RIPPLES

Factsheet No.4 in the Environment Agency educational series

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Pollution

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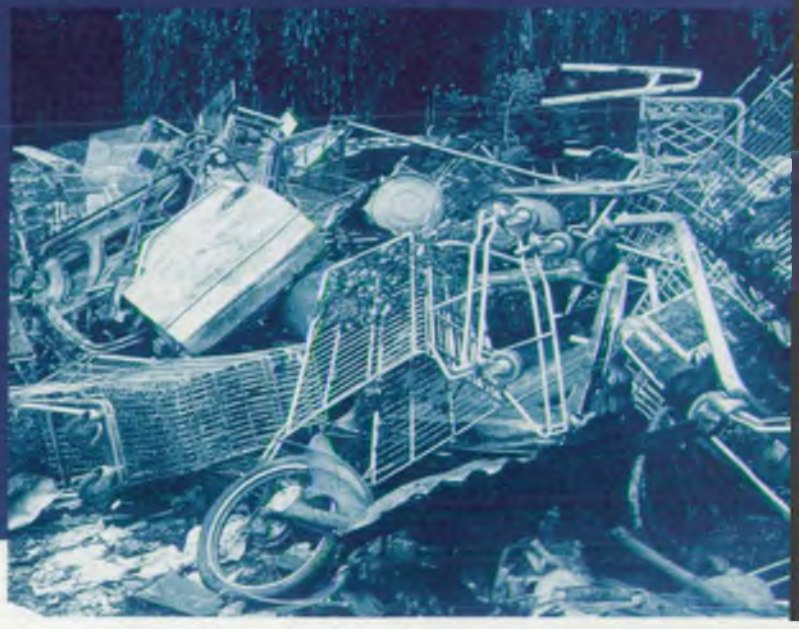

ENVIRONMENT AGENCY

Factsheet No.4 in the Environment Agency educational series

Rivers, canals and lakes provide a home or **habitat** for a wide variety of plants and animals.

However, they are at risk from **pollution,** when the natural environment can be damaged.

CAUSES OF POLLUTION

River pollution happens when something gets into the water that does not belong there, often damaging the natural environment. Rivers can be damaged in many different ways and by many different groups of people. Sometimes it is possible to see this pollution, but at other times, even though the water might look clean, it is not.

1. POLLUTION FROM THE HOME

It is a sad fact that some people use our rivers as dustbins. This photograph shows some of the rubbish collected from the River Thames. Much of it is very dangerous, such as broken glass and objects with sharp metal edges, and may harm wildlife. If this lies on the bottom of the river, it cannot be seen, but it is still causing damage. For example, car batteries contain lead and acid which are poisonous to wild life. Smaller pieces of rubbish such as fishing line and hooks are very dangerous, as birds become entangled with the line or even swallow the hooks.

Water that has been used in the home is called waste or 'dirty' water. When waste water goes down the plughole of a bath or sink, it should go through the sewers, to a sewage treatment works. Here, any dangerous substances which are poisonous to wildlife are treated and removed. These include detergents which are used in dishwashers and washing machines. When rain water falls onto a house, it goes into the drains and eventually ends up in a river. This is 'clean' water. It is not treated in any way. If waste water is put into the drains, it will not be treated and so the polluting substances will end up in a river, where they might kill the wildlife. This will happen if the waste pipes are not connected properly.

2. POLLUTION FROM FARMS

Farming can cause great damage to the natural environment, especially water. This pollution is not deliberate but happens because of the way modern farming is done. **Arable farming** is when the farmer grows crops. Farmers put **fertiliser** on to the land, because it contains **nutrients** that help plants grow bigger and faster. There are two types of fertiliser. **Organic** fertiliser, usually made up of animal waste, and **inorganic** or chemical fertilisers, which are spread on the fields.

This causes no problems unless it rains just after the fertiliser has been spread onto the fields. Because the

MANAGEMENT AND CONTACTS:

The Environment Agency delivers a service to its customers, with the emphasis on authority and accountability at the most local level possible. It aims to be cost-effective and efficient and to offer the best service and value for money.

