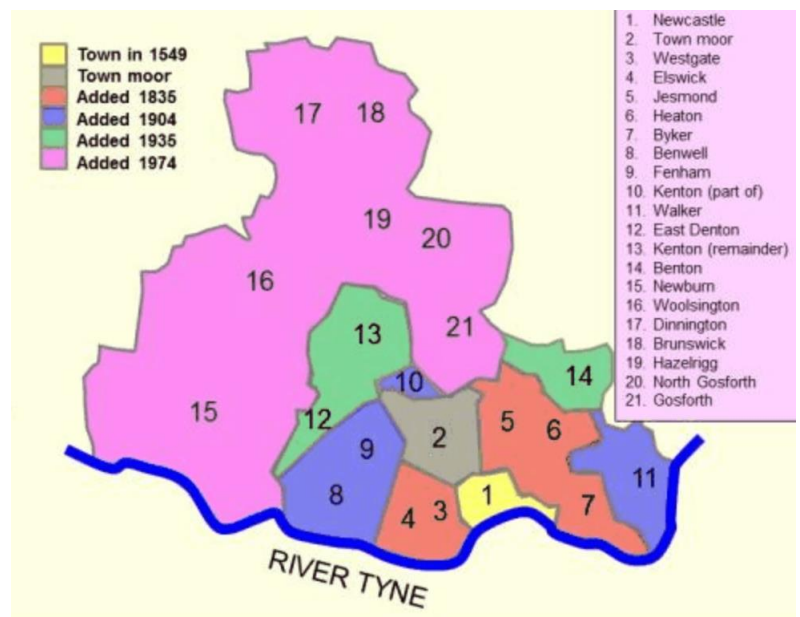
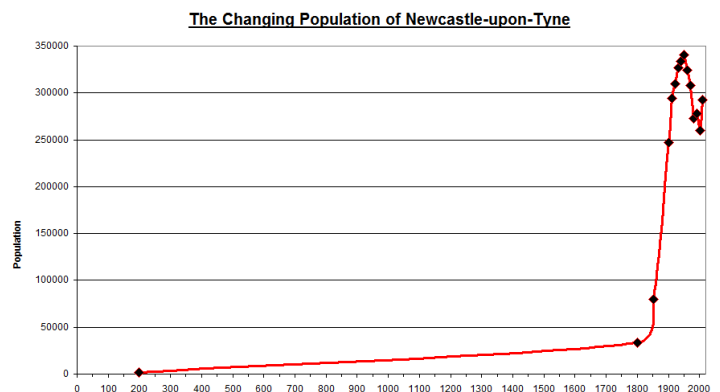
#### NEWCASTLE UPON TYNE

Newcastle-upon-Tyne is a large city in the Northeast of England that exhibits all of the characteristics of this World Cities Unit. It has both evolved over long periods of time but has also had major and tumultuous revolutions that have been both positive and negative. (recall that this unit is called World Cities: Evolution or Revolution). It is the largest city in North East England, has a very large sphere of influence, forms a major part of the Tyne and Wear conurbation and has been classified as a **Sufficiency city**<sup>1</sup> by the Globalization and World Cities (GaWC) Research Network. This means that it is a city with sufficiency of services, so it is not a world city but has sufficient services so as not to be overtly dependent on world cities.

#### URBANISATION PROCESSES

##### Urbanisation and suburbanisation

Newcastle upon Tyne is situated on the north bank of the River Tyne and was once part of the county of Northumberland. It owes its original location to the Romans, who established Pons Aelius. Initially the city was a great defensive site up on a valley side, which had fresh water in the Tyne and is a bridging point. It grew because of the wool trade but is really famous for being a major coal mining area. The port developed in the 16th century and, along with the shipyards lower down the river, was amongst the world's largest shipbuilding and ship-repairing centres. The coal industry developed from 1530 after a royal law was passed, and by the 18th century, Newcastle was the country's fourth largest print centre after London, Oxford and Cambridge. In the 19th century, shipbuilding and heavy engineering were central to the city's prosperity; and the city was a powerhouse of the Industrial Revolution.<sup>2</sup> Innovations included the development of safety lamps, Stephenson's Rocket, Lord Armstrong's artillery, Be-Ro flour, Joseph Swan's electric light bulbs, and Charles Parsons' invention of the steam turbine, which led to the revolution of marine propulsion and the production of cheap electricity. These developments encouraged the growth of Newcastle, and this involved rapid urbanisation and suburbanisation. The wealthy tended to migrate to the North of city away from the heavy industries of the river, and the city suburbanised in this direction and continues to do so today.



Major suburbs include Gosforth, Jesmond and more recently Newcastle Great Park. Gosforth contains its own high Street and a population of around 15,000 people.<sup>3</sup> It is a good example of outward expansion of a city and electoral ward boundary changes allowing a city to swallow up an independent town, this happened in 1974.

The council also helped in this process as they constructed edge of town council estates in Longbenton and Kenton. Industry has followed in this suburbanisation pattern, with new light industrial centres and office developments at Quorum, Newcastle Great Park and at Silverlink along the A19. The urbanisation process took place East and West along the river, and this gave rise to inner city developments of Wallsend, Walker and Benwell. All of these developments have their own characteristics, showing that not all suburbs are the same.

The recent suburbanisation of Newcastle northwards with the development of Newcastle Great Park into the Greenbelt originally designed to limit the cities growth shows that suburbanisation has not finished.

