At Loggerheads: An Examination of Afforestation as a Climate Change Prevention Tool and Environmental Policy

A 60-credit Journalism Project presented in partial fulfilment of the requirements for the degree of Master of Journalism at Massey University

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Abstract

This project examines the impacts of afforestation as a policy tool for mitigating climate change. Additionally, it examines the New Zealand media coverage of the One Billion Trees programme, and how this is influenced by access to sources and the use of framing. It will explore the programme's tensions between farming and forestry, and native versus exotic tree planting and its implications as a policy to address climate change.

Acknowledgements

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I'm also grateful to the editorial staff at the *Wairarapa Times-Age* who have accommodated my reduced hours and been patient about my excited ramblings as the project progressed. Thank you for giving me the time to pursue a lifelong goal.

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Introduction

Climate change is one of the major challenges facing society and the media play a significant role in influencing how people and governments in turn respond to the issue. This project explores how the New Zealand media have covered one of the government's key policies for mitigating the impacts of climate change, the One Billion Trees programme.

It begins with a long-form piece of journalism exploring the topic from a number of perspectives. This article has been informed by the literature review and content analysis which follow. The findings of both are further explored in a discussion with three journalists who explain the challenges involved with reporting on climate change topics.

This project seeks to build on existing research about media coverage of climate change both in New Zealand and abroad, and to capture how this coverage has changed in recent years as the issue became more prominent in the public domain.

While previous climate change coverage was centred on questions about the causes of climate change and man's part in this, it is now widely accepted by New Zealand media that climate change is the result of human activity and over-industrialisation (Milfont et al, 2017; Salmon et al, 2017). With the causes of climate change now widely accepted, the current debate instead focuses on how to resolve climate change and the steps we can take to mitigate its effects with particular emphasis on reducing greenhouse gas emissions (Kenix, 2008).

Media framing of climate change issues is believed to fit in to two general approaches, alarmist or discursive frames, and plays an important role in how the public comes to understand the implications of the policy (Painter et al, 2018; Schafer et al, 2016). The content analysis provides both a qualitative and quantitative framework with which to better understand the influences of sourcing and framing on media coverage.

In full, this project will be a study of the One Billion Trees programme as a means to mitigate climate change; it's environmental and economic impacts; and the different implications of exotic versus native trees being used towards this goal. It will ask questions about the role of the media in shaping public understanding of this policy.

Journalism Article

The many branches of the One Billion Trees programme

Nestled between Gladstone and Martinborough, just passed the long-closed Longbush school now converted to a play centre, scattered between the family farms and lifestyle blocks you'll find the 460-hectare farm, Waikoukou, down a two-kilometre gravel road.

It's here that GIANINA SCHWANECKE is meeting third generation farmer, Peter Gawith to learn more about the relationship between forestry and farming, and hear growing concerns that government policy is driving afforestation of productive farmland.

As the Toyota Landcruiser hauls us up and down winding hill country farm tracks, up towards the airstrip – elevation about 400 metres – it's clear to see why tree planting is such a necessary part of farm planning and management here. Here where heavy rainfall can wash away huge chunks of hillside and grazing land in a matter of minutes, take out key infrastructure like farm tracks and fence lines or deposit sediment into the waterways.

Gawith took over the farm in the early 1970s. Following a large rain event in 1977, he lost about 20 per cent of the hill country to slips. He likens hill country erosion to a bleeding wound – if he didn't learn to farm in a way that prevented this from happening and protect the hill country, he would lose the farm.

His father was an early adopter of integrating tree planting into the running of the farm, first starting in 1952. "My relationship with forestry is a continuation of the previous generation," Gawith tells me. "Tree planting has always been about management of hill country farming."

As we climb, he points to towering pines, poplars and eucalyptus trees which have secured the hillside – like "concrete and steel" tells me. "We have better than 60% coverage of the property in terms of our vulnerable soils and don't have the level of discharge."

The trees have been planted strategically to allow for dual land use purposes, with trees spaced 15-20 metres apart to allow for stock grazing. They provide shade and in dry summers like the one just passed, an alternative source of feed; during winter though they lose their leaves allowing the grass to grow unshaded. A hard wood variety, they also earn carbon credits through the Emissions Trading Scheme [ETS]. "For half the poplars we get the same effect that we would for pine trees. Poplars have twice the root strength of pine trees," he says. "And underneath we've got a livestock operation, whereas pine is just pine."

A small portion of the property has been planted in pine though – some blocks are even on their second rotation. "It's really the class of land we can't protect with our two tier system so we've retired it completely. For every bit of land I've retired I've never lost a stock unit," he tells me quite proudly.

He says land use should be kept "as open as possible" and allow for multiple uses. Some plantation pine was important to diversify a farming operation in case of biosecurity threats like foot and mouth disease or M. Bovis which could empty a farm of its stock. "You have to be so flexible because every year is different as a farmer. It's about adapting to the needs of the environment and the economy."

On the other hand, pine diseases or forest fires could also impact forest-only blocks. “That’s why it comes down to ‘right tree, right place’. Planting trees and having plantation forestry on the farm is important, but not the whole farm.”

Gawith tells me there has been a lot of farmer angst about whole farms being sold for forestry, with the ETS changing how land is valued, distorting the price, and making carbon farming more lucrative

“It will hurt us in the future; the farms that went for sale in the northern Wairarapa were very often stepping stone farms for young farmers. I feel that opportunity is now being taken away from young farmers. That land is not going to be available.”

Research by New Zealand Beef and Lamb shows that since 2019, about 70,000-ha of productive sheep and beef land has been, or is in the process of being, converted into forestry; this is approximately 13 times more than the average annual amount of afforestation in New Zealand over the past five years.

It’s a concern shared by former Federated Farmers Wairarapa President William Beetham. However, it’s not the government’s One Billion Trees [1BT] policy which is driving these changes, he said. “It’s a policy that has been blamed for afforestation of good sheep and beef country where perhaps it’s not the policy that’s caused that.”

The 1BT programme launched in November 2018 and overseen by Te Uru Rākau, aims to double the number of trees planted in New Zealand over the next ten years through grants to help with planting and related research.

The root of the problem is carbon trading through the Emissions Trading Scheme [ETS], Beetham said. “In reality afforestation is being driven by carbon trading which doesn’t distinguish between anything.”

Sitting alongside 1BT, the ETS is New Zealand’s main tool for reducing greenhouse gas emissions. Established 10 years earlier in 2008, it focuses primarily on carbon dioxide and puts a price on greenhouse gases to provide an incentive to reduce emissions. In June this year, The Minister for Climate Change James Shaw announced massive changes to the ETS including setting a provisional emissions budget, the NZ ETS cap, and price control settings.

It set a provisional emissions budget for 2021-2025 of 354 million tonnes of CO2 equivalent greenhouse gasses and a new cap on the ETS of 160 million tonnes of CO2 equivalent greenhouse gases over the same period. Most significantly it raised the price floor offering of carbon unit from $20 to $35 per unit.

“I’d like to be rather blunt,” Beetham said, “we’re moving into a space of absolute madness. It’s poorly informed and thought out policy that has significant intergenerational effects.”

It’s not just rural communities which should be concerned, he said. “It takes jobs away from people, income away from the country and has a significant environmental impact for generations to come.”

One of his main concerns is how it opened this up to overseas buyers – while the carbon units can’t be sold to overseas companies, they can be sold within New Zealand, cashed up and the money taken out of the country.

It also has significant long term consequences, and unlike other government policy, like social welfare payment amounts, was difficult to reverse, he said. “There’s no thought about what’s going to create the best result for our community whether that’s environmentally, socially or economically.”

He felt the changes were being rushed through, and the public was not properly informed about what this would mean for them. “When you look at how 1BT is portrayed and how these issues came out, I can understand how the media has to look for that quick sound bite. These are issues with quite a level of complexity and are delivered to the public, who have no understanding, in a two-minute slot. There needs to be more complex and in-depth coverage.”

Part of this was the commercialisation of the country’s media and how news was structured and delivered, as opposed to the quality of journalism, he said. However, it also related to how 1BT came to symbolise the issue. “The 1BT programme was initially designed as a programme for jobs and to drive afforestation of certain areas of New Zealand.”

While there were initially some issues with this, he commended Te Uru Rākau for listening to feedback and adapting the policy – one which he now thinks will significantly benefit the country.

Contrary to portrayals within the media, he said forestry and farming shared close ties. “In the area where we farm in the Eastern hills of Wairarapa, there would just about not be a farm that has some sort of forestry on it. We have logging trucks and crews on our roads – it’s an important part of our community.”

Concerns about afforestation of good farmland were shared by many in the forestry industry, he said. “The ‘right tree, right place’ is something that we should all think about it.”

Forestry part of the family tree

For Erica Kinder, chief executive of the Southern North Island Wood Council, forestry is a family business. Growing up on the family farm in Marlborough, her father started planting pine trees in the late 1980s. “It’s sort of what got me interested. A few people had started doing logging in the Sounds and they just made outrageously good money.”

Kinder studied a Bachelor of Forestry Science where she met her husband, an owner at Forest Enterprises, and now their daughter is in her first year of a forestry degree. She said she and others in the industry were surprised by the backlash from rural communities.

“I think forestry was more popular in the 90s than it is now,” she said. “Most locals just don’t seem to know. [Forestry is] out of sight out of mind. Apart from logging trucks driving through towns that’s all people see.”

The SNI Wood Council has been going for years, though others in different parts of the country have been going for far longer. The relationship between farmers and foresters has always been tense, she told me. “Foresters consider themselves farmers, they’re just farming trees.”

She said some farmers see forestry as a threat, in competition for different types of land use. “It’s about the money. Forestry simply makes more money per hectare that every other land uses, except for maybe grapes.”

But pinning down exact figures, particularly on a regional scale, is difficult, she said. “Getting those figures – how many people are employed in Wairarapa, how much does it contribute to our economy – it’s hard to define and companies don’t like to give up that information.”

According to *Infometrics*, the forestry and logging industry is believed to have made up 0.07% of the Masterton District’s contribution to growth last year, compared to 0.33% for sheep, beef cattle and grain farming. Sheep, beef cattle and grain farming made up 3.3% of the district’s GDP compared to 1.3% for forestry and logging. Combined, the agriculture, forestry and fisheries sector brought in $115 million last year and employed 12.9% of the population.

“The amount of money forestry makes compared to the amount of people it employs is incredible,” Kinder said.

The first step in developing commercial forestry is looking at the geography. Where is the land? What is its access like?

“Transport costs for your forest are the biggest cost – getting the logs off the land,” she explained.

The next step is figuring out what you want to do with the trees. Are they for export? Will they be processed at a local mill? If so, what grade?

