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# Understanding the effectiveness of vegetated streamside management zones for protecting water quality

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### **SUMMARY**

We set out to improve understanding of the effectiveness of streamside management zones (SMZs) for protecting water quality in landscapes dominated by agriculture. We conducted a paired-catchment experiment that included water quality monitoring before and after the establishment of a forest plantation as an SMZ on cleared farmland that was used for extensive grazing. In a second study, we monitored water quality during the harvesting of a 20-year-old plantation in an SMZ. We found concentrations of bacteria, sediment and phosphate were lower in the buffered paired catchment, but that lower nitrogen concentrations could not be attributed to the intervention. Harvesting caused no appreciable increase in sediment delivery to the stream and we found it to be a minor source compared to other disturbances (road drainage and cattle disturbance).

Simulation of hillslope processes and stream flow illustrated that uptake by SMZ vegetation was a more important nitrate-mitigating process than denitrification. Because this model thoroughly integrates climate and within-soil processes, its usefulness should also be tested for other nutrients and chemicals. For example, the observed decrease in phosphate concentrations in stream water due to the SMZ treatment was probably predictable. However, additional modelling approaches are needed to simulate SMZ effects on sediment and bacteria.