### Counterurbanisation

The city's last coal pit closed in 1956. This was followed by the slow demise of the shipyards on the banks of the River Tyne in the 1970s, 1980s and 1990s. The riverside areas of Newcastle upon Tyne were responsible for the cities incredible growth and wealth during the industrial revolution. Heavy industries such as the Armstrong armaments works and ship building (e.g. Swan Hunters) employed tens of thousands of people from riverside communities in Newcastle such as Elswick and Scotswood. Overseas competition in these industries in the 1960s, 70s and 80s led to the decline and closure of these industries and the communities suffered as a result. Manufacturing employment in conurbations like Newcastle fell nationally by nearly 20% in the 1960s and collapsed by 35% in the 1970s, amounting to 1.6 million jobs lost altogether.<sup>4</sup>

By the mid-1970s, employment at the Vickers factories along the West Newcastle riverside had fallen to little more than 3,000 – less than 16% of the previous wartime figure. The Vickers Scotswood works closed altogether in 1979. During the last two years of the 1970s, almost 1,500 jobs were lost from the eleven biggest local employers – representing a decline of 22% – and two of these eleven had closed altogether.<sup>5</sup> This resulted in population losses in many industrial parts of Newcastle, whilst surrounding suburbs and satellite towns, such as Whitley Bay and Cramlington New Town gained in population. The inner city and CBD also started to come under pressure from other forms of retailing, such as the Metrocentre in the early 1980s. The Metrocentre has 10,000 free parking spaces and accessibility for shoppers, the Metrocentre also has its own junction of the A1 west of Gateshead. The net result can clearly be seen on the graph of Newcastle's population, which declined rapidly and had a negative effect on people, the environment and the economy resulting in a cycle of decline for many parts of the city.

### Reurbanisation

As described above inner Cities in Britain in the 1970s started to decline, mainly as a result of the loss of their industries (deindustrialisation). This deindustrialisation led to many problems such as high unemployment, the development of ghettos, low morale and self-esteem of the local population, decline in the environment, decline in the housing stock. Many industries and people moved out of the inner city to the suburbs. One such area that suffered decline was Newcastle upon Tyne and many different schemes have been attempted to try and increase the population and economy of the city in the process of reurbanisation.



**TYNE AND WEAR  
DEVELOPMENT  
CORPORATION**

### PROPERTY LED REGENERATION - The Tyne and Wear Development Corporation (TWDC)

The TWDC was an urban development corporation (UDC) set up by the UK government. UDCs are property-led regeneration which are run by an executive board and are given money by central government and their aim is always to improve the area in such a way as businesses will see it as a good business opportunity. They are market led and property led because they make physical changes, e.g. improve infrastructure to attract businesses (property led) and it is market forces not planners, that decide the ultimate layout of the area – they want businesses to lead

the way (market led). So the Tyne and Wear Development Corporation (TWDC) is an example of large scale regeneration and its basic aims were to;

1. Create new business districts or modern offices and industrial estates
2. Increasing employment through grants and training
3. Reviving riversides as a place to live
4. Improving environment and landscaping

Set up in 1987 in the second wave of UDCs, TWDC's task was to bring land and buildings back into effective use in its designated area and encourage the development of existing and new industry and commerce. Its area covered 26 miles of riverside along the Tyne and Wear rivers and spanned the four local authority areas of Newcastle, North and South Tyneside and Sunderland. One-third of its area was derelict, polluted or under-used.

Funding - £430 million of government money attracting £1,114 million of private sector money.<sup>6</sup> The government money went into funding improvements to the infrastructure and public realm of the areas located on the map. This then encouraged private firms to join in. The TWDC was very successful in this and its major projects were mainly Flagship projects including:

- Newcastle Business park - £140 million development of 25ha of offices on previous derelict land British Airways have offices there.
- The Copthorne hotel was built at a cost of 30 million
- Newcastle Arena
- £2 million to transform 10 major historic buildings along the Quayside
- Newcastle quayside – cost £170 million
- St Peters Basin transformed into a major housing development

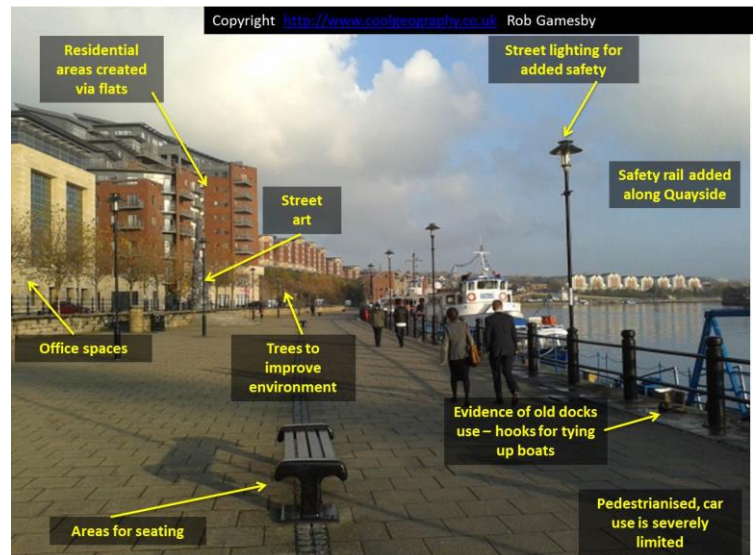


Figure 12 Newcastle and Gateshead Quayside from the Castle Keep

TWDC has transformed the Newcastle Quayside but has been less successful at regenerating housing estates. Many local communities had to be relocated to make way for the big developments despite the UDCs attempts to use a Community Development Strategy. This committed it to supporting, informing and consulting local communities and community groups. It covered activity across different policy areas: training, employment, social housing, environmental improvements, arts and cultural activities, and recreation and leisure facilities especially relating to the rivers and riversides. It helped to put 2000 local people into jobs in the Royal Quays Employment Office and 25% of the houses it built were low cost. However, the TWDCs use of compulsory purchase orders, focus on service sector and managerial posts rather than manufacturing and focus on predominantly expensive housing has been criticised.

