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How effective are riparian vegetated buffers in trapping sediment and phosphorus in cold climates?

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Riparian vegetated buffers are a common beneficial management practice (BMP) to help reduce the delivery of sediment and associated chemicals, including phosphorus (P), from upland areas to aquatic systems. This partly stems from their perceived ease of installation and management, and relatively low costs. In agricultural landscapes that experience cold winters, soils are often frozen for long periods of time, thereby limiting infiltration, particularly during snowmelt in the spring, which is usually the main period by which water, sediment and P are delivered to riparian buffers. In addition, the vegetation in buffers undergoes senescence which affects its ability to trap sediment and take-up P. We investigated the role of riparian buffers in trapping sediment and P in an agricultural watershed in the Canadian Prairies. Using intensive field sampling and monitoring, and laboratory experiments, we show that buffers in such environments may not always be effective in trapping sediment and P, and that under certain circumstances may actually be a source of P to adjacent surface waters. Our results suggest that careful design and management are required for buffers to achieve their BMP function.