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The Charcoal Trap: Miombo Woodlands versus the Energy Needs of People

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Abstract

Miombo woodlands cover the transition zone between the dry open savannahs and the moist forests in Southern Africa and occupy the vast area of 2.7 Mio km^2. These ecosystems are highly disturbed by deforestation, mostly for charcoal production. Charcoal has become the largest source to satisfy urban energy demands. Even though when charcoal is a less energy-efficient fuel compared to firewood but by having higher energy densities and thus being cheaper to transport. Over the last decades, charcoal production has become a full-time employment for migrant workers, resulting in very different and no longer sustainable deforestation patterns. Strategies to reduce the pressure on the miombo woodlands have to take aspects of employment and energy demand into account.

The objectives of the study were to examine above- and belowground carbon losses from an intact miombo woodland (protected forest reserve) in comparison to a highly disturbed surrounding area due to charcoal production. Detection of changes in carbon concentrations and stocks were made possible by applying biomass- and soil inventories as well as the eddy-covariance method. These local results were up-scaled to countrywide estimates of carbon lost to the atmosphere by deforestation in addition to carbon losses from fossil fuel combustion. The results show, that in the worst case scenario which does not assume any regeneration, a developing country as Zambia, can easily emit as much carbon per capita as a developed Western world country such as France, when deforestation is

included in the national inventory (up to 9.1 t of CO_2 per capita). However, regeneration is very probably when post-harvest disturbance is low. Further studies on miombo regeneration are highly demanded.

Keywords: Carbon dioxide, eddy covariance, inventory, southern Africa

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