This newspaper article, from the Journal of Wednesday February 14th 1996, reveals that these areas were all transformed during the era of the Tyne and Wear Development Corporation.

THE remarkable transformation of Newcastle's historic Quayside during the past decade has become one of the symbols of the rebirth of the North-East.

In some parts of the Quayside, new and restored buildings have replaced near dereliction as £170m has been ploughed into the Tyne and Wear Development Corporation's projects in the area.

One outcome of the renewal has been to extend the heart of the city to the waterfront.

This has had such positive results that on many evenings the area is vibrant with a nightlife that is becoming famous nationally and internationally.

There has been a more serious side to all this effort and that has been to use the rejuvenation of the riverside as a focal point for the economic revitalisation that is taking place in the region as a whole.

The photographs on this page are taken from *Riverside Revival*, a picturebook published by the TWDC to show the striking contrast between the recent past and the newly confident present.

Alastair Balls, TWDC chief executive,

## New book details a remarkable rebirth

says: "People say a picture can speak a thousand words. I hope that these contrasting images will sum up the transformation that has taken place on the riverside.

"Bringing derelict inner city land back into productive use is a complicated, time-consuming and expensive business. But the results can be spectacular as these photographs testify."

The Tyne Bridge has always been a landmark for the region. Until recent years it tended to represent nostalgia for the past glories of Tyneside, but these days its symbolism is changing – standing as it does at the centre of one of the biggest regeneration success stories of modern times.

Building on the astonishing results of Newcastle Business Park further up the Tyne – developed out of what was totally derelict industrial land – TWDC's primary aim at the Quayside has been to

establish a new commercial quarter.

Following the refurbishment of classical port buildings and warehouses near the Tyne Bridge, and the creation of an increasingly attractive promenade frontage all the way to the business park, the focus of effort has been moving eastwards.

The first phase of the East Quay-side scheme – with office and leisure facilities – is nearing completion and an infrastructure is being created for new homes and a luxury hotel that are likely to form the basis for the final stages.

In the meantime, however, TWDC has grant-aided more than £2m to support the sympathetic restoration of 10 historic buildings, with the establishment of flats, pubs, restaurants and a theatre among the offices.

Two striking examples of this are the Baltic Chambers and the Pandon Quays.

Between the High Level and King Edward railway bridges, £30m has been spent on the development of the 156-bed Copthorne Hotel and an office block, which have spearheaded a new look for that particular stretch of the riverside.

It is not just on the Quayside that TWDC has been active in reclamation and renewal.

St Peter's Basin at Walker is an award-winning village complex with more than 300 homes and other facilities grouped around a 110-berth marina.

This was a waterfront wasteland before the £30m redevelopment, and before and after pictures, left, show the enormous environmental improvement that has taken place.

Away from the Tyne, another transformed area of the city is that around the old Manors station site. Here £14m has been spent on bringing the Central Business and Technology Park to life.

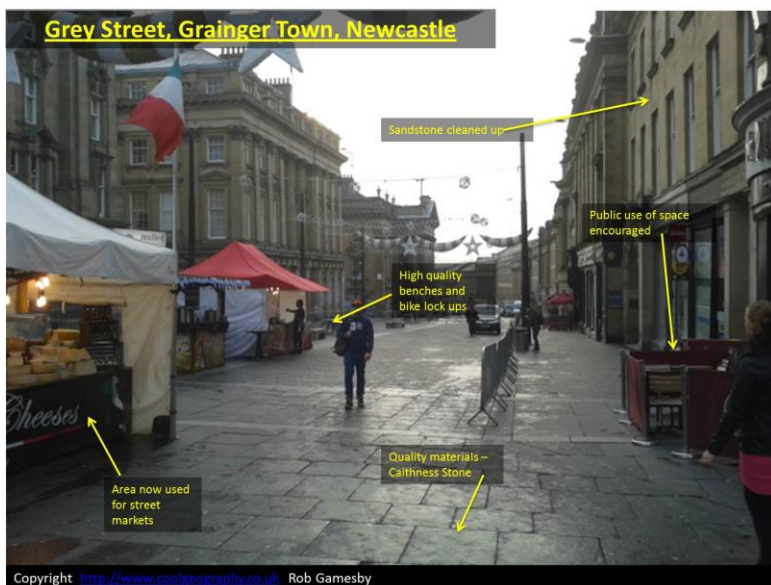
The central feature of this is the Technopole building, where the growth of small hi-tech companies is encouraged.

This, set amid landscaped surroundings, is now almost full and making its own major contribution to the changing image of the city.

### PARTNERSHIP SCHEMES BETWEEN LOCAL AND NATIONAL GOVERNMENTS AND THE PRIVATE SECTOR – Grainger Town

Newcastle is a fantastic city for architecture and much of it is conserved. The most architecturally beautiful area is Grainger town, where Grey Street and the Theatre Royal can be found. These areas have been subject to a multi-million regeneration project that involved redeveloping the interiors of many buildings, cleaning the sandstone on Grey's monument and the Theatre Royal and bringing empty shops back into use. Many of the buildings in Grainger Town are protected as Listed Buildings, and as such cannot be altered. Indeed, Grainger Town is a historic town in the heart of Newcastle-upon-Tyne. 40% of the buildings in the area are listed as being of historical and architectural importance. <sup>7</sup>

The Grainger Town area covers 90 acres between Central Station and Northumberland Street, encompassing Grainger's new buildings, Medieval streets like the Bigg Market and Victorian buildings too. In addition the 13th century Dominican Friary of Blackfriars and remnants of the old Town Wall gives Grainger Town a great richness of character.



Commercial ground floor properties consisting of shops sit beneath offices and residential properties in terraces with some landmark buildings such as the Theatre Royal.

