

# ScionConnections

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Scion's Sustainable Architect Andrea Stocchero at SW4SW representing the international wood design and construction sector, New Zealand and Scion.

## Sustainable wood for sustainable development

Wood is the world's most used renewable resource. We rely on it for building materials, heating sources, musical instruments, modes of transport, clothes and packaging. But, are the full benefits of wood being realised?

To explore the advantages of sustainable wood, the United Nations Food and Agriculture Organisation (FAO) and its partners hosted the 'Sustainable Wood for a Sustainable World' global meeting at their headquarters in Rome from 31 October – 1 November. Their aim was to discuss how forests and the use of sustainable wood products can contribute to the 2030 Agenda for Sustainable Development through the 17 United Nations Sustainable Development Goals (SDGs). New Zealand had a voice at the table through representation from Scion.

### UN Sustainable Development Goals and sustainable wood

In 2015, world leaders from 150 countries, including New Zealand, adopted the 2030 Agenda for Sustainable Development, including the SDGs that aim to end poverty and ensure prosperity for all, while protecting the planet. The SDGs cover a wide range of themes from the three dimensions of sustainable development: economic, social and environmental.

The objectives for the Sustainable Wood for a Sustainable World global meeting (SW4SW) were to show how, when and where wood is delivering contributions to the 2030 Agenda for Sustainable Development, unblock markets and finance

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# “A Billion Trees”



One of the challenges I was told I would face when I started at Scion was that despite being the third largest export revenue earner forestry was never talked about by government ministers. Well that has certainly changed, and I believe the time is right. Science and technology innovations, global trends for renewable and sustainable outcomes and local problems are opening up real opportunity for forests, wood products and bioproducts.

This is an opportunity to redesign the New Zealand landscapes for much enhanced environmental outcomes (such as erosion control, water quality, carbon absorption) and improved societal outcomes while delivering a potentially large increase in economic contribution (\$10 billion today to \$100 billion in the future). The exciting factor is that this will happen in our regions and compared to some current models the forestry opportunity will rejuvenate and invigorate our small local communities.

So, what is behind this change in focus and realisation of the huge and transformation opportunities from trees as a renewable resource? In no particular order I can list many developments and trends that are bringing forestry out of the shadows:

- A focus on the health of our freshwater environments and actions to clean up our lakes and waterways.

- Companies committing to carbon reduction programmes and achievement of CarboNZero certification.
- Growing interest in indigenous trees with some Māori forest owners wishing to diversify species and, in some cases, re-establish land in species other than radiata pine, such as kauri, tōtara and beech.
- Māori wanting to invest in trees and processing are becoming key enablers.
- Science that allows us to select trees and their traits in a third of the time previously.
- Precision forestry through a systems-wide forest management approach to greatly improve productivity.
- Mixed land use at different scales and multi-layered forests, such as under cropping, to increase value. For example, planted forests can provide an ideal environment for growing the shade-loving herb ginseng.
- A focus on regional economic development and action plans that identify forestry and wood processing as best opportunities for growth.

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... we need to make sure that we plant “The Right Trees in the Right Places for the Right Purposes”.

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- Revival of manufacturing in regions characterised by smaller scale high-value operations enabled by digital technologies, smart connected products and automation across agriculture, horticulture and forestry sectors.
- R&D in wood products and wood-derived materials has opened up markets in construction and high-value manufacturing through increased cost effectiveness and performance of processed wood.
- The international building design industry has ‘discovered’ wood and engineered wood products that deliver superior performance in structural, earthquake, fire, thermal, aesthetic and environmental properties.
- Recognising that trees are our oil wells of the future. We have shown that virtually everything we can make from

petrochemicals today we can make from trees tomorrow.

