

DIFFICULT TERRAIN

by *F. Field,*  
*Forest Manager,*  
*Henderson & Pollard*

Steep Country - (Thinning)

The majority of sensitive terrain smallwood harvesting falls into this category. It is possible that through stand manipulation ("delayed" thinning, rather than thinning to waste) increased harvesting of smallwood on steep country, of all soil types, could take place. The obvious catalyst is market demand. Factors such as labour and continuity of establishment will still be important to the manager of steep country resources. However, the direction of research should be to continue to develop logging systems which provide him with the option of delayed thinnings, to take advantages of possible markets.

Research should concentrate on extending present logging methods to their limits. On steep country, flexibility and adaptability are the key. It is felt that for some years haulers have been the focus of research attention;

1. From recognised research associations;
2. From private companies and contractors;
3. Overseas.

Examples of this include LIRA and F.R.I.'s involvement in the Lotus development, innovation by small hauler operators contracted to Forest Products, and the monitoring by LIRA of research in the Pacific Northwest into cable logging.

It is fair to say that while haulers are becoming more efficient they are expensive to buy and run, they require continuity of resource, regular markets and skilled labour. They are not the total answer to smallwood harvesting on steep country.

While we cannot ignore research requirements for improvements in small hauler systems, we should concentrate in the next few years on ground-based systems, as here is found the versatility required. Small crawlers, agricultural tractors, and to some extent skidders, can circumvent problems of continuity of work, by being available for other jobs not necessarily in the forest. They are easily modified (frequently by their owners) to increase productivity by the use of attachments. They are cheaper to buy and, apart from the machine operator, they require less skilled labour. Crawlers can stand alone as a single unit by doing their own tracking.

The single most important problem associated with pushing ground-based systems to their limits is safety. Efficient crawler or skidder logging on steep country requires :

1. Good planning at the operational level;
2. An operator with skilled knowledge of the limits of his machine on his soil and terrain;
3. Well maintained gear.

Environmental problems also demand consideration. Damage to crop element, excessive soil disturbance and consequent downstream problems, must be minimised and this starts at the planning level.

As a result of the above, which can be summarised as not forgetting haulers whilst concentrating on ground-based systems, the following recommendations are made.

1. *Classify areas by soil type that can be tractor or skidder logged.*
2. *Define limits of machines on terrain types.*
3. *Research production costs, collate and make them available to forest managers.*
4. *Investigate attachments to prime movers, test suitable options.*
5. *Investigate load accumulation to improve hauler production.*
6. *Investigate the best methods of training machine operators and familiarising them with handling techniques on steep country.*

#### Difficult Ground or Terrain Conditions

These conditions are often associated with steep country and are certainly aggravated by slope. They are usually also localised. Examples are :

Pakahi swamp conditions,  
Unstable East Coast soils,  
Rocky terrain, such as in the Kaweka's,  
Sand dune forests,  
North Auckland gumland clays.

Problems, if any, created by these conditions, have not been given a great deal of research attention with regard to smallwood harvesting. Future production of such areas is likely to increase slowly because much of the flatter country has been intensively silviculturally treated, e.g. sand dune forests. However, the same options as presented to the steep country manager may also apply to these conditions, i.e. late thinnings.

Therefore, research should :

1. *Identify broad categories of difficult ground conditions. If possible, specific zones could be defined, especially where smallwood harvesting is a likely option within five years.*
2. *Recognise the main problems within the category, e.g. traction, ground disturbance, or allowable dirt content.*
3. *Investigate clam bunk skidders (in spite of apparent high cost).*

4. *Investigate forwarders to minimise contact of produce with ground.*
5. *Investigate further the pros and cons of high-flotation tyres and tracks.*

#### Summary

It is quite impossible to expect LIRA to do all that research. While it can supply expertise to advise, assist and collate, the industry must be prepared to carry out some of this work. Don't forget that innovation carried out by owner-operators are basically research. Even failures in one area may work in another. You are urged to spread your knowledge and LIRA is the best medium through which this can basically be done.