### Historical development:

Grainger Town is a historic part of Newcastle City Centre which has had 3 major periods of Urban Change. The initial phase replaced old mediaeval parts of the town with new street layouts and buildings from 1835 to 42; a major decline phase from the 1960s to 1990s and its current regenerated phase.

1835 to 42 – Richard Grainger developed a series of classical streets 1835 and 1842 which are overlaid on the pattern of the medieval settlement that was there before. Grainger was lucky in that Newcastle was unusual as there was a large property – Anderson Place – with extensive grounds within the city walls. Grainger’s idea was to link the smart residential areas to the north with the cramped trading district above the quayside.



Newcastle's magnificent Grey Street, curving down to the Quayside and with alternate columns and flat facades

1960s to 1990s - parts of Grainger Town were demolished to make way for projects such as the Eldon Square and parts of the area were overtaken by others as centres for commerce and retail.

By the 1990s the decline in the area was at its worst with;

1. Shops and offices moved out to other locations
2. Residential population of the area was falling rapidly to 1,200
3. 100,000 m<sup>2</sup> of floor space vacant
4. Investor confidence was low
5. Structural problems became evident with 47% of its 244 listed buildings classed as being 'at risk' and a further 29% classified as vulnerable<sup>7</sup>

1993 – English Heritage and Newcastle City council launched a programme of property development and environmental improvement which helped the most at risk buildings and began to stop the decline of the area.

1996 - Newcastle City council, the English Heritage and English Partnerships decided that the area could no longer be left to take care of itself and prepared a bid for government funding for a regeneration strategy

1997 - Grainger Town Project established – a partnership with Newcastle City Council, English Partnership and English Heritage. £40 million of public sector investment was expected to be bolstered by a further £120 million from the private sector, but the latter reached £160 million.<sup>7</sup>

2003 – The project was finished to be overseen by the now defunct One NorthEast

### Elements of the project:

The original vision of the Partnership was that - *“Grainger Town will become a dynamic and competitive location in the heart of the City. Grainger Town will develop its role in the regional economy with a high-quality environment appropriate to a major European regional capital. Its reputation for excellence will be focused on leisure, culture and the arts, retailing, housing and entrepreneurial activities. Grainger Town will become a distinctive place, a safe and attractive location to work, live and visit.”*<sup>7</sup>

The achievements of the regeneration of Grainger Town include:

1. The public realm was also Improved, using high quality stone and public art
2. 1506 jobs created as well as a further 800 in Grainger Town due to the increased confidence in the area.
3. 286 new businesses set up.
4. 80,900 m<sup>2</sup> of new and/or improved commercial floor space.
5. 121 buildings, many of them listed properties and classified as 'Buildings at Risk' restored for use.
6. Grey's Monument repaired and cleaned.
7. 289 flats and apartments completed with many located within the Grainger Street and Clayton Street areas.
8. Westgate House, which was an eleven-storey office block, perhaps Newcastle's most unpopular building, was acquired by ONE North East and demolished between late 2006 and early 2007.



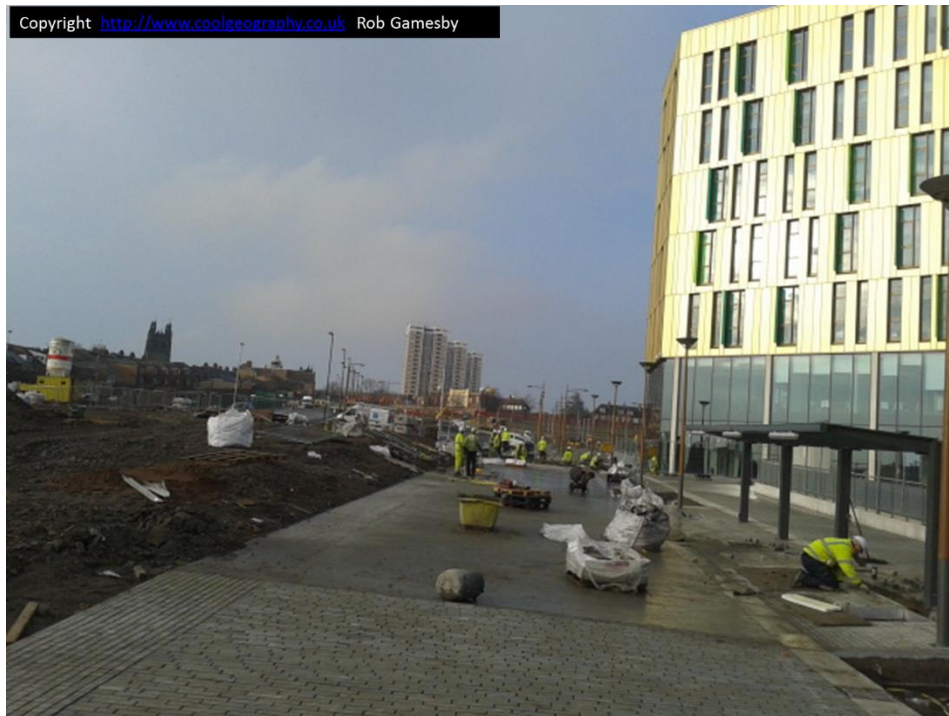
**Case study - The Union Rooms - The former Union Club in Westgate Road**, a Listed Victorian building lay empty for over 20 years in spite of its grand staircase and impressively sized rooms and its location close to Central Station. The 22,000 sq. ft. building has recently been renovated and converted into a pub/restaurant/wine bar, which occupies the three lower floors, by the J D Wetherspoon chain. There is also space for up to 7 flats on the top two floors.

Although the original building contained much wasted space, and vandalism and dry rot had caused extensive damage, the renovation has largely followed the original design.



