3.21 Other contemporary urban environmental issues

In this section you will learn about environmental problems in contrasting urban areas and strategies to manage these problems

Atmospheric pollution

Concentrated energy use and vehicle emissions in urban areas lead to greater air pollution with significant impact on human health. Strategies to manage these domestic, industrial and vehicle emissions are examined in detail in section 3.16. Clean air legislation, vehicle restrictions and technical innovations are improving air quality markedly in many cities, particularly in HDEs, but widespread progress is not yet global.

Water pollution

Urban water pollution comes from:

- domestic waste water from sinks, washing machines, bathrooms and toilets (sewage)
- effluent from industries
- leachates from illegal dumping and poorly managed landfill
- rainwater runoff from roads, pavements and roofs.

It is possible to identify point sources such as pipes from factories discharging effluent into a river and non-point (diffuse) sources such as surface-water drainage, urban runoff from brownfield sites and roads. All of these are contaminating and will significantly harm groundwater and therefore rivers. They also pose a significant risk to health. For example, sewage contains pathogens which spread infectious diseases leading to diarrhoeal disease and increasing child mortality, especially in poorer countries. Urban surface runoff alone contains oils and traces of heavy metals – the latter persisting for a long time in river sediments. Leachates and effluent are also toxic. Urban waste water collection and treatment is therefore essential (Figure **1**).

Fortunately, sewage treatment and rigorous legislation on the treatment of industrial effluent is commonplace in HDEs. For example, the EU's 1991 Urban Waste Water Treatment Directive (revised 1998) makes sewage and effluent treatment obligatory, with measurable improvements to river and ocean water quality in consequence.

In LDEs and EMEs progress is inevitably slower, but organisations such as the UN and World Bank are investing huge resources into addressing both water quality and supply issues. Treatment plants, dam and reservoir schemes, and aquifer identification and exploitation are just some examples. Add to this the work of NGOs such as the British charity Water Aid, and the remarkable Bill and Melinda Gates Foundation and there is considerable hope for the future (Figure **2**).

Figure 1 *Modern urban waste water treatment*

Figure 2 *The Bill and Melinda Gates Foundation has raised more than US$75 million to build thousands of freshwater wells and develop appropriate technologies to address water pollution. This prototype toilet (designed by Loughborough University researchers) extracts biological charcoal, minerals, and clean water from human waste.*

Urban waste water treatment in the UK

Before waste water can be treated it needs to be collected. Every day in the UK, over 600000 km of sewers collect over 11 billion litres of waste water from homes, municipal, commercial and industrial premises, and rainwater runoff from roads and other impermeable surfaces. There are three main types of collection system:

- surface-water drainage that collects rainwater runoff from roads and urban areas and discharges direct to local waters
- combined sewerage that collects rainwater runoff and waste water from domestic, industrial, commercial and other premises
- foul drainage that collects domestic waste water from premises.

Both surface water and foul drainage may eventually connect to combined sewerage where there are no local environmental waters to which surface-water drainage can discharge. Combined sewerage systems are not uncommon in the UK and elsewhere in Europe. A basic requirement of combined sewerage systems is that they need to cater for all normal local climatic conditions including storm water from peak seasonal wet weather. However, there may be times when heavy continuous rainfall will temporarily exceed the capacity of combined sewerage systems and so 'combined sewer overflows' are designed and built as an integral part of combined sewerage systems. These allow excess waste water to be discharged to local rivers to avoid sewers being overwhelmed and waste water 'backing up' along sewers and flooding streets and properties, or overwhelming waste water treatment plants.

Look at Figure **3**. Around 9000 waste water treatment plants usually process combined sewerage in four stages:

- preliminary treatment – to remove grit, gravel and screen large solids
- primary treatment – to settle larger suspended, generally organic, matter
- secondary treatment – to biologically break down and reduce residual organic matter under controlled conditions
- tertiary (advanced) treatment – tailored to address specified pollutants using different treatment processes.

An emerging issue is linked to pharmaceuticals and other chemicals such as antibiotics, birth control pills and chemotherapy agents. Tertiary treatment is therefore increasingly challenged and will have to evolve from the established:

- reduction of nutrients (phosphorus or nitrogen compounds) to protect waters from eutrophication (an excess of nutrients in water)
- reduction of nitrates and pathogens to protect bathing or shellfish waters
- reduction of ammonia to protect freshwater fisheries.

