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SUSTAINABLE DEVELOPMENT

**Fact Sheet Series for
Key Stage 4 and A-Level**

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1. *What Is Sustainable Development?*

Sustainable development is a concept that has recently become important for a wide range of people and industries. It involves maintaining our current rate of development whilst leaving suitable resources behind for later generations to continue to develop. Sustainable Development incorporates the dual issues of environment and society.



In the 1980s, increasing concern about the effects of economic development on health, natural resources and the environment led the **United Nations** to release the **Brundtland Report**. This defines sustainable development as 'development which meets the needs of the present without compromising the ability of future generations to meet their own needs.'

Achieving sustainable development requires strategies of resource conservation, energy efficiency and improved transport methods, as well as changes in attitudes amongst the public and the Government.

2. Agenda 21

Introduction

Agenda 21, established at the 1992 **United Nations** Conference on Environment and Development, or 'Earth Summit,' in Rio de Janeiro, Brazil, is the blueprint for sustainability in the 21st century. Agenda 21 is a commitment to sustainable development, which was agreed by many of the world's governments. Nations that have pledged to take part in Agenda 21 are monitored by the International Commission on Sustainable Development, and are encouraged to promote Agenda 21 at the local and regional levels within their own countries. Agenda 21 addresses the development of societies and economies by focusing on the conservation and preservation of our environments and natural resources.

Societies & Economies

Energy

Industrialised societies use a great deal more energy per person than those in the developing world. The average person in the UK uses 35 times as much energy as someone in India. Much of this energy comes from non-renewable sources such as **fossil fuels** (coal, oil and gas). These fuels are being used at a much faster rate than they are produced, and may be unavailable to future generations. In addition, the environmental effects of energy production from fossil fuels can be



harmful. These include the **greenhouse gases** which may cause **global warming**, and **sulphur dioxide** and **oxides of nitrogen**, which leads to **acid rain**.



It is necessary for some of these fuels to be preserved for the future, and for **renewable** energy sources to be introduced. Renewable energy sources include solar power (energy from the sun), wind power and **hydroelectric**

power (using water, often via a dam to generate electricity). They are sometimes known as 'green fuels' because they create very little pollution and are not likely to run out. Agenda 21 requires countries to increase the proportion of energy supplied by 'environmentally sound and cost-effective systems, particularly new and renewable ones.'

Transport

The growth of transport is widely believed to have damaging effects on our environment. Although a suitable transport network is necessary for a successful society and economy, current methods are unsustainable. Pollutants that are emitted from motor vehicles can lead to human health problems, **acid rain** and **global warming**. Some people also believe that the noise of traffic is a form of pollution.



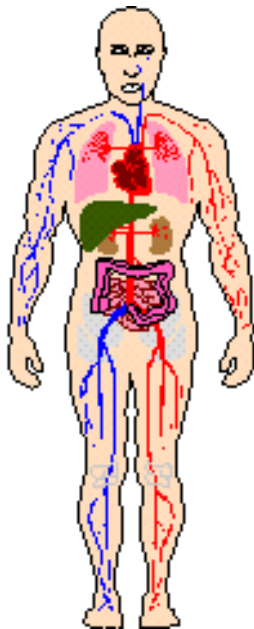
The UK Government has pledged under Agenda 21 to take steps to reduce the rate of traffic growth and to improve the performance and

efficiency of road vehicles. They must also inform people about the environmental impacts of road traffic, and the benefits of using public transport.

Poverty

Poverty is an international problem, but it requires specific programmes to tackle poverty in different countries. Some strategies include giving local and community groups more authority and control over their resources and providing the poor with access to fresh water, sanitation and primary education. Allowing the world's poor to create their own wealth is more sustainable than simply providing aid at times of crisis. Wealth needs to be distributed equally around the world. At the moment a small number of people in the developed world control a vast amount of the world's wealth and resources.

Health



Health is linked to poverty - the world's poorest people are often in the poorest state of health owing to disease, malnutrition or starvation. Commonly in developing countries public health suffers from a lack of **sanitation** from dirty drinking water, and from a lack of food. However, over-consumption in western societies can also damage health through heart disease and obesity.

