Wider buffers are better

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Excess nitrogen caused by fertilizers, animal waste, leaf litter, sewer lines, and highways is responsible for contaminating groundwater. It can also cause human health risks when found in drinking water and oxygen depleted water bodies endangering animals that drink from them. Establishing Riparian buffers is considered a best management practice (BMP) by State and Federal resource agencies for maintaining water quality, and they may be especially critical in controlling amounts of human produced nitrogen.

Scientists at the U.S. Environmental Protection Agency collected data on the buffers along with nitrogen concentration in streams and groundwater to identify trends between nitrogen removal and buffer width, water flow path and vegetation. They found wide buffers (>50 meters) removed more nitrogen than narrow buffers (0-25 meters).

Buffers of different vegetation types were equally effective but herbaceous and forest vegetation were more effective when wider. Removal of nitrogen within the water was efficient, but not related with buffer width; however removal on the water surface was related to buffer width. Nitrate nitrogen (sometimes used in fertilizer) did not differ by width, flow path or vegetation type. Results from the study are published in the July-August 2007 issue of the *Journal of Environmental Quality*.

The study suggested that buffer width is important for managing nitrogen in watersheds. Other factors such as soil saturation, groundwater flow paths, and subsurface chemical/organism relations are

important for governing nitrogen removal in buffers. Vegetation type also may be an important factor in certain landscapes and hydrologic settings where forested buffers may prevent nitrogen in deep groundwater or contribute more organic carbon in streams. Riparian buffers of herbaceous vegetation or a mix with forest vegetation were found to be effective only when wider.

Riparian services provide numerous ecosystem services beyond nitrogen removal, and although buffer width, dimension, and vegetation type provide benefits such as stream shading and water temperature maintenance, fish and wildlife habitat, or sediment control; there may be other buffer characteristics more favorable in removing nitrogen. In any case, watershed nutrient management efforts also must include control and reduction of specific and general sources of nitrogen from atmospheric, land, and water inputs.

Research is ongoing at the U.S. Environmental Protection Agency to assess the nutrient removal capacity of riparian buffers. Because buffers are often degraded or removed due to land use change (e.g. agriculture and urbanization), there is need for further research to identify the most effective methods for restoration. This could lead to the enhanced nutrient removal and optimal riparian areas needed for restoration to have the greatest impact with minimum resources spent.

Source: American Society of Agronomy