- Bioproducts made from renewable natural sources and primary-industry processing residues, such as bioplastics and bioenergy, are becoming fast-growing segments of industries wanting their products to be recyclable and/or biodegradable.
- Global consumer trends to sustainable and renewable products are evident in big brands (like Ikea, Lego, Starbucks, Philips, Toyota) that are leading the charge with substantial corporate sustainability goals, and many more brands are joining the wave.
- The United Nations 17 Sustainable Development Goals include goals such as clean water, climate action, life on land, sustainable cities and communities, affordable and clean energy that are clearly linked to the direct impact from forests and forest products. Just a month ago the UN Food and Agriculture Organisation and partners agreed that sustainable wood use contributes to achieving all 17 goals.
- The amenity value of forests is enjoyed by tourists and kiwis who recreate among trees, and this indirectly benefits local economics and community wellbeing.

As I stated earlier, now is the time to look at the landscapes we want for New Zealand in the future and to rejuvenate our regions. The picture in my mind looks very exciting. The possible outcomes from planting trees is truly great and for these reasons we need to make sure that we plant “The Right Trees in the Right Places for the Right Purposes”.

I welcome your thoughts on this topic and any other matters raised in this issue of *Scion Connections*.

Dr Julian Elder  
Chief Executive

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**FOR FURTHER INFORMATION**  
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Ben Morrow and Toby Stovold from Scion's remote sensing team, about to launch a UAV.

# New ways to measure and value small forests

"Collectively, the 14-16 000 small- and medium-scale forest growers are the largest forest owning group in New Zealand – but when it comes to measurement they don't have easy access to the benefits provided by research outputs, and the economies of scale that come with larger plantations," says Jonathan Dash, remote sensing scientist at Scion.

In particular, Jonathan is referring to the amount of data needed to accurately estimate forest yields. In larger forests (with more uniform topography, management, and crop conditions), fewer measurements are needed per hectare compared with smaller forests. In part, this is because smaller plantations tend to be located on more variable terrain and have less consistent tree growth and stand management. This means that more sample plots are needed per hectare to achieve accurate results, which comes at a cost to the forest grower. Accurately estimating forest yields is important in gauging the current and future wood availability at regional and national levels, as well as for providing realistic forest valuations.

To address this, a project team led by Jonathan, is developing techniques for gathering data specifically for smaller forests. The three streams of this project include developing UAV (unmanned aerial

vehicles, also referred to as drones) based methods, calibrating existing national forest yield models with local calibration plots and community data sharing.

## UAV science applied to small forests

The team is tasked with creating new statistical methods to use UAV data for small areas and incorporating that information with field plot data to improve forest yield estimates.

UAVs are a new technology that are now providing opportunities for collection of new types of data. If useful analysis techniques can be developed, this could represent a significant opportunity to improve assessment of small-plantations and woodlots more accurately.

Currently, small-forest growers can only improve accuracy by taking more measurements, or they can take the risk that a small number of sample plots will yield adequate results. The team aims to make the measurement process more efficient and take away some of the uncertainty in the measurement of smaller forests.

Once complete, this research will have identified how much field data collection is necessary in combination with other

tools, to create efficient and accurate yield estimates.

## Calibrating national models

Research efforts also include increasing the applicability of existing national scale yield models so that they work better for small-plantations and woodlots.

The team is investigating whether it is possible to use a small number of field plots to calibrate an existing national model developed by Scion's senior scientist Michael Watt and his team. If successful, this project will make a widely available tool valuable to more forest owners and increase the uptake and reuse of data and models developed through previous research.

## Data sharing for small forest owners

As the largest forest growing group in New Zealand, the potential for data sharing between small-forest growers could prove very valuable. In particular, forest growers could contribute their existing forest measurement data into a shared database, making it available for others.

Jonathan explains, "We are working on a prototype data sharing platform to bring together forest information and publicly available remotely sensed data sets. Then we'll develop software that extracts the information from the database, and builds models of forest yields that can be applied and summarised for relevant forest areas."

Building a successful database relies on finding participants willing to share their data. Jonathan and the team will be working with forest management and consulting companies to reach out to small-forest owners, so you may hear from them. If you are interested in contributing to this research and becoming part of a community of users, the team is eager for volunteers. All data can be made anonymous if required, please get in touch if you would like to be involved.

This two-year project is now half way through. The research results will be presented at industry-related events and seminars and published in 2018. The work has been supported by AgMardt, Forest Growers Levy Trust, New Zealand Farm Forestry Association, and the Neil Barr Foundation.