The spacious, high-ceilinged rooms have been retained; the stone staircase and the cast iron dome have been restored; the plasterwork, fireplaces, stained glass and other details have been replaced to match what was previously there. The total cost of the project was £4.2 million, but the result is a great success.

This project has been followed by others, not least the Helix development opposite St James Park in the city.



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- 7 - Fiona Currie and David Lovie (2003) - NEWCASTLE’S GRAINGER TOWN: An Urban Renaissance. Accessed 25<sup>th</sup> February 2020 at <https://historicengland.org.uk/images-books/publications/newcastles-grainger-town/newcastles-grainger-town/>

[https://www.youtube.com/watch?v=IB504XAV\\_dU&feature=emb\\_logo](https://www.youtube.com/watch?v=IB504XAV_dU&feature=emb_logo)

## MUMBAI

### Background to Mumbai

Mumbai is a megacity and a World city, it has grown enormously since the 1950's and gives a great case study of urbanization and its issues within an LIC. This case study will explore how urbanization, suburbanization, counter urbanization and now reurbanisation processes have occurred in the Mumbai region and how those processes have been managed.

Mumbai is located on a peninsular on the Western coast of Maharashtra state in western India, bordering the Arabian Sea. Bombay is a thriving megacity that has had an economic boom in recent years. It is home to Bollywood and the film "Slumdog Millionaire" was based there. Indeed, property in Mumbai is becoming some of the most expensive in the world. One 28 story structure for one family cost \$1 billion.<sup>1</sup> However, many of the residents of Mumbai live in illegal squatter settlements (known as bustees in India). Despite the poor conditions in the slum Prince Charles thinks that the people of Dharavi "*may be poorer in material wealth but are richer socially*".



Indeed, in terms of population size Mumbai is India's largest city, and is the financial capital of the country, being home to the Mumbai Stock Exchange. Up until the 1980s, Mumbai owed its wealth to its historical colonial past, textile mills and the seaport, but the local economy has since been diversified and now Mumbai is home to most of India's specialised technical industries, having a modern industrial infrastructure and vast, skilled human resources. Industries include aerospace, optical engineering, medical research, computers and electronic equipment of all varieties, shipbuilding and salvaging, and renewable energy.<sup>1</sup> Mumbai serves as an important economic hub of India, it accounts for 25% industrial output, 5% of India's GDP and also 70% of the capital transactions in the Indian economy.<sup>2</sup> Many of India's numerous Trans National Corporations (including the State Bank of India, Tata Group, Godrej and Reliance) are based in Mumbai. Other formalized workers include many state and government workers.

Alongside this incredible wealth is a large unskilled and informal workforce, who work as self-employed and often unregulated workers. Many of these people earn their living as street hawkers, street sellers, taxi drivers, mechanics and other such occupations.

Bollywood and other Media Industries also employ huge numbers of people. Most of India's major television and satellite networks, as well as its major publishing houses, have headquarters here. The centre of the Hindi movie industry, Bollywood, produces the largest number of films per year in the world.

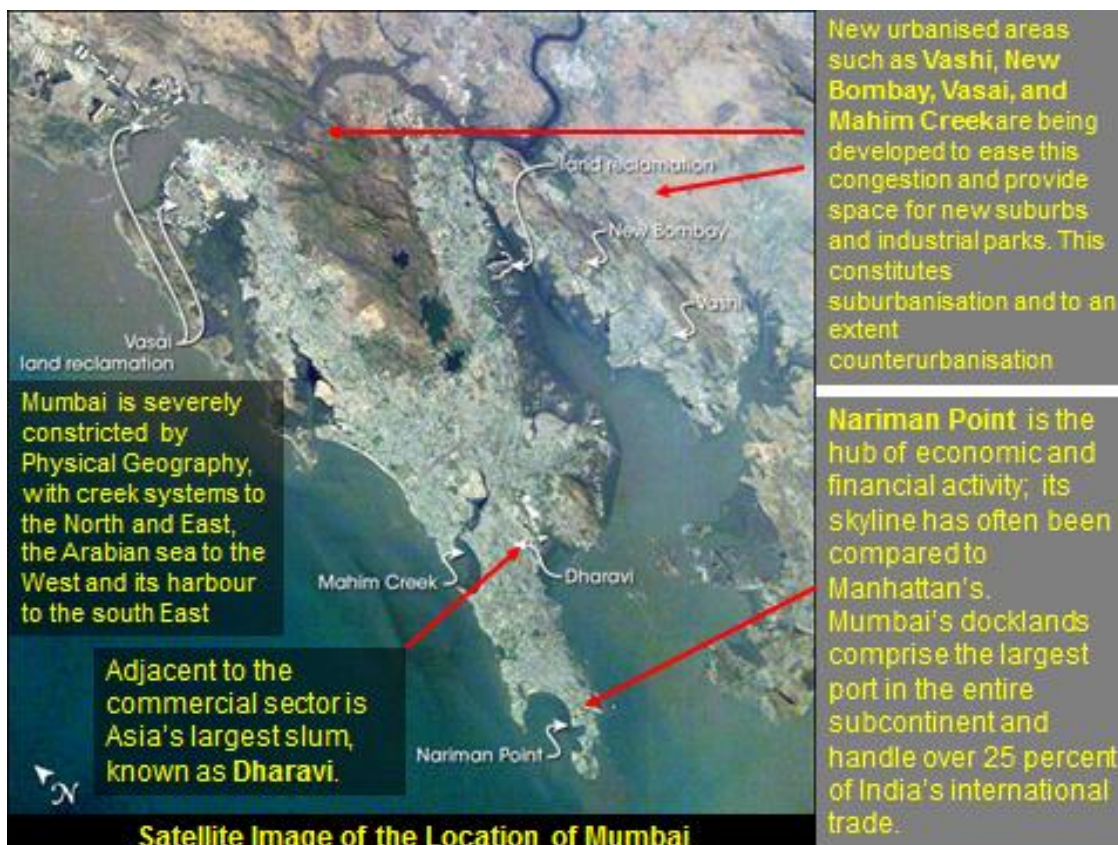
### Urbanisation and its impacts

Mumbai has urbanised over the past 60 years and urbanized rapidly from its origins as a fishing village. The site of the fishing village soon became a port region as the site favoured development. Protected from the Arabian Sea by a peninsular at the southern end of Salsette Island, it had access to sea on two sides and the British colonial administration in India developed the sheltered inlet into a major port. The British viewed the port and surroundings as the "Gateway to India".<sup>3</sup> This made it the closest port of entry to subcontinent for travellers from Europe,

