Pollution
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(Adapted book. Elementary level)

Chapter 1. In the beginning

When you pollute something you make it dirty or dangerous. It is dangerous to drink polluted water or breathe polluted air; and if you pollute the ground, nothing will grow in it. Pollution can start in a small way - like using a river for waste. But then, pollution grows and grows, until everybody is in danger...

In 1769 some people built a small town in a beautiful place between the mountains and the sea, and called it Los Angeles. They built houses and farms. They found gold and oil near by. More people came and built towns and factories. The factories worked twenty-four hours a day, making useful things; and the people drove to work in big, fast cars. Soon there was an airport too. There was more and more smoke and gas from the cars, factories and planes.

Then the fog came. Ordinary fog soon goes away; but this fog stayed for a long time. The sun ‘cooked’ the smoke and gases from the factories and cars and made smog - smoky fog. People had problems with breathing. Everybody felt tired and ill; and some people died.

Smog was born in Los Angeles. But today, most cities have their own smog - and the problem is growing.

Chapter 2. Polluting the air - coal

Air contains many gases, but two important ones are oxygen and carbon dioxide (CO_2). Plants take air into their leaves. They use the carbon in the carbon dioxide for food - the oxygen goes back into the air. Animals (and of course people) use the oxygen and breathe out carbon dioxide. So plants and animals help each other to live and grow.

Burning uses oxygen and produces carbon dioxide. Long ago. people learned to make fires to cook their food and to keep themselves

warm. This did not produce enough carbon dioxide to hurt anybody. Later people built factories, which burned coal or oil. New towns grew up around the factories, with shops, schools and houses for the workers. Everybody burned coal. The fires did not burn cleanly; they produced a lot of smoke and soot. If you stood on a hill and looked down at a town like this, you saw hundreds of chimneys with dirty grey smoke coming out. The soot from the smoke blackened the buildings in the towns, and many trees died. The sooty air made people cough. Every winter, many old people and children died from breathing problems. Every year there were terrible fogs. A writer from Manchester, where the air was badly polluted, wrote, 'Every morning I wake up and hear the birds - coughing!'

Then, in the 1950s, new Clean Air law's in Britain said that people must not burn wood, or ordinary, 'dirty' coal in their houses, but special, 'clean' coal. And factories must have tall chimneys to send the smoke, gases and soot up into the sky and away from the town. Soon the air in the towns was safer to breathe. People cleaned the soot off their buildings - and they stayed clean. But that was only part of the story. Where did the smoke and gases go?

Chapter 3. Polluting the air - oil

All burning produces smoke and gases; but burning petrol also produces a heavy grey metal called lead. The oil producers started putting lead in petrol many years ago because lead made it burn better. Cars burn the petrol, and send out the waste gases. Every year we send out 450,000 tonnes of lead into the air, all over the world. Half of this lead comes from the waste gases of traffic.

Lead is a poison. You can breathe it in; you can take it in through food or water, and it stays inside, slowly poisoning you. Children who live in places where there is a lot of lead do not grow and learn as well as other children. And too much lead can kill.

Unleaded petrol - petrol with less lead, or no lead - helps to control air pollution. In developed countries, there are laws against dirty

cars, and hundreds of millions of cars burn unleaded petrol. In many developed countries, garages sell unleaded petrol more cheaply than ordinary leaded petrol; and most new cars cannot use leaded petrol. Clean Air laws and unleaded petrol have helped to clean up smog. And in many places, special laws keep traffic out of town centres. That is helpful too.

But many developing countries have too much lead in their air because their petrol still contains a lot of lead. No laws stop oil producers from selling them heavily leaded petrol. No laws stop anybody from selling them cars which burn leaded petrol. And no laws tell drivers to clean up the waste gases of their dirty, smelly, wasteful cars.

