



Implications of changes in tropical shifting cultivation intensification on land productivity and GHG-related biogeochemistry

Bernard Bustier (1), Alfred Ngoy (2), Stephan Pietsch (3), and Aline Mosnier (3)

(1) MDN, Genie Militaire, Libreville, Gabon, (2) CENAREST, IRET, Libreville Gabon, (3) IIASA, ESM, Laxenburg, Austria

Traditional shifting cultivation used to be a sustainable type of land use for the subsistence of populations in tropical rainforests. The vast resource of moist tropical forests together with low population densities allowed for long fallow periods on sparsely distributed slash and burn parcels with large areas of untouched forest in between. Population growth and concomitant increase in land demand for subsistence as well as increasing infrastructure development for commercial forestry, cash crops and mining, however, altered the picture over recent decades. As a result, fallow periods were reduced due to lack of pristine land. In this study we use field data and modeling results from the Congo Basin to assess the impacts of reduced fallow periods on Carbon sequestration dynamics using a BGC model calibrated and validated with > 150 research plots distributed over the western Congo Basin and representing different management and land use histories. We find that the average carbon sequestration rate reduces over the number of cultivation cycles and that a reduction of the fallow from 10 years to 7 years reduce the average carbon sequestration between 13 and 21% and from 7 years to 4 years between 23 and 29% depending on soil fertility.

Results will be discussed in the context of population growth and changes in environmental conditions.