through the Suez Canal. As with many major global ports area around the port became industrialised – processing goods for export and handling imports. The city grew during British rule as variety of services grew up around the port and continued to grow after British left in 1947. Since 1971, the graph shows the inexorable rise in the population of Mumbai, from 8 million in 1971 to 21 million now. The other significant factor to note is that slum dwellers make up an ever-increasing proportion of the population, creating numerous problems for people and planners. It should be noted that the original urbanisation phase of Mumbai focussed upon the southern tip of Salsette Island, and outside of this the city suburbanised in a Northern direction.

**The causes of urbanisation** are multiple; but involve a high level of natural increase within Mumbai itself and in-migration principally from the surrounding district of Maharashtra but also from neighbouring states. Mumbai booming economy means that migrants come for job opportunities in the expanding industries, financial institutions and administration.

Mumbai has grown in a Northern direction limited by physical Geography as shown in the image below.

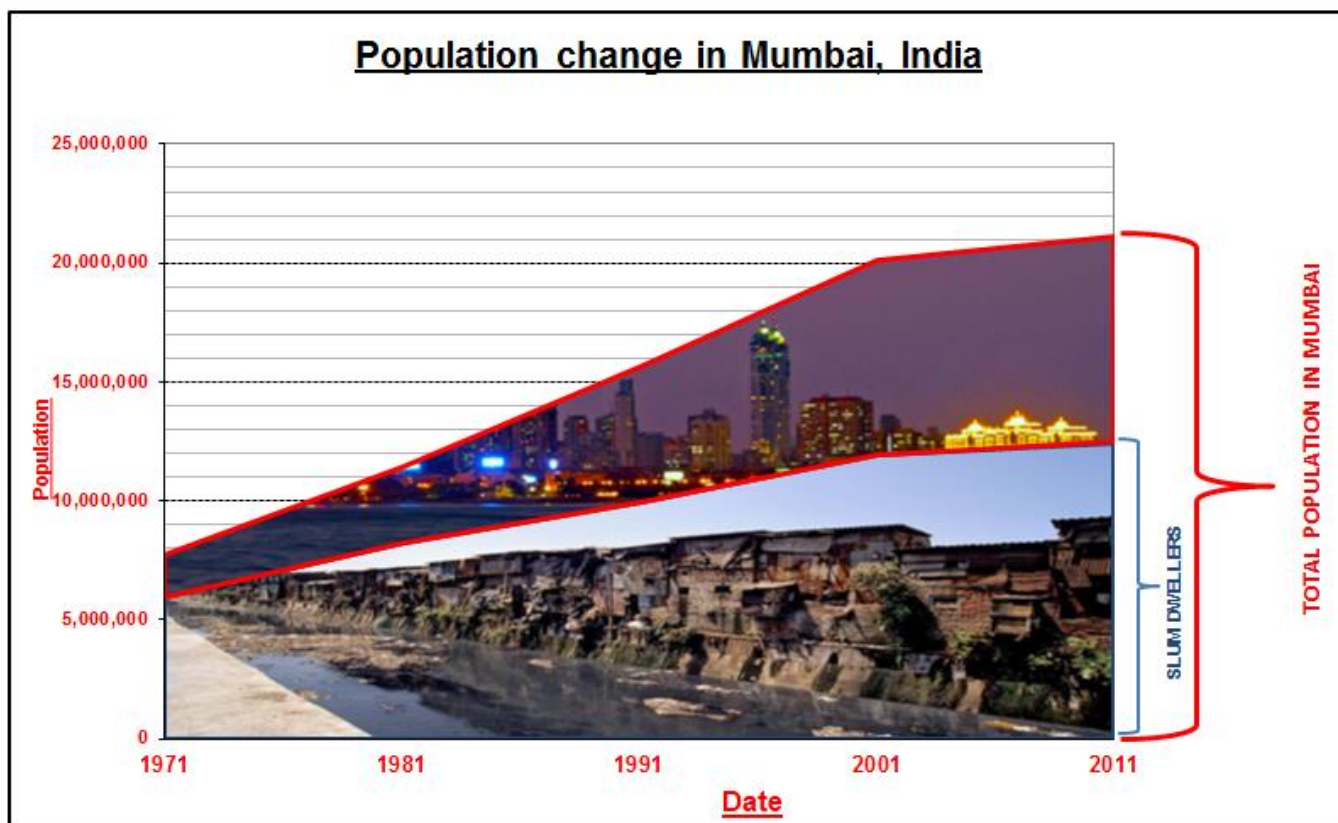


It is limited in where it can grow with creek systems to the North and East, the Arabian Sea to the West and its harbour to the south East. Mangrove swamps further complicate the picture, and these marginal lands often form the location for the poorest people who live illegally in slums. One such slum is Dharavi, in the heart of Mumbai.

## Slumming it

The following notes are based upon Kevin McCloud's "Slumming it."<sup>4</sup> And show the consequences of rapid urbanisation in poorer countries, where the pace of urbanisation make it difficult to maintain services essential for an acceptable standard of living.

