

## Geography: Section 1

# Air Pollution: Background Information

### What is Air Pollution?

Air pollution is the introduction of harmful gases and particles, into the atmosphere that makes the air harmful to humans and to the environment. When air pollution occurs it is very difficult to avoid because it can easily spread by the wind and we are always breathing air in.

### What Causes Air Pollution?

There are seven factors that can cause air pollution. These factors can be grouped into physical and human factors. To learn more about the major pollutants that cause air pollution take a look at the interactive element below:



Can you identify what the seven factors are? Click on each one to discover how each of these factors contributes to air pollution and use the information to complete Activity Two & Three in the Activity Sheet.

### **Monitoring Air Quality in Scotland**

Use the information in this video to complete Activity One in the Activity Sheet.

### **How We Travel to School Survey**

To get you starting to think about the causes of air pollution your class can use the 'how we travel to school survey' to allow your class to see how you affect air quality with the journey you make to school.

You can input the result of one of your travel surveys on the website.

The data you input will be automatically converted into graphs for your next lesson. You will also be able to compare your classes' results with that of other schools and use that information to complete an Activity sheet in the next section of this site.

For more information on the state of Scotland's Air Quality, check out Scotland's Environment Website

## Geography: Section 2

# Fieldwork: Air Pollution around our School

Now that you have an understanding of what air pollution is and what the main causes are you could carry out your own investigation into what the air quality is like around your school and consider the causes of this pollution.

An air sensor may have already been setup outside your school by one of your teachers. This sensor monitors levels of fine particles in the air and automatically sends this information back to a database. You will be able to see the results of this monitoring in the next lesson.

After completing this section you will be able to:

- Use a traffic count to record the number and type of vehicles that pass your school or chosen area
- Use simple observation and recording techniques to identify other possible sources of air pollution that might be contributing to the levels of pollution around my school.

### How to Complete a Traffic Count

In this activity you will conduct a simple traffic count to record the number of vehicles that pass your school over a given time. The results of your count will give you an indication of the level of air pollution you may find outside your school.

To carry out the survey you will need to download the traffic count record sheet from the site. The count should last twenty minutes. Please consider carefully your own safety and that of others while carrying out the count. If your school is unable to undertake fieldwork you could pre-record your section of road and complete the activity from inside.

If you are using one of SEPA's air quality sensors you can input the result of one of your traffic counts on the site.. Your traffic count results will then be linked to the air quality sensor results which can be explored in depth in the next section. If you aren't using an air sensor then you can still undertake the activity and answer the questions on the traffic count record sheet.

### How to Complete the Causes of Air Pollution Survey

This activity allows you to record your observations of the individual factors that may cause air pollution around your school or within your local area. In this activity walk around your school grounds or chosen area and note any factors you can see across the landscape that may be a source of pollution. You may also want to use a camera to take a photograph of what you see. It would be useful, before starting this activity to recap and think about the nine causes of pollution that were identified earlier in the site.

To carry out the survey you will need to download the observations sheet. The observation should last twenty minutes. Please consider carefully your own safety and that of others while carrying out the count.

Ideas to develop these activities further:

- Google maps, OS maps, street maps or local maps could be used by pupils to identify where they carried out their surveys.
- Instead of taking photographs you could draw a field sketch of the landscape and annotate it to identify different sources of pollution.
- Traffic counts could be done to coincide with quieter or busier times of the day
-

## Geography: Section 3

# Results and Assessment: Air Pollution around Our School

This section of the website is linked to an online tool that helps you visualise the data you and other schools have collected. If your school requested an air quality sensor or has completed the Travel to School Survey or Traffic Count, you will be able to view your results in the form of maps, graphs and charts. If your school hasn't carried out any of these surveys you can still access this online tool to view example data or that from other schools.

After completing this section you will be able to:

1. Gather information from bar graphs, line graphs and pie charts.
2. Assess the patterns of air quality around your school and when air pollution is at its greatest
3. Consider the impact that traffic around your school has on air quality
4. Identify the main method of transport used by your class to travel to school.
5. Identify which method of transport contributes the most to air pollution outside your school and what contributes the least.

To help navigate and analyse the data please download & print the Activity Sheet for this section. In order to complete the activities on the Activity Sheet pupils will need access to computers so they could work individually or in pairs to complete the activities.

## The Air Sensor

If your teacher/school has requested one, an Air Sensor has been installed around your school to measure patterns of air pollution (particulate matter) from vehicle exhausts and these results will automatically be sent back to our database.

Using the sensors and the data you entered in the Section 2 you can analyse the levels of air pollution at your school and identify the causes of the pollution. If your school hasn't setup a sensor you can still access this online tool to view example data or that from other schools.

## View the Data

To view the data you will need to visit the live site.

## Geography: Section 4

# Impact of Air Pollution

As you discovered in the first section of this package air pollution poses a real and serious threat not only to our environment but to our own health, success and development.

After completing this section you will be able to:

- Identify the impacts of air pollution
- Explain how air pollution affects humans health and economy
- Explain how air pollution affects animals and the environment.

### How does Air Pollution impact us?

Air Pollution can lead to a variety of health problems especially in areas where pollution is high. To learn more about the major pollutants that cause air pollution take a look at the video on the site.

There are many ways that Air Pollution can impact our lives. Our health is one, but there are others too.

### Power

Stop and think for a moment how much gas or electricity you have used since you got up this morning. Did you know that the power we use in our homes, communities and workplaces is generated by burning other fuels? These fuels include coal, gas and oil. When these fuels are burned to generate power they release pollutants, such as sulphur dioxide and other greenhouse gases into our atmosphere.