**FOR FURTHER INFORMATION**  
on this project please contact  
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Adam Matekuare and Doreen Roberts inspecting māhoe seedlings at Minginui Nursery.

# Growing from strength to strength – the Ngāti Whare and Scion partnership

When Ngāti Whare decided to build a state-of-the-art nursery in Minginui Te Whaiti, they had plans to grow more than just plants. They needed a supply of 10,000 trees a year to restore their whenua, returning 600 hectares of harvested radiata pine forest to indigenous forest. Rather than buying plants, they wanted to build a nursery that would create jobs and new skills for the Minginui Te Whaiti community. Meanwhile, Scion was in need of a partner to scale-up our indigenous propagation technology. Fortuitous and timely introductions led to the Minginui Nursery rolling out Scion's new propagation technology. The nursery, opened in September 2016, is the only nursery in New Zealand using Scion's technology to

The nursery has seven full time staff and has supplied thousands of trees to customers including neighbouring iwi, Tūhoe and Ngāti Manawa.

grow indigenous podocarps from cuttings, enabling mass production of plants with consistent quality and known parentage. In the time since the nursery opened, Ngāti Whare and Scion's relationship has

grown through a forward thinking partnership with the potential to shape a new indigenous forestry industry for New Zealand.

## What's happened since the opening

The Minginui Nursery has reached some major milestones in its first year of operating. The nursery has seven full time staff and has supplied thousands of trees to customers including neighbouring iwi, Tūhoe and Ngāti Manawa. There are up to 60,000 trees in the nursery, and with two seed collections under their belt and a second crop sown, the team hopes to have 100,000 plants in the nursery by the end of the year.

All this occurs under the watchful eye of Nursery Manager Peter Harington and his team. Peter is seconded to Minginui from Scion. As part of a Vision Mātauranga project, supported by the Ministry for Business, Innovation and Employment, Peter's role is also to mentor, train, and work closely with Minginui staff. This includes providing them with research skills. Ngāti Whare and Scion are supporting Doreen Roberts (Minginui Nursery's technician) through a co-designed research programme that will take the new vegetative propagation technology from the research scale to commercial nursery and forest regeneration scale. In parallel, Scion participants are mentored by kaumātua and hāpu members to explore and understand Ngāti Whare mātauranga further strengthening the relationship.

Taking stock of the first year, the landscape in Minginui is just as Ngāti Whare planned, the nursery growing more than just trees. Ngāti Whare Holdings GM Mere George says that the nursery has fostered a sense of community pride and a new interest in science, "It was a bigger picture for us in terms of our desire to ensure that it [the nursery] could be a catalyst for change.

"This [the nursery] has been able to provide jobs and provide an opportunity for education. So the kids at the school look at it and say, wow yeah, I might actually be interested in science. They know that science isn't just in the lab, it's in the community, it's in our nursery."

### Looking to the future

As the nursery moves beyond the establishment phase, the governance group that steers the roll out of the propagation



Peter Harington, Bob Shula, Anne Harris, Greg Steward, Bronco Carson, Mere George, Ian Hulton, Rick Braddock and Russell Burton at the launch of the Whirinaki Te Pua-a-Tāne Conservation Management Plan.

technology is looking to its next steps – growing the science, business and industry that will drive native forestry as a viable option in the future.

Mere says that Ngāti Whare see potential ahead of them, "What's really exciting about the technology is that we might be able to facilitate native forestry."

As Anne Harris, part of the Scion team, says, "If we're going to get commercial indigenous forestry going in New Zealand, it will be vegetative propagation that will make it viable."

If the partners can achieve what they set out to do, the Minginui Nursery will be the first of many high-tech indigenous nurseries mass propagating podocarps across Aotearoa.

In the meantime, Mere says that native forestry could transform Minginui Te Whaiti again. "It's as though the downfall for the community was the cutting of native trees and logging of native timber, but now, the thing that might revive the village is going to be the nursery and effectively replanting the areas that were logged way back then. It has come full circle."

