# Organisation of steep land harvesting research in New Zealand – where to from here?

Russell Dale

## Abstract

This paper provides an overview of the changes that have occurred to the funding and organisation of forest growing research in New Zealand and the impact of these changes on the management of the Future Forests Research Ltd (FFR) Steep Land Harvesting research programme (the steep land programme). FFR initiated a harvesting research programme in 2008 when the industry identified harvesting on steep land as a priority. For almost a decade there had been little or no structured research programme in the harvesting end of the business.

It is estimated that the industry spends in excess of 1.25 billion dollars annually in harvesting the forest crop and moving logs to ports or processing plants. The reasons for initiating this new programme were the increasing proportion of the national forest harvest coming from steep land, the poor productivity gains being achieved relative to what was being attained on flat land, and the higher risks to loggers working on steep land. Approximately 40 per cent of forestry fatalities have occurred on steep land, with tree felling and breaking out the most common activities associated with fatalities and serious harm accidents in the forest industry.

With government support through 50 per cent funding from the Primary Growth Partnership (PGP), a Ministry for Primary Industries initiative that recognises the critical role the primary sector plays in the New Zealand economy, the steep land programme was expanded in 2010. The vision of the programme is to reduce the costs of harvesting on steep land, with improved and safer working conditions encouraging the development of a highly motivated workforce using sophisticated technology. The aim of the programme has been to assist with the development of technology that will isolate workers from hazards through mechanisation, remote control, and ultimately an increased degree of autonomous operation of harvesting machines. In many ways, the programme is leading in these areas internationally, which has led to significant interest worldwide. Importantly, it has helped to restore and build harvesting science and innovation in New Zealand.

This paper also considers what happens beyond the end of the current PGP programme in 2016, and discusses some opportunities for the forest growing sector to achieve further productivity and safety gains in the harvesting and logistics part of the supply chain.

## Background

The FFR Harvesting Theme commenced in 2008 with a group of forest industry companies who were committed to seeing a re-activation of a well-structured R&D programme in harvesting and logistics. After a period of almost a decade since the demise of the former Logging Industry Research Organisation (LIRO), it was not easy to identify research areas that were beyond business as usual, strategic and capable of delivering significant improvements in productivity and safety.

However, a strategy was developed with the assistance of overseas harvesting researchers who had developed similar harvesting research programmes in Europe, North America, Australia and South Africa. This strategy enabled the industry to more clearly articulate its focus on steep land harvesting, and the need to improve both productivity to halt ever-increasing cost pressures and the safety of harvesting operations on this land. Mechanisation of felling and log manufacturing had enabled these gains on flatter terrain, and the industry identified that it needed to find ways of achieving these same gains on steeper land using similar technology.

Residual funds from the former Logging Industry Research Organisation were made available by the trustees of this fund through the NZ Forest Owners Association, and these funds along with industry contributions were sufficient to get a small programme of work underway. Attempts to source government funding support through the then Foundation for Research Science and Technology were unsuccessful and an application to the Labour government Forest Industry Development Agenda was overtaken by a change of government. However, the new National government established the PGP to spur innovation and growth in the primary sector and an early application to this fund secured matching funding from government. The proviso was that the industry provided a minimum of $500,000 of industry co-funding with the PGP fund matching this dollar for dollar.

The programme was not universally supported by all major forest growers, but there was sufficient support by forest owners, contractors and suppliers to secure the minimum funding required. The new PGP steep land programme was then approved in 2010 for a six-year term ending mid-2016. Total funding over this period is $6.52 million. The programme was just the

second PGP programme approved by the government. It is now into its fourth year and has less than two years to go to completion.

The achievements of the steep land programme are recorded in a separate paper by Keith Raymond, the Research Programme Manager. In summary they include the commercial development of the ClimbMAX steep slope harvester, the development and release to the industry of the HarvestNav on-board navigation system, commercialisation of the CutoverCam, a remote controlled hauler vision system and further development of the Alpine Grapple, a lightweight hydraulic grapple carriage. A number of other innovative projects, including remote control of harvesting machines and innovative carriage designs, are also underway within the FFR steep land programme.

