Environmental benefits of forestry understated

This has been used, with permission, from an article written by Dr Mike Marden of Land Care Research.

Fifty-five years after the initial plantings of exotic forests in the East Coast region, there has been a steady rise in concern about the perceived escalation in stream sedimentation and woody debris due to forest harvesting.

Though these issues existed before exotic forestry was established, publicity highlighting excessive woody debris on beaches has resulted in the forest industry shouldering much of the blame.

Barely a year goes by without a storm — causing significant landslide damage to pastoral hill country and plantation forests alike. Off-site effects can include trees being deposited in rivers, on beaches or on private land adjacent to forests.

Ironically, many plantation forests were established to control erosion in areas where conservation efforts on pastoral land had proved ineffective since the 1940s. Many forests have moved from a protective function to one of wood production, which has not been without consequences.

However, the overall or net environmental benefits of exotic plantation forests and the important role they play in reducing both on- and off-site impacts during the growing cycle are generally understated.

During the past five-plus decades, and largely as a consequence of historical storms resulting in continued mass erosion and significant soil loss from areas of pastoral hill country, 135,000 ha of the East Coast region has been replanted in exotic forest.

What are the benefits of planted forests for erosion control?

The on-site benefits of planted forests for erosion control are now well understood. For stands more than eight years old these include:

- a 90% reduction in shallow landsliding
- reduced rates of earthflow movement
- a 50% reduction in gully-derived sediment
- the retention of soil on the hills where it can continue to be used for productive purposes.

In time, the reduction in sediment supply to stream channels results in:

- improvements in water quality
- improvements of in-stream habitat equivalent to that of streams draining from indigenous forest.

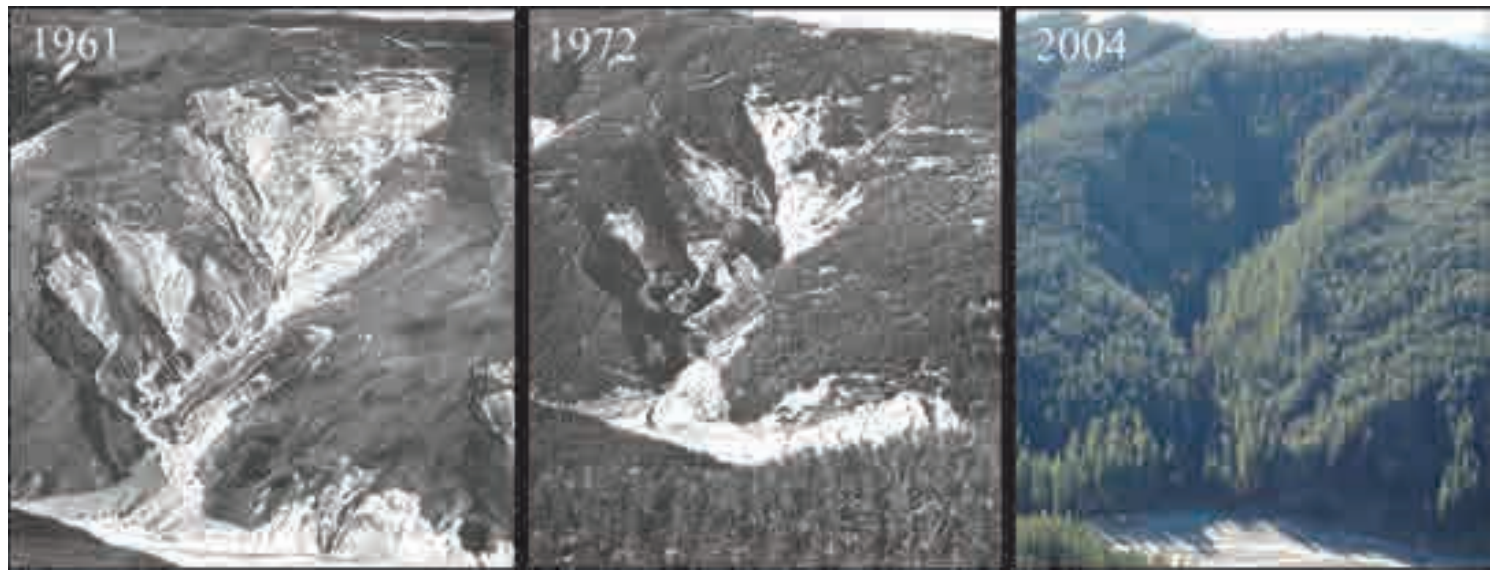
Off-site benefits include:

- a reduction in the amount of sediment delivered to larger rivers and coastal ecosystems – often with an improvement in flood hazard management.

