# Banking carbon: Riparian carbon storage in headwater streams

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**Abstract.** Hydrologic distribution of organic matter and carbon in river networks influence i) the global and terrestrial carbon cycle, ii) ecosystems integrity and productivity, iii) ecohydrologic feedbacks, and iv) sustainability of freshwater resources. Identifying potential controls on the distribution of organic matter along streams and rivers is crucial to understanding impacts of land-use and global climate change. Recent work suggests that rivers are a dynamic component of the global carbon cycle, but only refers to storage of carbon in fluvial networks without considering how specifics of process and form in rivers influence carbon partitioning among the atmosphere, geosphere, and oceans. Recent work in mountainous streams of Wild Basin, Rocky Mountain National Park, Colorado suggests that multithread channels, which occur only in unconfined valleys where beaver or old-growth forests (>200 y) are present, store a disproportionately large amount of carbon (~80% carbon in ~20% of total river km) compared to single-thread channels in at least partly confined valleys with younger forests. Riparian areas in Wild Basin account for only 1% of the entire catchment surface area and store ~25% of the total estimated carbon in adjacent uplands. Using systematic soil sampling and radiocarbon dating along 10 study reaches with drainage areas that vary from 10 to 200 $km^2$, I examine the potential role of drainage area and the influence of local disturbance gradients on long-term ($10^2 – 10^3$ y) riparian carbon storage and floodplain sediment turnover time. Preliminary results reflect the importance of unconfined valley segments for carbon storage and potential importance of climate change, ecosystem structure and land-use management on the formation of multithread channels.