### FOR FURTHER INFORMATION

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# Radiata pine genome – draft assembly completed

In a world first, the Scion Forest Genetics Team in collaboration with Massey University has completed a draft assembly of the radiata pine genome. At 25 billion base pairs, the radiata pine genome is eight times the size of the human genome, and its sheer size was a substantial challenge to researchers.

"A complete genome assembly means that we now have the instruction book for how radiata trees grow," says Dr Emily Telfer who leads the project. This milestone marks the beginning of a post-genomics era and opens the door to a new era of precision forestry.

## The next steps

Following assembly, the next steps will involve understanding the role each piece of the genome plays and eventually, how those pieces can be manipulated faster and more precisely to produce future generations of forest stock.

Armed with this knowledge, the forestry industry could more easily breed trees with highly desirable characteristics. Emily explains, "Currently it takes decades for us to breed new characteristics into trees. Once we better understand the genome puzzle we will be able to produce superior trees much more quickly."

She says that in time this will revolutionise modern forestry. "We could breed trees

suitable to different markets - from construction timber to biofuels."

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**As environments alter with climate, diseases not previously found in New Zealand may establish and threaten our forests. Emily says that thanks to genomics we will be able to identify genes for drought or disease resistance and establish them within the wider population much faster.**

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Another major advantage will be in mitigating the effects of climate change and disease. As environments alter with climate, diseases not previously found in New Zealand may establish and threaten our forests. Emily says that thanks to genomics we will be able to identify genes for drought or disease resistance and establish them within the wider population

much faster.

The genome assembly will also benefit the international scientific and forestry communities. Radiata is the backbone of New Zealand's forestry industry, but it is also the most domesticated pine in the world and is grown commercially in Australia, Chile, Spain and South Africa.

## Just the beginning

"Now the real work begins," says Emily. "We've already begun our second draft assembly and the next step will be to begin the task of deciphering what each of the DNA segments relates to in physical terms".

The genome assembly began in 2013 and, with assistance from the international conifer genomics community, was completed in September 2017 using Scion's newly acquired high-capacity computer server – the largest of its kind being used for genomics in New Zealand.

The official announcement of the first draft genome assembly was made at the Forest Growers Research Conference in Christchurch in October.

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**FOR FURTHER INFORMATION** on the draft genome contact Dr Emily Telfer at [emily.telfer@scionresearch.com](mailto:emily.telfer@scionresearch.com)



Science NZ award winner Dr Nari Williams with Dr Richard Gordon (Chair, Science New Zealand) and Hon Dr Megan Woods (Minister of Science, Research & Innovation).

## Award winning science

Industry, peers and colleagues have all recognised our high achieving scientists in what has been a busy awards season.

The forest growers of New Zealand presented two Scion staff with Forest Growers Research awards. Carolyn Andersen was presented a contribution to science award for her work managing the permanent sample plot database,

which stores over 100 years of tree growth data and is crucial to many research projects. Economist Dr Richard Yao received an award for enhancing sector value for his work to recognise and give an economic value to the ecosystem services provided by forests.

At the inaugural Science New Zealand (SNZ) awards Dr Nari Williams took home

an early career researcher award for her work in forest diseases, particularly *Phytophthora* and leading the Healthy Trees, Healthy Futures programme to defend our forests and horticultural crops from present and future *Phytophthora* diseases.

Forest research veteran Dr Dave Cown, received a SNZ lifetime achievement award for his wood science research. In the 40 years Dave spent at Scion (then the Forest Research Institute), Dave was responsible for creating the Wood Processing Research Group that developed the drying schedules now used by most of the softwood industries across the southern hemisphere, including the Dryspec™ Control system.

Scion's world-class Biosecurity Team picked up a SNZ team award acknowledging their successful management of several new-to-science diseases and development of a forestry biosecurity surveillance system considered by overseas experts to be the best in the world.

Congratulations to Mark Kimberley on winning our Roger Newman science excellence award. Mark has developed growth and yield models for New Zealand's plantation forest trees, forest inventory models and calculations of carbon stocks in New Zealand's forests. These are widely used by industry and government and have led to numerous highly-cited publications.