Reducing the effects of future floods may be another key benefit. In the longer term, as a consequence of the reduction in sediment generated from hill slopes following reforestation, sediment accumulation rates in the major catchments are expected to decline and stream channels to incise.

Channel incision is likely to result in:

- a reduction in the cost of bridge replacement and road repair reduced need for expensive channel excavation, realignment and /or stopbank construction
- a likely reduction in the risk (or flood hazard) and clean-up costs associated with the flooding of low-lying, high-value floodplains such as the Poverty Bay flats.



Just as trees work to enhance slope stability and reduce erosion, we know what happens when we remove or harvest a forest, particularly when it is clear cut. Timber harvesting changes the two mechanisms that provide slope stability — hydrological and mechanical — and in turn this tends to increase the risk of landsliding and sediment production, resulting in higher stream sediment yields.

This period of 'increased risk' is often referred to as the 'window of vulnerability', which for pine forests in New Zealand is estimated to be between one to six years following tree removal

Replanting within 12 months of harvesting reduces the risk of landsliding, and sediment yields return to pre-harvest levels within a few years. Re-planting fewer trees per hectare on harvested areas has the effect of widening the window of vulnerability which increases the risk of landsliding and elevating sediment yields.

Harvest systems that require more slope disturbance by way of earthworks, may also contribute to an increase in landslide failure, surface erosion, and the mobilising of woody debris (slash) during this period.

The potential for debris flows — a mix of sediment and slash — to form during this period is high, and in the past has been known to cause significant impact both within and beyond the forest boundary.

Managing this window of vulnerability either by identifying areas of high risk and taking appropriate action such as retirement, choosing longer-rotation species, increasing stocking rates, planned reversion, installation of slash racks, and retaining buffers to act as slash traps between harvest/production areas and streams are some ways of managing this risk.

Riparian buffers and set-aside areas are now becoming the norm rather than the exception, particularly in relation to the transition from one rotation to the next when such decisions can be made and future problems avoided.

Lessons have been learned and forest management has improved with many practices that once contributed to undesirable consequences several decades ago being now less prevalent.

Major changes in attitude and understanding of environmental issues have largely been responsible for continuous environmental improvements within the forestry sector.

These changes include improvements in identification and management of risk, implementation of improved on-site infrastructure, recognition of the value of market access systems such as Forestry Stewardship Council (FSC), and increasing societal expectations.

We have also seen forest management respond to the erosion issue in terms of the way logging systems are deployed, and in improved harvest planning and implementation. Most steep land is now cable-harvested instead of ground-based, minimising the amount of roads and tracks and slope hydrology disruption.

Landings are sited with careful consideration of the potential hazard they might create and are often of minimal size to allow for reduced risk of failure, or if large they are located on stable sites (super skids). Road alignment, design, and construction have also improved, as has attention to managing runoff to reduce surface erosion.

One avenue for further improvement relates to concerns regarding the long-term future of production forests on land with a high erosion hazard. Does consideration need to be given to a change to an alternative land use? Retirement issues, lease agreements, set-asides, widths of riparian buffers, carbon liabilities are all part of that conversation.

The adversarial approach of the RMA often limits opportunities to engage in rational and logical conversation about some of these issues. In many situations, avenues to make better decisions on future land use are hindered because of contractual factors. Having recognized the risks or high costs associated with harvesting difficult terrain, some forest companies are voluntarily withdrawing from these areas.

Additionally, there remain significant areas of pastoral hill country classified as severely eroding, for which some form of forest cover is the only sustainable, long-term solution. Climate change predictions suggest extreme storm events will become more common and therefore have an increasing impact on this landscape, indicating that this region requires more forest, not less.

Local knowledge and sound research are key to identifying areas of greatest risk to the environment from these events, however the formulation of management strategies to deal with this has not kept pace with other gains by the sector.

Reforestation is considered the most efficient, environmentally sustainable and cost-effective option for managing erosion on a large scale. It has been implemented with considerable success both at the local- and regional-scale, no more so than in New Zealand's most erosion-prone region, the East Coast of the North Island.

International and local research show that the long-term benefits of forestry to the environment during its growing cycle outweigh the damage and inconvenience caused during extreme storm events.

That said, landslide-derived sediment and woody debris originating from areas of forest in such steep terrain are inevitable, and during local and more region-wide extreme rainfall events are unpreventable.

The risks associated with managing forests in this region are now better understood and lessons from past mistakes have resulted in better management practices. There is still scope for additional gains to be made in environmental performance and community understanding and acceptance of the role forestry plays in contributing to the regional economy and to a range of ecosystem services.

Dr Mike Marden