## Changes to R&D funding

There have been changes to R&D funding arising from the new forest growing levy. Unlike other primary industries in New Zealand, the forest industry has not had a compulsory levy to fund industry good activities, such as research, despite the idea of a levy being investigated and considered previously. During 2012/13 new proposals were developed for the introduction of a forest growing levy. It quickly became apparent that, should the levy be adopted, a new way of organising and delivering industry good activities including research would be required. The result was the formation of a joint NZFOA/NZFFA secretariat to:

- Administer the collection of the new forest growing levy
- Convey recommendations from the industry to the new Forest Growers Levy Trust on how the levy should be allocated to the various industry good programmes
- Report on the management of levy-funded activities for the Forest Growers Levy Trust.

With the introduction of a compulsory forest growing levy on 1 January 2014, much of the industry good research previously funded through voluntary contributions by industry members is now funded from the new levy. This has resulted in significant changes to the way in which the forest industry organises and funds its pan-industry forest growing research activities.

Responsibility for the implementation of the various levy-funded initiatives lies with the NZFOA and the NZFFA. An important means of how these associations deliver this responsibility is through joint NZFOA/NZFFA committees. Comprising industry people, these committees are responsible for planning and overseeing the delivery of the levy programmes for the benefit of all forest growing levy payers, although they do perform other roles. Research is a good example of this where a Forest Research Committee has been formed and undertakes this role for levy-funded research programmes. The committee also has a role to play in managing non-levy-funded research programmes funded by a 'coalition of willing partners' where these partners agree.

## Research programmes funded by levy

The Forest Growers Levy Trust has allocated approximately 50 per cent of the levy funds to R&D in 2014. Based on recommendations of the Forest Research Committee, NZFOA and NZFFA, the levy trust has allocated funding in 2014 to support six research programmes totalling $3 million. The programmes supported for the first year of the levy programme are shown in Table 1.

The FFR steep land programme, while supported and rated as important by the forest growers, did not receive levy funding due to levy funding constraints. Another programme to investigate the genome of Radiata pine was also not funded due to these constraints. However, to keep the research work going the individual forest company and other investors in both these programmes have agreed to continue to support the research programmes.

## Management of PGP steep land harvesting research

Following the transfer of forest growing research oversight from FFR to NZFOA management, the investors in this programme agreed to retain the FFR company structure for the steep land programme to protect

Table 1: Research programme funding 2014 ($m)

| Programme | MBIE funding | Forest growing levy | Scion core funding | Other | Total |
|---|---|---|---|---|---|
| Diverse species | | 0.30 | 0.25 | | 0.55 |
| Fire | 0.70 | 0.06 | .05 | 0.30 | 1.11 |
| Sustainable Intensification | 3.38 | 1.60 | | 0.20 | 5.18 |
| Phytophthora | 2.20 | 0.40 | 0.50 | 0.27 | 3.37 |
| Bio-protection | | 0.30 | 0.08 | 0.30 | 0.68 |
| Foliar diseases | | 0.34 | 1.89 | 0.16 | 2.39 |
| **Total levy funded** | **6.28** | **3.00** | **2.77** | **1.23** | **13.28** |

