

# WHAT IS CLEAN AIR?

## ANIMATION SCRIPT AND ACTIVITIES



### TO MAKE THE MOST OF THIS SCRIPT, YOU COULD:

- stick it in your book as a record of watching the animation
- pause the animation and make notes as you go
- add your own illustrations to the sheet
- create your own animation to accompany it
- add notes from classroom discussions
- make notes of areas you will investigate further
- make notes of key words and definitions
- add questions you would like answered.

### SCRIPT:

Did you know that the air is a mixture of gases, the majority of which occur naturally?

The air also contains particles. Particles can be emitted naturally. For example, by volcanoes, sea spray and wildfires or by human activities.

Human induced sources of particles include combustion, such as domestic wood burning, transport, waste handling, sewage treatment plants and agricultural activities. Some of these polluting activities release unusually large numbers of particles into the air.

Scientists use the term aerosol to refer to liquid or solid particles suspended in air. Up to half of the particles in outdoor air may be of biological origin. In other words, they come from humans, animals, plants and microbes. These biological particles are referred to as bioaerosols.



Humans are also sources of bioaerosols found indoors. Large numbers of microbes live naturally on our skin and other body surfaces. Some of these are released into the air spontaneously through air movements or through our normal activities such as coughing, sneezing, talking or breathing.

If rooms are not well ventilated, it is possible for humans to pass diseases between each other over a long distance by releasing bacteria or viruses into the air and other people breathing them in.

Bioaerosols have been implicated in health issues for human beings as well as livestock. For example, bio-terror attacks, as well as pandemic outbreaks of flu, have informed us about the importance of aerosol and bioaerosol research.

In polluted environments, the number of aerosols in a cubic centimetre of air can be as high as a hundred thousand. In 2019, air pollution contributed to nearly 7 million deaths worldwide.

Older people, children and people who have underlying health conditions are more sensitive to the health impacts of air pollution.

Particulates below 2.5 micrometres in diameter are especially concerning. Inhaling too many of these small particles, even for a short period of time, can make people have difficulty breathing, especially if they already have breathing problems, such as if they suffer from asthma.

Scientists are concerned about the health effects of inhaling polluted air, especially air containing high levels of particles, and for long periods of time. For example, over years.

It is possible that long periods of inhaling polluted air can lead to the particles finding their way from our lungs to other parts of our bodies.

### SO, WHAT DOES THE TERM "CLEAN AIR" MEAN?

From a biological point of view, "clean air" does not mean air free from aerosols or bioaerosols. Aerosols and bioaerosols are found everywhere.

We might think of clean air as being unpolluted by human activities. However, even air unpolluted by humans may contain harmful chemicals and aerosols (including bioaerosols such as pollen). Clean air is, therefore, difficult to define.

Could clean air be defined as air that causes no harm to those who breathe it in? If so, our goal would be to manage the environment to maximise the chances that everyone is able to breathe in clean air.

### EXTENSION ACTIVITY:

#### Has clean air ever existed?

The walls of caves inhabited by early humans have been found to be covered with layers of soot, and many of the lungs of mummified bodies from Palaeolithic times have a black tone. There is also evidence of air pollution in ancient Rome. Then, there is the work of seventeenth century writer John Evelyn, which describes the inhabitants of London as being 'pursued and haunted by that infernal smoake'.

#### Start your research with these links:

[www.fee.org/articles/the-industrial-revolution-was-dirty-but-pre-industrial-europe-was-worse/](http://www.fee.org/articles/the-industrial-revolution-was-dirty-but-pre-industrial-europe-was-worse/)

[www.eolss.net/sample-chapters/C09/E6-156-15.pdf](http://www.eolss.net/sample-chapters/C09/E6-156-15.pdf)

[www.royalsocietypublishing.org/doi/10.1098/rsta.2019.0314](http://www.royalsocietypublishing.org/doi/10.1098/rsta.2019.0314)

Using key facts from your research, present your findings to the rest of the class and answer the question: Has clean air ever existed?

