Density variations and their influence on carbon stocks: case-study on two Biosphere Reserves in the Democratic Republic of Congo

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It is commonly acknowledged that allometric equations for aboveground biomass and carbon stock estimates are improved significantly if density is included as a variable. However, not much attention is given to this variable in terms of exact, measured values and density profiles from pith to bark. Most published case-studies obtain density values from literature sources or databases, this way using large ranges of density values and possible causing significant errors in carbon stock estimates. The use of one single fixed value for density is also not recommended if carbon stock increments are estimated. Therefore, our objective is to measure and analyze a large number of tree species occurring in two Biosphere Reserves (Luki and Yangambi). Nevertheless, the diversity of tree species in these tropical forests is too high to perform this kind of detailed analysis on all tree species (> 200/ha). Therefore, we focus on the most frequently encountered tree species with high abundance (trees/ha) and dominance (basal area/ha) for this study. Increment cores were scanned with a helical X-ray protocol to obtain density profiles from pith to bark. This way, we aim at dividing the tree species with a distinct type of density profile into separate groups. If, e.g., slopes in density values from pith to bark remain stable over larger samples of one tree species, this slope could also be used to correct for errors in carbon (increment) estimates, caused by density values from simplified density measurements or density values from literature. In summary, this is most likely the first study in the Congo Basin that focuses on density patterns in order to check their influence on carbon stocks and differences in carbon stocking based on species composition (density profiles $\sim$ temperament of tree species).