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Vines, CO_2 and Amazon forest dieback

The paper by Cox *et al*. (1) brings good news of a less-catastrophic dieback of Amazonian forest in the face of predicted climate change, as compared to that shown by the group's earlier models (2). However, it would be risky to conclude that climate-induced dieback would be cancelled out by increased growth rates stimulated by CO_2 fertilization. The paper emphasizes that the "magnitude of long-term CO_2 fertilization effects" is one of the "remaining uncertainties". I am wary of the global generalization that "carbon storage on land will increase …. under higher CO_2" being applied to Amazonia. Cox *et al*. (1) point out that recent increased growth of Amazonian trees (3) may be due to higher CO_2. This increased growth, which is primarily in forests on relatively fertile soils near the Andes at the western edge of Amazonia (4), does not mean that the effects of CO_2 fertilization are uniformly positive for Amazonian forest biomass, especially in eastern Amazonia where dieback is expected to begin and be most severe. Vines generally make better use of the extra CO_2 than do trees (*e.g*., 5), with the result that increased vine loads could slow tree growth or kill trees outright (6). CO_2-enrichment may explain why vine loads have increased at five of the six locations for which measurements are available across tropical forests worldwide, leading to higher tree mortality rates and consequent turnover (7). Amazonian forests vary tremendously in terms of the prevalence of vines, and the extremes found in virtually impenetrable patches of "liana forest" (mostly in eastern Amazonia) really have to be experienced to be appreciated (Figure 1).

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Fig. 1. Vines cut in a forest-management experiment at Buriticupu, Maranhão, in eastern Amazonia (Photo: P.M. Fearnside).