Forestry and farming are also interrelated in other ways – among the many products processed in New Zealand, logs are turned into firewood, framing timber and logs which are used as fence posts, by farmers. It takes about 22 or 25 years for the trees to reach maturity, ready for harvest – a figure improved with good genetics. It’s not about the age but the size of the tree and Wairarapa trees have the third highest growth rate.

“The more you’ve pruned and thinned the longer you’re going to leave them because it slows the growth process down. It’s quite a big trend that there’s less and less tending. It’s all labour intensive and extremely expensive.”

Pine grows well in New Zealand and it’s simply what customers overseas want, she said. “In commercial forestry it’s radiata pine. There are no commercial minor species plantations.”

Contrary to concerns from groups like 50 Shades of Green, she said 1BT is focused primarily on natives. She said she is not aware of any wood council members who had applied for the grants, nor is her husband. Similarly, many of their members have not been eligible for carbon credits under the ETS. “The ETS for [our members] is something they were already in. There hasn’t been any change,” she said. “It’s for people who have been outside of that system and are now coming into that system where the big gains will be made in planting trees.”

Those taking advantage of this are outliers, she said. “It’s not the norm. We’ve probably seen more of it here in Wairarapa than anywhere else, and Wairoa, but it’s not really happening. It’s simply not for commercial forestry companies. It’s for small-scale landowners.”

The primary goal of 1BT is to get trees in the ground she said; ‘right tree, right place’ is just a meaningless slogan. “I don’t think it matters what tree. Climate change doesn’t care what tree is.”

Kinder strongly believes farmers need to be better educated and empowered about 1BT and its potential benefits for biodiversity on their farm. “It’s about incorporating trees into the landscape. It’s

farmers and iwi. They're the land owners and the ones who can apply for the funding. I think they need the tools to do it themselves."

Limited Māori uptake

Until more recently, Māori uptake of 1BT funding has been fairly limited and one of the key areas Te Uru Rākau has sought to address, with only four per cent of funding granted for Māori-owned land. One of the key barriers has been the scope of land ownership and governance models where whānau groups may hold rights in relation to parcels of land which fall within a wider block owned by iwi or hapu level governance entities. These parcels might be too small for viable forestry and thus they may need to negotiate with neighbouring land owners

This was true for the Rangitane iwi post-settlement governance entity, Tu Mai Ra Trust. Its chair Jason Kerehi said, while the trust was interested in 1BT, it hadn't really applied in its context. "There wasn't any new opportunity for us. We don't have much land. And the land we do have is covered in trees."

Last August, close to 6000-ha of forested land was returned to the iwi – Ngaumu forest, comprising of three former Crown forestry blocks, including Castlehill, Tinui and the Waihora portion of Whareama Crown. Originally planted in the 1940s to help stabilise hill slopes, repurpose marginal land and supply building timber, it was one of the first major forests planted by the Crown.

He said they would continue to work with Masterton-based wood processing plant JNL, who have owned the current cutting rights since 1990, while the trust decided what it wanted to do with the land in the long term. "It's early days for us and we would want to understand how the industry works. We are learning about the land that we've got back. I remember talking to JNL about it and the reality is all that land is taken up in trees either in commercial forestry or native vegetation which you just don't touch."

There are pockets of native vegetation and several streams running through the different blocks, he said. He felt these were "taken care of" by JNL, who had a strong environmental plan which aimed to minimise damage to the streams' water quality during the harvesting process.

Future plans include the possibility of two further rotations, but this has yet to be decided. In the interim, the trust has developed a good working relationship with JNL and forestry is a big employer for many of their rangitahi [youth]. "It's another work stream," Kerehi explained.

While the trust had not sought funding from 1BT for tree planting, they had looking at developing an application for the overarching Provincial Growth Fund for programmes to train young Māori men in silviculture.

The returned forestry has also served to help feed local whanau. "The hunting has been at the forefront. We put it out there to our membership to register [to be able to access the land for hunting] and they've embraced it. It's all about getting food for people, for whanau, and sharing it around."

He said it was a great opportunity to allow Māori access to land and hunting opportunities which they might otherwise have been restricted from. "From my perspective we're not huge owners of land. There are some pockets of land that are owned-privately by Māori that are handed down. Iwi have arguably a stronger interest in forestry and fishery because we've got quotas in the fisheries and we own forestry."

He was unsure why Māori seemed to be a 'silent stakeholder' in the media coverage of 1BT. Kerehi had read a fair amount about the subject and understood it was a controversial policy, especially with regards to concerns about farmers' fears about loss of productive pastoral land – much of the trust's own land is also in agriculture, he said.

"I know there's mixed opinions. Can our land take more trees? Of course it can, because it used to be covered in vegetation. But what impact does that have on land, water?"

He was optimistic there was opportunity in the programme but it would be a while before the trust would be in a position to benefit from it.

This neck of the woods: community plantings

Along dozens of walking trails in the urban Lansdowne suburb of Masterton, 1BT has contributed to the planting of more than 5000 native trees so far with 5000 more yet to go in.

Lansdowne Residents Association Incorporated secretary and Masterton District councillor Sandy Ryan said the primary purpose was to help develop the area's biodiversity. "It was about clean air, clean water and trying to control the impacts of climate change. We're getting told the Wairarapa is hotter and drier which is evident. The more trees we plant, the more we can control temperature."

The association wanted indigenous plants which might have once been there, which were locally sourced. Ryan heard about 1BT from the Mayor Lyn Patterson and put in an application for 12,000 trees over two years.

The application was very straightforward, though she had help from local environmentalists Ray Stewart and Stan Braaksma. "They were very embracing that our community wanted to do something. The most complicated part was you had to submit detailed plans of your plantings."

It took just over three weeks for them to learn the application had been successful and they had been granted $64,000 for the plantings and a further $10,000 for a negotiated lime track. This funding includes the cost of sourcing the trees, preparing them for planting and ongoing maintenance costs.

"It's very generous funding," she said. "That's why I don't know why it's not happening more across the town. We need to really escalate taking advantage of this funding."

The association's funding came from the Matariki Tu Rākau fund which was aimed at community groups developing projects to commemorate veterans – the Lansdowne project includes an ANZAC memorial walkway with life-size soldier cut-out sculptures. It's also been expanded to recognise members of local communities for their service or contribution to New Zealand through living memorials. To date, $2,687,100 of the $5.5 million set aside for this partnership has been allocated, according to the most recent report from Te Uru Rākau.

Ryan called it the "government's gift". "They're struggling to get the money out there. They're adapting it all the time to make it more accessible."

She said this opened it up to other areas like private reserves, schools and church grounds. While the programme is often portrayed as being for farmers and large landowners, she was sympathetic to concerns about afforestation of productive farmland.

"The problem with forestry is that farmers get paid to plant and it's very lucrative. But really our long term future has got to be in food production."

There were lessons to be learnt from their own experience, she said. “We didn’t quite get the plantings right; we’ve had about 20 per cent loss. To be fair it’s been an increasingly dry summer.”

The list of native plant species has also been revised to include harakeke bushes, karaka trees, tarata [or lemonwood trees], and korokio trees. “We only ever set out to revegetate what would have been there.”

On the biodiversity side of things, they’ve certainly succeeded. Ryan said people were often “stunned” by the amount of birdlife in her home garden which is dominated by natives, and already they were seeing a difference along the trails. “We also really wanted to bring back the birds to the trails. It’s nice to think that as it matures, it will bring people to the area because it’s so pretty.”

The next half to the trees will be planted as part of a council-driven employment scheme later this year. She is currently with other Masterton residential groups to encourage them to apply and talking with neighbours about developing a shared reserve area.

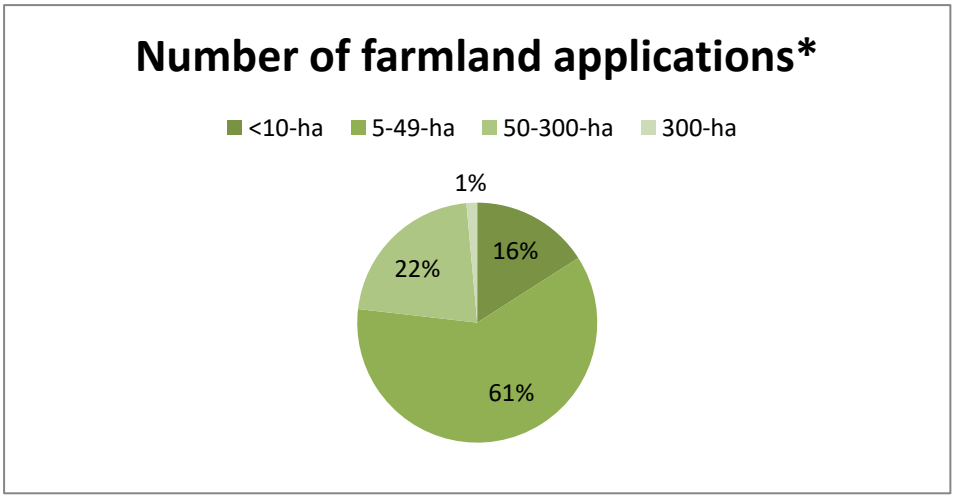
1BT two years on

As of January this year, 149,174,000 trees have been planted in total and $73,923,920 of the 1BT Fund has been allocated. Current estimates put the potential for carbon sequestration through 1BT funded trees to be approximately 1.5 million tonnes by 2030 and 6.9 million tonnes by 2050 – the equivalent of the annual emissions of 3.5 million cars.

The current portion of indigenous trees planted falls short of the Te Uru Rākau’s two-thirds native to one-third exotic goal, now sitting at about 51 per cent – though this is a significant improvement on 36 per cent for June last year.

Much of the media coverage around 1BT has centred around concerns that the programme is contributing to whole-farm conversion of forestry. However, Te Uru Rākau states “the intent is for trees to be integrated into the landscape to complement and diversify our existing land uses, rather than large-scale land conversions to forestry”.

To date, 69 farms have received funding relating to plantings over 3,294-ha, the majority for areas between 5-49-ha. The vast majority of land approved for planting to date has also been of lower production value – less than nine per cent of the approved area is on class 1-4 land.



*Information from Te Uru Rākau, updated May 2020.

What scientists tell us

University of Canterbury Professor of Forestry, Dr David Norton, said he liked the philosophy behind 1BT, but as an ecologist, doesn't like homogenous landscapes. "I personally believe we need a lot more woody vegetation. We've deforested from 80 per cent wooded area in New Zealand. I've got some concerns about 1BT about putting in fast-growing carbon fixing trees in the ground without the bigger questions of what we're doing.

He also has concerns about the long term consequences of a quick carbon fix, particularly as it is driven by price. "What about all the other consequences of harvesting those trees? What are the downstream consequences or broader ecosystem consequences? Are we putting trees in the right places? I'd be totally happy if every commercial forest went in to plant forestry and had a covenant put on it which said they couldn't harvest. Then we'd have the potential to convert it to natives in the long term."

