

Future environmental challenges and New Zealand's planted forests

Tim Payn



South Island high country wildings

Abstract

Environmental issues are becoming increasingly important globally and nationally. Through a survey of New Zealand forestry professionals, in particular members of the New Zealand Institute of Forestry (NZIF), I identified current and emerging environmental challenges facing forest growers. Current and emerging physical challenges focused on harvesting and water, climate impacts, biosecurity and biodiversity. Challenges in the human environment were identified as perceptions of forestry and the social licence to operate (SLO), environmental regulation and policy, workforce and health and safety (H&S), climate policy and carbon forests, and the integration of forestry into landscapes.

Future projections suggest a tighter regulatory environment and increasing public scrutiny and the challenge to forestry's SLO. To maintain a resilient, publicly acceptable and sustainable sector growers will need to continue to improve environmental

management practices, invest in research to assist this, and improve knowledge and information flows with the wider community on environmental management.

Introduction

The theme of the 2017 NZIF's annual conference was 'The Future of the New Zealand Forestry Sector'. I was asked to address the future environmental challenges facing our planted forests.

New Zealand has ~1.8 m ha of planted forests distributed across the country in diverse climatic, physiographic and edaphic environments. The environmental diversity makes forest operations challenging, and since the forests were first established in the early 20th century foresters have had to face soil fertility, soil compaction and soil erosion problems. Biotic and abiotic stressors have also had effects – pests, diseases and weeds, as well as fire, wind and drought. These are physical environment aspects, and are often the first things foresters think about when the word

‘environment’ is mentioned. However, forestry has also had to operate within the human (social, political and economic) environment. In this respect it has had to deal with regulatory and market-based challenges, and various forestry legislation and policy instruments.

In recent years the physical environment and its degradation has become a very important national issue, with declining water quality in our rivers, streams and lakes and groundwater (MfE, 2017) caused by land use intensification. This has led to the development of the National Policy Statement on Freshwater Management (NPS-FM) (MfE, 2017), with a National Objectives Framework designed to set contaminant limits for water bodies.

Concern about a changing climate is also increasing, and at the Paris Climate summit in 2015 New Zealand committed to decreasing its greenhouse gas emissions as one strategy to fight climate change. Other initiatives in New Zealand have addressed approaches to minimise or mitigate climate impacts on the primary sector or begun to develop adaptation strategies. Foresters identified climate change as an emerging issue in a 2008 survey (Payn et al., 2012) with a mid-range impact – at least 10 years out. The forest sector is currently engaged with government on this topic through a number of avenues.

Given the prominence of environmental issues, both nationally and globally, a review of current challenges and identification of emerging issues was requested by the NZIF conference organisers. To do this I took a survey approach and canvassed the views of NZIF members and this paper summarises the findings.

Methods

Online survey

To explore the topic of environmental challenges I designed an online survey (www.researchgate.net/project/Planted-forests-and-the-environment) to elicit views on current environmental challenges, changes in environmental management in the previous decade, and perspectives on future environmental challenges facing the forestry sector.

Specifically I asked:

1. What are the top three environmental challenges facing the forest growing sector?
2. Do you think environmental management is better, worse or about the same as a decade ago?
3. What have been the three biggest changes in environmental management in the last decade?
4. What environmental challenges do you see emerging in the coming decade?

We asked respondents to identify their role in the forestry sector: forest manager, forestry contractor, forest owner, landowner, farm forester, retired, local/regional/



Example of a debris flow

national government agency, academic (tertiary/CRI), consultant, environmental non-government organisation and student.

Only members of New Zealand’s professional body the NZIF were surveyed. The Institute has over 800 members with a variety of backgrounds and roles. It is also planned to survey a broader set of stakeholders in future to gain an external perspective on the environmental challenges facing forestry.

All responses were kept confidential and summary data was anonymised, although we did request respondents’ contact details in confidence in case we had a follow-up question.

Survey analysis

Results were summarised in Survey Monkey where summary statistics could be generated, and all text was extracted into Excel spreadsheets to compile the information associated with each question. Responses were grouped based on two environmental categories – physical and human. The physical category contained responses that related specifically to physical aspects of the environment such as erosion or debris flows, while the human category encompassed social, cultural, policy, regulatory economic and market-related responses.

