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Agriculture changes improve lake water quality

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Changing agricultural management practices can significantly improve water quality, according to a long-term study. The researchers found that in a US lake the total amount of suspended sediment fell, and water clarity increased as a result of multiple integrated practices implemented to reduce runoff in the surrounding area. These included introducing buffer strips of vegetation and planting trees.

The findings offer guidance to policymakers implementing changes to agricultural practices to help meet the water quality targets specified in the EU Water Framework Directive[1].

Runoff from agricultural land is a global problem. It can seriously reduce water quality by transporting suspended sediment into waterways. Such sediment can carry pollutants and limit the amount of light reaching aquatic plants, with potentially damaging impacts for the entire ecosystem. The Water Framework Directive and the European Commission's 2012 Communication 'Blueprint to safeguard Europe's waters'[2] both identify land use as an important determinant of water quality.

To examine whether agricultural management practices could improve lake water quality, the US Department of Agriculture Natural Resources Conservation Service selected 14 study watersheds, including the area surrounding Beasley Lake in the Mississippi Delta.

Between 1996 and 2009, four best management practices were implemented around the lake: vegetative buffer strips introduced in 1996; 'conservation tillage' in 2001 (where stubble or stalks from previous years is left in the soil to reduce runoff); planting trees on former agricultural land in 2003; and, in 2006, arable land was converted to habitat for northern bobwhite quail (*Colinus virginianus*).

To assess water quality, the researchers measured water clarity, total suspended solids (TSS) and total dissolved solids (TDS) at three sites. The data were analysed by season to account for expected seasonal changes in water quality.

They found that water clarity was generally higher in summer. TSS were highest in spring, likely due to winter field clearances, and TDS did not vary with the seasons. The introduction of vegetative buffer strips reduced the amount of TSS recorded during spring, and TDS in autumn, although it had little effect on water clarity. Conservation tillage led to an increase in winter and spring water clarity and lower concentrations of spring, autumn and winter TSS. Summer TDS was also reduced when conservation tillage was implemented.

The introduction of tree-planting and quail habitat improved water clarity throughout the year, with the greatest improvements occurring in spring. Tree-planting and quail habitat also reduced TSS in spring, autumn and winter, and TDS in the summer and autumn.

The researchers found that the quail habitat had the greatest effect on winter water clarity, while changes to spring and autumn water clarity were best explained by tree-planting. Summer water clarity and TSS variation was most influenced by a combination of rainfall and tree-planting, while vegetative buffer strips had the greatest effect on autumn and winter TSS and spring and summer TDS.

Source: Lizotte, R.E., Knight, S.S., Locke, M.A., & Bingner, R.L. (2014). Influence of integrated watershed-scale agricultural conservation practices on lake water quality. *Journal of Soil and Water Conservation*. 69 (2): 160–170. DOI:10.2489/jswc.69.2.160

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1.http://ec.europa.eu/environment/water/water-framework/index_en.html

2.http://ec.europa.eu/environment/water/blueprint/index_en.htm