A healthy society requires the construction of planning systems that concentrate on the prevention of disease. An important need for many people is **vaccination** against **contagious** diseases. Sickness prevention is a more sustainable option than illness treatment and cure, mainly because the costs are much lower. Agenda 21 also promotes reducing the risks to health caused by environmental pollution and hazards.

Populations

It has been predicted that by 2025 the population of the world could exceed eight billion (8,000,000,000). This would be double the population in 1975. Most of this increase is due to occur in the developing world. Such a large population can be sustained as long as food resources are properly managed and distributed, and the environmental impacts of food production and housing are minimised. By being prepared, population growth and development can be sustained by using sensible planning and suitable modern technology

Business & Industry

Business and Industry, including **multinational** companies, have a huge role to play in promoting and achieving world-wide sustainable development. They can play a major part in reducing impacts on the environment and resources by using more efficient manufacturing processes and producing less waste. Businesses can also promote fair employment.

A suggestion from the **United Nations** is for companies to introduce systems in which the prices of goods and services partly reflect the environmental costs of their production, use and disposal. This would mean that less harmful goods would be cheaper than those that caused more environmental damage. Such an 'environment tax' might provide funds for restoring habitats and cleaning up pollution caused during the lifetimes of certain products.

Consumption & Waste

The **United Nations** claims that current patterns of consumption are unsustainable. This is mainly because developed countries usually consume a great deal more resources than countries in the developing world, where basic needs for food, healthcare and education are often not met. Agenda 21 promotes changes in

patterns of consumption and production that reduce environmental stress and cater for the basic needs of humanity. Developed countries are encouraged to help other countries to achieve more sustainable consumption patterns by providing suitable technology. They should also lead by example by using fewer resources and producing less waste.



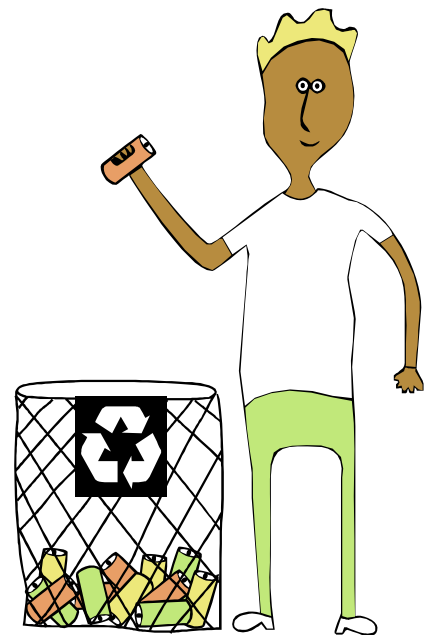
At the moment, the amount of waste produced in the developed world is not sustainable. For example, 99% of the material used to make goods in the USA becomes waste within 6 weeks of sale, including the goods themselves. Most waste is buried underground in landfill sites, and only around 7% of household waste in the UK is recycled.

Agenda 21 requires Governments, industry and the public to make efforts to reduce the amount of wastes by:

- Encouraging recycling;
- Reducing wasteful packaging of products;
- Introducing products that are more environmentally sound.

It is estimated that every year in the UK each person throws out the equivalent of:

- Over 100 glass bottles;
- 70 plastic bottles;
- 300 cans;
- 150 newspapers and magazines;
- Over 60 kg of food scraps and kitchen waste.



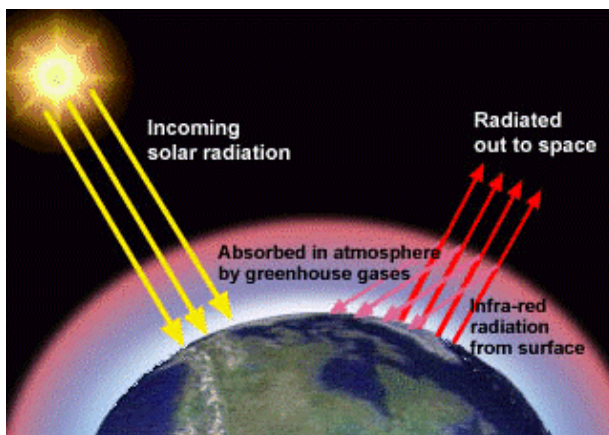
All of these types of waste can be easily recycled, which saves resources and energy.

