Burning coal worse for climate than clearing rain forests

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Deforestation has had a big influence on the increase of carbon dioxide (CO2) emissions in the past three centuries, but its impact is tapering off relatively. Nowadays, the burning of fossil fuels is a more crucial factor. This is the contention of Dutchh professor Rik Leemans of the Environmental Systems Analysis Group.

Together with colleagues from the Netherlands Environmental Assessment Agency (PBL), he has calculated the effect of land use on the global carbon cycle. The results are published in the latest issue of *Climatic Change*.

The authors first succeeded in reproducing a closed carbon cycle with small margins for uncertainty in the period between 1700 and 2000. They then calculated how much carbon is released into the atmosphere due to the use of fossil fuels and changes in land use and how much of this CO2 is absorbed by forests and oceans. Any surplus would result in a higher CO2 concentration in the atmosphere.

The research model developed by Leemans and PBL, IMAGE (Integrated model to assess the global environment), is at the root of the results. 'Since we know how much CO2 the oceans absorb globally and how high the CO2 concentration in the atmosphere is, we could calculate fairly accurately the effects of deforestation and fossil fuels', says Leemans. 'The impact of deforestation has been over-estimated in earlier research.' This is because temperate forests now absorb more CO2 than a century ago, as a result of reforestation in Europe and the United States

of America. In the 18th and the 19th centuries, these areas were still responsible for big increases of CO2 due to the clearing of temperate forests.

Tropical regions were CO2 neutral until 1950; since then, large scale deforestation has caused more CO2 to be released than absorbed. In these regions, changing land use is a more crucial factor for the increase of the CO2 emission than the use of fossil fuels. In the USA and Europe, the exact reverse is true.

'At this moment, changes in land use - mostly deforestation - account for fifteen percent of the total carbon emissions. And such contributions are becoming less relatively, says Leemans. Emissions caused by fossil energy were almost non-existent at the beginning of the 20th century, but rose enormously afterwards. This happened especially in western countries, but recently also in India, Brazil, China and the Middle East. 'The International Energy Agency expects a shortage of fossil fuels in ten years' time. The use of coal is currently growing at the fastest rate', adds Leemans.

He hopes that his findings will be taken into account in climate negotiations. 'We can still point a finger at deforestation in countries such as Brazil and Indonesia, but the use of fossil fuels is currently a more crucial factor in the global CO2 increase.

Provided by Wageningen University