**Task 3**: Read the following article to find out how equatorial regions could be affected by global warming, underlining/highlighting key points and concepts.

Amazon could shrink by 85% due to climate change, scientists say

• Scientists say 4C rise would kill 85% of the Amazon rainforest
• Even modest temperature rise would see 20-40% loss within 100 years

* [Buzz up!](http://buzz.yahoo.com/buzz?publisherurn=the_guardian665&targetUrl=http://www.guardian.co.uk/environment/2009/mar/11/amazon-global-warming-trees&summary=%3Cp%3EDevastating+new+study+predicts+that+one-third+of+the+Amazon%27s+trees+will+be+killed+by+even+modest+temperature+rises+and+up+to+85%25+could+be+lost+if+spiralling+greenhouse+gas+emissions+are+not+brought+under+control%3C%2Fp%3E&headline=%09%09%09Amazon%20could%20shrink%20by%2085%25%20due%20to%20climate%20change,%20scientists%20say%20|%09%09%09%09Environment%20|%09%09%09%09guardian.co.uk%09)
* [Digg it](http://digg.com/submit?url=http%3A%2F%2Fwww.guardian.co.uk%2Fenvironment%2F2009%2Fmar%2F11%2Famazon-global-warming-trees&title=Amazon+could+shrink+by+85%25+due+to+climate+change%2C+scientists+say)

* **[David Adam](http://www.guardian.co.uk/profile/davidadam)** in Copenhagen

* [guardian.co.uk](http://www.guardian.co.uk/), Wednesday 11 March 2009 14.34 GMT
* [Article history](http://www.guardian.co.uk/environment/2009/mar/11/amazon-global-warming-trees/print#history-byline)



Data from Nasa's Terra and Aqua satellites are helping scientists to map the rate at which plant life on Earth absorbs carbon out of the atmosphere

Global warming will wreck attempts to save the Amazon rainforest, according to a devastating new study which predicts that one-third of its trees will be killed by even modest temperature rises.

The research, by some of Britain's leading experts on [climate change](http://www.guardian.co.uk/environment/climate-change), shows that even severe cuts in [deforestation](http://www.guardian.co.uk/environment/deforestation) and [carbon emissions](http://www.guardian.co.uk/environment/carbon-emissions) will fail to save the emblematic South American jungle, the destruction of which has become a powerful symbol of human impact on the planet. Up to 85% of the forest could be lost if spiralling greenhouse gas emissions are not brought under control, the experts said. But even under the most optimistic climate change scenarios, the destruction of large parts of the forest is "irreversible".

[Vicky Pope, of the Met Office's Hadley Centre,](http://www.guardian.co.uk/environment/2009/feb/11/climate-change-science-pope) which carried out the study, said: "The impacts of climate change on the Amazon are much worse than we thought. As temperatures rise quickly over the coming century the damage to the forest won't be obvious straight away, but we could be storing up trouble for the future."

Tim Lenton, a climate expert at the University of East Anglia, called the study, presented at a global warming conference in Copenhagen today , a "bombshell". He said: "When I was young [I thought chopping down the trees would destroy the forest](http://www.guardian.co.uk/environment/2008/dec/02/forests-brazil) but now it seems that climate change will deliver the killer blow."

The study, which has been submitted to the journal Nature Geoscience, used computer models to investigate how the Amazon would respond to future temperature rises.

It found that a 2C rise above pre-industrial levels, widely considered the best case global warming scenario and the target for ambitious international plans to curb emissions, would still see 20-40% of the Amazon die off within 100 years. A 3C rise would see 75% of the forest destroyed by drought over the following century, while [a 4C rise](http://www.guardian.co.uk/environment/2008/aug/06/climatechange.scienceofclimatechange) would kill 85%. "The forest as we know it would effectively be gone," Pope said.

Experts had previously predicted that global warming could cause significant "die-back" of the Amazon. The new research is the first to quantify the long-term effect.

Chris Jones, who led the research, told the conference: "A temperature rise of anything over 1C commits you to some future loss of Amazon forest. Even the commonly quoted 2C target already commits us to 20-40% loss. On any kind of pragmatic timescale, I think we should see loss of the Amazon forest as irreversible."

Peter Cox, professor of climate system dynamics at the University of Exeter, said the effects would be felt around the world. "Ecologically it would be a catastrophe and it would be taking a huge chance with our own climate. The tropics are drivers of the world's weather systems and killing the Amazon is likely to change them forever. We don't know exactly what would happen but we could expect more extreme weather." Massive Amazon loss would also amplify global warming "significantly" he said.

"Destroying the Amazon would also turn what is a significant carbon sink into a significant source."

Jones said the study showed that tree growth in high latitudes, such as Siberia, would increase, but would be unlikely to compensate for the carbon stocks lost from the Amazon. Even with drastic cuts in emissions in the next decade, scientists say that there will only be around a 50% chance of keeping global temperatures rises below 2C.

This best-case emissions scenario is based on emissions peaking in 2015 and quickly changing from an increase of 2-3% per year to a decrease of 3% per year. For every 10 years this action is delayed, the most likely temperature rise increases by 0.5C.

Environmental campaigners said they were alarmed by the predictions. "With a rise of over 2C you begin to see a large-scale change to savannah," said Beatrix Richards, head of forest policy and trade at WWF UK. "You also lose major ecosystem services, such as keeping carbon levels stable, providing indigenous people with goods and services, and balancing rainfall patterns globally from the US grain belt to as far away as Kazakhstan. A 4C [rise] is a nightmare scenario that would move us into uncharted territory."

"People have known about the links between climate and [forests](http://www.guardian.co.uk/environment/forests) for some time, but the alarming thing now is the level of certainty because real world observations are feeding into the computer models," said Tony Juniper, an environmental campaigner and Green party candidate. "There really is no time for delay. Governments must cooperate to cut industrial emissions while at the same time halting deforestation, otherwise we'll have a mass extinction and a global warming catastrophe."

A separate study from the Met Office shows that, if temperatures do reach 2C, then there is a one-in-three chance they would stay that high for at least 100 years, whatever action was taken on carbon pollution.

The results were announced on the second day of a key climate science meeting in Copenhagen, which is intended to spur politicians into taking action to cut carbon pollution. It comes ahead of a UN summit in December, also in Copenhagen, where officials will try to agree a new global deal on climate to replace the Kyoto protocol. The results from the meeting will be published in the summer as a supplement to the 2007 report of the Intergovernmental Panel on Climate Change.

**Positive feedback**

Amazon dieback is one of the key positive feedbacks brought about by global warming. These are typically runaway processes in which global temperature rises lead to further releases of CO², which in turn brings about more global warming. In the Amazon this happens on a more localised scale but the result, increased forest death, also releases carbon into the atmosphere.

Experts predict that higher worldwide temperatures will reduce rainfall in the Amazon region, which will cause widespread local drought. With less water and tree growth, "homegrown" rainfall produced by the forest will reduce as well, as it depends on water passed into the atmosphere above the forests by the trees. The cycle continues, with even less rain causing more drought, and so on.

With no water, the root systems collapse and the trees fall over. The parched forest becomes tinderbox dry and more susceptible to fire, which can spread to destroy the still-healthy patches of forest.

Other positive feedback effects expected by scientists, are releases of carbon stored in frozen arctic ecosystems and an increase in the sun's energy absorbed by the planet as ice melts.