Waste that is hazardous to health or toxic is covered separately by Agenda 21. The main aim is to minimise the production of these wastes by changing manufacturing methods. Cleaning up land that has been contaminated by hazardous waste is also a priority.

Conservation & Preservation

Atmospheric Protection

Climate Change



A number of gases are known as **greenhouse gases**. This is because they trap heat from the sun that is normally reflected back into space from the Earth's surface. By doing this they act like the glass panels in a greenhouse, which let light

in and keep heat inside. Without them the world would be a lot colder, but recently, levels of some greenhouse gases have begun to increase. This may lead to **global climate change** or **global warming**, which could have detrimental effects such as rising sea levels and the extinction of plant and animal species that cannot cope with the change.

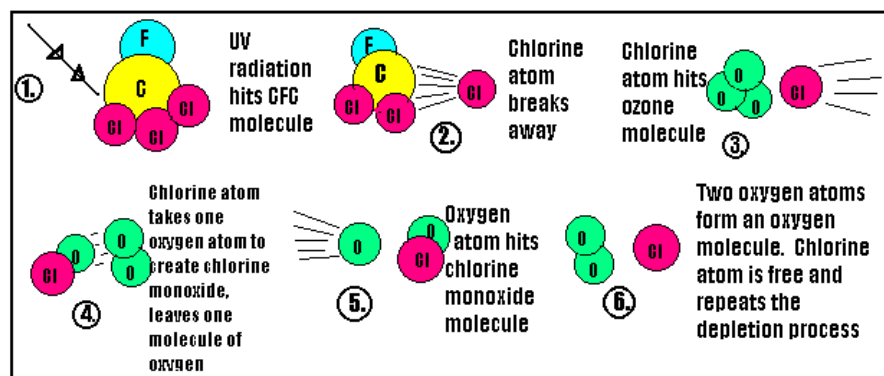
Carbon dioxide (CO₂) is an important greenhouse gas, and levels of it are slowly increasing. This occurs as a result of the burning of **fossil fuels**, which release a great deal of carbon dioxide into the air. Reducing carbon dioxide emissions is an important part of the **United Nations** Sustainable Development Programme. In the UK,

levels of emissions have not risen throughout the 1990s, partly through cleaner technology and also through the substitution of gas for coal in electricity generation. Natural gas gives off much less CO₂ than coal when it is burnt. It also gives off lower **sulphur dioxide** emissions, which results in less **acid rain**.

Ozone Depletion

Ozone is a form of oxygen. In the stratosphere, around 25 km above the Earth's surface, there is a layer of ozone that absorbs **ultra-violet** light from the Sun. Ultra-violet light is known to cause skin cancer in humans, and to damage plants. The ozone layer forms a protective shield around the Earth, and without it most life on Earth would not be likely to survive.

In the 1970s scientists realised that a hole was appearing in the ozone layer over Antarctica during the spring. They realised that this was due to the build-up of **chlorofluorocarbons (CFCs)** - chemicals used in aerosol sprays, packaging and air conditioning systems. One molecule of CFC can remove up to 100,000 ozone molecules, and the widespread use of CFCs before the damage was noticed has produced a serious problem. Life on the planet will not be sustainable if the ozone layer is destroyed, because damage caused to plants will severely reduce the global food supply.



International action has been taken to relieve the problem. In 1987 the Montreal Protocol was agreed which requires countries to take steps to eliminate CFCs and other substances which cause ozone

depletion. If CFC levels are reduced considerably, particularly in the developing world, then the ozone layer will probably fully repair itself by around 2050. Agenda 21 suggests that the ozone layer can be viewed as a vital resource for life, and should be protected for sustainable development to be achieved.

Ecosystems

Agriculture

The challenge facing agriculture (farming) in the near future is to feed a growing population using sustainable farming methods. Many current agricultural practices are not sustainable because they can damage the soil and other parts of the environment.



For example, repeatedly growing crops on the same site will need the addition of more and more fertilisers to replace the nutrients lost from the soil. Using large amounts of pesticides can reduce the effect that they have on pests (**resistance**). Also, the rapid destruction of natural **ecosystems** to provide land for agriculture can cause the widespread extinction of plant and animal species.

