

Case Study of Planning: MANGATU FOREST

Who got it right?

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ABSTRACT

A personal view is presented in this paper and reflects a practitioners perspective following eighteen months of clear fell harvesting mature Pinus Radiata stands at Mangatu Forest.

The challenge of achieving a commercial result from a forest which can be classed as "difficult" to log is discussed. The economic reality of various harvesting systems and roading techniques is also reviewed.

INTRODUCTION

The short answer to the title of this paper is that no one can claim to have got it right yet.

Not until harvesting at Mangatu has progressed through a cycle of perhaps twenty years possibly longer will anyone know if what was planned has worked.

One thing is certain regardless of mans further intervention, and whether we log or not slumping and soil erosion is a fact of life at Mangatu and other areas of the East Coast. From a forest managers perspective what is required is a balance between commercial plantation forest activities and conservation values, in other words sustainable land management.

I believe that is a realistic and achievable objective.

Mangatu is a commercial plantation forest with very high conservation value. The forest exhibits spectacular erosion in the form of massive earthflows and land subsidence. The forest is 12,500 ha in size and is located some 70 km North of Gisborne City on the East Coast of the North Island. The predominant species is Pinus Radiata.

In December 1990 Forest and Land Management under contract to NZ Timberlands Ltd commenced clearfell logging of 30 year old Pinus radiata stands. The operation was geared to a log export market with domestic sawlog and pulp arisings.

The logging plan used initially was that prepared by the Ministry of Forestry, Forest Research Institute (Coker) in 1987. Subsequently Forest and Land Management have developed a new 5 year plan.

After eighteen months and in excess of 220,000 tonnes of wood production through two summers and one (mild) winter considerable progress has been made in identifying "problems" facing management with the planning and co-ordination of a commercial logging

operation in forests such as Mangatu.

THE PROBLEMS AS WE SEE THEM

What distinguishes Mangatu Forest from other more "traditional" NZ forests, and puts it into the "difficult" category, is a combination of topography, geology and statutory constraints (environmental). The lack of quality road metal and the environmental "risk" from downhill hauling also features.

Lets look at the "problems" in more detail and illustrate the challenge facing the planning and the logging for forests like Mangatu. We should not lose sight of the fact that any problem can be resolved at a cost and given time. To remain commercially competitive both the elements of time and money may need to be constrained.

Topography

Long convex slopes are a major feature of much of Mangatu. These slopes often provide inadequate deflection for cable haulers.

The problem is compounded by the "hummocks" which are present throughout the forest (a result of earthflows).

Many of the slopes exceed the physical range of most cable haulers currently operating in NZ.

Geology

The unstable nature of the Mangatu soils commonly described as "crushed argillites associated with severe crush zones of bentonitic mudstones" (Hamilton & Kelman, 1952) are characterised by deep seated earthflows, slipping and slumping a phenomena dating back several centuries but greatly accelerated following European settlement and the associated clearing of natural vegetation from the late 1800 onwards for pastoral farming activities.

There are traces of Taupo pumice ash overlying the Northwest section of the forest.

Perhaps one of the most spectacular visual results of the erosion over the last 100 years is the aggregation of massive quantities of geological debris in to the major river system of the Mangatu Forest catchment.

CONSTRAINTS

1. Local Authority Permits

The requirement by the local authority was initially for a "Section 34 Permit" before undertaking any land clearing, earthworks or logging activities and tended to reflect a "controlled" approach to the activity. That is to say the method by which work was undertaken was defined to the extent that the logging system and direction of haul including location of roads and landings required permit approval.

Current permits are issued as "resource consents" under the Resource Management Act. Basically these permits follow the same Section 34 format with less emphasis on control.

2. Ground Conditions

Notwithstanding these statutory requirements the physical constraints of wet ground conditions often preclude the use of ground based hauling equipment.

3. Roothing

The absence of high quality roading material in sufficient quantities to enable all weather roads to be constructed to a standard capable of carrying logging truck traffic and heavy weight earthmoving or logging equipment.

Mid slope roading is not permitted at Mangatu due to slope instability. This

constraint on its own dictates to a large extent the choice of hauling system that can be used.

4. Downhill Hauling

Downhill hauling brings with it an environmental risk perhaps hitherto not clearly understood.

The inevitable accumulation of slash at the bottom of the hill has always been recognised as a potential problem as has the undesirable effect of sediment run-off down the haul lines into one focal point (the landing) at the bottom of the hill. Managing the debris removal is in itself not necessarily a problem, what could be a serious problem is if one gets caught unawares with an unpredicted "fresh" down the river bed before all debris and indeed logs awaiting load out are removed.

5. Marketing and Infrastructural Development

As with all new industries there is a pioneering phase whereby the coherent linkage between production and marketing is not synchronised.

Transport and processing infrastructures are not usually appropriate to the needs of the industry in the initial stage. The Mangatu logging operation is no exception being the first significant and sustainable harvesting operation on the East Coast, problem areas such as port facilities, absence of substantial local sawmilling capacity, no pulpwood processing, pressure on district roads have been the key areas of concern. Time will see these problems resolved as the harvest volume increases.

DISCUSSION AND RESULTS

Logging Systems

The introduction into Mangatu of the

Madill 046 Cable hauler to replace one of the Madill 009 units was based on the premise that a skyline machine with a reach in excess of 400 metres was required.

