

Article

The UK environment – fighting pollution, improving our health and saving us money

An article looking at the findings from a new study commissioned by the Office for National Statistics (ONS) suggests that the environment is playing a vital role in tackling the problem of poor air quality and helping to protect people's health and reduce spending on healthcare.

Contact:
Jack Philips
jack.philips@ons.gov.uk
+44 (0)1633 456587

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1 . Introduction

A street lined with trees or a park full of flowers can improve the look of your surroundings, but did you know that this nature is improving your health too? Think back to your school biology lessons and you may remember that plants turn carbon dioxide into oxygen through a process called photosynthesis. However, this is not their only health benefit; vegetation and water also act as a natural filter, capturing harmful pollutants and toxins, which could otherwise cause life-threatening health problems.

A new study commissioned by Office for National Statistics (ONS) from the Centre for Ecology and Hydrology (CEH) suggests [that the environment is playing a vital role in tackling the problem of poor air quality](#). In 2015, it is estimated there were 5,800 fewer respiratory hospital admissions, 1,300 fewer cardiovascular hospital admissions, 27,000 fewer life years lost and 1,900 fewer premature deaths as a result of natural pollution removal by plants across the UK. This resulted in an estimated saving of over £1 billion of avoided health costs in that year alone.

2 . Which pollution is the most harmful?

PM2.5 particles are the most harmful pollutants. This fine particulate matter has a diameter less than 2.5 micrometers, which is about 3% of the diameter of a human hair. These particles are so small that they can bypass the nose and throat and penetrate deep into the lungs and sometimes even the blood stream. This means the health effects can be quite serious and therefore the filtering of PM2.5 is having a positive impact on improving the length and quality of people's lives. This in turn results in large savings in healthcare costs.

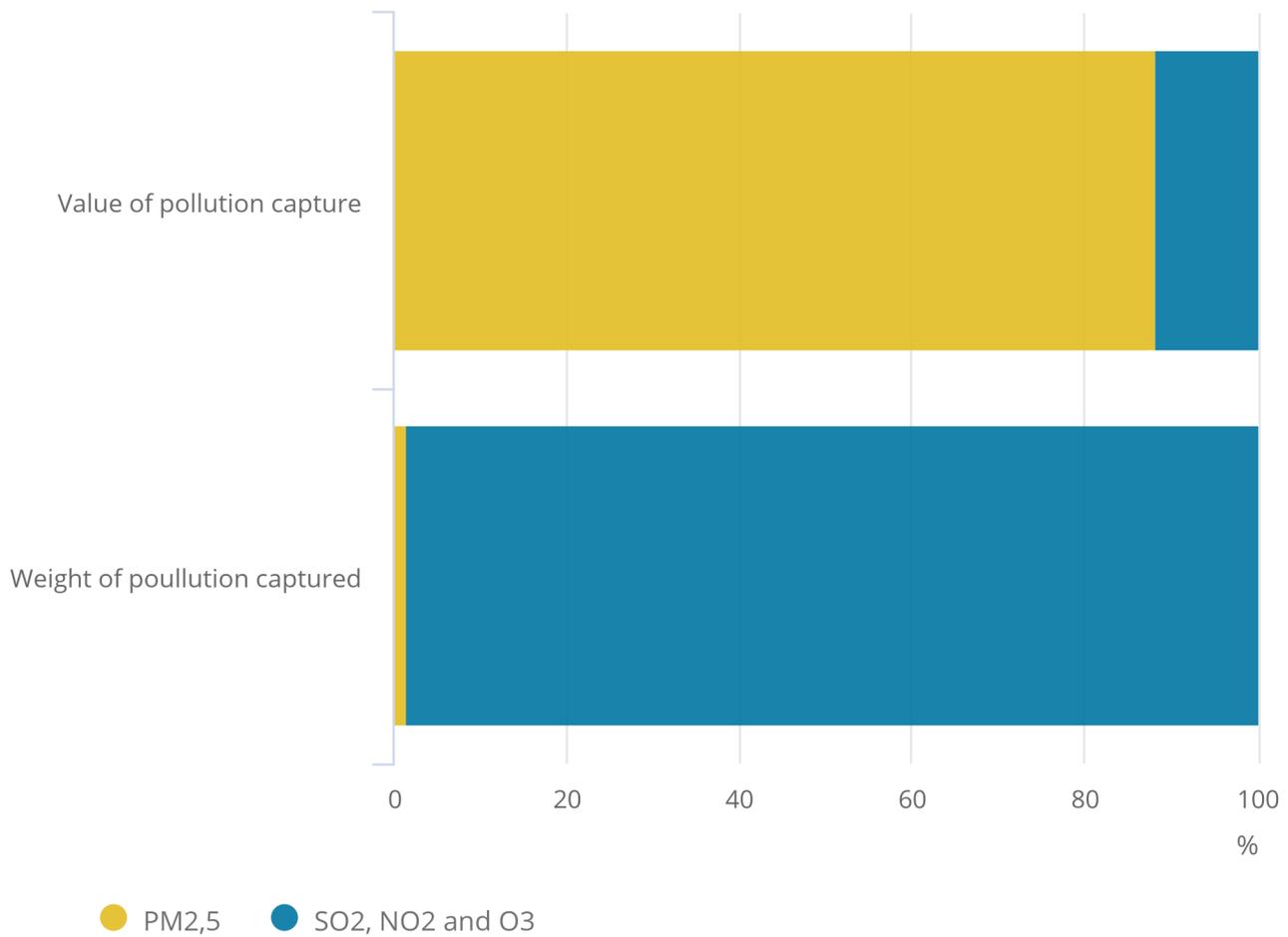
The savings from pollution capture of PM2.5 relative to the other pollutants in the study can be seen in Figure 1. While less than 2% of the pollution captured relates to PM2.5 (in terms of tonnes of pollutant removed by vegetation), this accounts for almost 90% of the savings from health improvements. The study also looked at sulphur dioxide (SO₂), nitrogen dioxide (NO₂) and ground level ozone (O₃).