Part of this stems from the anti-native biases of the ETS which underpins 1BT and New Zealand's climate change policies. He said commercial forests purely for carbon sequestration or timber harvesting don't offer the same benefits as native plantations. "You don't get the same carbon return short term [with natives] but you do for 300-500 years. And you're going to get the other benefits – cultural, biodiversity, water quality. I think the ones who are planting natives are not interested in the immediate cash flow, they're interested in the other benefits."

Benefits like increased biodiversity, was one which was supported by the sheep and beef hill country farmers whom he worked with. "Biodiversity offers a lot to farmers. We are seeing the dawning of a new age where farmers are seeing the benefit of looking after things." He said 25 per cent of all remaining native forestry in New Zealand is on sheep and beef farms. For many this involves, a bit of forestry here and a bit there as opposed to mass-scale plantings, he said.

This also offers a "market premium" for New Zealand products as producers learn to better communicate how things are made. "Our environmental story is going to become more important. It's going to be done by getting people in rural environments to feel they've got ownership of it."

For Norton, it's not about turning back the clock and covering the whole country in forests, native or exotic. It's about protecting those things which are "uniquely New Zealand" and creating diverse landscapes to help mitigate climate change in the long term. He liked that 1BT provides an environment to think differently about forestry in New Zealand and was hopeful that it would survive the upcoming election.

The chief executive behind Crown research institute Scion is a firm believer in 'right tree, right place, right purpose'. Dr Julian Elder said 1BT highlighted New Zealand forestry and the opportunity it brings.

He was particularly excited about the world moving towards a circular bio-economy – a world where products are bio-based and thus renewable and sustainable. "All the work we've been doing for well over 10 years points to the opportunities around sustainability. We've seen growing interest from all over the world. That positions New Zealand in a very positive place."

Forestry serves to lock in carbon in two ways; carbon sequestration from the actual growing processes which stops when the tree reaches maturity, and secondly, the carbon remains stored in timber

manufactured products. “It’s probably the biggest opportunity New Zealand has ever had. I liken it to when refrigerated shipping came about. We are great at growing things, great at the science.”

The institute’s role is to help understand what this means and provide advice for landowners to make their own decisions – in this way Elder seemed very supportive of 1BT and government policy being led from the bottom up. “For us it’s always about making good land use decisions. What we are very keen on, is to help provide the evidence to allow landowners to make the better decisions for their land. They have to be made by the landowners.”

This was the same for farm owners as it was for Māori, whom Elder said are key stakeholders in forestry and their research efforts. Of the tension between farming and forestry, he said they were complementary industries. “If you are making the right decisions, they are not competitive industries. We’ve got the opportunity to create new industries.”

The research institute has contributed to more than 70 years of research about tree growing in New Zealand and helped improve the genetics of tree species like pinus radiata. He acknowledged that it’s not until recently that more work has been done to understand native trees. “At the moment it’s clear that 70 years of research has been put into making pinus radiata very efficient and not enough into indigenous forestry.”

Indigenous forestry research first started in the late 1980s and work on a totara based on-farm industry with processing is due to conclude its first phase soon.

One of the biggest challenges with any research relating to trees, is the length of the time they take to mature, he said. “Prior to now, if you wanted a better growing tree [a faster growing tree], you start selection and growing and this takes 22 years. After 22 years, you get the data to start growing the strains so you can plant for the nursery. It seems that’s changing quite quickly because of technology. We are aiming to bring that life cycle down to about seven years.”

One of the differences that has been observed with natives versus exotics, is the difficulty growing them. “The problem with native versus exotic is the cost for the indigenous seedlings is quite high, and the survival rate is not.” However, natural forests don’t require the same level of management as exotics and in the long term lock away greater amounts of carbon.

This is where ‘right tree, right place, right purpose’ comes in. Elder said ideally the programme is a “mosaic” of different plantings in different places for different needs. “You need to ask what the purpose is. If it’s to sequester as much carbon in the next 10 years as possible, you’ll be planting exotics because they grow faster. If you’re looking at erosion susceptible plains then you are looking at specific trees and management.”

A Longbush legacy

Back at Waikoukou in Longbush, we’re nearing the top of the hill and it’s clear to see that the property is a perfect exemplar of the ideal mosaic Elder described.

Poplars stripped bare of their leaves by winter winds, secure several hillsides – clearly a favourite at Waikoukou. Beneath their spaced out trunks and bare branches, sheep and cattle graze, while a row of rust-green eucalyptus trees planted on the side of a high dam protects the water from the worst of the wind. A block of retired land covered in pines sits alongside a five-hectare block of native bush. The pines will be harvested eventually while the bush provides habitat for native birds and bees.

Across the way a neighbouring paddock not as heavily covered in trees shows signs of recent slips following the last few days' rain. Gawith tells me most farms in the area have adopted tree planting to protect the hill country, but it's a slow going effort involving whole-paddock planting. "Trees are very much part of a farmer's life and their future planning."

Now retired, the farm is run by a company with other family members and the task of tree planting has been passed onto the next generation. He'll always be a farmer though he says and as such, knows that the land, and people in turn, are always changing.

Literature Review

Climate change is understood to be one of the major challenges facing humanity. In recent years, the calls for governments to take action have grown louder in part thanks to increased media coverage of climate related issues. However, the framing and sources depicted by this media coverage also influences the terms of debate about how to respond. This research topic examines the New Zealand government's response to climate change through the One Billion Trees [1BT] policy. It will examine both the impact of afforestation as a policy tool for mitigating climate change and how the media has covered this policy.

It was difficult to find academic studies specifically about media coverage of afforestation in relation to climate change, so I have focused on general coverage of climate change in New Zealand and abroad to understand how those themes might be applied. This literature review includes different academic perspectives and studies from the last 20 years, reflecting the way in which the topic has become more important in recent decades due to public pressure. It highlights how sources, frames, and news values have influenced coverage. An international comparison between Australia, Europe and the United States provides greater insight into how New Zealand's emissions profile and media landscape influences its coverage.

The Science

What is Climate Change?

Climate change is the heating of the Earth due to the observed increase in anthropogenic greenhouse gas concentrations. New Zealand is unique amongst OECD countries in that its greenhouse gases are dominated not by carbon dioxide [CO_2] but by the agricultural greenhouse gases methane [CH_4, 37.0% of New Zealand's gross emissions] and nitrous oxide [N_2O, 14.2%] (Kirschbaum et al, 2012, p.1).

Several academic articles provided useful information about how afforestation can serve as climate change mitigation, providing detailed analysis of different species' rates of carbon sequestration and other environmental impacts (Kirschbaum et al, 2012; Hopkins et al, 2015; Trotter et al, 2008). While not strictly related to the 1BT programme, this information was valuable in becoming more familiar with the scientific elements and highlighted the in-depth level of knowledge required by journalists to truly understand this topic. For information about New Zealand's response, I primarily relied on government policy documents and Crown research papers, which also highlighted the limited sources available to journalists.

Mitigating Climate Change

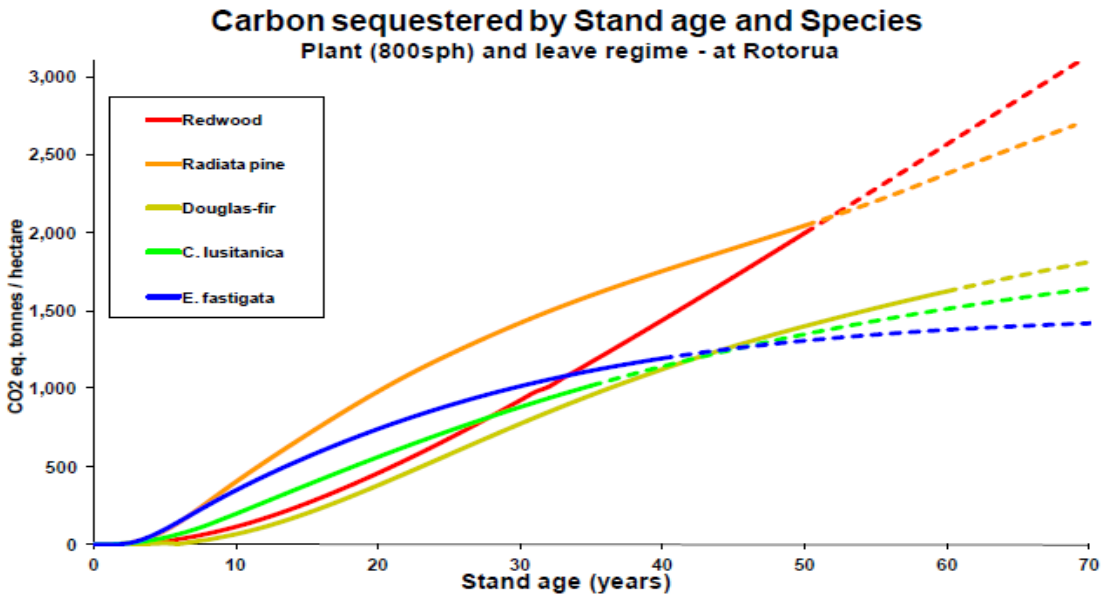
The Emissions Trading Scheme was launched in 2008 as the Government's main tool for reducing greenhouse gas emissions, specifically carbon dioxide. It puts a price on greenhouse gases to provide an incentive to reduce emissions. The main unit of trade is the New Zealand Unit [NZU], which represents one tonne of carbon (Te Uru Rākau, 2015). Forests which meet certain eligibility criteria can be registered with the ETS to earn carbon credits as they grow and store carbon. Growers can either voluntarily register their post-1989 forest land or mandatorily sign up when non-exempt pre-1990 forest land is deforested. If trees are harvested, carbon is considered lost back to the atmosphere. The ETS has been criticised for failing to place pressure on high emitting practices and thus incentivise low-carbon behaviours (Hopkins et al, 2015).

The 1BT programme is an initiative which was announced by the Government in November 2018. Its goal is to increase current rates of tree planting to reach at least one billion trees over the next decade. It is overseen by Te Uru Rākau – Forestry New Zealand which fits within the Ministry for Primary Industries [MPI] with funding from the Provincial Growth Fund [PGF] (Te Uru Rākau, 2018). The programme is designed to, "support landowners to grow both native and exotic trees to create employment and workforce development, optimise land use, mitigate climate change, support Māori values and aspirations, protect the environment and support New Zealand's transition to a low emissions economy" (Ibid, p.1). As part of this programme, $240 million was made available for landowners, organisations, and community groups to plant a mixture of exotic and native tree species.