Chapter 4. Acid rain

Acid rain is a great problem in many countries in the North. Many foods and drinks - oranges, for example - contain acid, but they do not hurt anybody. Ordinary rain is a little acid, too. But strong acid is dangerous. Car batteries contain acid which can burn your hands and can burn holes in your clothes too. In 1979, the acid rain in West Virginia, USA was as strong as battery acid.

Acid rain is not new. We started producing acid rain when we started building a lot of factories and power stations which burned coal or oil.

When you burn these fuels, you produce the gases CO_2 and NOx.

Britain produces about five million tonnes of these gases every year. China produces eighteen million tonnes. The USA produces more than twenty million tonnes. The wind carries the gases high into the sky. There they come together with water in the air and make acid rain, acid fog and acid snow. In Canada and northern Europe many millions of trees have died because of acid rain from power stations and factories thousands of kilometres away.

Acid rain and acid snow poison rivers and lakes too. Fish and other animals cannot live in acid water. Sweden is a very ‘clean’ country

with good Clean Air laws; but thousands of Swedish lakes are dead because of acid rain from other, less clean places.

Acid rain is bad for buildings too. The acid eats into the stone. Many of the world's oldest and most beautiful buildings are in danger because of acid rain.

We can clean the smoke from factories and power stations, but it is expensive; and many of the countries which produce the most acid rain have no laws to control pollution.

Chapter 5. Water and chemicals

Polluted water kills more than 25 million people every year. One and a quarter billion people do not have clean, safe, water for drinking or washing. Many millions of women and children in developing countries walk a long way every day to bring home a few litres of dirty water. At the same time, one and three quarter billion people - nearly half of all the people in the world - do not have toilets in, or even near, their homes. All over the world, billions of people use rivers for washing, for drinking, and as sewers to carry away their waste.

A little waste in a river is not dangerous; often a river can clean itself. But every day millions of tonnes of waste from houses, farms and factories get into our rivers and lakes. The waste takes oxygen out of the water, and nothing can live, except some very small water plants which do not need much oxygen.

Farm waste often contains poisonous chemicals, too. Many farms today are factories where millions of animals never see a field. They live in special buildings, with chemicals in their food to make them grow faster, and medicines to stop them from getting ill. The chemicals often stay in their bodies. Meat and eggs from these farms look good; but they contain a lot of chemicals.

Farmers also use chemicals on fruit and vegetables, and some of these chemicals are very poisonous. Developed countries have laws against them, but developing countries still use them a lot; and tonnes of chemicals get into the ground and water - and into the food chain, too.

The poison stays on the leaves of a plant; an insect eats the plant; the poison stays in the insect's body until a small bird eats the insect. The poison stays in the bird's body, and gets stronger every time the bird eats a poisoned insect. A big bird then eats the small one, and so on.

In the past, people used DDT (dichlorodiphenyltrichloroethane) on farms, and in their homes, to kill insects. But DDT is a poison, and many countries now have laws against it. It is against the law to use DDT in the USA, but factories in the USA produce 18 million kilograms of DDT every year. They sell it - and other dangerous chemicals - to farmers in countries where there are no laws to control poisonous chemicals. The farmers grow coffee, tea, fruit and vegetables to sell to people in developed countries.

Every year, in developing countries, chemicals like DDT kill 40,000 people and make a million people ill.

Chapter 6. Recycling

Some waste is not dangerous. Often somebody will recycle it and do something useful with it. You can break up old cars to get the metal, or make new glass from old bottles. But some waste is toxic - it is very poisonous. In the USA, for example, factories dump - throw away - 265 million tonnes of toxic waste every year. How do you dump toxic waste safely? Well, you can put it in metal containers and leave it somewhere safe; but this can be a very bad idea.

You can bury toxic waste. You put it in a deep hole and cover it with soil. That is what happened at Love Canal in the USA. In the 1930s a chemical producer buried many tonnes of toxic waste in metal containers. In the 1950s, a builder bought the land and built a little town there. Nobody remembered the containers of toxic waste under the ground. Then, in the 1970s, the waste started to come through the metal of the containers and pollute the ground.