Figure 1: Pollution capture and value of pollution capture for PM2.5 and other pollutants in 2015

UK

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Source: Office for National Statistics, Centre for Ecology and Hydrology

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3 . Why is some nature more valuable than others?

The amount of pollution that vegetation filters and the impact it has depends on a number of factors, which are incorporated into a scientific model. Areas with busy traffic or factories, for example, are likely to produce high levels of pollution. If combined with high population density these are the areas likely to see the most hospital admissions and premature deaths. This means that vegetation in these locations has greater potential to prevent illness.

However, pollution is able to travel far from its source and affect other parts of the UK. Some pollutants such as ammonia, which contributes to forming PM2.5, are also generated in rural areas, but affect people living in cities due to atmospheric transport, often over long distances. Laurence Jones who led the project explains:

"Previous studies have assumed that people only benefit from the pollution removed by vegetation in their immediate area. Our work has shown that plants are removing pollutants right across the UK and this overall reduction in the levels of pollutants leads to a substantial health benefit."

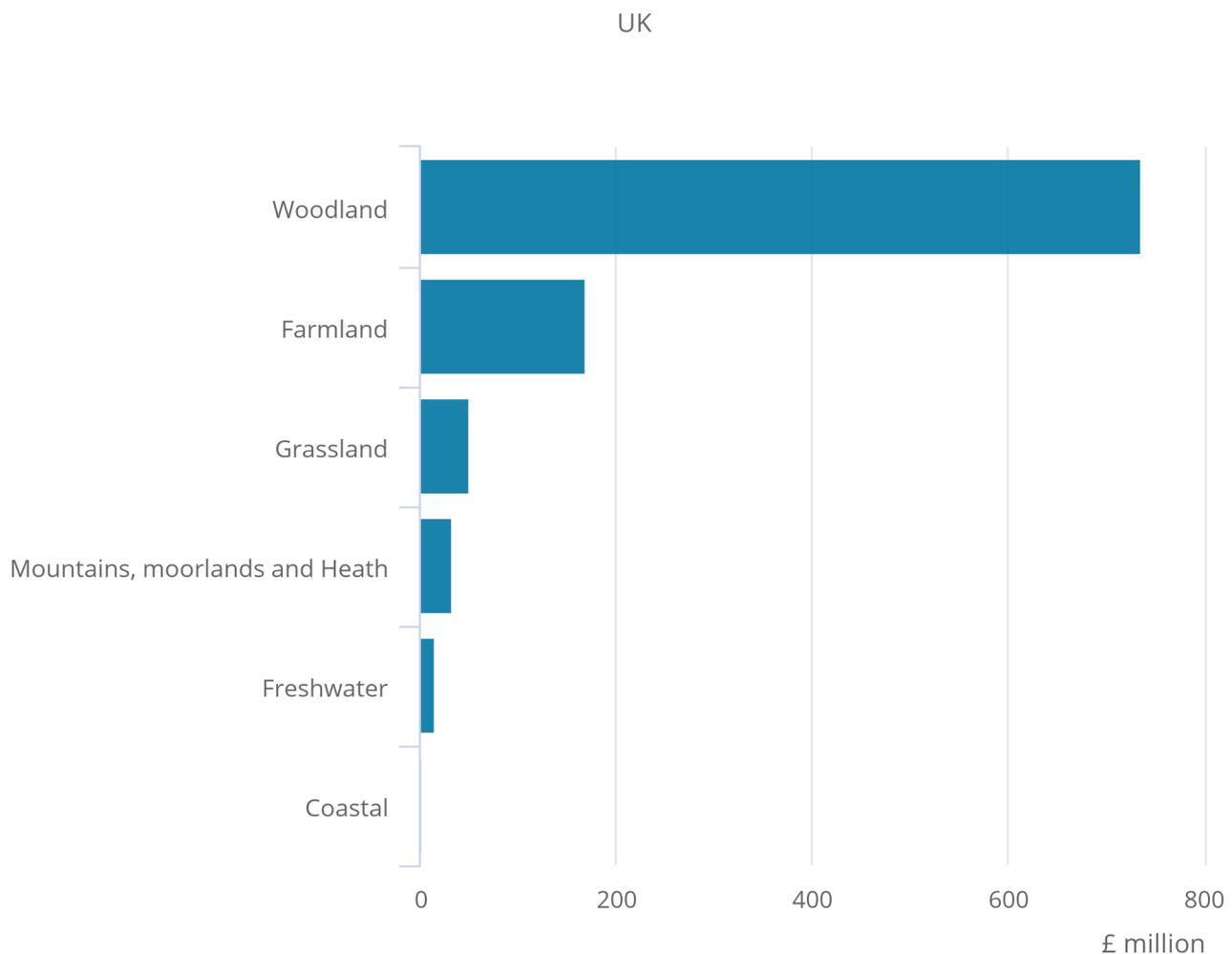
The type of habitat is also very important; it is well-known that trees are good filters of pollution, while cut grass absorbs very little pollution. This is reflected in figure 2 where the value of woodland is far higher than other habitats despite covering less land than farmland and grassland. These values take into account the efficiency of the vegetation and the amount of vegetation in the UK.

Even then, some trees are better at filtering pollution than others; conifers are good at removing particles as they stick to their waxy leaves while large trees like elms are efficient at reducing harmful gases because the tree canopy has a large surface area. However, some species, including conifers release compounds that form the pollutant ozone, reducing their positive effects.

Figure 2: Annual value of pollution capture in 2015

UK

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Source: Office for National Statistics, Centre for Ecology and Hydrology

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4 . How much are we polluting the air?

