Wrong Type of Trees' In Europe Increased Global Warming

By McGrath, Matt. 5 February 2016. "Wrong Type of Trees' In Europe Increased Global Warming." *BBC News* http://www.bbc.com/news/science-environment-35496350

Based upon Naudts, Kim; Yiying Chen, Matthew J. McGrath, James Ryder, Aude Valade, Juliane Otto, Sebastiaan Luyssaert. 05 February 2016. "Europe's forest management did not mitigate climate warming" *Science* Vol. 351 Issue 6273 pp 597-600 DOI: 10.1126/science.aad7270 http://science.sciencemag.org/content/351/6273/597

Based upon interview of Dr. Kim Naudts who carried out the study while at the Laboratory of Climate Science and Environment in Gif-sur-Yvette, France Science in Action on the BBC World Service

The assumption that planting new forests helps limit climate change has been challenged by a new study. Researchers found that in Europe, trees grown since 1750 have actually increased global warming.

The scientists believe that replacing broadleaved species with conifers is a key reason for the negative climate impact.

Conifers like pines and spruce are generally darker and absorb more heat than species such as oak and birch.

The authors believe the work has implications for current efforts to limit rising temperatures through mass tree planting.

Management issues

Europe's green canopy was dramatically thinned between 1750 and 1850, when the forested area diminished by 190,000 sq. km. Ironically the greater use of fossil fuels, particularly coal, slowed the timber rush, and from 1850 to the present day, Europe's forests grew by some 386,000 sq. km and now cover 10% more land than before the industrial revolution.

However, the form and content of these new woods differed considerably from what went before. In the distant past, these forests ran wild - but in the modern world, some 85% of Europe's trees are managed by humans. And over the past 150 years, foresters have adopted a scientific approach to woodlands - planting faster growing, more commercially valuable trees such as a Scots pine and Norway spruce.

The rapid re-forestation of great swathes of European has generally been seen as a good thing due to the trees' ability to soak up carbon, something that has become particularly relevant in recent decades.

But the new study questions the positive impact of all these new trees on the climate.

The research team reconstructed 250 years of forest management history in Europe - and found that the way forests are controlled by humans can lead to far less carbon being stored than would have been the case when nature was in charge.

“Removing trees in an organized fashion tends to release carbon that would otherwise remain stored in forest litter, dead wood and soil.

Choosing conifers over broadleaved varieties also had significant impacts on the albedo - the amount of solar radiation reflected back into space.”

"Even well managed forests today store less carbon than their natural counterparts in 1750," said Dr. Kim Naudts who carried out the study while at the Laboratory of Climate Science and Environment in Gif-sur-Yvette, France.

Speaking to Science in Action on the BBC World Service, she said: **"Due to the shift to conifer species, there was a warming over Europe of almost 0.12 degrees and that is caused because the conifers are darker and absorb more solar radiation."**

The researchers say that the increase in temperature equates to 6% of the global warming attributed to the burning of fossil fuels. They say that is a significant amount and believe that similar impacts are likely in regions where the same type of afforestation has taken place.

Many governments have made planting trees a key part of their plans for dealing with climate change; China is building a "great green wall" of trees, set to cover around 400 million hectares when complete.

The authors suggest the world should look carefully at both the types [of] trees that we are planting and the ways in which they are managed.

"We shouldn't put our hopes on forests to mitigate what is an emission problem," said Dr. Naudts.

"Our results indicate that in large parts of Europe, a tree planting programme would offset the emissions but it would not cool the planet, especially not if the afforestation is done with conifers."

The researchers believe that consideration should be given to a programme of replacement. As the conifers are harvested, more broadleaved species could replace them.

How Flowering Plants Conquered the World

By Briggs, Helen. 14 January 2018. “How flowering plants conquered the world.” *BBC News* http://www.bbc.com/news/science-environment-42656306

Based upon Simonin, Kevin A. & Adam B. Roddy. 2018. “Genome downsizing, physiological novelty, and the global dominance of flowering plants.” *PLoS Biology* 16(1): e2003706. https://doi.org/10.1371/journal.pbio.2003706 http://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.2003706

Scientists now think they have the answer to a puzzle that baffled even Charles Darwin:

How did flowers evolve and spread to become the dominant plants on Earth?

Flowering plants, or angiosperms, make up about 90% of all living plant species, including most food crops. In the distant past, they outpaced plants such as conifers and ferns, which pre-date them, but how they did this has been a mystery.

New research now suggests it is down to genome size - and small is better.

"It really comes down to a question of cell size and how you can build a small cell and still retain all the attributes that are necessary for life," says Kevin Simonin from San Francisco State University in California, US.

Hundreds of millions of years ago, the Earth was dominated by ferns and conifers. Then, about 150 million years ago, the first flowering plants appeared on the scene. They quickly spread to all parts of the world, changing the landscape from muted green to a riot of vibrant colour.

The reasons behind the incredible success and diversity of flowering plants have been debated for centuries. Charles Darwin himself called it an "abominable mystery", fearing this apparent sudden leap might challenge his theory of evolution.

Simonin and co-researcher Adam Roddy, of Yale University, wondered if the size of the plant's genetic material - or genome - might be important.

The biologists analyzed data held by the Royal Botanic Gardens, Kew, on the genome size of hundreds of plants, including **flowering plants,** gymnosperms (a group of plants, which include conifers and Ginkgo) and ferns.

They then compared genome size with anatomical features such as the abundance of pores on leaves.

This provides "strong evidence", they say, that the success and rapid spread of flowering plants around the world is down to "genome downsizing". By shrinking the size of the genome, which is contained within the nucleus of the cell, plants can build smaller cells.

In turn, this allows greater carbon dioxide uptake and carbon gain from photosynthesis, the process by which plants use light energy to turn carbon dioxide and water into glucose and oxygen.

Angiosperms can pack more veins and pores into their leaves, maximizing their productivity. The researchers say genome-downsizing happened only in the angiosperms, and this was ''a necessary prerequisite for rapid growth rates among land plants''.

"The flowering plants are the most important group of plants on Earth and now we finally know why they have been so successful," they say.

The research published in the journal PLOS Biology raises more questions about plants.