

Urban environmental issues and management

3.2.3.7 Urban environments

What you need to know
How air pollution has increased in urban areas and why it's a problem
How water pollution has increased in urban areas and why it's a problem
Why dereliction occurs in cities and what issues it causes
How environmental problems in cities can be solved

Introduction

The rapid growth of urban areas and their changing functions over time has led to serious environmental damage. Increasing concentrations of people, the growth in the affluent consumer economy, the growing congestion issue of transport and the growth in polluting industry in the developing world, have all affected the natural environment – and rarely in a good way. This damage is also detrimental to the health of people living in these cities.

- Rural-urban migration has increased exponentially in many developing world cities. There are over 30 megacities in the world (over 10m people) and this number is increasing. Growing numbers of people living in an urban area generate large amounts of waste and use energy / transport that pollutes the air.
- In many cities - particularly in south east Asia - there has been a distinct rise in an affluent middle class. This group of people are part of the consumer economy, with several cars per family, large homes to heat/cool and a large turnover in new goods. Changing diets can bring western diseases associated with wealth.
- Transport creates more than congestion for urban residents living in areas different to those in which they work or have leisure time, as increasing numbers drive motorbikes and cars to get around the city. Stress of long queues, risk of accidents, air pollution and CO2 emissions all have an impact on the human and natural environment.
- Industrial growth in cities, particularly in the developing world, also affects air quality. In rapidly industrialising countries, air quality laws may not be adhered to and urban-wide emissions can result in damaging smog.

Air pollution

Air pollution over cities occurs as a result of fossil fuel combustion in transport and industrial output.

Transport and urban morphology

- In both developing and developed world cities the structure of the city is an issue when it comes to transport. In developed world cities that started growing during the industrial revolution, early buildings and roads were created when there was no motorised transport. In current times, this means that there are often many areas of a city where congestion is a problem. This congestion, particularly during rush hour times in the week, results in a large volume of emissions. Constant acceleration and

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deceleration as traffic struggles to move burns more fuel and, as such, releases more pollutants.

- The effects of pollutants released from vehicle exhausts are significant for people who live in urban areas. High levels of nitrogen oxides are toxic to humans and low level ozone caused by pollutants reacting with sunlight can lead to impaired lung function and an increase in asthma.
- Sulphur dioxide is the main cause of acid rain and this can cause issues for both the natural and built environment. Acid rain can form which can discolour and start to wear away building frontages. This can make buildings look unsightly, which is a particular problem if the building is a tourist attraction, as it may reduce interest in the city, reducing tourism revenue. Acid rain can also affect local rivers and rural areas on the fringe of the city. Water quality can be affected and species may die out. Soil can be affected and crops may give poorer yields.
- CO₂ is also released from vehicle exhausts and has a global impact upon climate change, while its cousin – carbon monoxide, CO - causes respiratory diseases in humans.

Industrial pollution

- This occurs in rapidly industrialising urban areas where factories, power plants and chemical facilities face little to no regulation. As countries race to develop, unregulated factories may spring up across the cities. The common atmospheric pollutants from factories are sulphur dioxide, nitrogen dioxide, carbon monoxide and volatile organic compounds (VOCs) which pose significant health risks as well as contributing to acid rain downwind of the urban area, and global climate change.
- Even in some countries aiming for higher standards, air pollution as a result of industrial processes, is an issue. According to a report into China's air quality, 85.7 percent of sulphur dioxide emissions came from industries, while the factories also contributed 76.1 percent of nitric oxide emissions from 2006 to 2009.

Pollution from construction

- Harmful gases and particulate matter is released into the atmosphere by construction activities. As cities continue to grow, this is forecast to get worse.
- Local air pollution is directly affected by construction and demolition. High levels of dust are created and, combined with other pollutants, creates issues for human respiratory conditions. Inhaled particles may aggravate asthma and bronchitis, and very small particles may cause cancer. It is thought to contribute to Global Dimming.
- Dust also reduces local visibility which can be dangerous for drivers and pedestrians. It also dirties buildings, and increases the rate of corrosion to many structures. This can cost a lot of money to deal with and can have long-term effects on businesses and the tourism industry.