Weighing in at over 80 tonnes in transport mode it was obvious from the outset that roads to move this machine would have to be of a high standard. Shifts would need to be minimised and available wood at each location maximised. Already the 046 has achieved reaches of 600 metres albeit at some inconvenience and extra effort by the contractor.

There simply was no other commercial option at our disposal to extract the logs off the setting in question. We believe this type of machine has a future on the East Coast.

Conventional ground based units such as flat tracked crawler tractors with arches in combination with rubber typed skidder have proved very successful on the readily accessible flatter country at Mangatu, particularly for roadline operations. Soil disturbance and ground compaction is always a concern with this system and must be constantly monitored. The weather obviously influences the use of this equipment.

Future developments for ground-based systems would most likely be with light weight low ground pressure units.

Some of the more sophisticated ground hauling units on the market today attract a very high initial purchase price and or high repairs and maintenance (R & M) factors which has tended to discourage contractors and management alike from getting involved.

What we must remember of course is that any machine pushed to the limit will create an undesirable environmental effect.

There is nothing that will replace common

sense when the going gets tough or ground conditions are adverse.

Hydraulic knuckleboom loaders have proved versatile units for logging of difficult areas.

The "shovel" logging technique has been successful at Mangatu with "Daylighting" operations.

The Madill 009 with its relatively quick shift and set up time has demonstrated its ability to successfully log the steeper and relatively shorter (up to 400 metres) slopes.

From uphill hauling with the highlead, scab skyline or shotgun system to downhill highlead this unit in the hands of a proficient operator can achieve production targets while delivering an acceptable environmental result.

However without proper care unacceptable environmental impacts will occur.

I would hasten to add that ground damage is often unavoidable when settings with little deflection, hummocks and convex slopes are logged with cable haulers irrespective of whether the hauler has skyline capability or not.

The future? Well high speed track machines, balloons, intermediate spars, quad tracks and helicopters have been mooted. In the final analysis unless such systems can demonstrate their cost effectiveness then I suggest we are unlikely to see such equipment in this region for sometime. First we must ensure our existing facilities are being utilised to best advantage, a situation only likely to be achieved through a thorough understanding of equipment capability and very careful planning.

Roading Systems

The tried and tested old fashion

corduroying system of forming a road sub-base has proved a "life saver" in critical locations.

While this method of road construction is expensive (\$5.00/m²) it does guarantee a permanent result when the logs need to be shifted and the weather is against you.

The well proven lime/cement stabilising technique for road sub-base construction has been trialed with projected costs at between \$2.50/m² and \$4.00/m².

The logistics of getting the specialised machinery on site when you want it could be a problem. A 3% lime mix (granules) over 500m of particularly wet road was laid down in April, logging traffic pressure was immediate and intense. The road did suffer some structural failure but not to the extent that an adjacent untreated section did. It is debateable whether or not the method is a realistic option on a larger scale because of logistics and cost. We tend to think the real cost will be nearer \$4.00/m² than \$2.50.

Perhaps the most exciting and very cost effective development we have had at Mangatu has been the Bitumen stabilising trial.

This very simple technique of spraying cold liquid bitumen emulsion directly onto the road using the inexhaustible supply of "free" river metal effectively "waterproofs" the road.

California Bearing Ratio (C.B.R.) readings of 150 have been recorded on the trial with metal which would otherwise when wet turn to a sticky slurry (Bentonite). Indicative trial costs suggest a figure of \$1.00/m². The technique requires no specialist equipment and is very quick.

Suitable and cost effective running coat metal has always been a problem in the Gisborne, East Coast region. A localised calcinated limestone resource in the forest

was quickly exhausted early in 1991. The majority of this resource had been exploited by previous management when the initial in forest roads were strengthened ready for the first commercial logging operation in 1990.

Fortunately there is a substantial resource of high grade roading metal within 20 kms of the forests northern boundary. Quarry development has commenced and we expect to achieve adequate quantities of competitively priced road surfacing material next spring.

Local Authority Consents

The Section 34 permits were considered by management to be extremely restrictive in controlling the activity.

It is worth pointing out that the permit conditions also cover forest re-establishment and that broadcast desiccation, burning and/or mechanical land preparation are all prohibited.

Dialogue with the local authority has been continuous and productive throughout the last 18 months.

The Resource Management Act has enabled management to work with the local authority in the development of a policy statement, and to comment on a draft Regional Management Plan.

Along with other forestry interests in the district we have been successful in getting the forestry industries point of view heard, reinforcing the need to recognise the benefits of forestry to the East Coast region relative to the perceived short term effects of logging and above all focus on the effects not the controls, effects which should be measurable and objective not perceived and subjective.

Our 5 year logging plan has been approved subject to annual review and regular monitoring.

Further liaison between the two parties in this way will achieve the same fair and equitable treatment by the consenting authority as given to other "resource managers" within the region.

CONCLUSIONS

Harvest planning for Mangatu and any resource consents should be based on the best collective information, be flexible, cost effective and as conventional as possible. Over specialisation may result in loss of flexibility.

In the final analysis mother nature will have the last word.

So Who Got It Right?

I believe it will take another twenty years to know that with any certainty, however I am equally sure that only through the greatest possible cooperation and understanding will the best possible result be achieved.

REFERENCES

Hamilton, D. and Kelman, E.H.H.; (1952) Soil Conservation Survey of Waipaoa River Catchment, Poverty Bay, N.Z. Soil Cons. Ministry of Works.