Another problem facing agriculture is the loss of the **gene pool** variation in some crop species. This reduces the basic resources available to develop food crops. It also increases the chances of disease affecting large areas of crops, because all of the plants are very similar to each other. In Australia, where **soil erosion** is

common, the production of 1kg of bread leads to the loss of 7kg of topsoil forever. The **United Nations** promotes sustainable agriculture through efficient storage and distribution methods and responsible land management. Techniques for increasing production and conserving soil and water resources need to be applied.

Forestry

Forests are an important resource, both as a source of wood for fuel, building and paper and as habitats for a variety of wildlife. Forestry practices in much of the developed world are almost sustainable - felled trees are replanted and the wildlife found in most commercial forests has been improved by the addition of other plants which make the forest resemble a more natural habitat.

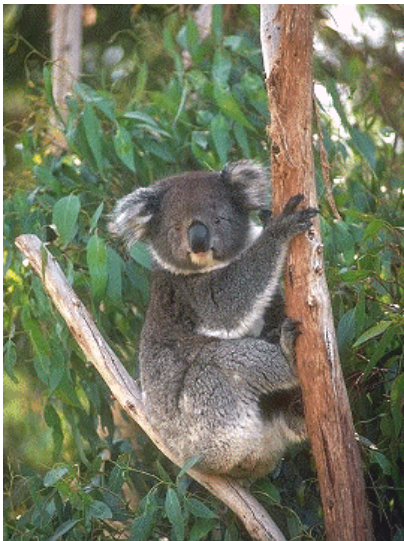


been improved by the addition of other plants which make the forest resemble a more natural habitat.

In other countries, however, forests are often not well managed and are threatened by agricultural expansion, commercial logging, forest fires and overgrazing. As well as the extinction of wildlife species, the loss of a forest can also lead to **soil erosion**.

Sustainable forestry can be achieved by correctly managing forest resources through replanting, conservation and protection from fire, disease and pollution. Commercial forests should not be made up of only one tree species - there should be a variety of trees and a layer of smaller plants (an 'understorey') to provide refuges for wildlife.

Biodiversity



Biodiversity has been defined by the International Committee for Bird Preservation as 'the total variety of life on Earth.' [It can mean the range of species at a site, the size of the **gene pool**, or the number of different **ecosystems** on the planet.] It is important for sustainable development because it represents the wealth of biological resources available to us and future generations for food, clothing, medicine and housing. Currently

biodiversity is being reduced by habitat destruction, pollution and the introduction of foreign plants and animals (e.g. in Britain, where American grey squirrels are replacing the local red squirrels.)

Reducing habitat destruction and promoting co-operation between countries are good ways of safeguarding the biodiversity that remains. Several states have signed the Convention on Biological Diversity, which forms an international effort to conserve plant and animal species.



Oceans & Freshwater

Fishing

Fish are the main source of animal protein for about a quarter of the world's population. The farming of the sea (sometimes known as 'aquaculture') provides a large number of jobs. However, the fishing industry can have negative impacts on the environment. Some fish stocks are being over-exploited at unsustainable levels, and other species (e.g. dolphins and seabirds) are affected by problems



caused by fishing, such as discarded nets which can trap them underwater. Over-fishing can also affect the rest of the marine **ecosystem** by disturbing the natural balances that exist between different aquatic

species. Pollution also has a significant impact on the aquatic environment. 70% of sea pollution has come from activities on the land, and some fish stocks are being damaged, especially shellfish.

Some of the policies which are suggested by Agenda 21 to make the fishing industry more sustainable include reducing the amount of fish which may be caught by each country. This is known as the 'quota.' Licensing fishing boats and banning fishing in parts of the sea which have been over-exploited in the past, should allow fish stocks to recover.

Water Quality

Sustainable development requires suitable supplies of clean water for drinking and cleaning. The main world-wide use of water (70-80%) is for **irrigation** schemes which provide water to allow crops to be grown in dry areas. A great deal of water is lost in these schemes through evaporation, and so countries which are downstream often have very little water to use, which can lead to disputes. Other uses of inland water include **hydroelectric** schemes and recreational activities.



Groundwater is just that - fresh water beneath the ground. In many countries it is used for industrial and drinking water supplies. When

groundwater is over-exploited it can become contaminated with salt water which makes it unsuitable for use.