The programme includes principles of "right tree, right place, right purpose" (Ibid, p.7). Funding for afforestation is provided through four grant categories which vary based on the type of trees planted, whether the land is prone to erosion, if fencing is required and if it is linked to ecological restoration projects. The most money is offered for indigenous mix forestry plantations, at a rate of $4000 per hectare with a minimum planting of one hectare (Ibid, p.6). Comparatively, exotic plantations have a base rate of $1500 per hectare and require a minimum of five hectares (Ibid.). Funding partnerships, like that with Project Crimson Trust's Trees that Count programme, which encourages the planting of native trees, have also been established. The policy has come under attack from some however, with many in the agriculture sector and rural communities arguing it will increase greenhouse gas emissions by threatening efficient food producers in New Zealand.

A 2012 document by Scion, a Crown research institute which specialises in science and technological development for the forestry industries, provides insight into the potential benefits and associated costs of different forestry arrangements. Potential benefits of carbon forests include producing clean water with low nitrates, controlling soil erosion and reducing landslips, providing shelter and shade for livestock, enhancing biodiversity through creating new environments, and capturing carbon dioxide from the atmosphere while producing wood fibre (Scion, 2012). It underpins the importance of the ETS in encouraging afforestation and highlights its economic benefits. Allowing growers to access funds from carbon credits provides income which can be put towards early-rotation forestry operations such as pruning and thinning, or alternative cash flow for farmers during downturns.

Scion also provides insight into the different planting options and the carbon opportunities they present. This is best captured in a graph which shows the carbon sequestration rates of different tree species during their lifetime. It highlights why Radiata pine is such a popular choice for exotic forestry plantations, offering higher rates of sequestration in a short time (See below – Scion, 2012, p.2).



In a 2019 paper, Scion also compared the potential benefits of carbon forestry using regenerated native species. It states that 1.55 million hectares of marginal grassland could be converted to indigenous shrubland, a practical and inexpensive option for large areas [more than 30 hectares]. However, carbon sequestration is much slower with native species. The national average carbon stocks of natural forest, including live above- and below-ground biomass, deadwood and litter, in New Zealand is 840t CO_2e per hectare (Holaway et al, 2017). This set up also requires more regular pest management and fencing to prevent stock access.

Kirschbaum et al's 2012 study provides a detailed introduction to the climate change implications of land use change from grassland to forestry and vice versa. Of particular note is the mention of the "albedo effect", in which forests absorb more solar radiation than grassland due to its dark colouring – this is found to raise the ground surface temperature by 1.5C and can offset the carbon storage benefit of tree establishment by 15-25% (Ibid, p.130). They also raise the point that land-use changes such as increased afforestation have consequences other than those related to climate change, including economic, social, ethical, and other environmental consequences that are important for both nature and society. In New Zealand, this includes the relationship of Māori to the land, and also rural communities (Ibid, p.133).

Media Coverage of Climate Change

In New Zealand

To understand New Zealand media's approach to climate change coverage, it is also important to understand the country's emissions profile and how it contributes to the issue. It may come as a surprise to learn that New Zealand is the 11th highest per capita emitter in the world of greenhouse gases (Chetty et al, 2015, p.1). This seems contrary to its reputation, both at home and abroad, as a 'clean green country' and should be noted in this analysis. While New Zealand has a comparatively low reliance on fossil fuels compared to other states, two of its biggest industries have high emissions profiles – agriculture and tourism (Ibid, p.1). Its reliance, particularly on the agriculture sector, has led successive New Zealand governments to adopt a cautious response to climate change, focusing on the ETS as a means of mitigation.

The literature shows that reporting on climate change varies depending on the country, with factors such as reliance on emissions-heavy industries, political culture and public perception of

climate change influencing media coverage (Chetty et al, 2015; Craig, 2009). Reporting also varies depending on the media type and the limitations of the commercial system in which they operate. It is useful thus to separate the findings from different studies by country to provide the basis of an international comparison. Despite the variation in coverage across these different contexts, key themes true of all media do emerge.

The changing face of most newsrooms was also apparent in studies around the world (Painter et al, 2018). Newsrooms have been cut back, the deadlines pushed forward, and there are fewer niche or in-depth journalists. This varied between traditional media like print, radio and television and newer digital mediums. Painter et al (2018) found that digital media approached climate change reporting differently, going so far as to appoint science journalists and editors, to move away from traditional media models. This is especially interesting given by New Zealand news media company *Stuff's* recent appointment of a climate change editor. This pointed to the value of narrowing the content analysis which focuses on articles which were published by *Stuff*.

Sourcing

Where journalists get their information from is just as important as who is producing the content, and can have a considerable impact on how issues are covered. Sourcing is also one of five factors understood by Herman and Chomsky's Propaganda Model to influence media (1998). Craig's 2009 study of New Zealand television coverage of the environment provided a strong foundation for understanding media approaches. Though somewhat dated and without a specific focus on climate change coverage, many of the trends are arguably still true today. The study is prefaced with changes to the media landscape with television industry staff cutbacks, a shift to entertainment news and falling audience numbers (Ibid, p.56).

Craig found that government agencies were the most frequently cited group in environmental reporting, accounting for just over 25% of sources (Ibid, p.59). Coverage was also focused on the business and policy implications of the environmental issue, with Crown research institutes also frequently cited (Ibid, p.62). The study also highlighted the importance of primary industries, which are understood to be a key part of New Zealand's economy, in sourcing – 'farming' and 'agriculture' were the second most common word after 'pollution' in the media coverage (Ibid, p.64). Craig concluded that, "industries central to New Zealand's economy, most notably agriculture, have a significant impact on environmental coverage" (Ibid, p.69). Environmental issues became newsworthy once "recognised as a problem requiring remedial or preventative action" (Ibid, p.59). In television, this coverage was further focused on "discrete environmental issues" which lend themselves to strong visual forms of representation (Ibid, p.62).

Several subsequent studies supported Craig's findings that New Zealand media relied primarily on government bodies and scientists as sources of information. A 2015 study by Chetty et al of frames used in New Zealand media's climate change coverage between 2009 and 2010 looked at sources and dominant frames. Using quantitative analysis of articles published in three of the country's largest newspapers, it found politicians (33%) followed by scientists and academics (20%) were the most common source of information cited in stories (Ibid, p.11). Subsequent studies further develop this research, examining the relationship between where information comes from and how it is packaged by media for audiences.

A 2017 study by Salmon et al about climate change communication in New Zealand found that reporting was consistent with the IPCC and scientific consensus. Mainstream media in New Zealand

focused on questions of how to respond to climate change (Ibid, p.9). New Zealand's small population means there is a limited number of scientists for media to call upon, but the study found that scientists were trusted over government agencies (Ibid, p.2). The limited scale of the media landscape means journalists are also able to create stronger relationships with certain scientists, which contributes to certain voices being amplified. The study stated that the Ministry for the Environment was also a key government provider of climate change communication, providing evidence-based advised to other officials and politicians – which is, in turn, reflected back to the media, and engaging with international climate science advice (Ibid, p.24). The study provides insight into how sources cited in coverage reflect editorial policies and framing.

Framing

Media frames are devices of storytelling and news reporting. They are described as "a central organising idea or storyline that provides meaning to an upholding strip of events" (Gamson and Modigliani, 1987, p.143). Framing thus plays an important role in how news audiences come to understand the information that is put to them. It includes such devices as the use of myths – for example, New Zealand's reputation as a "clean, green" country underpins almost all environmental reporting. A 2017 study by Milfont et al on New Zealand attitudes towards climate change puts forward the two questions central to climate change coverage:

1) Is climate change real?, and;
2) Is it anthropogenic? (p.79).

In New Zealand, these questions seem to have been answered and framing rather focuses on how the country can and is responding to climate change, which the government and science community accepts is likely anthropogenic. Media coverage of climate change issues is believed to fit into two general approaches, alarmist or discursive repertoires (Painter et al, 2018; Schafer et al, 2016). While overseas coverage focuses on the consequences of climate change and adopts a pessimistic view of these impacts, the literature shows New Zealand media focus on debates about how the country is responding to the crisis and the effect of these mitigation measures.

A 2008 study established the historical context of climate change communication and argues that media can play a powerful role in shaping debate about such political issues (Kenix, p.119). Based on analysis of 30 different articles, it identified 10 framings of climate change within New Zealand's mainstream and alternative media: new evidence or research; scientific background; consequences; economics; domestic politics; international relations; current weather; sensationalism; conflict; and morality (Ibid, p.125). Among others, the study discussed the use of reward frames, framing issues as how people can benefit from making changes, as a more effective means of communicating solutions (Ibid, p.118). It also highlighted the difficulties of science reporting which attempts to include multiple perspectives, particularly when allowing for news values of "balance", which is a dominant point in several other later studies both in New Zealand and abroad (Ibid, p.122-123).

Harcup and O'Neill (2001) list a number of news values, including: "bad news" in stories with particularly negative overtones, "conflict" stories involving controversy such as the cause of climate change, the "drama" of the impacts of climate change, and its "follow up" story potential (p.279). Other news values such as "timeliness" and "simplification" also complicate media coverage of climate change stories. A 2017 analysis of broadcast coverage in New Zealand by Bourk et al, which included interviews with five leading scientists, found that scientists were reluctant to package their

findings in newsworthy forms at the expense of their own professional values (p.835). For newsrooms already under pressure due to industry changes, and with difficulty covering a slow-moving issue, this breakdown in the relationship between expert source and media informer is a weakness. They stated scientist's reluctance to engage with media "reveals an articulation between news production and expert consumption (du Gay et al., 1997, in Bourk et al, 2017, pg.835) that represents a clash in professional values across science and journalistic communities" (Bourk et al, 2017, p.835). This weakness is exacerbated by a lack of resources being put towards science journalists in already under-resourced and pressured news outlets.

Bourk et al's 2017 study also found that economic lenses were used as dominant frames in climate change coverage. This was supported by Chetty et al (2015) who concluded that political, then social progress, followed by economic competitiveness were the most prominent frames used by New Zealand media (p.7). Economic risk mitigation, technological market-driven progress and climate mitigation as heroic were among the most prevalent (Bourk et al, 2017, p.826). Farmers were a dominant group referenced in the economic risk frames (Ibid, p.827). It found that climate change coverage was also influenced by New Zealand's geographical isolation, a succession of centre-right governments and a concentrated media environment (Ibid, p.834). Salmon et al (2017) also highlighted New Zealand's strong economic dependence on primary industries, its relatively low emissions footprint, and international reputation as factors influencing coverage (p.3).

Salmon et al stated that while the majority of New Zealanders believe that anthropogenic climate change is occurring, a "substantial proportion" of the population remains sceptical or unsure (Ibid, p. 27). It also found that media avoided using sceptical and catastrophic frames, partly because the impacts on New Zealand are unlikely to be as severe in other parts of the world (Ibid, p.17). Mainstream media's consensus with the IPCC thus contributes to the seeming disconnect between New Zealand's significant number of climate sceptics and the media (Ibid, p.1). A poll included in the 2015 study by Chetty et al study also found that most New Zealanders were ambivalent to climate change. It discussed the apparent "disconnect" between aspects of the framing and presentation of the issue, specifically by New Zealand newspapers, and the "apparently mixed and ambivalent attitudes and perceptions held by the public (ShapeNZ 2007)" (Chetty et al, 2015, p.13).