Dharavi slum is located in Mumbai (formally Bombay) in India. India's and Mumbai's biggest slum is known as Dharavi. There are a million people crammed into one square mile in Dharavi. At the edge of Dharavi the newest arrivals come to make their homes on waste land next to water pipes in slum areas. They set up home illegally amongst waste on land that is not suitable for habitation. In the wet monsoon season these people have huge problems living on this low-lying marginal land. Many of the people here come from many parts of India as a result of the push and pull factors of migration.



## Conditions in the slum

In the slum people have to live with many problems. People have to go to the toilet in the street and there are open sewers. Children play amongst sewage waste and doctors deal with 4,000 cases a day of diphtheria and typhoid. Next to the open sewers are water pipes, which can crack and take in sewage. Dharavi slum is based around this water pipe built on an old rubbish tip. The people have not planned this settlement and have no legal rights to the land. There are also toxic wastes in the slum including hugely dangerous heavy metals. Dharavi is made up of 12 different neighbourhoods and there are no maps or road signs. The further you walk into Dharavi from the edge the more permanent and solid the structures become. People live in very small dwellings (e.g. 12X12ft), often with many members of their extended families.

Many architects and planners claim this slum could hold the solution to many of the problems of the world's largest cities.

Water is a big problem for Mumbai's population; standpipes come on at 5:30am for 2 hours as water is rationed. These standpipes are shared between many people. Rubbish is everywhere and most areas lack sanitation and excrement and rats are found on the street. 500 people share one public latrine.

The famous cloth washing area also has problems, despite its social nature sewage water filters into the water used for washing clothes.

### The Positives of Dharavi Slum

There are positives; informal shopping areas exist where it is possible to buy anything you might need. There are also mosques catering for people's religious needs.

There is a pottery area of Dharavi slum which has a community centre. It was established by potters from Gujarat 70 years ago and has grown into a settlement of over 10,000 people. It has a village feel despite its high population density and has a central social square.

Family life dominates, and there can be as many as 5 people per room. The houses often have no windows, asbestos roofs (which are dangerous if broken) and no planning to fit fire regulations. Rooms within houses have multiple functions, including living, working and sleeping.

Many daily chores are done in social spheres because people live close to one another. This helps to generate a sense of community. The buildings in this part of the slum are all of different heights and colours, adding interest and diversity. This is despite the enormous environmental problems with air and land pollution.

85% of people have a job in the slum and work LOCALLY, and some have even managed to become millionaires.

### Recycling and waste in Dharavi

Kevin McCloud found that people seemed genuinely happy in the slum. However, toilets are open holes above a river – hardly hygienic. This could lead to Dengue fever, cholera and hepatitis

Dharavi has a recycling zone. It is claimed that Dharavi's recycling zone could be the way forward to a sustainable future. Everything is recycled from cosmetics and plastics to computer keyboards. 23% of plastic waste gets recycled in the UK, in Mumbai it is 80%. However, it is humans who work to sift the rubbish in the tips where children and women sift through the rubbish for valuable waste. They have to work under the hot sun in appalling conditions. They earn around a £1 a day for their work.

At the edge of the tip the rag dealers sort their haul before selling it on to dealers. The quandary is that people have to work in poor conditions to recycle waste. From the tip it arrives in Dharavi where it is processed. It is sorted into wire, electrical products, and plastics. Plastics in India are continuously recycled. People work in dangerous conditions with toxic substances without protective clothing; this could affect people's life expectancy. Even dangerous hospital waste is recycled.

One private enterprise makes the metal cages inside suitcases, making 700 pieces per day, paid 3 rupees per piece. There are 15,000 one room factories in Dharavi which there are 300 feeding most of Mumbai. Many of the products from Dharavi end up around the world based upon very cheap labour. Many of the people work in very poor working conditions, and includes children. Indeed, Dharavi is trying to do in 20 years what the west did in 200, develop.

### Managing and improving Squatter settlements

#### Large scale redevelopment

A \$2billion development project threatens the recycling district and part of Dharavi. The land upon which Dharavi is built is next to Mumbai's financial district. This makes it a prime target for redevelopment. The people who are relocated will be put into smaller housing in apartment blocks. An ancient fishing village is also threatened. These areas have strong safe neighbourhoods that have low crime and communal areas. Also at risk are the local shops and markets and the community spirit which has taken generations to develop. The locals would prefer small improvements to the existing slum such as improvements in drainage. The value of land is so high that redevelopment is now a real threat. The alternative accommodation is very small.

The slum dwellers face 14 story apartments as accommodation as proposed by the cities Slum Rehabilitation Authority. This will separate communities and make people work away from where they live. Only people who have lived in the slum since 2000 will be relocated. Current redevelopment projects are densely populated and house lots of people. They are not good for community cohesion.

### Local Based Improvements

There is an alternative to large scale redevelopment and that is to allow LOCAL people design the improvements to the slum.

The Society for the Promotion of Area Resource Centres, better known as SPARC, this is an NGO that supports the efforts of local people to get better housing for their many members. Ideas generated from local people supported by this charity include adding an extra floor to buildings so that all family members can be accommodated in the same building. These flats also had 14-foot high ceilings and a single tall window so are well ventilated, bright, and less dependent on electric fans for cooling. Their loft spaces add extra room without seeming crowded and include small spaces for bathing. But toilets are placed at the end of each of the building's four floors and kept clean by the two or three families who use each one. These ideas only work when water is running in Dharavi.

Architecture students have also been hard at work. One student has created a multi-storey building with wide outer corridors connected by ramps "space ways in the sky," to replicate the street. These space ways allow various activities to be linked, such as garment workshops, while maintaining a secluded living space on another. Communal open space on various levels allows women to preserve an afternoon tradition, getting together to do embroidering.

