This is the print version of the Skeptical Science article 'IPCC were wrong about Amazon rainforests', which can be found at http://sks.to/amazon.

Comparing what the IPCC and peer-reviewed science say about Amazonian forests

What The Science Says:
The IPCC statement on Amazon rain forests is correct. The error was incorrect citation, failing to mention the peer-reviewed papers where the data came from. The peer-reviewed science prior to the 2007 IPCC report found that up to 40% of the Brazilian forest is vulnerable to drought. Subsequent field research has confirmed this assessment.

Climate Myth: IPCC were wrong about Amazon rainforests
"The IPCC also made false predictions on the Amazon rain forests, referenced to a non peer-reviewed paper produced by an advocacy group working with the WWF. This time though, the claim made is not even supported by the report and seems to be a complete fabrication." (EU Referendum)

The IPCC statement on Amazonian forests can be found in Section 13.4.1 of the IPCC Fourth Assessment Report:

> 'Up to 40% of the Amazonian forests could react drastically to even a slight reduction in precipitation; this means that the tropical vegetation, hydrology and climate system in South America could change very rapidly to another steady state, not necessarily producing gradual changes between the current and the future situation (Rowell and Moore, 2000).'

The reference is Global review of forest fires (Rowell and Moore 2000), a non-peer-reviewed report by the WWF. The WWF report makes the following statement:

> 'Up to 40% of the Brazilian forest is extremely sensitive to small reductions in the amount of rainfall. In the 1998 dry season, some 270,000 sq. km of forest became vulnerable to fire, due to completely depleted plant-available water stored in the upper five metres of soil. A further 360,000 sq. km of forest had only 250 mm of plant-available soil water left. [Nepstad et al. 1999]'

The WWF correctly states that 630,000 km^2 of forests were severely drought stressed in 1998 - this figure comes from Nepstad et al. 1999. However, the 40% figure comes from several other papers by the same author that the WWF failed to cite. A 1994 paper estimated that around half of the Amazonian forests lost large portions of their available soil moisture during drought (Nepstad et al. 1994). In 2004, new rainfall data showed that half of the forest area of the Amazon Basin had either fallen below, or was very close to, the critical level of soil moisture below which trees begin to die (Nepstad et al. 2004). The results from these papers are consistent with the original statement that *'Up to 40% of the Brazilian forest is extremely sensitive to small reductions in the amount of rainfall'*.

Subsequent research has provided additional confirmation of the Amazonian forest's vulnerability to drought. Field measurements of the soil moisture critical threshold found that tree mortality rates increase dramatically during drought (Nepstad et al. 2007). Another study measured the effect of the intense 2005 drought on Amazonian biomass (Phillips et al. 2009). The drought caused massive tree mortality leading to a fall in biomass. This turned the region from a large carbon sink to a carbon producer. The paper concluded that *'such events appear*

capable of strongly altering the regional carbon balance and thereby accelerating climate change'.

An investigation into the peer-review scientific literature shows the information presented by the IPCC on Amazonian forests is correct. The error is that the WWF erroneously omitted the citations supporting the *'up to 40% of the Brazilian forest is extremely sensitive...'* statement. The lesson here is that the IPCC could have avoided this glitch if they'd quoted directly from the original peer-reviewed papers. Critics of the IPCC, if their goal is a clearer understanding of the science, would also do well to follow this advice.

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Skeptical Science explains the science of global warming and examines climate misinformation through the lens of peer-reviewed research. The website won the Australian Museum 2011 Eureka Prize for the Advancement of Climate Change Knowledge. Members of the Skeptical Science team have authored peer-reviewed papers, a college textbook on climate change and the book Climate Change Denial: Heads in the Sand. Skeptical Science content has been used in university courses, textbooks, government reports on climate change, television documentaries and numerous books.

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