Trees and grass blackened and died. There was a bad smell everywhere. People had to leave their homes.

The people who cleaned up Love Canal found eighty-two different toxic chemicals in the soil.

You can burn toxic waste, but it is more expensive than burying it, and the burning can produce dangerous gases. So some people burn their toxic waste at sea in special ships. The chemicals get into the air and the wind carries them a long way.

You can send your toxic waste to a poorer country and pay somebody to bum or bury it there.

The USA sends toxic waste to Panama. Germany and Holland send toxic waste to the Czech Republic. Is this a good idea?

Toxic waste can be useful if you know how to recycle it. Some petrol producers bury their toxic waste in the soil. There, special bacteria in the soil eat the waste and change it into clean, safe carbon dioxide and water. In Britain, some people are growing special waste-eating bacteria. These bacteria eat toxic chemicals. There is a lot of toxic waste in the world: are these bacteria hungry enough?

Chapter 7. Accidental or deliberate?

Some pollution happens by accident. In Seveso in Italy, in 1976, there was an accident at a chemical factory. A cloud of poisonous gas killed a lot of people and animals. Everybody had to leave the town. Even the ground near the factory was toxic. Workmen in special clothes had to take it away.

A terrible example of accidental pollution happened in Minimata in Japan in the 1950s. At that time, people did not fully understand the dangers of toxic waste. A factory dumped its waste into the sea. This waste contained a very poisonous metal called mercury, which got into the food chain. Many people ate fish with mercury in their bodies. Thousands died from mercury poisoning. Thousands never walked or talked again.

But a lot of pollution is deliberate. Some people deliberately dump their waste in dangerous ways because it is cheaper than doing it safely. Every day factories deliberately dump toxic waste in the river

Rhine. They know it is wrong, but they still do it because it is cheap. Poisonous chemicals from this toxic waste get into the food chain. Every year many seals at the mouth of the Rhine die from the toxic chemicals in the bodies of the fish they eat.

Today, the law in developed countries says, 'The polluter - accidental or deliberate - must pay.' Strong laws are helpful; but how do you catch the polluters? And what about countries where there are no laws to control pollution?

Chapter 8. Radioactivity

Ordinary power stations bum coal, oil or gas to produce electricity, but they waste nearly three-quarters of their fuel. Power stations in countries with strong Clean Air laws use a lot of fuel to clean up their smoke and gases.

Nuclear power stations use uranium to produce electricity. Nuclear power produces one-sixth of the world's electricity. In France, three-quarters of electricity comes from nuclear power.

Nuclear power does not use much fuel. One tonne of uranium produces as much electricity as 20,000 tonnes of coal. Nuclear power does not produce smoke, soot, poisonous gases or acid rain.

But there is a problem. Nuclear power stations produce a special kind of waste. This waste is radioactive; it gives off radiation.

A little radiation can save lives: doctors use it in hospitals. But too much radiation is dangerous. You cannot see or smell it, but it travels on the wind. It gets into soil, plants and water and into the food chain.

About 95% of radioactive waste is not dangerous, and you can destroy it safely and cheaply. But used nuclear fuel is highly radioactive and very toxic. You cannot dump it easily or cheaply. You can recycle it in special factories and make it into new fuel. You can make it into a special kind of glass. You can keep it under water in special containers, or bury it deep under the ground. But you must remember that it stays radioactive - and dangerous - for thousands of years.

Accidents can happen. In 1987, in Brazil, a man found a metal container near an old hospital and opened it. It contained a radioactive chemical. His wife and daughter died of radiation poisoning.

After the nuclear accident in 1986 at the Chernobyl nuclear power station in the Ukraine, 600,000 people worked night and day to try to make the power station safe.