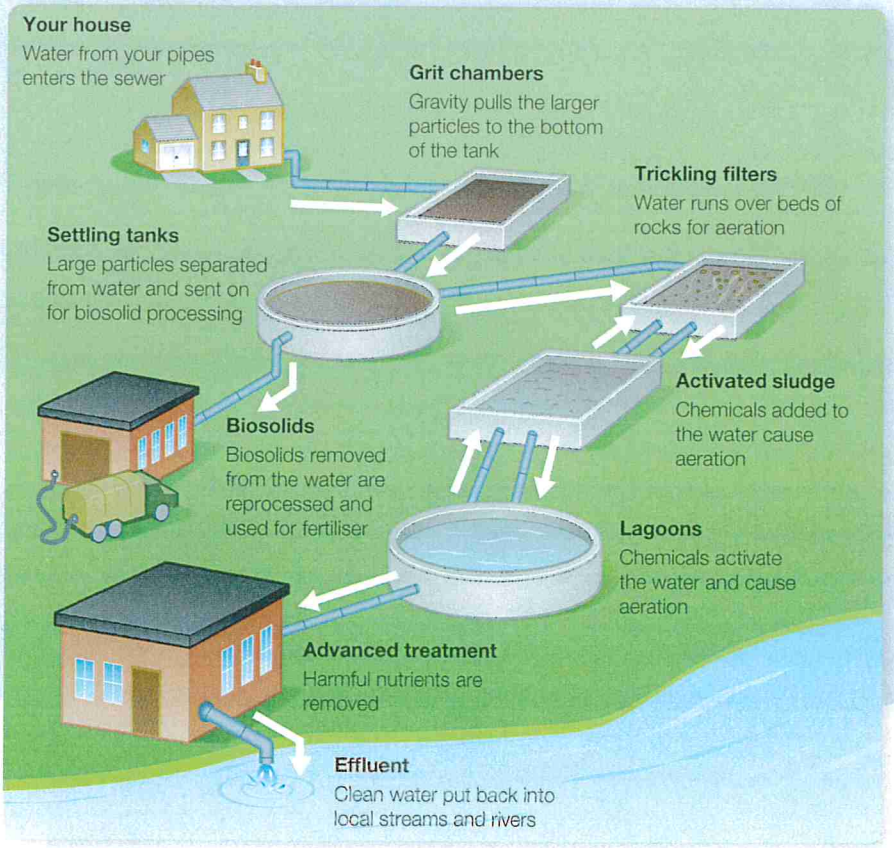

Figure 3 *The basic principles of waste water treatment*

Dereliction

Derelict (neglected or abandoned) urban land results from:

- the inevitable ageing and decay of buildings with the passage of time (causing maintenance costs to spiral)
- the movement of urban activities to better and more profitable locations
- changes in an urban economy brought about by deindustrialisation (Figure **4**).

Figure 4 *Urban dereliction can be hazardous and also create eyesores*

Brownfield site development

Redevelopment of brownfield sites is a key feature to the development of sustainable cities (see 3.22). But there are difficulties with building on them:

- Thousands of brownfield sites have been contaminated by previous industrial uses and may present significant risks to human health and to the wider environment. Decontamination is both time-consuming and very expensive.
- Not all brownfield sites have the physical access necessary for residential development.
- The neighbouring land may still be used for industrial purposes making the brownfield site unsuitable for new homes, for example, a sewage treatment works or a heavy industrial plant.

In the UK these unsightly brownfield sites represent a valuable urban resource (Figure **5**) – despite the potential high costs of clearance and decontamination. For example, their redevelopment for housing:

- starts to address the pressing need for more homes
- improves the urban environment
- reduces urban sprawl and so protects green-belts
- reduces demand on car use (commuting from suburbs or further afield).

Did you know?

Friends of the Earth argue that there are already 750 000 unoccupied houses in British cities which could be upgraded, while a further 1 250 000 could be created by either subdividing large houses or using empty space above shops and offices.

Figure 5 *New housing development at Lysaght Village on the site of the former steelworks, Newport, Gwent*

Brownfield regeneration of Bristol's river docks area

Between 2006 and 2013, 94 per cent of new housing in Bristol was built on brownfield sites and it is estimated that a further 30 000 new homes will be needed by 2026. The city council is confident that this can be achieved without using any greenfield sites.

Look at Figure **6**. In the 1960s, when cargo ships became too large to come up the River Avon, the docks area went into decline and dependent industries such as tobacco factories closed. The subsequent regeneration and redevelopment of the area has required cooperation between the city council, landowners, private developers and the South West Regional Development Agency.

Much has been achieved:

- Decaying industrial buildings have been redeveloped for residential purposes.
- Several listed buildings have been preserved.
- Derelict land has been cleared and decontaminated for new housing, businesses, and cultural and leisure facilities.

