On the hidden half: testing precision of techniques used in estimating below ground biomass in mangrove forests

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Tropical deforestation has been associated with the net emission of 20% of carbon dioxide to the atmosphere (IPCC 2007). Reducing Emissions from Deforestation and forest degradation commonly called REDD+, is a potential market based approach in forestry that can be considered in mitigating climate change through carbon capture and storage (Donato *et al.*, 2011). For REDD to work, accurate monitoring of C pools and emissions is required thus the importance of robust C storage estimates for various forested ecosystems. Overlooked in climate change mitigation strategies are mangroves, which are highly efficient carbon sinks for atmospheric CO_2 along tropical coastlines (Donato *et al.*, 2011). Critical uncertainties remain, however, before sufficiently accurate and precise estimates of mangrove C storage and land use emissions can be given. Field studies of mangrove biomass and productivity are difficult due to the soil conditions and the site and species-specific dependencies render universal conclusions unreliable (Komiyama *et al.*, 2000). In mangrove forestry, most biomass studies have tended to concentrate on aboveground components and there is no standardized methodology to estimate belowground biomass, which was estimated to contribute about half of the vegetative carbon sequestered by these forests. Three common methods are used in mangrove biomass estimation: complete excavation (Ong *et al.*, 2004), coring method (Saintilan, 1997) and the trench method (Komiyama *et al.*, 2000) . Several biomass studies have been carried out at Gazi Bay in Kenya on mangrove biomass in both replanted and natural stands. Following these studies there has been a great desire to improve on the methodology of determining below ground root biomass in mangroves. To test the accuracy and precision of the three methods used in mangrove forestry, sampling was done at Gazi Bay, Kenya from August 2008 to December 2009 using *Ceriops tagal* (Perr.) C.B. Robinson. The objective is to use root biomass as a proxy to estimating below ground carbon storage. Preliminary results indicate root biomass reduction with increasing distance from the tree base and increasing depth for both the coring and trench methods. We found root biomass consisted of 58%±9.7 of total plant biomass confirming the bottom-heavy structure of mangroves. Parallel to this we intend to further apply allometric scaling techniques in estimating tree weight from measureable tree dimensions based on existing models.

References

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