Word frequency analysis was done on the text resulting from each question using WordItOut (www.worditout.com), which enables the generation of a visual ‘word cloud’ where the frequency of occurrence of each word is reflected in its font size. This gives a visual summary of dominant words.

The interpretation of the results was done by me and others might interpret the results differently, depending on their perspectives, or pick up different threads. The spreadsheet and raw text responses by question have

and regional policy discussions, possibly because the number of people in the forestry sector are less than those involved in the pastoral sector.

Comments about the workforce and H&S highlighted the shortage of properly skilled workers, decreasing levels of experience, and the need for the education of small operators to improve environmental outcomes. Safety was mentioned generically, both in-forest by balancing safety with environmental considerations and outside the forest gate in the context of road transport. The challenges around climate change and mitigation concentrated mainly on mitigation and the ability of forests to provide carbon sequestration services, and the challenges around understanding these values and the politics of carbon and Emissions Trading Scheme (ETS) settings.

Changes in environmental management

Sixty-seven percent of respondents thought environmental management was better today than a decade ago, 21% thought it was about the same, 10% thought it was worse and 2% did not respond (Figure 4). This paints a positive picture for forestry. A number of general comments were made by those respondents who thought environmental management was better. The comments pointed to:

- An increased awareness of environmental issues
- A better understanding of the environment and the need to avoid or minimise negative impacts
- The development of environmental management systems by companies
- The positive benefits of third party certification on environmental management practices
- The fact that expectations from outside are higher, but also that the environmental challenges have increased with movement onto steeper sites and the rising incidence of extreme rainfall events.

A number of mentions were made of the ability of large companies to better manage the environment compared to small companies who may have access to less resources. While respondents generally thought things were better, there were numerous comments on the need to continue to improve environmental management.

Digging a little deeper into the responses to the question 'What have been the three biggest changes in environmental management in the last decade' allowed us to tease out more insights. We were able to group changes into six main categories (in order of number of mentions):

1. Standards and regulations.
2. Awareness, perceptions and oversight, (external).
3. Awareness, understanding, culture, skills and training (internal).
4. Harvest management.
5. Technology advances.
6. Chemical management.

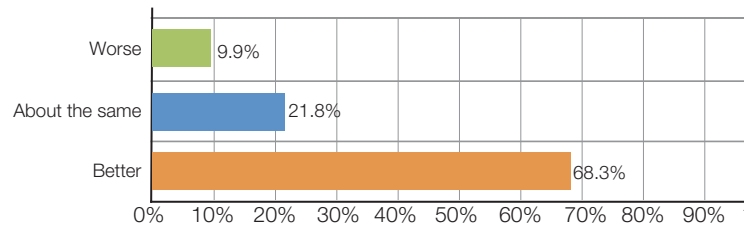


Figure 4: How has environmental management changed in the last decade?

The most frequently mentioned standard was the development of the National Environmental Standards for Plantation Forestry (NES-PF) (MPI, 2018a), which aim to 'maintain or improve the environmental outcomes associated with plantation forestry activities and increase the efficiency and certainty of managing plantation forestry activities' through a single set of regulations under the Resource Management Act (RMA) 1991 that apply to foresters throughout New Zealand. This has been a very significant collaborative initiative by the forest sector, the Ministry for Primary Industries and local and regional government. While it only came into force in May 2018 it signals a major change from the multitude of regionally-based regulations applicable in the past.

The other very significant change noted was the impact of forest certification standards on environmental management, initially under the Forest Stewardship Council (FSC), but more recently under the New Zealand forestry standard endorsed by the Programme for Endorsement of Forest Certification (PEFC). Collectively, these two big initiatives plus the *New Zealand Environmental Code of Practice for Plantation Forestry* (NZFOA, 2007), the *New Zealand Forest Road Engineering Manual* (NZFOA, 2011), ongoing improvements to company environmental management standards, and more requirements from councils are felt to have led to improved environmental management.

Respondents identified that increased awareness of forestry activities and potential environmental impacts and the possible effects on forestry's SLO from the wider public, and increasing pressure to increase management standards even further, suggests that while things have improved in the last decade the sector cannot rest on its laurels. The biggest technical area of change reported was in the harvesting area. Better roading and harvest planning in hill country, forest engineering (landing construction) and higher standards of road construction, waterway protection during harvesting, water and sediment control, slash management and riparian management were mentioned frequently. This was linked closely to an improved awareness of environmental management by forest contractors and managers, better staff training, harvesting skill levels, and an overall increase in an 'environmental culture'.