The content analysis in the next section examined to what extent the rural voice was strongly critical of the 1BT programme. It also explored how journalists balanced their roles as educators and purveyors of information with representing their audiences' views in coverage. For example, New Zealand media outlets recently announced they would take a stance on climate change by refusing to give voice to climate deniers (Savage, 2018). The divide between climate sceptics and the New Zealand media is more prominent when compared to frames used in international coverage. Chetty et al (2015) suggested that international coverage of climate change which was processed by New Zealand audiences may have contributed to perceptions of the issue and the apparent disconnect (p.13). This was also suggested by Salmon et al (2017), with specific regard to international media exposure through the internet (p.11).

An International Comparison

Studying existing literature on how media report on environmental issues like climate change was useful in establishing the limitations journalists face. The research shows reporting varies depending on the country, with factors such as reliance on emissions-heavy industries, political culture and public perception of climate change influencing media coverage (Chetty et al, 2015; Craig, 2009). Reporting also varies depending on the media type and the limitations of the

commercial system in which they operate (Painter et al, 2018). Despite the variation in coverage across these different contexts, themes around framing and sourcing become evident. Many of these global themes, true for New Zealand coverage, are exacerbated by its small media landscape.

Boykoff's 2009 study provided a good basis of media coverage trends which were found to impact most countries' reporting. In it, he described the media's attention to climate change as a proxy for public attention to the issue (p.438). Most importantly, the study demonstrated that the content and framing of coverage was actually more important than the quantity of coverage (Ibid.).

Common frames focused on the costs and benefits through an economic and political lens (Bourk et al, 2017; Boykoff, 2009; Chetty et al, 2015; Craig, 2009). This trend was exacerbated by what Boykoff saw as fragmented coverage, in that political journalists focused solely on the political, business journalists on the economic and science journalists on the environmental impacts (2009, p.439). As part of this research, New Zealand journalists were interviewed to establish to what extent the findings of the literature review applied here.

Boykoff also noted how the background training of journalists impacted both quality and quantity of environmental reporting (Ibid, p.451). He found that the number of newspapers with weekly science sections shrank by two-thirds from 1989-2006 (Ibid, p.445). This is important for understanding the relationship between scientists and journalists, and the role media play as disseminators of information and educators. It is also especially important given New Zealand media's heavy reliance on the scientific community as a source.

This was also highlighted in a 2018 paper by Painter et al which explored the differences between legacy and traditional media coverage with that of social and digital media. It found that digital media attempted to be in niche from legacy media and approached climate change coverage differently (Ibid, p.2). This was reflected in staff appointments with a stronger focus on hiring people from a scientific background. Recent climate change-focused appointments by *Stuff* highlight a possible shift in New Zealand. This was discussed in the industry interviews reported in the next chapter.

A more recent 2017 study by Bourk et al examines the way news values problematise climate change coverage and environmental issues reporting. Conventional news values like simplification, timeliness, novelty, conflict, personalisation and dramatisation contribute to "newsworthiness" (p.832). However, these values are not necessarily suited to covering climate change, a complex, slow-moving issue which is difficult to capture on television. This difficulty may also explain the use of disaster framing, in which the "catastrophic consequences" of climate change are highlighted in media coverage. Bourk et al also describe climate change as a "nearly invisible" news topic in which the scientific voice is muted (Ibid, p.828). This however, seems to contradict with other studies of New Zealand media coverage in which the scientific community is the main source of information. The differing conclusion may relate to when the studies were conducted.

It is worth noting that most of the studies on media focused largely on Western of OECD member states, which while helpful for drawing comparisons with New Zealand, is not reflective of all international media.

Australia

Australians seem just as sceptical as many New Zealanders about the reality and causes of climate change. A 2017 study by Salmon et al found that Australia had one of the highest levels of

climate scepticism compared with other countries, noting New Zealand was not far behind (p.6). Again, this may relate to Australia's strong economic reliance on the mining, fossil fuel and primary industries. However, Australian climate change coverage is understood to differ greatly from that of New Zealand in its use of framing. Its media coverage is purported to promote a sensationalist frame by looking at the catastrophic consequences of climate change, like bush fires, drought, or rising ocean temperatures killing off coral at the Great Barrier Reef.

It is worth noting that during recent bush fire coverage, media outlets owned by Rupert Murdoch, like *News Corp*, were strongly criticised for favouring climate sceptic lens in their coverage. An increased focus on the catastrophic consequences and potential risks of climate change as framing devices is also supported by a 2016 study which found most OECD or Western countries were increasingly using "securitisation language" in the framing of their news coverage (Schafer et al, 2016, p.86). They define this as a communicative process which posits climate change as a threat to a state's security, particularly in hotspots, that "interweaves the water-food-energy nexus with locally specific conditions of disaster, migration, and violent conflict to undermine the stability of regions" (Ibid, p.78).

Europe – UK, Germany, Finland

Many European countries are using similar framing techniques, taking a sensationalist approach to reporting on climate change (Chetty et al, 2015, p.3). This was found to be true of countries like the UK, Germany and Sweden. Salmon et al (2017) also describe the impact of the "conservative white male" effect which leads to more sceptical coverage as being prevalent in the UK and Sweden (p.6). They also noted it impacted coverage in the US and Brazil. This is relevant to rural New Zealand's response to the 1BT programme and a perceived divide between the country's large sceptic population and media coverage.

Communicating climate change stories can be challenging because of perceived "outrage factors", which Sandman explains are an intrinsic part of how people understand risk (1987, p.21). Sandman's "risk communication principles" may explain climate sceptics and how this impacts news coverage. He found that the public responds more to outrage than to hazard, which means risk managers must work to make serious hazards more outrageous for the public to respond appropriately. However, he also stated that many risk experts "resist the pressure to consider outrage in making risk management decisions" and "insist that the data alone, not the irrational public, should determine policy" (Ibid, p.21). Outrage factors in climate coverage could include things like "control", where the risk is lower when prevention and mitigation are in the individual's hands rather than that of a government agency, and "diffusion in time and space", where people are more outraged by fast-moving events even if the risk is the same (Ibid.).

For many news organisations, climate change is also difficult to cover using concepts of framing and news values as it is difficult to define it as a 'news' subject. The effects of climate change are seen to be slow-moving in the context of the 24-hour news cycle making it more difficult to report. Lyytimkai's 2015 study about climate change coverage in Finland – a country of comparable population to New Zealand – reinforced the difficulty news outlets, face in covering slow-moving topics in a fast-paced news environment (p.252).

United States

Studies suggest that American coverage uses controversy frames, and in the name of balance values often gives voice to climate scepticism (Chetty et al, 2015). Like in Australia, attempts of

"balanced" reporting are problematic in the US coverage of climate change (Bourk et al, 2017, p.831). This shifts the debate from how to mitigate climate change to one which still questions whether it is real and anthropogenic driven. This differs greatly from the New Zealand approach. This was supported in several other studies which described this coverage as one of "scientific disagreement" and "controversy" (Chetty et al, 2015, p.3). I believe it is this international coverage which some cite as having possibly contributed to the large base of New Zealand climate sceptics, via dominant broadcasting networks and easy access to the internet.

Summary

This literature review has attempted to cover the history of climate change coverage in New Zealand, drawing comparison with coverage in other parts of the world. New Zealand media coverage of climate change is markedly different from that of many other OECD countries. In relying on government bodies and sources from the scientific community, media have adopted a narrative which accepts that climate change is both real and caused by human activity. This has significant implications for coverage, turning from one of debate to discussions about how to respond to this global phenomenon. New Zealand's reliance on the primary industries as a source of economic strength and growth also underpin this response, and the economic impacts of climate mitigating policies are a dominant feature of coverage in New Zealand.

Overseas coverage of climate change has been reflective of different news values, like "controversy" and "dramatisation". In Australia and parts of Europe, this has contributed to news stories which focus on the catastrophic consequences of climate change, while in America the debate about whether climate change is real still carries on. It seems evident that global media coverage of climate change has impacted New Zealand audience's understanding of the issue in that the country is home to a large population of climate sceptics, despite local coverage aligning with the IPCC.

Science reporting as a whole is threatened by global changes in the media environment, such as job cuts and increasing pressures on newsroom resources. This seems especially prevalent in a small media landscape in New Zealand and it will be interesting to see how local journalists combat this. This literature review also provides a brief summary of some of the key policy documents which underpin New Zealand's response to climate change, through the ETS and now the 1BT programme, outlining the different rates of carbon sequestration and pricing across tree species. There is little academic material of the media's coverage of afforestation specifically as a climate mitigation tool.

The next chapter discusses the findings of a content analysis of articles relating to the 1BT programme and interviews with media industry professionals.

Methodology

The content analysis comprised of 42 articles published on the digital platform *Stuff* over the course of 12-months between 1 January 2019 and 31 December 2019. These parameters were put in place as the sample size was deemed an appropriate range for the purposes of this project as the time period followed the announcement of the 1BT policy and increased media coverage of the subject. This time period also covered increased criticism from the farming community about the impact of 1BT and the formation of the lobby group 50 Shades of Green. In a more substantial study it would be interesting to compare the coverage over the same period of other digital platforms, for example *The New Zealand Herald* or *Newsroom.*

Stuff was chosen for analysis owing to its reputation as one of New Zealand's largest and most popular news sites. In November 2018, it launched 'Quick! Save the Planet', a series focused on climate change coverage which signalled a shift in its approach to the topic. The analysis sample was selected by using the search words "One Billion Trees" on the website's search tool, resulting in an appropriate range of articles. A small number of these were not related to the topic at hand, such as an article originally published by Reuters about a similar venture in Ethiopia which made no reference to the New Zealand programme, and were thus removed from the search results selection.

Drawing from several regional newspapers and three of the country's largest dailies *The Dominion Post*, *The Press* and *The Waikato Times*, whose works were published online on the *Stuff* website, the selection included a good geographic spread. This provided a broad picture of how the 1BT programme was impacting different communities in New Zealand and the country as a whole. The articles also demonstrated the impacts at different scales. The selected articles included a range of perspectives and opinions relating to the 1BT programme. The general impression of the articles was that they were neither supportive nor oppositional towards it, and rather put forward multiple views on the subject and provided updated factual information.

The articles were analysed on a number of bases including the word count, the category which the stories were filed under, the number and types of sources cited in the article, and the frames used. It is also worth noting that each of the articles included at least one multimedia item and more than half of them (57%) included a video. For the purposes of this study, the video content was not included and the analysis focused solely on the text of the article. In relation to the literature review, the prevalence of multimedia content seems representative of how newsrooms have evolved in the digital age. This poses additional challenges in covering climate change stories which again, would be worth further analysis in a broader study.

