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Air, Water, and Aquatic Environments Program

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Science BRIEFING

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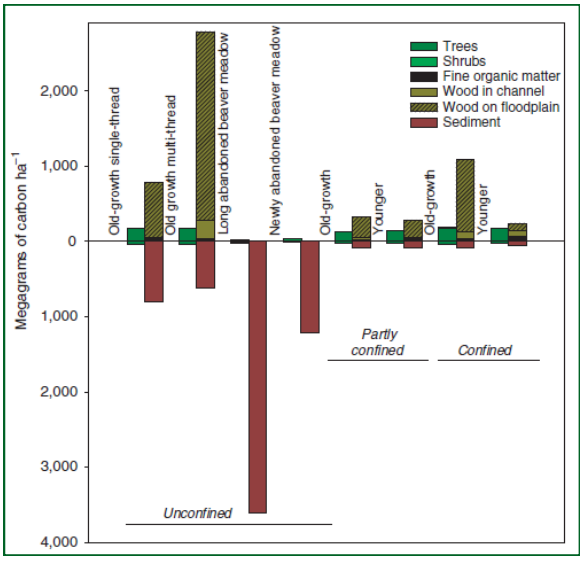
CARBON STORAGE IN MOUNTAIN RIVERS

BACKGROUND

Published research emphasizes rapid downstream export of terrestrial carbon from headwaters, but few studies have investigated the volume of carbon storage along stream-riparian corridors.

RESEARCH

Research Activity: Recent studies are quantifying the spatial distribution of carbon pools along different valley types of headwater streams in Rocky Mountain National Park, Colorado. Findings show that low-gradient, broad valley bottoms with old-growth forest or active beaver colonies store the majority of above- and below-ground carbon. Estimates of riverine carbon storage represent a previously undocumented but important carbon sink.



Carbon pools (Mg per ha) of different ecosystem components within each of the eight valley types. Components of above-ground biomass are shown above the x axis; below-ground carbon components are shown below the x axis. Quantities of carbon in tree regeneration and herbaceous vegetation are too small to be visible in this figure.

Management Implications: These findings highlight the importance of headwater streams and associated riparian areas in watershed-scale carbon retention. Management to reduce the effects of climate warming on headwater river corridors is important to maintaining ecosystem services such as carbon storage in mountainous watersheds.

KEY FINDINGS

- Low-gradient, broad valley bottoms with old-growth forest or active beaver colonies store the great majority of above- and below-ground carbon.
- Estimates of riverine carbon storage represent a previously undocumented but important carbon sink.
- These results indicate that: 1) not all mountainous rivers rapidly export carbon; 2) not all valley segments are equally important in carbon storage; and 3) historical changes in riverine complexity have likely reduced carbon storage.

Along unconfined stream segments with old-growth riparian forest, characterized by high stem densities and large diameter trees, large volumes of wood accumulate in the channel and on the floodplain, creating obstructions that contribute to carbon retention.

FURTHER READING

- Wohl, E., K. Dwire, N. Sutfin, L. Polvi, and R. Bazan. 2012. Mechanisms of carbon storage in mountainous headwater rivers. Nature Communications 3: 1263 www.nature.com/ncomms/journal/v3/n12/abs/ncomms2274.html

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 Science Briefings can be found online at: http://www.fs.fed.us/rm/boise/AWAE_home.shtml