Unravelling complexities in mangrove meio- and macrofauna benthic food webs using carbon, nitrogen and hydrogen stable isotopes

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At the interface between terrestrial, freshwater and marine environments, mangrove food webs are particularly complex systems, and the availability of a large number of food sources make it difficult to constrain their contributions based on carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) stable isotope analysis. Moreover, mangrove meiofauna has been little studied and many questions regarding its trophic diversity or links with macrofauna remain. Recent methodological advances are enabling the use of hydrogen ($\delta^{2}H$) stable isotopes as a complementary tracer in food webs, but it has been seldom used in mangroves and never in meiofauna studies. Here, we combined C, N and H isotope analysis to compare the food web properties of mangrove meio- and macrofauna communities and evaluate the added value of H isotopes. The inclusion of $\delta^{2}H$ improved depiction of food web links and allowed differentiating sources that were indiscernible based solely on $\delta^{13}C$ and $\delta^{15}N$ variation (e.g. mangrove tissue and epiphytes). Interestingly, meio- and macrofauna communities constituted largely parallel trophic chains of similar length and depicted identical average trophic diversity. Yet, meiofauna spanned ~1.5 times greater $\delta^{13}C$ range and expanded global community niche space towards significantly lower $\delta^{13}C$ and $\delta^{2}H$ values corresponding to an area unoccupied by macrofauna and which may be influenced by C and H assimilation from chemoautotrophic production in sediments. Our results shed light on mangrove ecosystem functioning, the meiofauna role, and the added value of $\delta^{2}H$ to unravel food web complexities.