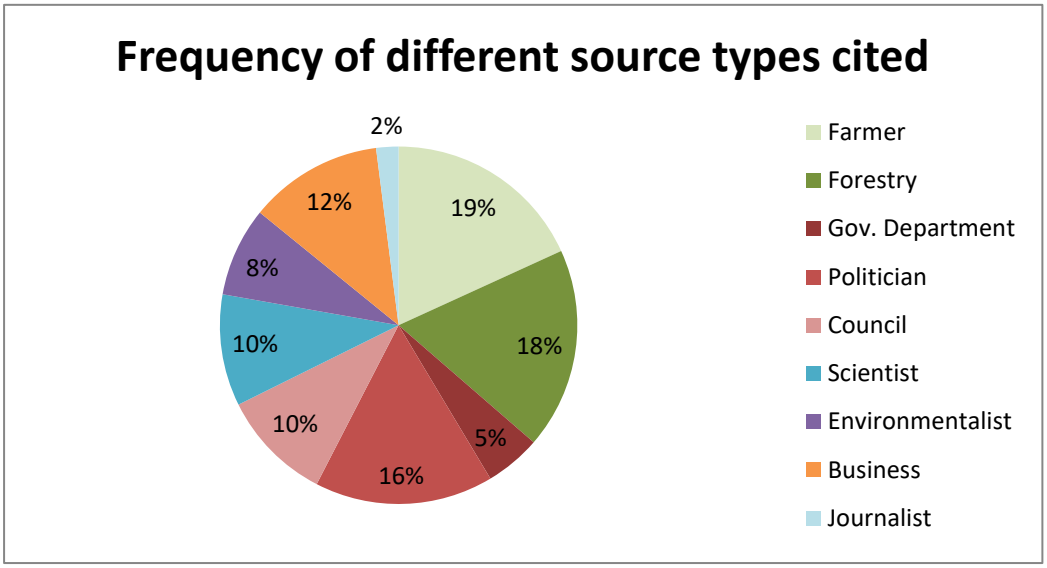
Discussion and Analysis

Sources

Views from a total of 99 different sources were represented across the 42 articles analysed as part of the selection. The nature of these sources was quite varied and analysed using a number of criterion: type of article, author, number of sources cited, and background of sources cited. A total of nine opinion pieces (21% of all articles) were also included in the study. Most articles cited only one source (38%), followed by two sources (24%) and three sources (17%). This suggests most articles only included a small number of sources which may not have been representative of all perspectives or frames relating to the topic.

It is interesting to note the dominant voices which were cited as sources in the articles. Sources were grouped into nine categories: farmer, forestry representative, government department or authority, politician, local council, scientist, environmentalist, businessperson and journalist (*see Figure 1 below*). The two most dominant groups were equally farmers and those in the forestry industry (18%: 18%). This was followed by national level politicians such as the Prime Minister Jacinda Ardern and Forestry Minister Shane Jones (16%). Businesses (12%), local council representatives (10%) and scientists (10%) received a similar amount of coverage as sources. The least cited sources were journalists (2%); this figure only relates to two editorials which only contained the views of the authors.

Figure 1



For the purpose of this analysis, representatives from the political sphere (local council, national politicians and members of parliament, and government departments) were separated for a more precise view of how sources are used. However, adopting a more broad definition of sources belonging to the political sphere and combining these entities would result in a much higher representation in the media coverage (a combined total of 31% of sources cited). Similarly, farmers and representatives of the forestry industry could also be grouped together under a broad definition of the primary industries (a combined total of 36%); however, this would seem unhelpful as the two groups are portrayed as being in opposition to each other in many of the articles.

It is also worth highlighting a number of sources were cited multiple times in different articles. It is understandable that Shane Jones as the Minister of Forestry would be cited most often, accounting for 26% of the articles. Julie Collins, the chief executive of Te Uru Rākau which is overseeing the implementation of the 1BT programme, is also unsurprisingly a common source (10%). Perhaps relating to the dominance of the conflict frame adopted in many of the articles, representatives from the farm lobby group 50 Shades of Green were also cited a significant number of times (12%). Ollie Belton of Permanent Forests in Christchurch and Forest management agent David Jannett were both cited in two separate articles by Heather Chalmers, a senior rural reporter at *Stuff*. It might suggest a certain level of expertise relating to the topic, or else highlights the reliance of New Zealand media on specific sources with whom they have developed a relationship.

Overall the analysis was largely consistent with the findings of previous studies cited in the literature review, which found that government bodies and politicians were frequently cited (Craig, 2009; Chetty et al, 2015). Craig's 2009 study also found that farming and agriculture sources featured prominently in and were the second most common word after 'pollution' in the media coverage (p.64). The importance of the primary industries to the New Zealand economy, both in relation to farming and forestry, is especially relevant to the 1BT topic and might explain why farmers were so often cited. This may also be attributed to the dominance of the conflict frame which will be discussed later.

I found it surprising how few scientists were cited in the articles (10%), considering the depth of scientific knowledge needed to understand the topic and its implications as a policy. The results of this analysis also differed considerably from Chetty et al's 2015 study, which found scientists and

academics were quoted in 20% of articles. New Zealand's relatively small population and the limited number of scientists available to comment on this topic might explain this difference, as suggested by Salmon et al (2017, p.2). The difference might also be explained by the different frames used to cover the topic and tendency for the media to avoid delving into the topic from a scientific perspective.

Frames

Sources provide important information and insight into the topic which journalists are tasked with communicating to their audiences. The types and number of sources cited in the articles can also be seen to have had an impact on the frames used, which in turn influences how the issue is understood by the public. A 2017 study by Milfont et al about New Zealand attitudes towards climate change revealed two underpinning questions; is climate change real, and is it anthropogenic? The analysis supported the literature review which suggests these questions have been answered by New Zealand media, allowing them to focus on how to respond to climate change rather than debate if it's happening.

This may also be why there is a noticeable lack of climate sceptic views or sources in the articles, despite New Zealand having a large climate sceptic population compared to other OECD countries (Salmon et al, 2017, p.27). In November 2018, *Stuff* also announced it would reject comments on articles which deny anthropogenic climate change (Savage, 2018). A statement on the bottom of the article reads:

> "Stuff accepts the overwhelming scientific consensus that climate change is real and caused by human activity. We welcome robust debate about the appropriate response to climate change, but do not intend to provide a venue for denialism or hoax advocacy. That applies equally to the stories we will publish in *Quick! Save the Planet* and to our moderation standards for reader comments."

This may also explain why sceptic frames were not referenced in any of the articles analysed. Another voice which was noticeably absent in the coverage was that of Māori and iwi settlement trusts. Only one article made specific reference to the impact of 1BT on Māori and this was in relation to a related $100 million fund being announced for Māori on Waitangi Day as part of the programme.

Each of the articles was filed under a different category on *Stuff*'s website, including, business, farming, news, national, politics, environment and climate news. These categories provided context and guidance for the frames used in this analysis. Many of the articles included multiple frames but for the purpose of this study, the most dominant frame was used for analysis. The frames chosen for the analysis were also informed by Harcup and O'Neill's (2001) list of news values.

The four frames used were (*see Table 1 for examples)*:

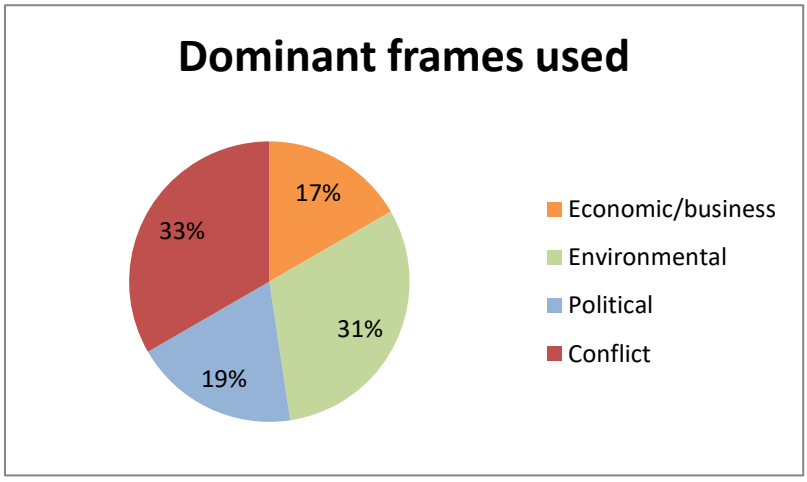
- *Conflict* - concerns relating to the loss of pastoral farmland to forestry conversion as a source of conflict;
- *Economic/business* - the economic costs and benefits of 1BT, such as job opportunities, worker shortages and money allocated for the programme;
- *Environmental* - the effectiveness of 1BT as a climate change and environmental policy, including in relation to biodiversity such as the impact of wilding pines;
- *Political* - the national implications of 1BT, the personalities behind it and potential for political mobility.

Table 1

FRAME	*HEADLINE*	*AUTHOR*	*DATE*
Conflict	*Carbon farming can provide better returns than sheep and beef*	*Gerard Hutching*	*02/05/2019*
Economic/business	*Plant pines, not natives to make money from carbon farming, says consultant*	*Heather Chalmers*	*08/01/2019*
Environmental	*When it comes to forestry, we've got the wrong end of the stick*	*David Hall*	*05/12/2019*
Political	*One billion tree plan to get $58m Budget boost*	*Benn Bathgate*	*16/05/2019*

