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Forests and climate change: High intensity rain

Erosion and flooding caused by heavy rain can damage soils and create havoc downstream from sediment and debris flows. Intense rain events are predicted to become more frequent in New Zealand as average temperatures rise.

Image: Bay of Plenty Regional Council

Managing erosion risks

Under normal circumstances, forests are effective at protecting soils and preventing erosion. However forested land on steep slopes can be vulnerable at the time of harvest if the exposed site is subjected to heavy rain.

Flooding from intense rainfall events can carry large volumes of woody material from harvested areas, causing negative impacts on waterways and properties downstream. The worst damage occurs when logging debris is washed down from steep slopes into flowing waterways.

The following recommendations apply when harvesting steep land:

Remove large material from the site - Avoid leaving logs longer than 4 m with a small end diameter of 30 cm, large slovens and intact tree heads. Place slash on a stable excavated bench, rather than on a slope. Avoid large piles that can be mobilised in a flood.

Poison standing trees - Trees which are not likely to be recovered should not be felled to waste on an erodible slope. They should be poisoned standing and left to break down slowly. This will allow suitable regrowth to establish as the canopy dies off.

Intercept woody debris below vulnerable sites - Slash racks constructed from railway irons and wire rope are another mitigation option. These require heavy machine access so the slash racks can be easily cleared when build-up of debris occurs. The slash racks should be located on alluvial fans, not placed across gullies or in streams.

Map high risk areas - A good understanding of slopes and soil types is an important step in managing future risk.

These recommendations arise from a study completed by the Bay of Plenty Regional Council with input from Scion.

Protecting streams

Removing all wood from waterways is not necessarily the best way to reduce flooding risks. The management of woody debris following harvesting operations is the focus of a recent Scion study. The research showed how forest managers can make use of wood in streams to reduce low to moderate flooding risks, trap sediment and enhance New Zealand's stream environments.

Mainly above the channel:
- Gives shade.
- Controls temperature.
- Lowers risk of movement downstream.
- Creates habitat.

Mainly in the channel:
- Impedes flow.
- Increases temperature.
- Decreases oxygen.
- Increases algal growth.
- Increases sedimentation.
- Impacts on biota.
- Risks movement downstream.

Recommendations from the study suggest that logs and large branches can be left in smaller streams, as long as they don't block the channel. These larger pieces of wood are relatively stable and less likely to move downstream.

This wood enhances the habitat diversity in the stream by creating shaded pools favoured by larger fish species and habitat for aquatic insects.

Harvesting operations can be managed to reduce the risk of wood debris mobilising in floods and to maintain the aquatic health of streams.

Climate change will affect planted forests in New Zealand

Over the next two or three forestry rotations, NIWA projects the following likely climate trends in New Zealand:
- Warmer by 2.0°C (mid-range projection).
- Wetter in the west and drier in the east.
- More extreme weather events.

Some of these changes will create opportunities. Others will require higher levels of risk management.

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About Scion

Scion is the Crown research institute that specialises in research, science and technology development for forestry, wood and wood-derived materials, and other biomaterial sectors.

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