The water that is available in rivers and lakes is sometimes polluted, making it harmful to plants, animals and people. The cost of providing treatment works is usually much cheaper than the cost of dealing with disease and illness. This should make water treatment a more sustainable option, especially in the developing world where up to 80% of all diseases and a third of deaths are caused by drinking contaminated water.

Proper **sanitation** requires a good quality water supply - a lot of pollution in water comes from human waste. The rapid growth in the populations of towns and cities in the developing world is putting pressure on governments to set up sustainable sanitation schemes to cope with large numbers of people.

The **United Nations** claims that the sustainable use of the world's water resources will be achieved through co-operation between countries which share a source of water, efficient water use, and a reduction in pollution and contamination.

3. Indicators Of Sustainable Development

Introduction

In the UK, the Government uses information on 21 groups of issues to review whether the nation is becoming more sustainable. The range of topics shows that achieving a sustainable level of development in the context of society and environmental protection will need action in all aspects of life. *(Some indicators for each group are shown in brackets.)*

The Economy

Sustainable development requires a healthy economy to provide resources to meet people's needs and improve the quality of the environment. *(Indicators: employment, **inflation**, government borrowing and debt)*



Transport



For transport to be sustainable a balance must be met between the needs of economic development and the protection of the environment and public health. *(Indicators: car use, number of short journeys, freight traffic)*

Leisure & Tourism

The quality of the leisure environment should be maintained and tourists should be attracted. Natural resources should be safeguarded. (Indicators: air travel, leisure journeys)



Overseas Trade



Objectives require UK activities to contribute to sustainable development in the UK and abroad. (Indicators: imports & exports)

Energy

Sustainable energy resources should be maintained whilst reducing their impact and encouraging their efficient use. (Indicators: energy consumption, use of fossil fuels, renewable fuel use)



Land Use



Sustainability requires the balancing of the needs for land for development with the amount of land available. The liveliness of town centres should also be retained. (Indicators: use of derelict land, urban development, green spaces)

Water Resources

For water resources to be sustainable, they should be used efficiently, whilst the aquatic environment should be protected. (Indicators: rainfall, demand & supply of public water)



Forestry



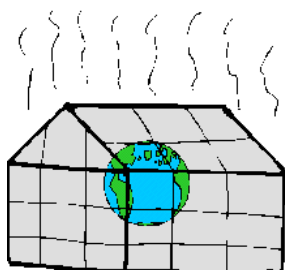
Sustainable forestry requires the maintenance of timber production as well as the wildlife value in forests. (Indicators: forest cover, tree health, ancient woodland remaining)

Fish Resources

These should be protected from over-exploitation and allowed to regenerate. (Indicators: fish stocks, fish catches)



Climate Change



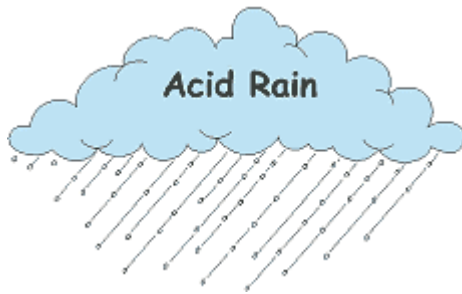
Greenhouse gases should be limited to reduce global warming. (Indicators: global temperature change, **greenhouse gas emissions**)

Ozone Layer Depletion

Emissions of **ozone**-damaging substances should be reduced. (*Indicators: measured ozone depletion, CFCs consumption*)



Acid Deposition



Sustainability requires acidic emissions to be limited. Appropriate land management practices should be carried out. (*Indicators: power station and road transport emissions of sulphur dioxide and oxides of nitrogen*)

Air

Air pollution should be controlled to reduce the risks of damage to human health and natural **ecosystems**. (*Indicators: pollutant emissions, money spent on air pollution reduction*)



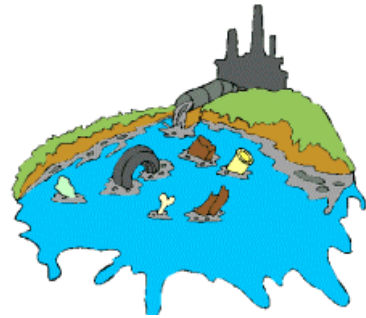
Freshwater Quality



Good water quality, low pollution and the maintenance of resources for drinking water treatment are necessary for sustainable development. (*Indicators: chemical and biological river quality, pollution incidents, money spent on sewage treatment*)

