INTRODUCTION

Until recently, much of the debate and concern surrounding the loss of tropical forests has focused on the loss of biodiversity, and to a lesser extent, the loss of resources on which forest-based peoples depend. More recently, the potential impacts on climate and weather have been highlighted, in part reflecting growing evidence of the onset of the effects of global warming. These discussions have mainly been concerned with the role of forests as sinks and sources of carbon. However, this is not the whole picture. Forests also influence climate through their physical characteristics, influencing the transfer of water and energy to the atmosphere.

This report presents current evidence for the role of tropical forests, and in particular, those of the Congo Basin, in local, regional and global climate processes. Firstly, data on their significance as both a sink and source of greenhouse gases is presented. This is followed by a review of research into the role of this region's forests in weather patterns through their influence on atmospheric circulations. Finally, the significance of these findings for forest policy within the region and internationally is considered, focusing in particular on recent proposals to develop mechanisms to promote forest conservation within the international climate regime.

FORESTS & GREENHOUSE GASES

In the tropics, depletion of forest resources and land-cover change have been the primary source of carbon emissions. These phenomena are estimated to be releasing about 1.6 (0.8-2.4) Gt C/yr.[1], most of which is attributable to deforestation and degradation. By comparison, fossil fuel emissions are about four times this level, at 6.3 Gt C/yr. (Chomitz, 2006). These figures not only highlight the crucial role of forests in the carbon cycle, but also the shortcomings in our understanding of it, apparent from the wide range of possible values for emissions from land-use change.

BACKGROUND

Forests play an important role in the cycling of greenhouse gases, acting as both a sink and source of these gases. In discussions of global warming, most discussion is focussed on the role of carbon dioxide (CO^2), and indeed this is the most important of the greenhouse gases, having contributed some 58% of the greenhouse effect up to 2000 (Houghton, 2005a). However, there are in fact a number of greenhouse gases, and forests play a role in the cycling of a number of these. The most important after CO^2 are methane (CH^4) and nitrous oxide (N^2O), which contributed 21% and 6% of the greenhouse effect respectively until 2000 (Houghton, 2005a).[2] However, most assessments of the role of forests on climate change only consider CO2 emissions, and in fact, there are no reliable global estimates of emissions of either CH^4 or N^2O from land-use change (Baumert et al., 2005). Since there is little information available on the importance of other greenhouse gases, this report will only focus on the carbon cycle. However, it should be noted that emissions of these other gases are significant, one estimate suggesting that they could add up to 15% to the impact of forests on climate change (Fearnside & Laurance, 2004).

Forests influence the carbon cycle through their ability to store carbon and exchange it with the atmosphere. Plants absorb CO^2

[1] 1 Gt = 1 billion tonnes / 1 x 109 tonnes
[2] The Kyoto Protocol is concerned with 6 greenhouse gases: Carbon dioxide (CO2), Methane (CH4), Nitrous oxide (N2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur hexafluoride (SF6)