Head Office is responsible for overall policy and relationships with national bodies including Government.

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ENVIRONMENT AGENCY
GENERAL ENQUIRY LINE
0645 333 111

The 24-hour emergency hotline number for reporting all environmental incidents relating to air, land and water.

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fertiliser is lying on the surface, rainwater might wash it off the fields and into rivers. Once in the river, it helps the river plants, including small and microscopic plants called **algae,** to grow. If they grow too much they will block the river.

Too many plants in a river can cause another problem. All plants, including those in rivers, perform two activities. During the day, especially in sunlight, they produce oxygen. This process is called **photosynthesis.** The other process, called **respiration** - when plants use oxygen, takes place all the time, night and day. If there are a lot of plants in a river, they will use up all the oxygen in the water at night. This would mean that the other animals in the water, such as fish, will be unable to breathe, and might die.

Livestock farming is when the farmer rears animals, such as dairy cattle which produce milk. This can also cause pollution problems. During the summer, animals are allowed to graze on the land, but during the winter they are taken indoors. Their waste, called **slurry** is collected and stored for use as a fertiliser, but if any escapes and enters a river, it will cause a lot of damage. Milk itself is also a pollutant.

Slurry and milk, like any organic material, are food for bacteria that live in the water. If there is a lot of this extra food, the bacteria will multiply very quickly. Like all animals, they need oxygen, but if there are too many bacteria, they use up all the oxygen, so other animals in the river will die.

Another problem is the spraying of **pesticides.** These are chemicals used to kill pests that might damage the crops or harm the farmer's animals. Once again, problems happen if rainwater washes these into rivers, where they might kill the plants and animals in the river. Some insects eat the microscopic **algae.** The insects themselves are food for bigger animals, such as shrimps, who in turn are eaten by fish and other water creatures such as otters. If there are no insects, then these other creatures will not be able to grow properly.

Farmers also need to store pesticides and fertilisers carefully because they are very poisonous (toxic) to animals living in rivers. Even a small spillage or leakage would cause a very serious pollution if it were allowed to enter a stream or river.

3. POLLUTION FROM INDUSTRIES

There are many industries that use polluting substances such as oil and chemicals. If these get into the rivers they cause great damage. Oil floats on water and one gallon of oil will cover an area the size of two football pitches. The film of oil may stop plants and animals in the water from receiving oxygen, so they die. If the oil gets onto the feathers of a bird, they will try to clean themselves by **preening,** so swallowing the oil.

If poisonous chemicals get into a river, they might be dissolved in the water. This water is absorbed by plants, through the roots, or it might be drunk by animals, and so enters the food chain. The amount of chemical increases at each stage of the chain. Eventually, if the amount becomes very great, it may be enough to kill or seriously harm plants and animals higher up the food chain, such as otters.

A lot of pollution is caused by accidents. This might be a break in a pipeline, a leak from a storage tank or even a road accident. If a lorry or car overturns, petrol and oil could leak from the engine and this might be washed into a river.

An important industry is the production of electricity at power stations, like the one at Didcot in Oxfordshire. They produce electricity, but also produce warm water. If this warm water is released into rivers it can upset the natural balance of the environment.

There is also a danger that power stations will pollute the air. Many power stations burn fossil fuels such as coal, gas and oil. As the fuel burns, it releases poisonous gases and very small particles of solid matter. As little as possible must be allowed to enter the atmosphere, so the

Environment Agency makes the power stations filter the waste gases so that pollution does not occur.

Some of the power stations in England use nuclear energy to produce electricity. Nuclear power can be very dangerous if not carefully controlled and can cause special problems. Although there are no poisonous gases released, radio-active waste is produced. This can be extremely dangerous, because if it is not dealt with properly, it might cause serious illnesses and death. Some of this material remains dangerous for thousands of years so it must be safely stored. The Environment Agency is responsible for issuing licences giving permission for use and storage of radio-active materials including waste. Radio-active material is not just used by the nuclear power industry, but by many organisations including hospitals and universities.