Marine

Sustainability requires pollution at sea to be reduced, especially toxic substances or those prone to **bioaccumulation**. (Indicators: bathing water quality, oil spills and discharges, contaminants in fish)



Wildlife & Habitats



The main sustainability objectives are to conserve the wide variety of wildlife species and habitats in the UK, and to correctly manage commercial species. (Indicators: breeding birds, mammal populations, **habitat fragmentation**, butterfly distribution)

Land Cover & Landscape

A key issue is to balance the production of enough food with the protection of the landscape and wildlife value of the countryside. (Indicators: rural land cover, agricultural productivity, use of pesticides)



Soil



Sustainable development will need soil to be protected as a limited resource for food production and as an **ecosystem** for many organisms. (Indicators: soil quality, **heavy metals in soils**)

Minerals Extraction

Sustaining the supply of mineral resources involves their efficient use, minimisation of waste and the prevention of environmental damage during extraction. (Indicators: *mineral workings on land, amounts of waste*)



Waste



Sustainability requires the minimisation of waste produced and its pollution. An improvement in the uses made of existing waste is also needed. (Indicators: *household & industrial waste, recycling, landfill waste*)

Radioactivity

For sustainable development to be achieved, radioactive waste should be minimised and disposed of safely. (Indicators: *population exposure to radiation, nuclear power station discharges*).



4. Sustainable Development In The UK

The UK Strategy on Sustainable Development

The UK Government bases its vision of sustainable development on four broad objectives:

- *'Social progress which recognises the needs of everyone'*

Reducing health risks caused by pollution, poverty, poor housing and unemployment. Meeting our needs without treating others in the world unfairly.

- *'Effective protection of the environment'*

Limiting global environmental damage. Protecting things that people value, such as landscapes or historic buildings.

- *'Sensible use of natural resources'*

Using non-renewable resources efficiently and developing alternatives to replace them in the future.

- *'Maintenance of high and stable levels of economic growth and employment'*

Producing high quality goods and services for consumers throughout the world. Equipping our workforce with suitable skills and education. Encouraging businesses to invest in British companies.



Changing the way we think about development is an important part of the UK strategy. The Government suggests looking at the long-term and short-term effects of policies. It also encourages companies to look at the indirect effects of their products and services. An example of this is called Life Cycle Analysis, which involves looking at the life of a product from its production, through its use, to its final disposal or recycling. Ways of reducing resource use or waste can be introduced into the life of the product.

The Government Panel On Sustainable Development

This was set up in January 1994 to provide independent advice to the Government on issues arising from the UK Sustainable Development Strategy. It also covered other areas included in the Rio Earth Summit – mainly **global climate change, biodiversity, and forestry.**

The main jobs of the Panel were:

- To examine general sustainability issues at home and abroad;
- To identify major problems;
- To decide the priority of issues.

The UK Round Table on Sustainable Development

This was launched in early 1995 to encourage discussion on major sustainable development issues. It also aimed to build agreements between people who have a range of different viewpoints and a variety of responsibilities.

Some of its objectives were:

- To help identify priorities for sustainable development;

- To develop new areas of agreement on sustainable development, or to reduce differences of opinion;
- To provide advice on actions to achieve sustainable development;
- To help evaluate progress.

The Sustainable Development Commission

As proposed in the Government's 1999 Sustainable Development Strategy, A better quality of life, the Government established the Sustainable Development Commission, subsuming the UK Round Table on Sustainable Development and the British Government Panel on Sustainable Development. The Commission's specific objectives are to:

- review how far sustainable development is being achieved in the UK in all relevant fields, and identify any relevant processes or policies which may be undermining this;
- identify important unsustainable trends which will not be reversed on the basis of current or planned action, and recommend action to reverse the trends;
- deepen understanding of the concept of sustainable development, increase awareness of the issues it raises, and build agreement on them; and
- encourage and stimulate good practice.

5. Local Agenda 21

Introduction

At the Rio Earth Summit in 1992, the **United Nations** agreed that the best starting point for the achievement of sustainable development is at the local level. In fact, two thirds of the 2500 action items of Agenda 21 relate to local councils.