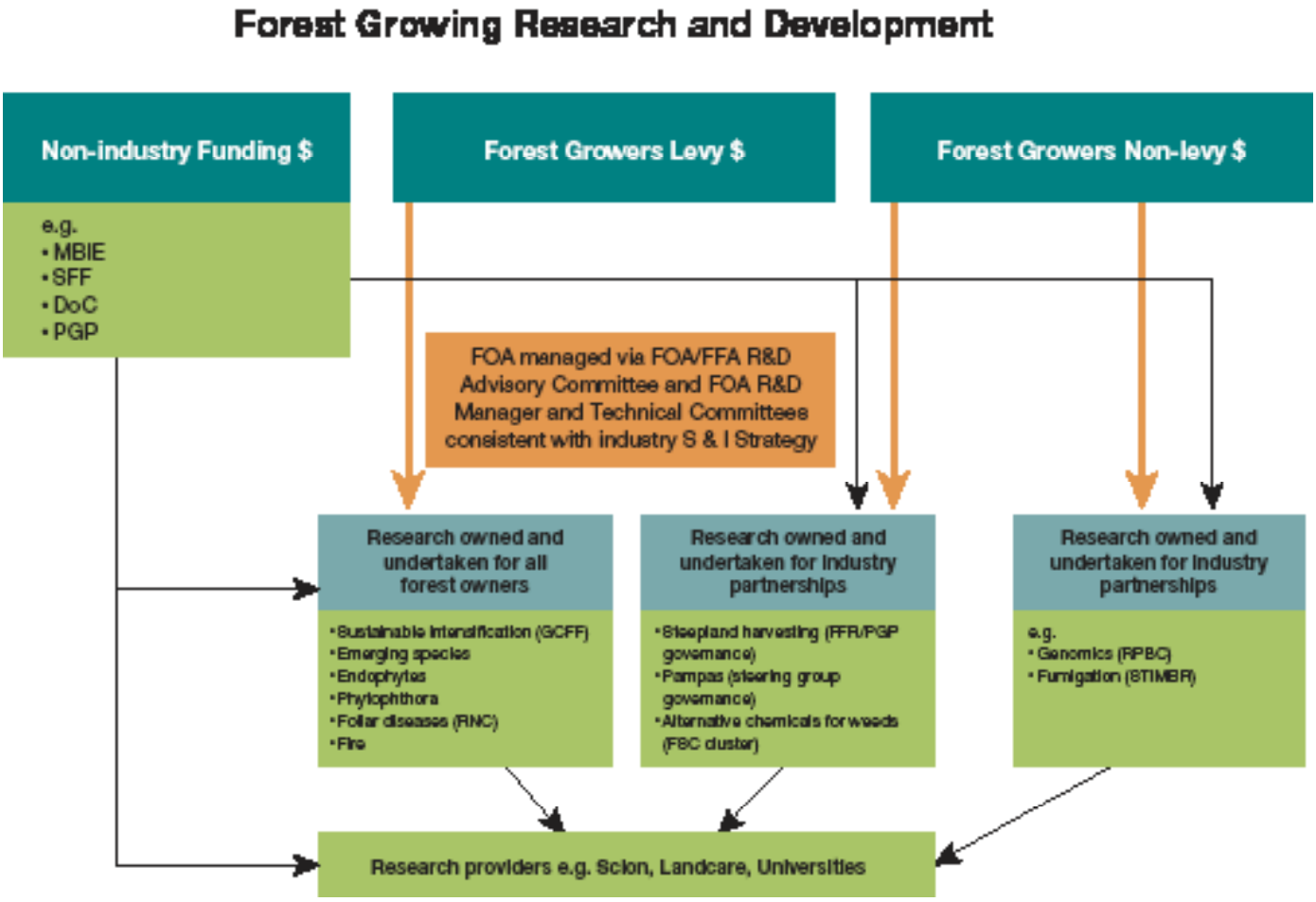


Figure 1: Organisation of forest growing R&D

commercial arrangements and to ensure programme control remained with the investors. However, to ensure overall coordination of forest growing research activities funded by forest owners, whether by way of the levy or by coalitions of willing investors, it is being managed by NZFOA under a management agreement with the FFR Board. The new forest growing research funding structure is shown in Figure 1.

The detail of the steep land programme continues to be managed by a Technical Steering Team made up of industry people knowledgeable in steep land harvesting. The committee has the role of:

- Engaging with science leaders to understand the research programmes
- Providing advice and recommendations on the technical direction and progress with the research programmes
- Providing assistance in the form of operational information and harvesting contractors to evaluate new technology in harvesting operations, and
- Importantly, being advocates for the programme, and assisting with technology transfer and industry uptake to ensure the desired outcomes from the programme are achieved.