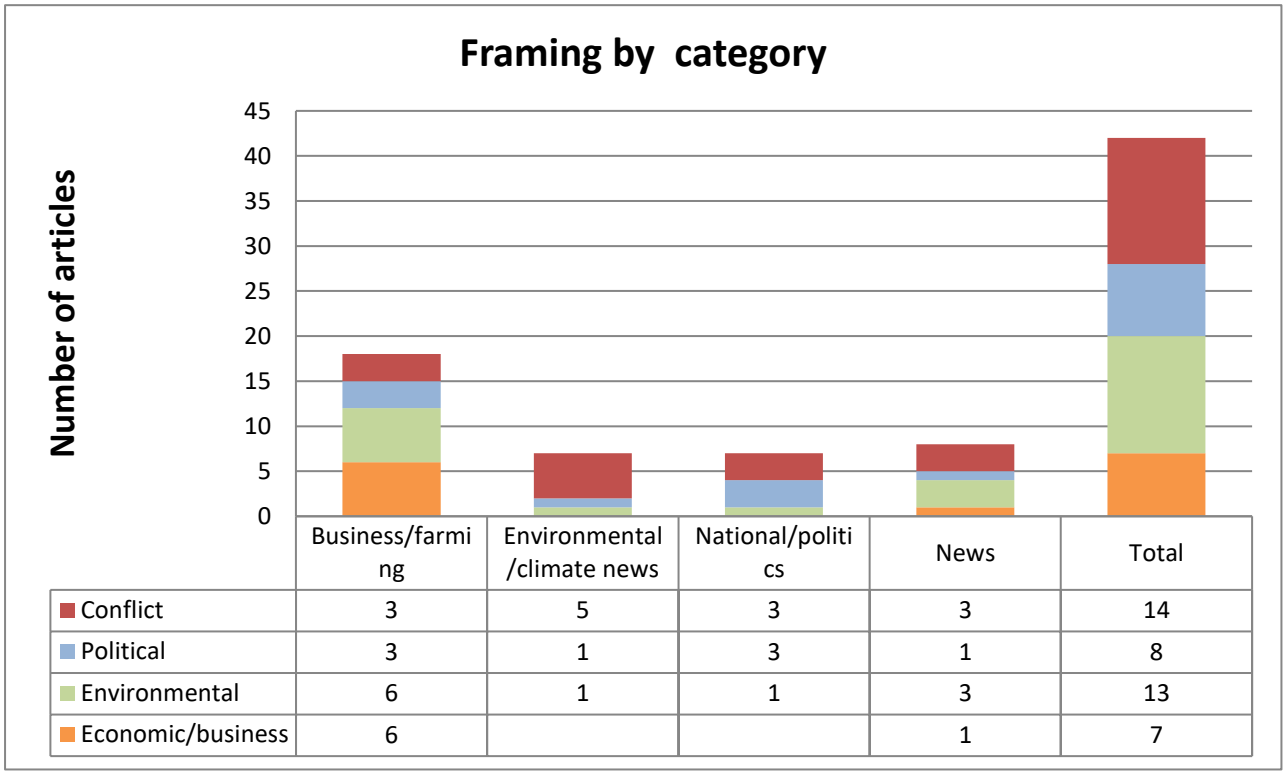
The findings both confirm and challenge aspects of the literature review (*see Figure 2 below*). The analysis found that the most prevalent frame used in coverage was the conflict frame which was dominant in 14 of the articles (33%). The next most dominant frames were environmental (31%), followed by political (19%) and economic/business (17%).

Figure 2



The results are also interesting when compared with the categories under which the articles were filed on the website (*see Figure 3 below)*. The majority of articles (43%) were filed under the farming category, a subsection of the business page. The remainder of the articles were evenly divided between the environmental or climate news, national or politics, and news categories (19%; 19%; 19%). It reinforces the idea that farmers are a dominant group referenced in economic risk frames due to New Zealand's strong economic reliance on the primary industries (Chetty et al 2015; Bourk et al 2017).

Figure 3



	Business/farming	Environmental /climate news	National/politics	News	Total
Conflict	3	5	3	3	14
Political	3	1	3	1	8
Environmental	6	1	1	3	13
Economic/business	6			1	7

It is interesting that the frames and categories where the articles can be found differ so greatly. The analysis shows that the conflict and environmental frames are the most dominant, with economic/business frames accounting for only 17% of the articles. This seems to contrast Bourk et al's (2017) study which found that the economic lens was most dominant. However, the majority of stories were filed under the business section on the website.

It is also worth noting that the dominant frames used in the articles don't necessarily align with the category under which it was filed. For example, of the 18 articles filed under the business/farming category, only six (33%) were framed in relation to economic/business while another six (33%) were framed in relation to the environment. The remaining six articles were equally characterised by conflict and political frames (17%; 17%).

Summary

The content analysis was generally very supportive of the findings of the literature review though there were some differences. Politicians and farmers were the main sources cited in the articles. The role of farmers as central to discussions about 1BT was underpinned also in the frames used to cover the topic which was dominated by the conflict between afforestation and the loss of hill country farmland. The economic and business lens was less dominant in this analysis than the literature review suggested, though this may be because the frame is strongly connected to farmers as well. While the environment was also a key frame used in the coverage, it was less the scientists and rather politicians who acted as sources for these articles. The content analysis suggests there is a relationship between sources and framing, with each, in turn, influencing the other. This is discussed in further detail below in interviews with media industry professionals.

Discussion and Analysis

Media industry views

Trends and themes noted in the content analysis were put to three New Zealand journalists who were in interviewed in relation to their experiences covering climate change stories and the 1BT programme. These questions covered topics such as the changing face of newsrooms, access to sources, correspondence with climate sceptics and frame selection.

What they had to say…

Eloise Gibson's foray into environmental and climate change coverage grew from her work as an environmental lawyer. Now *Stuff*'s dedicated climate change editor, she said it's no longer the "ratings killer" it once was.

"They decided they would launch a dedicated team so we are an editor and reporter at the moment. We also lead that looser range of journalists that cover climate change."

Having a dedicated team, and greater support from editors and management helped improve coverage, she said. "I think there were well-meaning intentions to cover the other side. Science, climate and environmental journalists have understood the scientific consensus for a long time but what I think has changed is our editors and their superiors understand now."

While she still regularly gets emails from sceptics, she said they seem to be a small part of the population.

Stuff and other media companies' revision of how climate change is covered is representative of a societal shift, she said. These days Gibson sees the media's role as informing debate about how to respond. "Media as a whole have thankfully moved on from endless debates about if it's happening to what do we do. Part of it is holding the government to account."

She said it was also partly an explanatory role. "There's an appetite for quite simple explanations – a couple of lines in a story which explains what something is, or what an acronym means. Greater demand for climate change coverage allowed for "longer, more nuanced stories".

One of the things she wanted to do in her role was to broaden the sources used in articles about climate change. "All journalists are aware that in each field there are a few scientists who are confident with dealing with the media, who give good quotes, who are good talent […] and are experts. It is easy to go to them time and time again."

Generally, though she found there was good access to sources, particularly at universities, and many scientists lacked the commercial conflicts of interest sometimes seen overseas.

The biggest challenge was finding time, she said. "A lot of my time is managing the flow of other people's work and dealing with other things that are not researching and writing stories." Finding fresh ways to cover the story was another. "Climate change is finding 1000 different ways of telling the same story."

Gibson agreed there was an issue of journalists in rounds being 'siloed'. "It's easy when you're in the bubble. If you spend all your time talking to climate change journalists and scientists […] you do talk to a lot of people who are very concerned and it's easy to forget there's a segment of society who don't have access to those people."

She described 1BT as more than an environmental story, even though it was a huge part of where the government was spending its time and attention. It also had strong social, political and economic factors. “I think the political drivers for this are complicated. It’s a coalition government with competing priorities for itself. I think it suffers from trying to be all things to all people.”

At 3125 words, more than four times the average word count of the articles in the content analysis, John McCrone’s feature on 1BT stands out both for the level of depth dedicated to the subject and for his analysis.

With a science background, McCrone developed a reputation for covering scientific matters like neuroscience and human evolution in the UK where he was based for 25 years. Climate change is more than the subject of his articles; it’s what brought him home.

“I came back to New Zealand because of climate change. I could see where the world was going and knew I wanted to get my kids back. I knew enough science to know the world had a serious problem we weren’t dealing with. It’s quite funny for how long it took to become ‘not crank’.”

Since 2005 he’s been based at *The Press*, a subsidiary of *Stuff*, as a senior features writer. It’s a role which allows him to cover “everything and anything”, something he views as distinct from other journalists who cover a specific round.

“I was interested in the whole what the hell is New Zealand doing with the ETS. I’ve done a few other ETS, carbon-related stories and every year I do a couple of stories on climate change. It was just about time.”

Despite having a science degree himself, McCrone said it wasn’t as important as the other social and adaptable skills which make a good journalist. “If you’re a good journalist you can walk into a room knowing nothing about what’s happening and you can walk out like an expert entirely by asking the right questions and talking to the right people.

“As a science journalist, I’ve never relied on anything I learnt at university.” Knowing enough to pass for someone with knowledge of the subject was important for getting access to sources, “the gatekeepers” of information. Credibility as a representative of more recognisable media outlets like *The Press*, also helped, he said. He described access to sources in New Zealand as “patchy”, as there was a smaller pool of experts.

Finding the ‘angle’ or ‘frame’ was simply about diving in, he said. “I go out and read everything that’s been written so I don’t end up rehashing what’s been done before. You also identify a few people that might be worth speaking to. “Euan Mason (University of Canterbury forestry professor) caught my attention. He became the story because everything he said mapped, made sense.”

McCrone describes it as a “political detective story”; one where one must look at what is being said, and what the actual long-term consequences of that are. “Our history of climate change policy has been not very honest. The whole thing is a big charade. There’s a huge amount of spin about this story.”

He said the danger of writing for an informed audience was that it becomes about the personalities rather than the policies and issue behind them. “People don’t really like to be bored by detailed facts.” He felt the subject sometimes went over people’s heads or like they didn’t’ care.

Increased media coverage of climate change issues was reflective of increased public interest, but it was still difficult to sell papers with only doom and gloom stories. “Time after time we’ll try and make ourselves feel good.”

New Zealand was known for its high-quality journalism, but increasingly separate newsrooms made it difficult to cover a story using the multiple lenses where the real world intersects. “I think we’re doing a bad job for understandable reasons.”

Former senior agribusiness reporter at *Stuff* Gerard Hutching agreed that there had been a big “sea of change” in the coverage of climate change.

“*Stuff* has led the pack really when it comes to the rest of the media,” he said. He was unsure whether this was because they had recognised the crisis which needed to be addressed; or rather that it was an opportunity.

He cited its policy of not publishing sceptics’ comments as an example. “I’ve been in contact with the sceptics; there are some that I worked with as a journalist. I’m certainly aware of their views and every now and again you get long letters. It’s very difficult to report because they don’t come to the point particularly well.” He said he wouldn’t be surprised to learn New Zealand had a large sceptic population compared to other OECD countries.

One of the biggest challenges he found was operating with the national structure. Based in Wellington, travel to cover 1BT or other agribusiness stories was always limited as the company would rely on regional reporters in the area. “Newsrooms haven’t got the funding.

“*Stuff* has lots of regional representation and the line that is run is that we won’t send you up to Gisborne to do a story on climate change because we’ve got people up there. Or secondly, we have this tier of national correspondents.”

However, he disagreed that journalists were siloed, as he felt all articles were underpinned by the same key factor. “It’s all about economics now. Until recently, people used to do rounds and I was in agribusiness but since I have left, all the people that I was in the business area have taken over. There are no specialists anymore.”

In covering the 1BT, many of his articles focused on concerns about foreign ownership and mass-conversion of farmland to forestry. These articles primarily relied on the conflict frame. “They were quite high-profile stories because they involved people like the Austrian Countess. Those kinds of stories rouse interest.” He cited the 50 Shades of Green lobby group as particularly vocal and prominent in relation to his coverage.

Like Gibson, he believed it was more than an environmental story, with strong social issues in the consequences for rural communities. “They had very real concerns. The big concern was that we were going to see a loss of population. A sheep and beef farm for example that employs many more people than forestry.” Some of these concerns might have been overblown though, and there hadn’t been an enormous number of properties sold for planting. Source accessibility wasn’t difficult.