Each local authority has had to draw up its own Local Agenda 21 (LA21) following discussion with its citizens about what they think is important for the area. The principle of sustainable development must form a central part of the Local Agenda.

Bert Bovenkerk, the project leader for LA21 in The Hague, Netherlands says, "Reaching fine agreements is all very well at world-wide level, but when it comes to carrying them out the process falters."

Local Authorities

Many local authorities have begun schemes of co-operation to allow them to exchange ideas about sustainable development. Groups of local authorities can join together to give themselves a louder voice to influence large companies.

As part of Local Agenda 21 in Liverpool, for example, the public and the city council have drawn up their own indicators to discover the success of sustainable development. These indicators include the number of parks and people living close to them, education standards and crime figures.

In Cheshire, the local authority has set up a transport task group as part of its LA21. This aims to set up commuter plans to discourage people from travelling by car.

Kirklees council, in West Yorkshire, has encouraged partnerships between themselves, businesses, charity groups and members of the public to help them to achieve a sustainable level of development.

Glossary

Acid Deposition - Contamination of the ground and lakes etc. with acid, usually owing to sulphur dioxide emissions from power stations. This usually happens as acid rain.

Bioaccumulation - The building up of dangerous levels of a pollutant, usually in predators that feed on contaminated prey.

Biodiversity - Usually, the variety of wildlife species in a particular site or ecosystem.

Brundtland Report - A report produced in 1987 by Gro Harlem Brundtland of the **United Nations** proposing the ways in which sustainable development can be achieved.

Carbon Dioxide (CO₂) - A colourless gas given off when fossil fuels are burnt. It is a **greenhouse gas**.

CFCs (Chlorofluorocarbons) - Chemicals used in refrigeration, packaging, air conditioning and cleaning. They are now known to damage the ozone layer.

Contagious - Describes a disease that can be passed on by direct contact between people.

Ecosystem - The living and non-living environment of a particular site (e.g. a lake or desert), and the relationships between them.

Fossil Fuel - A naturally occurring carbon-based fuel such as coal, oil or gas, formed millions of years ago.

Gene Pool - The variety of genes (inherited pieces of information which determine what an organism is like) available to a population of plants or animals.

Global Warming (Global Climate Change) - Changes in the Earth's climate, believed to be caused by greenhouse gases.

Greenhouse Gases - Gases that trap heat from the Sun reflected from the Earth's surface, acting like a greenhouse.

Habitat - The natural home of an animal or plant.

Habitat Fragmentation - The breaking up of large habitats into smaller areas which are of less value to wildlife. Often caused by farming and building.

Heavy Metals - Types of metal which can contaminate the environment easily. They include lead, zinc and mercury. They are usually toxic to animals and plants.

Hydroelectricity - Electricity generated using the power of falling water. Building a dam traps water, allowing a lot of energy to be extracted from it when it is released.

Inflation - (In economics) the rate at which the prices of goods increase.

Irrigation - Supplying land with water by building ditches and canals. Usually done to help water crops.

Multinational - A large company which operates in several countries. (e.g. BP, McDonalds)

Oxides Of Nitrogen (NOx) - A range of gases emitted when fuels are burnt in air. They can cause acid rain and can affect human health.

Ozone (O₃) - A form of oxygen which has three oxygen molecules instead of the two that form the oxygen that we breathe (O₂). It is toxic, but a layer of it high above the earth protects us from radiation.

Regeneration - Re-growth of a population of plants or animals through reproduction.

Renewable Energy - Energy from a never-ending source, such as wind power or solar power.

Resistance - An ability to withstand pesticides etc. which can occur if a pest is repeatedly exposed to them - a sort of immunity.

Sanitation - The use of practical methods to improve public health, especially sewers etc.

Soil Erosion - The loss of soil from a site, usually through winds or water. It happens easily if plants are removed.

Sulphur Dioxide (SO₂) - A gas given off from power stations and other industries, mainly through the use of coal. It is responsible for acid deposition.

Ultraviolet - Invisible radiation from the sun that can cause skin cancer and damage plants.

United Nations (UN) - An international organisation of independent states that was formed in 1945 to promote international co-operation and peace.

Vaccination - The treatment of people to protect them against a specific disease (e.g. tetanus, rabies).

Further Reading

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