



Mangrove production and carbon sinks: a revision of global budget estimates

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Mangrove forests are highly productive but globally threatened coastal ecosystems, whose role in the carbon budget of the coastal zone has long been debated. Here, we provide a comprehensive synthesis of the available data on carbon fluxes in mangrove ecosystems. A re-assessment of global mangrove primary production from the literature results in a conservative estimate of $\sim 218 \pm 72 \text{ Tg C y}^{-1}$. When using the best available estimates of various carbon sinks (organic carbon export, sediment burial, and mineralization), it appears that $>50\%$ of the carbon fixed by mangrove vegetation is unaccounted for. This unaccounted carbon sink is conservatively estimated at $\sim 112 \pm 85 \text{ Tg C y}^{-1}$, equivalent in magnitude to $\sim 30\text{-}40\%$ of the global riverine organic carbon input to the coastal zone. Our analysis suggests that mineralization is severely underestimated, and that the majority of carbon export from mangroves to adjacent waters occurs as dissolved inorganic carbon (DIC). CO_2 efflux from sediments and creek waters and tidal export of DIC appear to be the major sinks. These processes

are quantitatively comparable in magnitude to the unaccounted carbon sink in current budgets, but are not yet adequately constrained with the limited published data available so far.