New study suggests that older beaver ponds act as carbon sinks

Asa White

Researchers from Uppsala University and the Swedish University of Agricultural Sciences have found that older beaver ponds act as a sink of carbon, pointing to their role in sequestering atmospheric carbon; a cause of global warming. Older ponds were also found to sequester some of the excess nutrients of agriculture and waste-water management which often degrade river systems across the globe.

Eurasian beavers have been making a comeback across many parts of Northern Europe since the 1800s when hunting was outlawed. These semi-aquatic mammals were pushed to extinction in many countries, but now are being actively re-introduced in countries such as the UK. The re-introduction and expansion of beaver populations has not always been welcomed by all. Landowners have concerns that productive fields could be turned into wetlands, while some anglers express concern that fish populations will be impacted by the obstruction caused by dams. However, many ecologists and wildlife organisations embrace their return as landscape modification by beaver leads to an increase in biodiversity through creation of a more heterogeneous habitat.

The ecological impact of beaver activity has been well studied. A novel aspect of the recent research in Uppsala was the use of aerial photographs and local knowledge to estimate the date when ponds were created by beaver, thus allowing pond age to be determined. The researchers were primarily investigating how beaver ponds of differing ages impact food-webs downstream of the dam. To achieve this, measurements of water chemistry, organic material and stream invertebrates were taken up- and downstream of six beaver ponds of a range of ages located within forests in Sweden. Interestingly, it was found that the more recently constructed the dam was, the more it exported carbon and nutrients downstream relative to the levels entering the pond. However, when the oldest ponds were examined, the opposite situation occurred; the ponds exported less than they received. This suggests that as beaver ponds mature, they become net sinks of carbon and nutrients. With nutrient inputs from agriculture causing water quality problems in rivers, these findings suggest that beaver reintroductions may play an important role in sequestering those nutrients. Moreover, by sequestering carbon, older beaver ponds can play a role in locking up the atmospheric carbon which is the root cause of global warming.

These findings inform a cautionary approach when assessing the impact of new beaver colonisation on river water chemistry. When surveying the impact of a new colony on a river, this research highlights the importance of acknowledging that discharges from the pond will change over time; from one which looks to be detrimental to river ecology to one ultimately beneficial to the river, and further, to the wider global carbon cycle.

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Biology Education Center, Uppsala University and Swedish University of Agricultural Sciences
Supervisors: Brendan McKie and André Frainer