Developments in technology also supported these changes – better harvest planning tools, GIS, digital terrain models, LiDAR and remote sensing, environmental monitoring technologies, better

harvesting technologies and mechanisation. Changes in chemical management were also noted by a number of respondents in terms of understanding, responsible use and application methods.

While only 10% of respondents thought things had worsened in the last decade their insights are very useful in painting the whole picture. General concerns can be summed up around complacency, movement onto very challenging steep land sites, overall increases in harvest volumes, and increasing storm events causing more environmental impacts. Also mentioned were wildings, disease, a low genetic base and poor community understanding of forestry.

Emerging challenges

Again I segmented issues into physical and human. In the physical category a lot of the current issues continued to be represented. Water was the dominant one – cleaning up our waterways, controlling sediment and slash ingress to water bodies. The outcome sought was clean water and the main concern again was steep land harvesting and how to protect water resources. There were also a few mentions of water flow, quantity and allocation – a new topic compared to current challenges.

Climate change and its impacts was much more prominent than in the current issues. A recurring theme was concern about more frequent extreme climatic events, linked once again to harvesting and water quality. The big emerging challenge, however, that rated second only to water was biosecurity – incursion risk, risks from a single species model, impacts from new pests and diseases (climate-related), weed spread, and out of control wildings. There was also some mention of biodiversity challenges, and protecting rare and endangered species.

Four main themes emerged from the human category. The first was the broad expectation that regulation and cost of compliance would increase. There would be increasing restrictions on land available for forestry, harvesting operations and specifically coupe size, chemical use and earthworks. Compliance costs, such as consents, and monitoring requirements

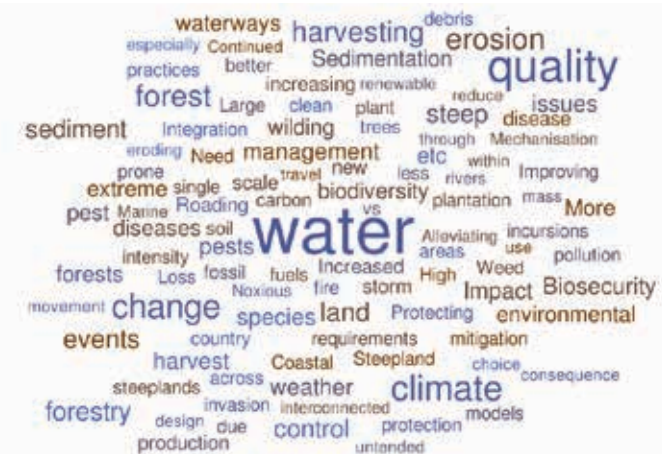


Figure 5: Emerging challenges – physical

are also expected to increase. Consistent application of the NES-PF across all regions is also seen as an issue.

The second theme was around perceptions of forestry and SLO. Respondents are expecting more public scrutiny and judgement, pressure around the visual aspects of forestry, especially harvesting cutover, and logging slash and debris and sediment in waterways. There will be a large challenge to educate communities as to the benefits of forestry to regional economies and about climate change mitigations, and that forestry is a sustainable land use despite some of the very visual and physical impacts. There was a comment that with increasing urbanisation the challenges of explaining rural land use practices becomes even harder. Expectations will often be based on a very limited understanding of forestry.

Tightly aligned with the SLO theme is the third challenge emerging around the possible expansion of forestry as a carbon sink and a mechanism to help New Zealand meet our Paris climate commitments. This expansion will require an enduring and stable climate policy and an ETS that is useable and equitable, the thoughtful placing of trees in the landscape, and good community engagement to ensure the benefits are understood.

This leads on to the fourth challenge, that of effectively integrating forestry within the landscape and communities. Challenges include developing equitable land use policies and land use change mechanisms, the rights of landowners, and exploring synergies between key players in adjacent productive ecosystems. Flows of ecosystem services between land uses and the recognition of environmental benefits from forestry within catchments, or increasing competition for scarce resources such as water, were all identified.