WASTE DISPOSAL

Waste is something we don't want and throw away. This waste must be dealt with very carefully or it will cause serious pollution of the environment. The best way to prevent pollution from waste would be to reduce the amount of waste we produce. For example, we could cut down on unnecessary packaging of food. If the waste cannot be reduced, it would be better for the environment if we were able to re-use it, or recycle the waste. That is why there are more and more recycling centres where people can take their glass, paper, metal and so on. However at the moment, most is simply thrown away. Although some is burned or **incinerated**, most waste is disposed of in landfills, which are giant holes in the ground. These are filled with waste, covered with soils and restored to other uses such as grazing land.

Landfills can be a pollution risk. Rainwater passes through the soil covering the waste and then through the waste. As it passes through, it may dissolve dangerous substances and carry them away in solution. This is called **leaching** and the polluted water is called **leachate**. The danger is that the leachate may escape and enter the water cycle. To help stop this, the landfill is lined and covered with a material that does not allow water to pass through. Any that does get through is collected and removed for treatment, or channelled into the sewage system where it can be dealt with effectively.

As the waste rots and decomposes, it releases dangerous gases, including methane, which is highly flammable, and carbon dioxide. Both these gases also contribute to the **greenhouse effect** or **global warming**. The site operators must make sure these gases do not escape in an uncontrolled way, so the Environment Agency makes regular checks around the landfill to make sure the gas is not escaping during and after tipping.

The safe disposal of waste costs money. It is a sad fact that some people try to avoid these costs by 'dumping' their waste illegally. This is called **'fly tipping'**. It is unsightly and can be a danger to the health of people and animals. The Agency will prosecute anyone found doing this, but they would rather protect the environment by educating people about the correct way to deal with their waste.

THE WORK OF THE ENVIRONMENT AGENCY

It is the responsibility of the Environment Agency to protect and improve the environment. It aims to prevent pollution but, if it does happen, its staff will work with others to reduce the effects.

PREVENT POLLUTION

The Agency runs campaigns to try to prevent pollution. For example, farmers are given guidance about how and when to spread fertilisers and pesticides on the land, and so prevent it from being washed into the rivers. People are warned about the effects of pouring oil down drains, or putting rubbish into rivers.

Trash screens are metal grills put across the river. They will trap rubbish and stop it from being carried further downstream. These are very important where the river is going into a man-made tunnel, called a **culvert**. These are built under bridges or in towns. If rubbish got stuck in the culvert, it would quickly cause flooding.

If there is pollution, the Agency tries to find out who or what was responsible. That person would then be forced to pay for the clean-up work and might be fined. For example, so that they know if any water pollution has happened, the Agency measures the quality of water all year round at thousands of sites.

They perform two different types of test. A **chemical analysis** is when they test for dangerous substances in the water. Samples of the water are taken to a laboratory where scientists test for harmful chemicals such as nitrates, found in fertiliser, or ammonia, which is found in sewage. They also test the quality of the water found at beaches.

Agency staff also record the amount of bacteria found in the water. A small amount is very useful because they break down waste such as sewage, but if there are too many, they damage the environment.

Anyone who wants to put treated waste water into a river, such as a water company, needs permission from the Agency. Licences, called **Discharge Consents** are issued that set strict limits on what can be released, and stop the river from being harmed.

This photograph shows a **biological analysis** being done. Agency staff count and record the numbers and types of invertebrates found in the river. If there are a lot of creatures of many different species, the water is unpolluted. But if there are only a few species, the water may be polluted.

All these different measures have helped to make the rivers in this Region much cleaner in the last six years, but there is still a lot of work to be done because pollution continues to happen.

DEALING WITH POLLUTION

If pollution does happen, the Agency must try to reduce the amount of damage. They work with organisations such as the Fire Brigade to stop the pollution from spreading. For example, a **floating boom** is used to trap oil and stop it from spreading. The oil can then be removed by a vacuum pump and disposed of safely.

THE ENVIRONMENT AGENCY

The Environment Agency was formed by a merger of the National Rivers Authority with Her Majesty's Inspectorate of Pollution and the Waste Regulation Authorities. This new organisation began operating on 1 April 1996, and has responsibilities for the environmental protection of water, land and air.