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The application of stable isotope probing to investigate carbon transformations in slow sand filters for the treatment of drinking water.

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Slow sand filters (SSFs) are used globally to provide safe drinking water that is biologically stable. The importance of the biological community in SSFs for removing organic pollutants and pathogens has been acknowledged, but the specific mechanisms are yet to be understood. To investigate the biological activity, we utilized stable isotope probing experiments in intact cores acquired from mature SSFs using 13C-glucose as a tracer. The cores were incubated for 2-3 weeks and the carbon fluxes and isotopic signatures were monitored in different pools, including solid organic carbon, dissolved organic carbon, dissolved inorganic carbon, bacterial lipids, and meiofauna. The results indicate that the bacterial lipids were the primary sink for the added 13C-glucose tracer, confirming that the microbial community can participate in the filtration process by consuming assimilable organics entering the SSFs. Furthermore, the carbon residence time in the bacterial pool was found to be longer than the time of the incubation, indicating that the transfer of carbon from bacteria to higher trophic levels or inorganic carbon is a slow process. SSFs resemble aquatic sedimentary systems with minimal organic carbon input. Thus, this study can also provide insight into how the biological community can adapt and cope with a limited carbon supply.