Discussion and conclusions

The results of the survey have given some very interesting insights into the current and emerging environmental challenges facing forest growers, and changes in the last decade, as seen by forestry professionals. Challenges are fairly evenly spread between physical and human categories. Physical challenges in both current

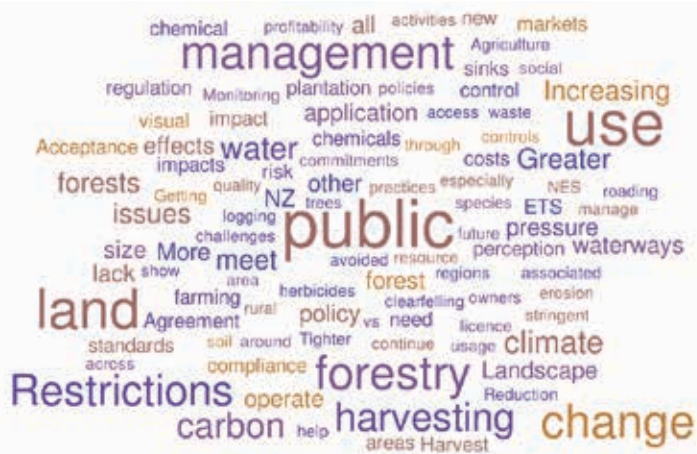


Figure 6: Emerging challenges – human

and emerging groups were harvesting and water quality, climate change impacts, biosecurity and biodiversity.

The current human challenges were perceptions and the SLO, regulation and policy, workforce and H&S, and climate change impacts. Emerging human issues were a little different: regulation and compliance, perceptions and the SLO were similar, but two new challenges around forest expansion for carbon forestry and the integration of forestry into landscapes emerged.

The view was that overall environmental management had improved strongly in the past decade. This was based on: a greater awareness of the importance of the environment and the need to minimise impacts; developments in environmental management best practices and codes of practice; and the advent of forest certification and development of new regulations. This picture of improvement was tempered, however, by comments that there was still plenty of room for improvement and more was needed.

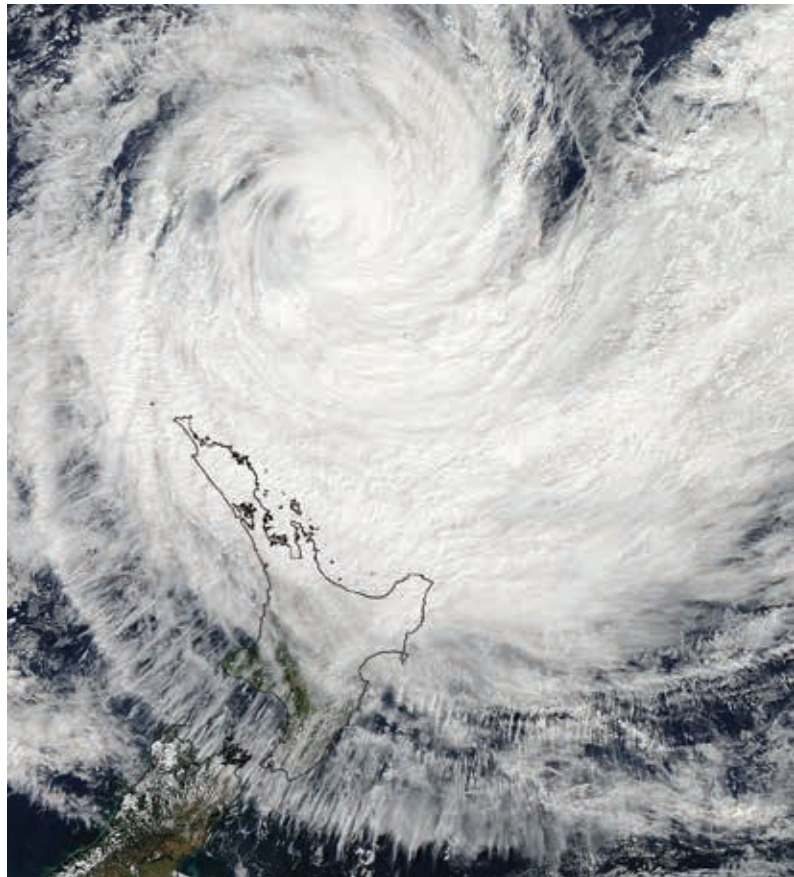
Respondents are expecting a tougher regulatory environment in the future and much more public scrutiny of operations and activities. This is likely to focus on obvious environmental impacts with the increased harvest coming on-stream, such as the results of sediment and debris flow events, visual impacts (e.g. large-scale clear-cuts), or increased logging truck movements and associated impacts (e.g. dust or noise). Respondents are also expecting a more volatile climatic environment with more extreme events, and increased risks from pests, diseases and weeds.

