



## **Distribution and sources of organic carbon in a mangrove-seagrass ecosystem (Gazi Bay, Kenya)**

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The concentrations and stable isotope composition of different organic carbon pools was studied in Gazi Bay (Kenya 4.4°S 39.5°E), in July 2003. Gazi Bay is a shallow tropical coastal ecosystem, with extensive mangrove forests intersected by 2 main tidal creeks (Kidogoweni and Kinondo), and a shallow bay largely covered by dense *Thalassodendron ciliatum* seagrass beds. The distribution of organic carbon along the salinity gradient of the tidal creeks indicated significant internal inputs of organic carbon, with a  $\delta^{13}\text{C}$  signature consistent with that of the dominant vegetation, i.e. mangroves. Low water column Chl *a* values and high POC/Chl *a* ratios are indicative of the predominance of macrophyte material or highly degraded organic matter in the water column. At the boundary of the mangrove-seagrass interface, however, coinciding with a salinity of  $\sim 30$ , the carbon isotope composition of POC changes drastically, from about  $-27\text{‰}$ , to values as high as  $-14\text{‰}$ , indicative of a geographically sharp change in the relative contribution of mangrove and seagrass-derived organic carbon. The sedimentary record, however, does indicate that mangrove carbon is exported from the system boundaries and trapped in the seagrass beds adjacent to the mangrove forest where it contributes to benthic mineralization. On the other hand, seagrass material is similarly imported into the mangrove areas, but the contribution of seagrass material in mangrove sediments appears to be limited, overall. The high spatial variability in the sources of the aquatic organic carbon pool is also mirrored in the distribution of  $p\text{CO}_2$ ,  $\% \text{O}_2$ ,  $\delta^{13}\text{C}$  signature of DIC and  $\delta^{18}\text{O}$  signature of dissolved  $\text{O}_2$ , which indicate a distinct gradient from a highly heterotrophic system (mangrove creeks) to a net autotrophic region (seagrass beds). Overall, the data indicate that ex-

port of mangrove-derived organic carbon is limited to a geographically limited area close to the forest boundary, and unlikely to reach the coastal shelf area.