Options for saving the Amazon forest in the face of climate change

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A review, led by an Oxford University scientist, claims that intact parts of the Amazon forest are resilient to climatic drying and are unlikely to disappear if they can be sufficiently protected.

However, in the review published today in *Science* online, Yadvinder Malhi, Professor of Ecosystems Science and Jackson Fellow from the Environmental Change Institute, explains that in parts of the forest where fragmentation and clearing has occurred, the forest is more vulnerable to the drying effect of climate change and the spread of fires. Professor Malhi and his co-authors also quantify the risks of the drying climate in different parts of the region, based on the climate models in the 2007 Intergovernmental Panel on Climate Change (IPPC).

The paper, based on research led by scientists at Oxford University and the UK Meteorological Office in collaboration with some of the world's leading experts on Amazonian science, looks at options for preserving the Amazon forest – an area 25 times as great as the United Kingdom. It assesses the scale of degradation and the possible impact of this on the regional and global climate. The review is particularly significant as Professor Malhi will be among the leading climate change experts attending the UN's climate change conference in Bali next week, where new mechanisms for funding the protection of rainforests will be very high on the agenda.

The review assesses the probability of drought in different regions in the Amazon – the first time that the risks of the drying effect in Amazonia

have been calculated in such detail. Professor Malhi and his co-authors take the 23 IPCC models, and calculate that the zone of highest drought risk is in the south-east with a 70-80 per cent risk; the least affected is the west with a drought risk of 20 per cent; and in the east, the risk is 50 per cent.

According to the researchers, the zone of highest drought risk in the south and southeast is also the zone where the forest is degrading most rapidly because of deforestation, leading to a vicious circle between these two processes. Despite this, there is mounting scientific evidence that intact Amazonian forests are more resilient to climatic drying than was suggested in previous models. Professor Malhi and his co-authors suggest that this is due to the forests' deep root systems, and to adaptations by the plants to acclimatise to the increased temperatures and lack of water.

Professor Malhi said: 'The latest science points to intact rainforests being fairly resistant to a possibly drier 21st century climate in the eastern half of Amazonia. However, this resistance breaks down when the forests are opened up and fragmented by roads, logging and agriculture, and become vulnerable to fires. Once burnt, a forest becomes even more vulnerable to further risks of fires. Once the forest starts breaking up, rainfall in the region is likely to decline. Hence maintaining sufficient forest cover in Amazonia is an effective means of protecting the region from future climate change, as well as directly contributing to slowing down global warming.'

The scientists offer a range of ideas to protect the forest: well-managed clearance programmes with limited fragmentation; maintaining broad species migration corridors connected to cooler montane regions to allow species to adapt to climate change; improved governance and law enforcement; and setting up a multi-billion dollar fund to provide financial incentives to the individuals and groups making decisions about

land-use in the Amazon to shift the balance of market forces that currently favours deforestation.

Professor Malhi is also co-founder of the Amazon Forest Inventory Network (RAINFOR), which today announced the launch of a major new project to quantify the influence that Amazonia has on global carbon dioxide concentrations. The new project will expand and consolidate a network of ecological observatories in forests across the Amazon and Andes region to inform the debate on incentives for protecting the forest, and that can act as early warning systems to study how the forests are responding to global atmospheric change. RAINFOR is led by the University of Oxford and Leeds University, with a large number of collaborating institutes in eight South American countries. The $4.5 million funding for the four-year project was awarded by the Gordon and Betty Moore Foundation.

Professor Malhi said: 'The research being conducted by RAINFOR will improve understanding of global carbon balance and directly inform the debate on the value that Amazonian forests provide to the regional and global environment. It will also improve the science capability among eight South American countries for monitoring the carbon balance of their forest ecosystems and soils, a capability that is essential if these forests are to be valued for the services they provide the global environment.'

Source: Oxford University