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“Filling gaps and removing traps  
for sustainable resource management”

## Reassessing the Role of Remnant Trees in Tropical Swidden Systems

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### Abstract

In shifting cultivation (swidden), forest plots are cleared, cultivated for a short time then abandoned to fallow. In many parts of the tropics, plots are not clear-felled but certain trees are retained, providing services and also storing carbon. Carbon emission in such cyclical systems is less than that associated with permanent conversion practices as carbon is sequestered in the following fallow phase. The time averaged carbon of a swidden system is often estimated as half of the maximum carbon stocks at the end of the fallow phase and assumes negligible carbon stocks at the beginning of the crop phase. We conducted a systematic review to assess reasons why farmers retain remnant trees, where they do so, approximately what is the quantity of carbon retained in these trees and how does this alter the time-averaged carbon estimates of swidden cultivation based on clear-felling. Data from 103 publications in three agroecozones (humid, montane and dry forest) were included. We then combined our findings with data on the extent of swidden in ten countries in the tropics to estimate how much carbon in remnant trees is unaccounted for. The most commonly reported reasons for tree retention included future timber or fuelwood (n=34), use of fruits and leaves for food (n=24), use of other tree components for medical uses (n=22) and shade for other crops and workers on farm (n=21). Other reasons cited included soil fertility maintenance, seed flow under trees, supporting biodiversity, source of livestock forage, physical support for other crops such as yam vines in some areas. Some studies stated that due to the scarcity of tool such as chainsaw farmers left some hardwood species in field. We calculated that from ten countries alone, approximately 3 Pg carbon stored in remnant trees is unaccounted for so the global contribution of remnant trees in shifting cultivation to the “missing terrestrial carbon stock” would far exceed this.

**Keywords:** Remnant trees, shifting cultivation, time averaged carbon