### Impact on Human Health

The effects of air pollution on our health varies from person to person and depends on the type of pollution and length of time we are exposed to it. People who suffer from lung or heart diseases, such as asthma, or the young or elderly are more at risk of suffering the effects of air pollution. Also, people who live in areas where their exposure to air pollution is over a longer period of time or at higher levels are also at greater risk of developing symptoms and problems with their health.

Air pollution can cause our eyes, nose and throat to become irritated. Some people may experience pain when breathing or start to cough. Breathing polluted air which contains dangerous chemicals can lead to the development of cancer, lung disease, heart and respiratory problems, brain and nerve damage and birth defects.

According to research, air pollution contributes to the death of about 2000 people every year in Scotland. That's around 40 people a week and is ten times higher than people killed by traffic accidents. It also plays a significant role in reducing the average life expectancy of every person in the UK.

## **Impact on the Economy**

Air pollution costs the UK economy around £16 billion per year. If people are off work because they are sick from illnesses caused by air pollution, businesses make less goods and in turn they make less money - meaning the government collects fewer taxes, which in turn means less money to invest in education, hospitals, transport and housing. Also the government has to spend money treating people who become sick because of air pollution.

Air pollution can also damage crops, forests and materials that businesses use.

Air pollution can make travelling difficult. The air pollution caused by a volcanic eruption in Iceland in 2010 closed European airspace for nearly a week and cost the economy \$5bn

Damage to buildings from air pollution can cost money to repair.

## **Impact on Plants**

Air pollutants can limit a plants ability to photosynthesise, reproduce and grow. Chemicals in the atmosphere can damage plants physically with brown spots, bleached areas or lesions appearing on leaves. High levels of nitrogen in soils and water can lead to the growth of toxic algae and some plants do not grow well in high nitrogen.

## **Impact on Animals**

Some animals may experience similar health problems that we do such as respiratory (breathing) illnesses from air pollution. Pollution can make the environment toxic for some animals. Acid rain can pollute the water that marine animals call home and damage soil destroying food sources and habitats of other animals.

## **Impact on the Wider Environment**

Damage to one aspect of an ecosystem and/or food chain can have a knock on effect on many other animal and plant species.

Pollution can lead to smog, damaged trees, forests, rivers/lakes and soil making the landscape unattractive and uninhabitable for some animals and plants.

Some air pollutants contribute to climate change. Climate change can lead to increasing temperatures, extreme weather, flooding, drought, melting of the ice caps and a loss of animal and plant habitats.

## Geography: Section 5

# Solutions: What can we do about it?

Although our air quality in Scotland is relatively good, when compared with other areas of the world, there is still room to make it even better. The Scottish Governments, Local Authorities, SEPA and other organisations all help to reduce air pollution, either in direct or indirect ways. Perhaps one of the most important people involved in tackling air pollution is you.

### You and Your Family

We, as individuals, can work together to help make our air cleaner and air pollution levels will fall. There are many ways you and your family can help improve the air quality in Scotland. It might not seem like much, but if everyone does a little, it will have a great effect.

## Travel and Transport

### USE CAR TRAVEL LESS

Think about your journey: Do you have to go by car, or could you use another method?

- Walking
- Cycling – tried and tested for 190 years. Still zero emissions
- Public Transport – put your feet up and relax, catch up on your reading
- Car Sharing – share the journey, have a laugh

### IF YOU MUST TRAVEL BY CAR

Try to travel outside peak times where possible: less congestion means faster journeys, which in turn creates less pollution. We can't always change when we go to school or work, but less important journeys, such as shopping or visiting friends, can be done at quieter times of the day.

Avoid leaving your engine idling when not in use: New laws mean your parents could be issued with a fine!

Service your car regularly: Keep the engine properly tuned and the tyres at the right pressure. A happy car is an efficient car!

### REDUCE ENERGY USE AT HOME

- Conserve energy wherever possible. Turn off appliances like your television or radio when not in use.
- Don't forget to switch off lights when you leave the room.
- Recycle paper, plastic, glass bottles, cardboard, and aluminium cans. This conserves energy and reduces production emissions.
- Turn down the thermostat in your home.

- Wash clothes with warm or cold water instead of hot.
- Buy rechargeable batteries for devices used frequently.
- Try growing your own fruit and veg rather than buying it
- Plant trees to help green our cities

## Greening Our Towns and Cities

Planting more trees and creating green spaces can help remove certain pollutants from our air such as ozone, nitrogen dioxide, fine particles and carbon dioxide. Not only does this help improve air quality but it also contributes to reducing the greenhouse gasses that cause climate change.

Greening our towns and cities has other benefits as well both for our health and wellbeing and our environment. Creating green spaces will help make our local areas more pleasant to live in. These spaces will attract wildlife and give homes to plants and animal species. Green spaces also help to improve our physical wellbeing as often these areas are used for walking, cycling or other forms of exercise.

You could help create green spaces by planting a window box, growing your own fruit and vegetables, volunteering to help look after your school or community garden or taking part in volunteering with local park rangers.

## Education

Educating people about air pollution is an incredibly important way of reducing improving the quality of our air. Projects in your school will help to raise people's awareness about the causes and impacts of air pollution. It also helps to let people know what they can do to tackle air pollution. Even small changes to our day to day lives can make a big difference to the quality of the air we breathe. Think about passing on some advice or information you have learned so far about air pollution. By passing on what you know you will help others to make a difference.

Part of passing the message on might involve your school or community group taking part in one of the following activities:

1. Create a display within your school
2. Design a leaflet with action points to give to pupils and parents
3. Create a podcast
4. Star in your advert
5. Design posters to put up informing people of what they can do to help
6. Deliver a lesson or presentation to others