One student also tried to help the potters of Dharavi. He designed into existing houses the living space at one end and a place to make the pots at the other. Each has an additional open terrace on which to make pots, which are fired in a community kiln.

As the National Slum Dwellers Federation has repeatedly proven, housing the poor works best, costs less and is better for the environment, when the poor themselves have a say in what is being built.

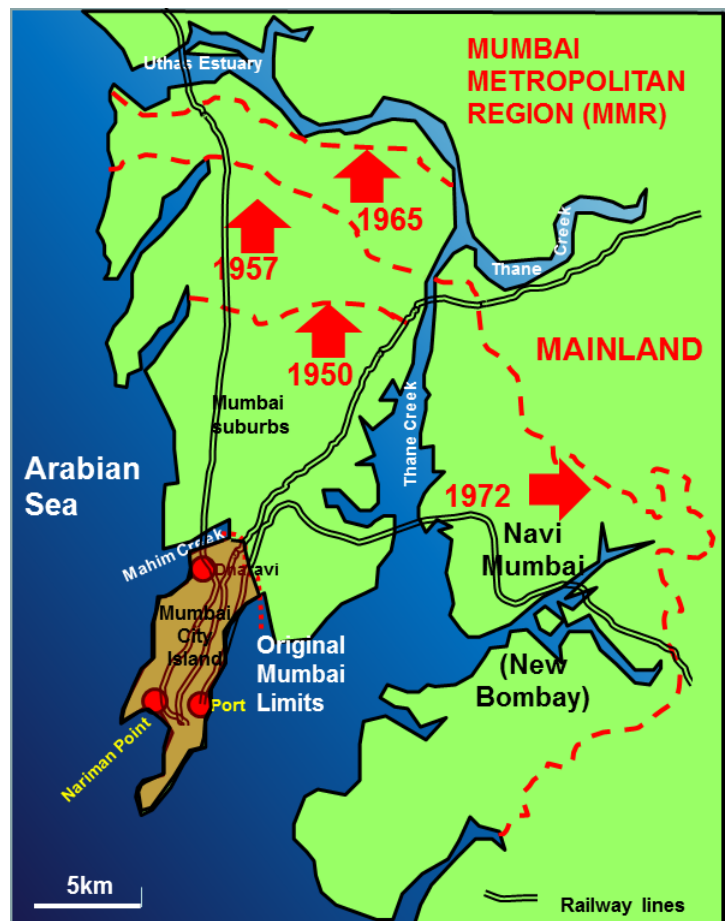
Dharavi could also follow the Brazilian model, as evidenced in Rocinha in Rio de Janeiro. Within the Favelas the government has assisted people in improving their homes. Breeze blocks and other materials (pipes for plumbing etc) were given as long as people updated their homes. This is an approach known as SITE and SERVICE.

The Brazilian government also moved a lot of people out of shanty towns and into low cost, basic housing estates with plumbing, electricity and transport links. The waiting list for these properties was huge.

### Suburbanisation in Mumbai

Mumbai now has a long history of suburbanisation, and many key events have occurred in the suburbanisation process, initially in a Northwards direction along major transport routes such as roads and rail links, and now in an Eastward direction. This suburbanisation has involved not just the growth of residential areas but also the relocation and growth of new industrial areas.

- 1930s to 1940s - The rise of Shivaji Park area, Matunga and Mahim as the outlying suburbs





## Reurbanisation – changes to Dharavi Slum

### Large scale redevelopment

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The slum dwellers face 14 story apartments as accommodation as proposed by the cities Slum Rehabilitation Authority. This will separate communities and make people work away from where they live. Only people who have lived in the slum since 2000 will be relocated. Current redevelopment projects are densely populated and house lots of people. They are not good for community cohesion. Indeed, the planned redevelopment is part of the Maharashtra state governments plan for Dharavi. The architect employed to put together a \$2 billion bid from major developers across the world to demolish Dharavi and build homes and amenities, Mukesh Mehta, has said 'Dharavi is a black hole – something we should be ashamed of. My vision would be that it would be transformed into one of the better suburbs of Mumbai.'

The residents do not want this redevelopment, Arputham Jockin grew up in Mumbai's slums and now represents the slum dwellers in their fight against the government's plans. 'Selling this land to the global market and giving it over for commercial use - how will that improve our lives? 90% of the people here want a stake in their future and a say in how it is transformed. It has to work from the bottom up - not top down.' he says. In 2018 a new plan was announced for the wholesale redevelopment of Dharavi. <sup>5</sup>

1 – Encyclopedia.com – Mumbai accessed 25<sup>th</sup> February 2020 from <https://www.encyclopedia.com/places/asia/indian-political-geography/mumbai>

2 – Mumbai.org, Commercial Capital Mumbai, accessed 25<sup>th</sup> February 2020 from <https://www.mumbai.org.uk/commercial-capital-mumbai.html>

3 – The British Library (no date) Bombay: History of a City - accessed 25<sup>th</sup> February 2020 from <https://www.bl.uk/learning/histcitizen/trading/bombay/history.html>

4 – Kevin McCloud & Helen Simpson (2011) - Kevin McCloud : slumming it. Roadshow Entertainment, ©2011.

5 – Sujit Mahamulkar (2018) Dharavi to be redeveloped, The Times of India - accessed 25<sup>th</sup> February 2020 from [http://timesofindia.indiatimes.com/articleshow/66253470.cms?utm\\_source=contentofinterest&utm\\_medium=ext&utm\\_campaign=cppst](http://timesofindia.indiatimes.com/articleshow/66253470.cms?utm_source=contentofinterest&utm_medium=ext&utm_campaign=cppst)