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Water pollution

- Having adequate clean water supplies in cities is a challenge. This challenge is intensified by the impact of various atmospheric pollutants on water quality. Pollutants dispersed into the air via vehicles and industries etc. can lead to acid rain which can contaminate water and kill off certain species.
- As well as the impact of atmospheric pollution on water there are many land based problems which contaminate water. Where sewage is untreated and is poorly dealt with, for example, in developing world cities, this will enter water system. For many in poverty living in these cities they have no choice but to still use the water supply as a drinking, cleaning and washing source; leading to disease and high death rates.
- In some cities, where regulations are not enforced or adhered to, industrial waste is often poured straight into water courses and this reduces water quality. Similarly, municipal waste can end up in rivers. Within cities, available land is in short supply so landfill sites are often on the outskirts. Where the amount of waste produced exceeds the amount that can be removed, waste is often allowed to pile up along river banks and will be washed into rivers, particularly during seasonal flooding.
- The impacts of poor water quality are severe. Pathogens are often transmitted through polluted water causing intestinal infections and common water-borne diseases such as dysentery and cholera are rife. As well as pathogens, humans are also exposed to metal toxicity. Common elements also found in polluted water include arsenic and chromium. In developing cities, where people may try to grow their own food on small plots of land, the use of this water to irrigate crops exacerbates the problem as these metals bio-accumulate in the food source, affecting families - particularly those pregnant and young children, leading to development issues which can have long-term health implications.
- Environmentally, a major problem caused by water pollution is eutrophication. Increasing growth of algae blooms will reduce oxygen levels in rivers and streams and this will result in the death of all species.

Dereliction

In cities, there are areas where there has been industrial decline. Inner cities in the developed world have experienced this to a considerable extent in recent decades. Whilst derelict buildings are unsightly to look at and can affect people and their quality of life, they have many environmental concerns too.

- Many of the factories that close will have used chemicals and metals in their processes, so often these are left on site and can contaminate nearby water courses and the ground. This can be dangerous to people living nearby and should people wish to redevelop the area it will be costly to remove the contaminants.

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- Many of these derelict sites are broken into and fires are often lit which can send toxic pollutants into the air. Locally, people will be warned to stay indoors, over fears that people with already weakened respiratory systems could be put at risk.

Solving environmental problems:

Air pollution

- Reducing car usage and improving public transport. This will reduce congestion and result in improved air quality. The use of “green fuels” such as biogas and hydrogen fuel cells to run public transport will help further.
- Improve technology with regards to factories and power stations with scrubbing filters to remove damaging emissions and invest in carbon capture technology that removes CO₂ for burial.
- Enhancing the policy making and implementation of air quality laws. Ensure that emissions are monitored and that industrial and construction companies change their policies to reduce their emissions through effective enforcement and action if standards are not met.

Water pollution

- As with air quality, effective laws and monitoring of key players within the city should take place. Industries found to be using water courses as a waste disposal site should be fined. To work with industries, appropriate procedures need to be implemented so that factory operators have somewhere that their waste can be taken to. This is often the issue, particularly in the fastest growing cities. The infrastructure and facilities can't keep up with the rate of industrialisation, so people have fewer options to make responsible choices of waste disposal.
- In squatter settlements where water is polluted with untreated sewage, city authorities and NGOs may intervene by providing both drainage and sanitation systems.

Dereliction

- Derelict sites are prime brownfield sites and can be regenerated to have a new function. The aim of policy should be to encourage reuse of these areas in preference to greenfield sites to avoid possible contamination into the air, ground and water. This will also benefit the rural areas as greenfield sites will not be used. This is one of the principles behind Green Belt planning law.
- Public-private partnerships between city authorities and private developers working to regenerate a derelict urban area may see the city removing toxic soil and clearing the site ready for new construction as part of their side of the agreement. Hull City Council did this with the new Victoria Dock housing development on former contaminated industrial land next to the Humber before Bellway Homes were prepared to build a new inner-urban development there.