Such an approach is now commonplace where deindustrialisation has blighted waterfront and dockland areas in some of the UK's largest cities. For example, both planned and completed projects are to be found in London, Liverpool, Glasgow, Cardiff and Belfast.

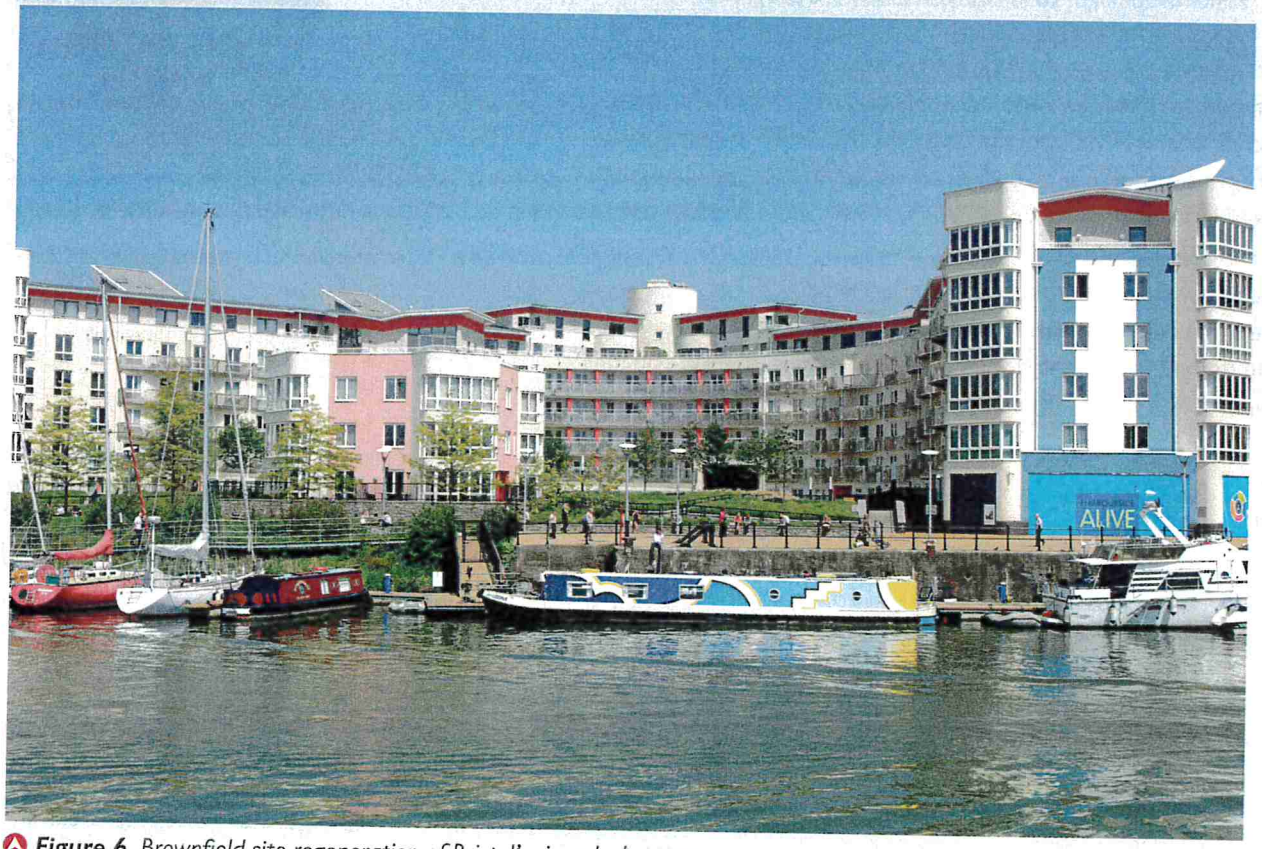

Figure 6 *Brownfield site regeneration of Bristol's river docks area*

ACTIVITIES

1 Create a list of ten environmental problems facing urban areas today. Rank them from the most to the least pressing and justify your decisions.

2 Outline the primary sources, impacts and treatments of urban waste water.

3 Explain why building new homes on brownfield sites is more expensive than developing greenfield locations.

4 Whether for example the Bristol river docks area, London Docklands (3.24) or Cardiff Bay (3.11), all such schemes have transformed areas of urban dereliction. With reference to any one of these, or a similar named project in your area, identify and outline five key advantages and five key disadvantages associated with the regeneration. (For both advantages and disadvantages, think of social, economic and environmental aspects.)