Congratulations to all for these well-deserved wins.

## Sustainable wood for sustainable development

(Continued from page 1)

for sustainable wood and dispell the perception of wood production as a driver of environmental damage and inequity.

In response to a suggestion from David Rhodes (New Zealand Forest Owners Association), Scion's Sustainable Architect Andrea Stocchero was invited to SW4SW to represent the international wood design and construction sector, New Zealand and Scion. He was featured on a panel addressing how wood product use contributes to sustainability and climate change mitigation, and participated in the 'Sustainable wood products for the SDGs' breakout group.

"An important outcome from the global meeting was the agreement that sustainable wood use contributes to achieving all 17 SDGs" says Andrea. "It's especially evident when considering the

whole value chain with an integrated system approach." This thinking put new emphasis on considering value systems that spread the benefits of sustainable wood across the community and the natural environment.

He explains that using wood in construction supports local communities. "It fosters integration across a multi-industry value chain that spans forestry, wood product manufacturing, building design and construction, including waste management, energy production, logistics and transportation. This provides employment opportunities for all genders and levels of qualifications, in both rural and industrialised areas worldwide, contributing to SDGs 4, 5, 8 and 10." Andrea says there are similar examples of benefits for all of the other SDGs.

### Aligning with the SDGs

The global meeting prompted an initiative from the FAO and its partners to support sustainable wood value chains to have a

strengthened role in sustainable development.

Governments, businesses and civil society around the world are currently mobilising efforts to achieve the Sustainable Development Agenda by 2030. Scion and New Zealand will be contributing to these efforts by supporting forestry, wood products, wood-derived materials, and other biomaterial sectors and achieving the SDGs through research, science and technology development.

Andrea says, "Human history has been deeply influenced by the use of wood. Using wood is part of the common cultural heritage of humanity and it is time we recognise the wider benefits sustainable wood can bring to society, economy and natural environment and that we advocate for its use."

**FOR FURTHER INFORMATION** and updates please contact Andrea Stocchero at [andrea.stocchero@scionresearch.com](mailto:andrea.stocchero@scionresearch.com)



## Nau mai haere mai to our two new leaders

Scion welcomes new general managers Adriana Botha (People, Culture and Safety) and Arron Judson, (Marketing and Partnerships).

Adriana comes to Scion from OMD/Omnicom Media New Zealand, where she has been Group Director People and Development since 2013. Prior to that she held high-level human resources and organisational development roles with Serco New Zealand, APN New Zealand and Australia, Westpac New Zealand, Deloitte Group HR, and ABSA (Barclays) Bank.

Arron came to Scion from the University of Auckland where he was Director for the Centre of Software Innovation – ICT Sector Innovation Manager since 2012. He is also a co-founder and current Director of Astrolab Limited. His previous roles include General Manager and Founder of SmallScreen Limited, Vice President Asia Pacific for GeoVector Corporation, Regional Manager Asia for Ericsson Wireless Internet Services, and National Technical Manager for Toshiba.

Adriana and Arron both started with Scion on 1 November.

## Annual Report has landed

Scion's 2017 annual report is now live on our website, showcasing another successful year. Chair Tony Nowell says Scion's 70-year legacy of delivering science impact gives the institute the confidence to think boldly about the future.

"We firmly believe in forestry. Indeed, we see the power of trees as a renewable resource, coupled with our science capabilities, meeting the market needs of

a low-carbon bio-based economy."

Guided by a 'Unleashing the power of forestry' theme, this year's report stakes out a dozen of our highest impact stories, from making drone and UAV science more accessible, to increasing productivity and profitability of planted forests.

These and other success stories from our Annual Report can be downloaded from [www.scionresearch.com/annual-reports](http://www.scionresearch.com/annual-reports)

## Meri Kirihimete

Our offices will close for the year at 5pm on Friday December 22 and re-open on 8 January.

The Scion Board and staff would like to wish all our clients, partners and colleagues the very best for the festive season. We look forward to working with you again in 2018.

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