HUMAN NITROGEN EMISSIONS INDIRECTLY CAPTURE CARBON BY FERTILISING FORESTS

Human activity has greatly increased the levels of active nitrogen in the environment. By acting as a fertiliser and speeding the growth of forests, this extra nitrogen has indirectly locked up more carbon dioxide in the world's trees.

There is no doubt that of all the elements in the entire periodic table, carbon is currently hogging the limelight. As it cycles through our environment, the policy decisions and economic futures of entire countries hang in the balance.

For all its media-whoring, you might be forgiven for forgetting that carbon is not the only element we are belching into the environment. Over the last century, we have greatly overwhelmed the natural nitrogen cycle too.

Nitrogen – the neglected element

Through the manufacture of nitrogen-based fertilisers and the exhausts of our cars, power plants and factories, we have more than doubled the natural levels of active nitrogen in the atmosphere.

Nitrogen is a valuable commodity in many parts of the world, and restricts the growth of local plant life. As such, the recent man-made influx has led to large increases in plant growth. In some cases like algal blooms that choke rivers and lakes, it's too much of a good thing. But there is a silver lining.

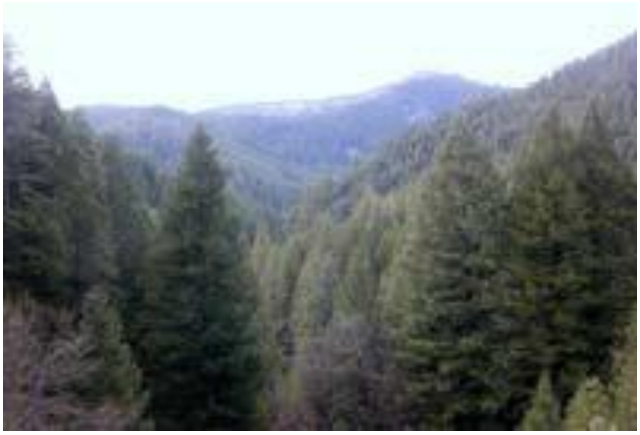
Federico Magnani from the University of Bologna, together with an international team of scientists, have found that the changes in the nitrogen cycle may have been inadvertently fertilising our forests.

Carbon and nitrogen

The world's forests act as massive carbon sinks, delaying the global warming effects of carbon dioxide by trapping it in prisons of wood and leaves. And larger forests mean more trapped carbon. The temperate forests of the Northern Hemisphere alone could store a massive 600 megatonnes of carbon every year.

The carbon and nitrogen cycles dance around each other in complex ways. When nitrogen levels increase, forests respond by channelling growth from roots to leaves and trunks. These above-ground organs are more enduring than roots and

retain sequestered carbon for a longer time. More leaves also means increased photosynthesis, which serves to draw more carbon dioxide in from the air.
The extra nitrogen also delays the decay of leaf litter, further halting the release of organic carbon into the atmosphere.



Magnani's colleagues are not the first group to try and look at the interplay between nitrogen levels and carbon capture. But other studies have found it difficult or impossible to account for the effects of nitrogen alone.

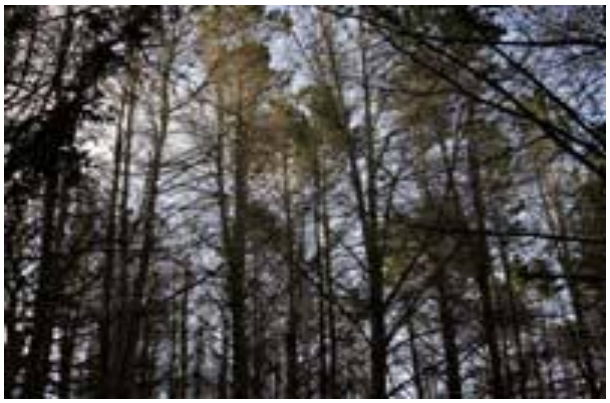
Carbon balance

A forest's carbon balance – the amount of carbon trapped versus the amount released – depends on a variety of factors, including its age, logging, fires, and more. Some of these are easy to account for at a small scale. For example, when logging or fires kill off patches of forest, they become net sources of carbon as they start to regrow.

But after a couple of decades or so, the mature forest turns into a carbon sink, and the amount it stores outweighs the amount it releases. Clearly, a forest's carbon balance changes as it matures, but real forests consist of patches of vegetation are very different ages.

To look at the overall picture, Magnani's group took direct measurements of the carbon balance over a long period of time, from a network of forest sites in Western Europeand the USA. This allowed them to account for short-term sources of variation. And by using direct measurements, they have surpassed the models and simulations of previous studies.

The group found that carbon balance corresponds well with nitrogen levels in the area. In fact, the prowess of some forests at carbon capture seem to be overwhelmingly driven by their extra nitrogen boost. Our effects on the nitrogen cycle may have been acting like an unexpected carbon offset scheme.



Practicalities

So should we start pumping nitrogen in our forests to trap more carbon dioxide? Certainly, Magnani's results suggest that small extra amounts of nitrogen can cause unexpectedly large levels of carbon capture. But his view and those of other commentators is a resounding "Not yet".

Source: https://notexactlyrocketscience.wordpress.com/2007/06/16/human-nitrogen-emissions-indirectly-capture-carbon-by-fertilising-forests/