How many died? Some say a few hundred; some say 10,000. Nobody is sure. Thousands of families had to leave their homes. Workmen had to destroy all the crops and kill all the farm animals. They had to take away all the earth and bury it in special dumps. This was not enough to control the radioactivity. On farms hundreds of kilometres from Chernobyl, cows still give radioactive milk, and people are still getting ill from radiation poisoning.

What will happen if there is another accident like the one at Chernobyl?

Chapter 9. Oil in the sea

The sea is full of bacteria, plants and animals which eat waste. It can clean itself if we do not use it as a dump. But if we dump too much waste in the sea, the bacteria, plants and animals cannot recycle it quickly enough and the water gets polluted.

When you use a toilet, the waste goes into a sewer. But where does it go after that? All over the world, sewers dump waste into the sea. The sea washes the waste onto the beaches and pollutes them.

The Mediterranean is one of the most polluted seas in the world. There is land nearly all around it, so the waste has nowhere to go. Many big towns empty their sewers into the sea. It is not safe to swim in parts of the Mediterranean, and many beaches are polluted.

Chemicals from farms and factories get into rivers; and the rivers carry the waste to the sea. The chemicals get into the food chain and poison the fish. Ships dump their waste at sea and pollute the beaches.

The worst kind of sea pollution is an oil spill. Oil is black and dirty and contains toxic chemicals. If you spill oil at sea, it makes an oil

slick on top of the water. Air cannot get to the plants and animals under the water. We spill a lot of oil into the sea every year, from ships and from oil refineries.

Those oil spills were, accidental, but the worst oil pollution in the world was deliberate. In die Gulf War in 1991, oil was spilled deliberately. Oil wells burned and millions of tonnes of oil went into the sea. There were fifty-kilometre oil slicks. Oil also spilled onto the ground. There were lakes of burning oil everywhere. The oil went down under the ground and polluted the water in underground wells.

The pollution was terrible.

Electric street lights burned all day in Kuwait because of the smoke and smog from burning oil. Black and dirty rain fell on the Himalayan mountains, thousands of kilometres away. Many years after the war, people are still trying to clean everything up.

Chapter 10. Changes in the weather

Our sun produces a lot of ultraviolet radiation. Too much radiation is dangerous; but between fifteen and fifty kilometres above the earth there is a layer of a gas called ozone. This ozone layer protects the earth from the sun's dangerous radiation. If you make a hole in the ozone layer, the radiation will come through the hole and do a lot of damage on earth.

We produce many gases which go high into the air and damage the ozone layer. In 1984 some scientists found a hole in the ozone layer above Antarctica. The hole was as big as the USA. In Chile, under this hole, many sheep now have eye problems. The sun's radiation also damages people's bodies.

Some gases are called greenhouse gases. Greenhouse gases hold the sun's warmth and keep it near the earth.

When the earth was young, the only greenhouse gas was CO2. It stopped the earth from getting too cold. But today there is too much CO2. There are other greenhouse gases too, and we produce billions of tonnes of them. Any kind of burning produces CO2 and also NOx.

Farming - specially of animals and rice - produces another greenhouse gas called methane. Many modern chemicals produce gases called CFCs (chlorofluorocarbons). The US produces the most greenhouse gases (25%), then Europe, then Russia and the countries around it.

The earth has two big ice caps, one in the north, in the Arctic and one in die south, in Antarctica. Each ice cap contains many billions of tonnes of water. There are also billions of tonnes of poisonous methane gas under the ice. If the weather is too warm, those ice caps will melt. Water will cover the earth and the air will be full of methane gas.

Scientists think the earth is getting warmer because of all the greenhouse gases. Slowly, very slowly, the ice caps are melting.

Some scientists think the level of the sea will go up by about forty centimetres by the year 2100. Perhaps this does not sound much, but it is enough to cover many islands and a lot of land near the sea. Many millions of people will lose their homes.

Many people think that these changes to our weather will be the biggest problem caused by pollution in the next hundred years.

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Hope you have enjoyed the reading!