



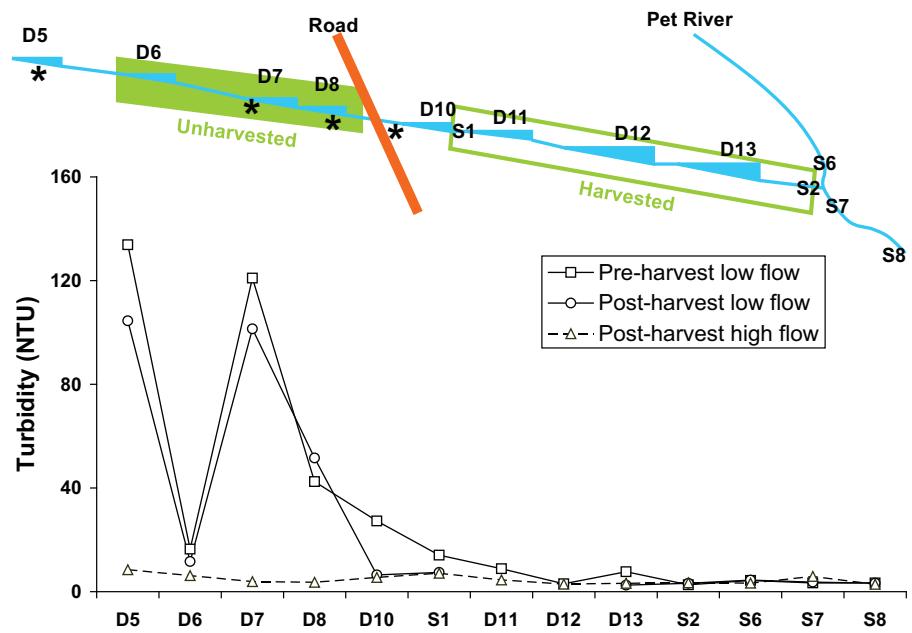
Farm-scale sediment sources: Tree harvesting, cattle and roads

What we found

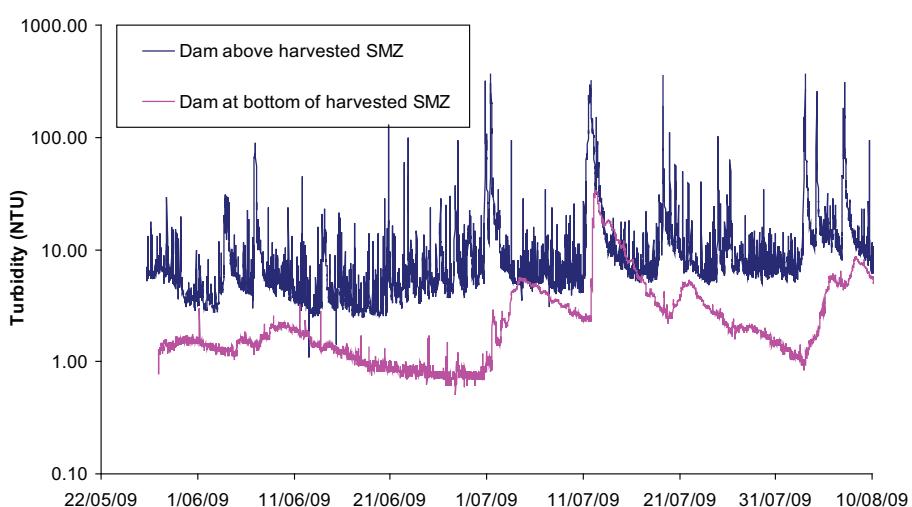
Total harvesting of a 20-year-old plantation of eucalypts in a stream-side management zone (SMZ) was conducted without increasing turbidity during the operation or subsequently during a wet winter period. Turbidity is a measure of the cloudiness of water due to suspended sediment.

Overall, the erosion risk at this site was considered low, because the soil was a red-brown, well-structured, basalt-derived Ferrosol soil with low slopes. Upstream of the harvested area, which included an SMZ that was not harvested, turbidity was seriously affected by cattle access and road runoff. Most of the sediment generated by cattle disturbance and the road was captured in a dam above the reach of the harvested SMZ. Hence, instream dams throughout the catchment acted as filter traps.

Continuous monitoring in the dam just above the harvested SMZ started soon after harvesting during low flows and showed that it regularly had turbidity values an order of magnitude higher and was more responsive to storms than the dam at the bottom of the SMZ. However, on occasions during high flows, connectivity increased between the dams and similar values were recorded for several days at a time as turbidity



Schematic of the catchment showing the relative layout of dams, roads, streams, plantations and regular cattle access points (*). During the flow season, water flows from dam 5 (D5) to stream sampling point 8 (S8) and beyond. Plantation SMZs are shown unharvested (full green) and harvested (border only). Turbidity measurements along the catchment are shown for three occasions.



The study catchment was a tributary of the Pet River, which is a major water supply for Burnie, Tasmania. The temporal pattern of turbidity of water being delivered from the tributary to the Pet River did not appear to change substantially due to harvesting and was usually less than 10 NTU, which approximates to water with only slight cloudiness.

in the lower dam (D13) reached a maximum of 33 NTUs. Turbidity in the dam just above the harvested SMZ (D10) was probably a combination of newly delivered sediment and resuspended sediment that had previously accumulated, but the relative contributions were not determined.

Implications for managers

The results show that, at least at some sites, forest plantations in an SMZ can be harvested to the water's edge without adversely affecting turbidity. While these results should encourage broader adoption of SMZs on farmland, care with harvesting will be needed to ensure that it does not lead to unacceptable sedimentation, and harvesting methods may need to be adapted to suit different conditions of erosion risk (e.g. soil type and slope).

Australian examples should be sought and water quality monitored in a range of situations as suitable harvesting techniques are further tested and developed, but such

practices are already common in some other countries and, due to minimal adoption to-date, very few examples exist in Australia where this practice can be evaluated. We encourage potential practitioners to seek advice from agro-forestry regulators and advisors.

How we did it

In collaboration with the CRC for Forestry, we identified a rare opportunity to conduct water monitoring as a commercial plantation was harvested in an SMZ on farmland. The plantation of *Eucalyptus nitens* was on a tributary of the Pet River, Tasmania. The predominantly north-flowing tributary included an SMZ plantation in the upper part that was not to be harvested and could therefore be used for comparative purposes. Pre-harvest monitoring using grab samples started in December 2008.

The larger eastern side of the SMZ was harvested in March-April 2009, after which we continued the grab sampling program and started monitoring turbidity in Dams 10



A view upstream showing the harvested tributary (1), Dam 13 (2), and the unharvested SMZ plantation (3).

and 13 every 15 minutes. Rainfall at Burnie for 2009 was 11% below average, but included several large storms, which at the site caused many trees in the remaining western side of the SMZ to be blown over.

Salvage harvesting of this area was conducted November 2009 to January 2010. Harvesting was conducted as a routine commercial operation in accordance with the Tasmanian Forest Practices Code using tracked tree felling and log forwarding machinery. The plantation was well-stocked and had grown vigorously, with some trees in excess of 60 cm diameter over bark at 1.3 m height.

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five research institutions – University of Tasmania, Australian National University, RMIT University, Charles Sturt University and CSIRO; and

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