CLIMATE CHANGE MAKES IT DIFFICULT FOR FORESTS TO COPE

Forests are important carbon sinks

Seas make up 2/3 of the carbon sinks on earth. Vegetation, mainly forests, represent the remaining 1/3. In the plant kingdom trees, compared to other plants, are the major consumers of CO_2. Forests consumed roughly 1/6 of the world's anthropogenic CO_2 emissions. The seas took care of 1/3. The rest accumulated in the atmosphere. Today, as emissions have been rapidly increasing for years, the forests and seas are able to take care of roughly 1/3 of emissions. The rest is warming the planet.

Extreme drought and floods is tough for the forests

Warm air binds more water leading to more rain at a time, but more seldom. The rain will not be evenly distributed. We will see extreme droughts - and floods. This is tough for the forests.

Increasing CO2 & temperatures lead to shrinking air holes leading to droughts, and fires

Rain forests in Amazonas are called the lungs of the earth. Today they generate their own rain, but the escalating cutting of the forests and, the warming of the climate damage this ability. Increasing amounts of CO2 makes it possible for the trees to shrink the air holes they have on the down side of the leaves and still get the CO2 they need. Evaporation from the trees decreases, leading to lower atmospheric humidity. This in turn increases surface temperatures making formation of clouds and rain more difficult. Areas dry up. Less forests cause less evaporation, hence less rain and a more dry soil. Risk for fires increase.

The drying up of the forests in Amazonas is estimated to start feeding itself as of 2040. The long periods of drought, connected to El Niño, are expected to be permanent. The rainfall in the Amazonas is estimated to drop with 64% and the number of forests in 2100 is estimated to be 1/8 of today's amount.

Droughts will be a problem also in other than Amazonian forests

This development is not typical only for Amazonas. Inlands are dryer today than some decades ago; already 8 % of the lands suffer from severe drought. In 2100 the amount is expected to be 40 %. Escalating droughts multiply amounts of fires. Destroyed forest areas emit CO2. Severe, widespread and continuous droughts are expected in South and Central America, Australia, Indonesia, Africa, and also in USA and the Mediterranean.

Increased temperatures make forest destroying animals rocket in the north

Droughts and possible fires are not the only problem for the forests. The magnitude of attacks by noxious insects, and other noxious animals on trees have rocketed as an effect of the increase in temperatures. Large areas of forests in the northern hemisphere (Siberia, Canada) have been destroyed.

Decrease in tree growth up north will induce more warming

Up north a rise in temperature increases the evaporation from the trees, which decreases the growth, and the capacity for CO2 uptake. Using nitrogen fertilizers to speed up growth will both increase respiration from the soil and decrease the capacity to absorb CO2. In addition nitrogen fertilizers add N2O to the atmosphere. See the article "Deepen your understanding of greenhouse gases".

Forests might turn into CO$_2$ sources

Due to higher temperatures the crowns of the trees in Amazonas are close to a point where the respiration of the tree (CO2 emitted by the tree's breathing) will exceed the amount of CO2 taken up for photosynthesis. From Amazonas 50 Gt of CO2 are at risk to be released from the soil to the air, if the rise in temperature is big enough. In the northern hemisphere 150 Gt of CO2 could be released if enough of the forests would be destroyed. It has been estimated that a rise in average winter temperature of 3ºC is enough to destroy 50 % of the worlds' forests in the northern hemisphere. This equals 1/6 of all the forests in the world.

SOURCES

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http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf IPCC synthesis report 2007, summary for policymakers