The other important part of the governance for this research programme is the Programme Steering Group (PSG), which comprises two representatives from the industry investors and two people from the Ministry for Primary Industries representing the PGP investment in the programme. The role of the PSG is to:

- Approve the annual research programme
- Consider recommendations from the Technical Steering Team on the programme
- Approve any minor changes to the programme
- Make recommendations on any major programme changes to the PGP Investment Advisory Panel
- Approve research payments.

The PSG also deals with communications, as there is agreement that these will be jointly agreed between the Ministry for Primary Industries and FFR before release to the media or wider audiences.

## Where to from here?

The FFR steep land programme has been successful in getting industry participants engaged and involved in innovation with a clear focus on improving the productivity and safety of the tree felling and extraction

phases of harvesting. As well as the programme outputs, there is recognition that it has been a catalyst for a new round of innovation in forest harvesting. The emergence of other cable secured machines, grapple systems and vision camera systems is an example of industry players seeking better ways and this is a very promising sign for the industry.

This research programme comes to an end in mid-2016, less than two years away, and the current programme will not be extended by the Ministry for Primary Industries. This means that agreement is needed by the industry to support a new programme of work focusing on other aspects of harvesting or the wider supply chain to continue the momentum to date.

The scope of the steep land programme was deliberately constrained to just focus on the felling and extraction of trees from steep land. Research funds were limited, and it was considered important to focus on this part of the supply chain where there was a strong element of common interest by industry investors. A number of the more innovative and blue sky research projects already underway will require further development beyond the current programme before they are ready for commercialisation.

Any future work will utilise the innovative capability developed through this programme at Scion, the University of Canterbury, and a range of engineering companies, and the infrastructure developed by FFR to manage projects.

Work in 2013 that investigated a possible extension of the current programme identified a number of potential opportunities for forest owners to capture value further down the supply chain including:

- Moving log manufacturing away from the hauler landing to a separate less constrained site, thus allowing smaller landings and a less hazardous environment for log manufacturing
- Debarking and using log processing heads or other technology to optimise log-making
- Capturing true volume log measurements from the optimising technology, tagging logs, and using this information to provide better tracking of logs from forest to end user
- Using true volume log measurements to eliminate the manual and time consuming JAS scaling of export logs
- Assisting the industry to meet phytosanitary standards for export logs.

The current steep land programme has a safety focus through the development and utilisation of new technology, mechanisation, and ultimately increased automation, but it is not a safety research programme. It will be surprising however if the Independent Safety Review Panel, whose report is imminent, does not identify the lack of any formal safety research in the forest industry as an issue and make recommendations in this area. Some areas for an increased safety research focus could be:

- Investigate and understand the reasons for the risk-taking behaviours of forestry workers
- Investigate the reasons for the high rates of worker turnover and what is needed to reduce this
- Understand the barriers to the long-term retention of skilled workers
- Investigate and understand the reasons for lack of adoption of safe logging practices
- Investigate the further development of tele-operated and autonomous harvesting machinery
- Improve the working conditions of loggers through monitoring fatigue levels and reducing fatigue by improved work methods and equipment.

## Conclusion

The steep land programme has been successful in engaging forest owners in a programme to raise the levels of innovation in the harvesting industry through the adoption of new technology and assisting the introduction of mechanised tree felling, bunching and grapple extraction on to steep land. This has acted as a catalyst for further innovation as industry players attempt to modify, improve or reduce the costs of the outputs from the programme. The introduction of mechanised felling and bunching on steep terrain has been accelerated, and if properly managed will result in a reduction of accidents in this phase of the business. As noted, the programme has helped to restore and build harvesting science and innovation in New Zealand, much of which is world-leading.

However, with the current programme having less than two years to go before funding stops it is now becoming urgent for the industry to begin considering the opportunities for further improving the safety of forest harvesting operations, increasing the returns to forest growers through better productivity and reduced costs, and more effective management of the supply chain from forest to customer. This discussion needs to start now or there is a high risk of losing the momentum and capability that has been built up over the last six years in this critical part of the supply chain.

***Russell Dale is R&D Manager at the NZ Forest Owners Association and is based in Rotorua. Email: russell.dale@ffr.co.nz.***