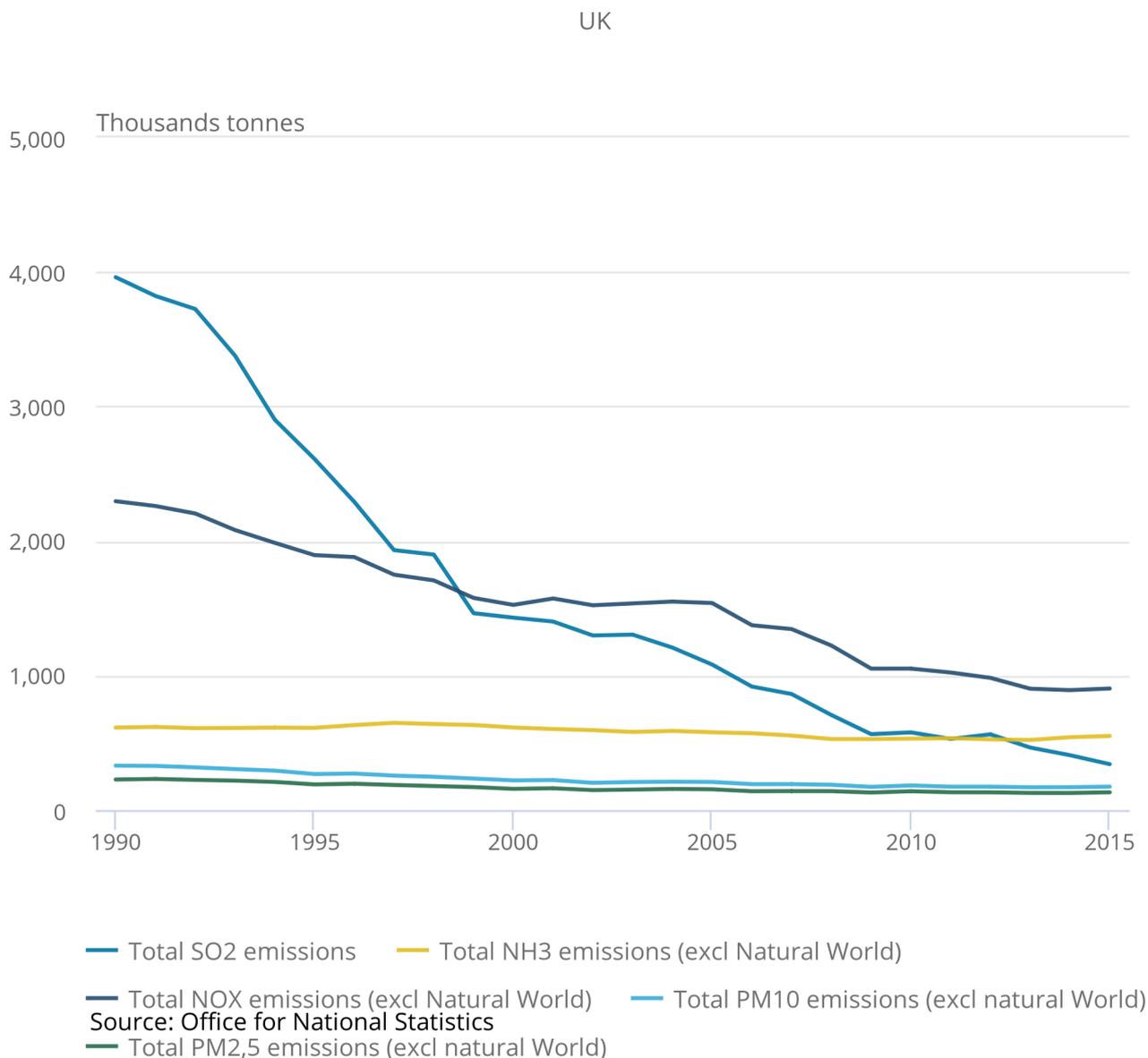
Air pollution remains a major problem in the UK despite a reduction in emissions since 1990. In February 2017, the UK was issued a warning from the European Commission for failing to address repeated breaches of air pollution limits for nitrogen dioxide (NO₂) in 16 cities including London, Glasgow and Leeds. In 2015, road transport accounted for 34% of UK nitrogen oxide (NO_x) emissions with [increased ownership of diesel cars](#) fuelling the problem (NO_x is made up of nitric oxide (NO) and nitrogen dioxide (NO₂), which is released into the atmosphere when fuels are burnt).

Sulphur dioxide (SO₂) emissions have fallen the most since 1990 (Figure 3), this change can be linked to policy initiatives to discourage the use of high-sulphur fuels and the adoption of cleaner technologies, in particular to switch from coal to gas for electricity generation.

Figure 3: Pollution emitted by pollution type, 1990 to 2016

UK

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Source: Office for National Statistics

Although domestic pollution from motor vehicles and industry remain the greatest contributors to air pollution in the UK, there are other sources. According to the Department for Environment, Food and Rural Affairs (DEFRA), in 2008 around 20% of PM_{2.5} in the UK atmosphere was produced abroad, while roughly 13 to 24% of PM_{2.5} is from ammonia produced from agricultural sources in the UK and abroad. Smaller particles are able to remain in the air for weeks and travel hundreds of miles so with the right weather conditions can travel to the UK from mainland Europe.

Nature is another source of pollution, sand, dust and sea salt amongst other natural sources can add to poor air quality. In addition to these direct emissions, particles can also be formed from the chemical reactions of gases, known as secondary particles. This all makes for a complicated picture of UK air quality, with many different sources.

To find out what other services nature is providing in the UK and how these are measured please see our latest release [Ecosystem Accounts for Freshwater, Farmland and Woodland](#). This work is part of the natural capital accounting project by Office for National Statistics (ONS) and DEFRA to monitor and value the services from the UK's natural environment. For information on atmospheric emissions and how these are changing in the UK see the latest release of the [ONS Environmental Accounts](#).