Hutching said coverage of 1BT was mixed, though many articles lacked the contextual history of forestry in New Zealand, particularly a period during the 2000s when many plantations were not replanted after being harvested. “A lot of [it] is related to native plantings rather than pine trees. That was one of the values of the 1BT programme; it was attempting to invert that balance.”

He said there wasn't a very good understanding of what the policy was about and that needed to be made clearer. Part of this was the way political personalities like Shane Jones dominated the news coverage – certainly, this is evident in the content analysis. "I felt it was a bit unfortunate the way Shane Jones (Minister of Regional Development) characterised it as being from an opposition party. I don't think that serves his purpose particularly well."

Summary

All three journalists were quick to point out how climate change coverage had shifted. They noted that it was much easier to get support and approval from their editors. The nature of the coverage had also changed, in that attempts to 'balance' stories with sceptics was no longer necessary. While Gibson and Hutching had differing opinions on the scale of New Zealand's sceptic population they had both had dealings with them.

Another factor which stood out in their experiences was how newsrooms had changed and were structured. Gibson described her role of managing various reporters across different rounds relating to climate change as time-consuming. McCrone emphasised the unique position he was in as a features writer which afforded him more time and for more detailed coverage. For Hutching, *Stuff*'s structure meant certain stories relied on regional reporters, possibly lacking expertise, to cover them.

Each also felt that the media environment had impacted the way stories were framed. Gibson and McCrone agreed with criticisms that reporters tended to be siloed, in that environmental journalists stuck to environmental stories, political reporters political, and business reporters economic. They agreed that 1BT, like other climate change stories, was a mix of factors environmental, political, economic and social. McCrone said it was not necessary for reporters to have a scientific background to cover the topic, but rather needed good general journalistic skills. Hutching felt that each story was underpinned by economic factors and that was a key part of the coverage.

Generally, the three journalists agreed that there was good access to sources, though this came with the knowledge that experts were limited in New Zealand. Gibson in particular said she was wary of always relying on the same contacts and had challenged other reporters to broaden those they spoke to.

Implications

The implications of this study helps confirm the way in which the changing face of newsrooms, with fewer resources and journalists specifically from scientific backgrounds, has impacted coverage of environmental and climate change issues. The news cycle of today is much faster, meaning there is less time to unpack complex science and policies in great detail, with journalists relying on a few sources (Painter et al, 2018; Salmon et al, 2017). The literature review showed that scientists and politicians are often the dominant voices in New Zealand environmental stories, providing authoritative detail (Craig, 2009; Chetty et al, 2015). While I think it is necessary to provide a platform for scientists so that complex information can be told by those who understand it best, I made a conscious decision not to include politicians (bar a Masterton councillor who was also involved through a local residents association), in my own feature article.

The feature article was also informed by the content analysis and my interviews with the three journalists. I knew that I wanted to cover the topic from a variety of perspectives, touching on the tensions between the forestry industry and rural farming communities, whilst adding something new

to the coverage of the topic. What became apparent was that Māori were one of the voices lacking in previous coverage, something I attempted to rectify in my interview with Jason Kerehi.

This project supports previous research which suggests that climate change coverage in New Zealand is underpinned by its impact on the primary sector as an important part of the country's economic and cultural makeup (Bourk et al, 2017; Boykoff, 2009; Chetty et al, 2015; Craig, 2009). As such, farmers are an equally vocal and important part of the coverage. Most significantly, this project helps mark the significant shift in the public, and the media's, attitude towards climate change coverage, from one of scepticism to acceptance. The literature review noted that New Zealand media coverage of climate change differs greatly from that of other countries, in that it focuses on how society needs to respond rather than debating whether it is real or not (Salmon et al, 2017). However, until now there has been little research on the media's coverage of specific New Zealand policies such as the ETS or 1BT.

Limitations

There were relatively few limitations relating to ethics as this project did not involve the handling of especially personal or sensitive information. However, to mitigate any potential risk I sought approval from the Human Ethics Committee. Those who were interviewed as part of the project were informed that their comments would be published and asked if they were comfortable with this. Confirmation of their approval was also sought in later correspondence with the participants.

One of the challenges journalists face in covering environmental stories, as touched on in both the literature review and interview with *Stuff* journalists, was reporting complex scientific information succinctly and accurately. By focusing on how media covered the policy, there was limited scope in this project to cover in detail the ways in which tree planting mitigates climate change. While touched on briefly in the literature review, it is a very compact summary of the science.

Due to the complex and wide coverage of this subject, it was also necessary to narrow the focus of the content analysis to just one media outlet over a limited period of time. As such, it is difficult to say the findings of the content analysis are true for all New Zealand media and reach a firm conclusion about the relationship between framing and sourcing as this may vary depending on the size and type of the media organisation, as well as the formatting which might allow for different depths of coverage or other storytelling practices such as the use of multimedia. Similarly, the number of journalists interviewed was fairly limited. While they gave detailed answers which largely supported the findings of the literature review and content analysis, a broader response might have led to more varied feedback relating to their personal backgrounds and their regional placement.

Further Research

The aforementioned limitations are all things which could be considered in further research. Previous research about media coverage of environmental subjects has often separated them into the different mediums (Craig, 2009; Boykoff, 2009; Kenix, 2008; Painter et al, 2018). It would be interesting to examine how media coverage of one specific policy varies across different mediums such as television, radio, print and digital as well as how this compares across different media companies. Analysis of how multimedia content is incorporated into this coverage would be worth further research in relation to how newsrooms have changed in the digital era.

In the final few weeks of this project, media coverage of the afforestation in New Zealand seems to have shifted again with a greater emphasis on the impacts on the ETS as opposed to the 1BT programme. In years to come it be worth doing a temporal analysis of the coverage and to look at reasons for why this might have changed over time.

Conclusion

This project has explored the New Zealand media's coverage of the government's 1BT programme which aims to lessen the impacts of climate change through subsidised afforestation.

Society's changing attitude towards and acceptance that climate change is indeed real, has allowed media in New Zealand to spend more time analysing the potential consequences and merits of mitigating policies. While journalists in other countries are still confined to debate about whether climate change is real and what is causing it, the New Zealand media are free to explore the issue through a different set of frames.

However, my analysis found that the media coverage and subsequent framing was subject to influence from other news values like conflict; media coverage of the policy-focused namely on the tensions between rural farming communities and the forestry industry over perceived threats to productive land through afforestation. To this effect, the project also highlights how the prominence of the agriculture sector as part of New Zealand's economy underpins media framing of environmental issues.

Both the academic research and interviews emphasise the challenges journalists face in covering complex policies involving scientific concepts, namely reduced newsroom resources and time, which contributes to a reliance on scientists as sources. However, New Zealand's relatively small population and limited access to specialists or experts, means the media also relies on government representatives and politicians as authoritative sources on such topics. This contributes to the increasingly political framing of the policy which shows that there is a relationship between media sources and framing. With media coverage of climate change issues having changed dramatically in recent years, the topic becoming more commonplace and better understood, it is increasingly important to understand the role media play in shaping the narrative.

References

Bourk, M, Rock, J, and Llyod, D (2017). Mediating the Science: Symbolic and Structural Influences on Communicating Climate Change Through New Zealand's Television News. *Environmental Communication,* 11(6), 821-839.

Boykoff, M (2009). We Speak for the Trees: Media Reporting on the Environment. *The Annual Review of the Environment and Resources*, 34, 431-457.

Chetty, K, Devadas, V, and Fleming, J (2015). The framing of climate change in New Zealand newspapers from June 2009 to June 2010. *Journal of the Royal Society of New Zealand*, 45(1), 1-20.

Craig, G (2009). Aotearoa/New Zealand television news and current affairs representations of environment. *Australian Journal of Communication*, 36(2), 55-71.

Gamson, WA and Modigliani, A (1987). Framing as a Theory of Media Effects. *Journal of Communication*, 49(1), 103-122.

Harcup, T and O'Neill, D (2001). What is News? Galtung and Ruge Revisited. *Journalism Studies*, 2(2), 261-280.

Hopkins, D et al (2015). Climate Change and Aotearoa New Zealand. *WIREs Climate Change*, 6, 559-583.

Kenix, L (2008). Framing Science: Climate Change in the Mainstream and Alternative News of New Zealand. *Political Science* 60(1), 117-132.

Kirschbaum, M et al (2012). Comprehensive evaluation of the climate change implications of shifting land use between forest and grassland: New Zealand as a case study. *Agriculture, Ecosystems and Environment*, 150, 123-138.

Lyytimaki, J (2015). Prospects for Environmental Communication Based on 25 Years of Newspaper Coverage of Climate Change and Eutrophication in Finland. *Applied Environmental Education and Communication* 14, 246-255.

Milfont, T, Wilson, M, and Sibley, C (2017). Changes in Climate Change Beliefs Over Time. *PLoS One*, 12(3), 1-9.

Moore, J and Watt, M (2015). Modelling the influence of predicted future climate change on the risk of wind damage in New Zealand's planted forests. *Global Change Biology*, 21, 3021-3035.

Painter, J, Kristiansen, S, and Schaer, M (2018). How 'Digital-born' media cover climate change in comparison to legacy media: A case study of the COP 21 summit in Paris. *Global Environment Change,* 48, 1-10.

Salmon, R, et al (2017). Climate Change Communication in New Zealand. Oxford Research Encyclopaedia, Climate Science. Oxford University Press 2019.

Sandman, P (1987). Risk Communication: Facing Public Outrage. *EPA Journal (US Environmental Protection Agency)*, November, 21-22.

Savage, Micky (2018, November 29). *Stuff is banning climate change deniers from articles and comments*. Retrieved from https://thestandard.org.nz/stuff-is-banning-climate-change-deniers-from-articles-and-comments/

Schafer, M, Scheffran, J, and Penniket, L (2016). Securitization of media reporting on climate change? A cross-national analysis in nine countries. *Security Dialogue*, 47(1), 76-96.

Scion (2012). Carbon Forestry – The Opportunity. *Ministry for Primary Industries.*

Scion (2019). Carbon Forestry with Regenerating Natives. *Ministry for Primary Industries.*

Te Uru Rākau (2015). An Overview of Forestry in the Emissions Trading Scheme. *New Zealand Government.*

Te Uru Rākau (2018). The One Billion Trees Programme. *New Zealand Government.*

Trotter, C et al (2008). Afforestation/reforestation of New Zealand marginal pasture lands by indigenous shrublands: the potential for Kyoto forest sinks. *ENDP Sciences*, 62, 865-871.

van Minnen, G et al (2008). Quantifying the effectiveness of climate change mitigation through forest plantations and carbon sequestration with an integrated land-use model. *Carbon Balance Management*, 3(3), 1-20.