One-fifth of fossil-fuel emissions absorbed by threatened forests

An international team of scientists have discovered that rainforest trees are getting bigger. They are storing more carbon from the atmosphere in their trunks, which has significantly reduced the rate of climate change.

Globally, tropical trees in undisturbed forest are absorbing nearly a fifth of the CO2 released by burning fossil fuels.

The researchers show that remaining tropical forests remove a massive 4.8 billion tonnes of CO2 emissions from the atmosphere each year. This includes a previously unknown carbon sink in Africa, mopping up 1.2 billion tonnes of CO2 each year.

Published today in *Nature*, the 40 year study of African tropical forests–one third of the world's total tropical forest–shows that for at least the last few decades each hectare of intact African forest has trapped an extra 0.6 tonnes of carbon per year.

The scientists then analysed the new African data together with South American and Asian findings to assess the total sink in tropical forests. Analysis of these 250,000 tree records reveals that, on average, remaining undisturbed forests are trapping carbon, showing that they are a globally significant carbon sink.

"We are receiving a free subsidy from nature. Tropical forests are absorbing about 18% of the CO2 added to the atmosphere each year from burning fossil fuels, substantially buffering the rate of climate change." says Dr Simon Lewis, a Royal Society research fellow at the University of Leeds, and the lead author of the paper.

The reason why the trees are mopping up carbon and getting bigger is unclear. A leading suspect is the extra CO2 in the atmosphere itself, which may be acting like a fertiliser. However, Dr Lewis warns, "Whatever the cause, we cannot rely on this sink forever. Even if we preserve all remaining tropical forest, these trees will not continue getting bigger indefinitely. "

The Intergovernmental Panel on Climate Change reports that globally human activity emits 32 billion tonnes of CO2 each year, but only 15 billion tonnes actually stays in the atmosphere adding to climate change. The new research shows exactly where some of the 'missing' 17 billion tonnes per year is going.

"It's well known that about half of the 'missing' carbon is being dissolved in to the oceans, and that the other half is going somewhere on land in vegetation and soils, but we were not sure precisely where. According to our study about half the total carbon 'land sink' is in tropical forest trees," explained Dr Lewis.

The study is released at a time when protecting tropical forests is gaining widespread support, and is likely to be a key theme of the upcoming negotiations to limit carbon emissions in Copenhagen later this year.

Co-author on the study, Dr Lee White, Gabon's Chief Climate Change Scientist said, "To get an idea of the value of the sink, the removal of nearly 5 billion tonnes of carbon dioxide from the atmosphere by intact tropical forests, based on realistic prices for a tonne of carbon,

should be valued at around £13 billion per year. This is a compelling argument for conserving tropical forests."

"Predominantly rich polluting countries should be transferring substantial resources to countries with tropical forests to reduce deforestation rates and promote alternative development pathways," says Dr Lewis.

There are also broader implications for rainforest biodiversity, as the ecology of tropical forests changes. Further study is needed on how the interactions of the millions of species that live in the tropics are being affected by the increasing size of rainforest trees.

Further information

Please contact:

Simon Lewis, University of Leeds. Email: s.l.lewis@leeds.ac.uk , Tel: 0113 343 3337

Clare Ryan, University of Leeds press office. Email: c.s.ryan@leeds.ac.uk , Tel: 0113 343 8059

Notes to editors

Calculating changes in carbon storage over time

To calculate the change in carbon storage in forests over time, scientists took 79 areas of intact forest across ten African countries, from Liberia to Tanzania, and identified, mapped and measured the diameter of all the trees above a threshold size. They periodically returned to re-measure the surviving trees, note tree deaths and record new trees, measuring over 70,000 in total.

Combined with the height of each tree and the density of the wood (according to species) scientists calculated how the amount of carbon stored in each of the 79 areas changed over time. By extrapolating the data from the areas studied to all similar African tropical forests, they discovered a previously unknown carbon sink that is removing 1.2 billion tonnes of carbon dioxide from the atmosphere every year.

The pan-tropical analysis utilises 156 areas of intact forest from 20 countries.

To calculate the amount of carbon forests are absorbing, rather than the amount of CO2 they are removing from the atmosphere, the CO2 figures should be divided by 3.67 (to adjust for the mass of the attached oxygen atoms).

African Tropical Forests and Afritron

Africa is the world's largest tropical continent. It contains approximately 30% of the world's tropical forests, including the Congo Basin, the world's second largest contiguous expanse of tropical forest, after the Amazon. Dense wet tropical forest covers 3.8 million Km2, with a further 2.6 million Km2 of drier tropical forest. The forest is in two major regions: the West African forest area which stretches from Guinea in the far West to Togo in the East, with most forest being in Liberia, Cote D'Ivoire and Ghana. The central Africa block is predominantly spread across six countries, the Democratic Republic of Congo, Cameroon, Gabon, Congo-Brazzaville and the Central African Republic. African forests are home to ten's of millions of people, including several hundred thousand indigenous hunter-gather peoples in the Congo

Basin. African forests have the highest mammal diversity of any ecosystem, with over 400 species, alongside over 10,000 species of plants and over 1,000 species of birds. According to the FAO deforestation rates are approximately 6 million hectares per year (almost 1% of total forest area per year), although other studies show the rate to be half that (approximately 0.5% of total forest area per year). The African Tropical Rainforest Observation Network, Afritron (www.afritron.net) brings together researchers active in African countries with tropical forest to standardise and pool data to better understand how African tropical forests are changing in a globally changing environment. The institutions include University of Leeds (UK), University of Yaounde (Cameroon), Forestry Commission of Ghana, University of Agriculture (Nigeria), Bureau Waardenburg bv (The Netherlands), Institute for Tropical Ecological Research (IRET, Gabon), Smithsonian Institution (US), Wageningen University (The Netherlands), Plantlife International (UK), Wildlife Conservation Society-Democratic Republic of Congo, National Museum of France, University of York (UK), University of Dar es Salaam, Centre for International Forestry Research (Indonesia), University of Aberdeen (UK), University of Dublin (Republic of Ireland), University of Toronto (Canada), Mbarara University (Uganda), and Forest Development Authority (Liberia).

Funding The research was funded by the Royal Society and the Natural Environment Research Council and by the many institutions and donors who funded establishment and monitoring of the study plots (details on www.afritron.org)

Dr Simon Lewis is a Royal Society Research Fellow at the Earth & Biosphere Institute, School of Geography, at the University of Leeds.

The School of Geography is one of the world's largest and most innovative. A staff of over 70 produce and disseminate knowledge about global change, tropical ecology, soil science, water systems, hillslope erosion, socio-demographic change, social inclusion & exclusion and city futures. http://www.geography.leeds.ac.uk/

The University of Leeds is one of the largest higher education institutions in the UK with more than 30,000 students from 130 countries. With a turnover approaching £450m, Leeds is one of the top ten research universities in the UK, and a member of the Russell Group of research-intensive universities. www.leeds.ac.uk