So how could the forest growing sector respond to these challenges? Given these pressures a major issue will be to maintain its SLO to be able to continue to operate profitably. There were only a couple of small mentions of the economic environment by survey respondents, but they related to concern around increased compliance costs and difficulties maintaining profitability in the future given various current and emerging challenges.

Public perception is very important, so increasing public awareness of the environmental challenges forestry faces, how it manages them now, and what it plans to do in the future will be very important. A recent study on the SLO (Edwards et al., 2018) showed openness, transparency and honesty to be key components in gaining and maintaining a social licence.

Respondents identified the need for continual improvement in environmental management, and field days related to steep land management have identified the benefits of sharing information on current best practices amongst the forestry community. The various wood councils or other regional forestry groups are doing this to varying degrees and sharing further nationally might be a good next step.

There are good written sources of information available. The NES-PF Good Practice Guidance material recently developed (MPI, 2018b) will highlight state of the art practices, and supporting documents such



Tropical Cyclone Pam bearing down on New Zealand

as the NZ Forest Owners' *Environmental Fact Sheets* (NZFOA, 2018), and the already mentioned *New Zealand Environmental Code of Practice for Plantation Forestry* (NZFOA, 2007) and *New Zealand Forest Road Engineering Manual* (NZFOA, 2011) are excellent material.

There will be research needed to support responses to these challenges. Harvesting and water quality, the SLO, and responses to climate change impacts would be three main areas to investigate where increased effort and focus would be beneficial. Other areas such as biosecurity (e.g. wildings) have quite active research programmes. Topics emerging around harvesting and water quality include new silvicultural/harvesting/catchment design approaches to minimise erosion and debris flow risks, the retirement of extremely erosion-prone forests to permanent forest status, and the potential of enlarged riparian buffer zones.

In the SLO area a follow-up to this survey is planned to better understand wider perspectives on forestry's environmental challenges and to see if the results line up with this study, and if not where that might identify new or different responses. We will survey national, regional and local government, iwi, environmental non-governmental organisations (ENGOS), other land use groups, and communities with the same three questions. Responses to climate change will need increased emphasis given the long-term nature of forestry and the expected increased risks. To determine where this research may focus, a forestry Climate Change Adaptation working group may be a good start to scope out needs.

While this paper was being written a number of extreme rainfall events triggered some very significant debris flows and associated impacts on downstream land and infrastructure, both in Golden Bay (ex-Cyclone Gita in February 2018) and on the east coast of the North Island with the Tolaga Bay events (June 2018). The events had significant environmental and social impacts and created a very high level of media coverage, community concern and opposition to forestry on steep and erodible land.

Online comments to a specific article in the *Nelson Mail* (2018) ranged from calls for a total ban on steep land production (clearfell) forestry, the retirement of steep lands to native species and no harvesting, removing the slash from on-site through finding a valuable use for it, getting the forestry companies to take responsibility and pay clean-up costs, and planting higher value species and using small coupe or selective harvesting. The issue of debris flows was identified as a national one.

A petition was launched calling for stronger controls on forestry in the Tasman District, which by 27 June 2018 had garnered over 8,000 signatures (see www.change.org/p/stronger-controls-needed-on-forestry-in-the-tasman-region). The Tolaga Bay event was on a larger scale than the ex-cyclone Gita event and resulted in a very high level of media coverage with very similar perspectives. There were also calls for stronger controls on forestry, even with the new NES-PF which came into force in May 2018 (see www.radionz.co.nz/news/national/358981/tougher-rules-needed-to-stop-logging-debris-environmentalist).

The findings from this study and the planned wider study will give a good picture of current and future challenges. It should be very useful in helping the forest sector develop responses, and ultimately build a more resilient and sustainable land use that is well accepted by the wider community across all environmental challenges identified. It is obvious from recent events that debris flows and climate impacts are a very urgent and topical issue to both the wider community and the forestry sector.

Acknowledgements

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