CHILE STUDY TOUR

DIARY

Integrating Restoration into Forestry Practices

Los Rios and Araucanía Regions

25-29 November 2013

By Barney Jeffries

Much has changed since the last NGP study tour to Chile in 2010. Back then, the country had less than 280,000 hectares of FSC-certified plantations, belonging to NGP participant Masisa. Chile's other major plantation companies – CMPC, also an NGP participant, and Arauco – were just beginning their journey toward sustainability, after many years of conflict with environmental and social NGOs. Forestal Mininco, a CMPC company, achieved FSC certification in December 2012, and Arauco this September, bringing the total certified area in Chile to more than 2 million hectares (out of a total industrial plantation area nationally of around 2.6 million).

But certification has come with conditions. The companies are obliged to restore any areas of native forest that have been converted on their land since 1994. They also need to protect and enhance areas of high conservation value – an FSC condition and one of NGP's four principles. Over the coming decade, we're going to be seeing forest restoration on an unprecedented scale in Chile. NGP is here to see how we can make the most of this opportunity, to learn from practical examples in the field, and to share experiences and ideas with colleagues from around the world.

The tour is being hosted by WWF-Chile and NGP's two participating companies from Chile, CMPC and Masisa. We're pleased to have Arauco joining us too, along with around 40 participants from forestry companies, WWF offices, NGOs and universities from across South America and further afield.

Monday 25 November

Valdivia, where our tour begins, is an attractive university city, notable for the giant sea lions that loll on the riverbanks beside the well-stocked fish market. WWF has an office here – the Valdivia ecoregion, home to the world's second largest temperate rainforest as well as most of Chile's plantation industry, is one of WWF's priority places. The Austral University of Chile, a leader in environmental research, is also based in the city, and it's here, on the tree-lined campus on an island in the Rio Valdivia, that we're holding our first event.

The purpose is to exchange experiences on restoration. As Rodrigo Catalan, conservation director of WWF-Chile, explains in his opening address, the large-scale restoration that companies have committed to in Chile could bring big gains for conservation and communities. But it's uncharted territory, and there's potential for mistakes and missed opportunities. That's why it's important to have platforms like NGP and events like this, where we can learn from each other.

David Lindley from the Mondi Wetlands Partnership, a WWF-South Africa programme funded by NGP participant Mondi, begins by outlining his experiences in wetland restoration in South Africa. What began as a project with a plantation forest company (Mondi) has now influenced other industries and grown into a multimillion-dollar government programme which employs 2,000 people and rehabilitates around 50 wetlands every year. While there are obvious differences between wetlands and forests, and between South Africa and Chile, David suggests it's the principles that matter more than the details.

The work has been successful, he says, because it's brought companies, government, NGOs, communities and universities together in a shared learning process – while there's space for debate and disagreements, over time the different parties have built up trust and understanding. In a water-scarce region, wetland degradation is a risk they all share – so restoration is a shared responsibility. Another reason for the programme's success is that it's tapped into a government priority: the labour-intensive wetland rehabilitation work provides employment, particularly for poor rural people. Winning significant government backing has allowed the programme to be scaled up massively – something to consider in the field of forest restoration?

Our next speakers are all involved in forest restoration in Brazil's Atlantic rainforest region. Three NGP participants – Fibria, Stora Enso and Suzano – are involved in the Sustainable Forest Mosaics Initiative. The mosaic concept is about fitting together different land uses – like plantations, agricultural, national parks and indigenous reserves – on a landscape scale, so that commercial production, local livelihoods and healthy ecosystems can coexist. As part of this, the companies are helping to restore areas of native Atlantic rainforest – particularly by establishing corridors to link conservation areas.

This landscape-scale thinking requires cooperation: Paulo Dimas Menezes outlines how the Brazil Forests Dialogue, and its Bahia regional forum, has been bringing together companies, government, NGOs and community groups. The social side of this is vital, and the forum involves community groups, including indigenous people, in the planning and decision-making. An indigenous people's cooperative has been set up to assist in restoring a national park, and 55 families have swapped timber harvesting for work in a nursery cooperative that raises 200,000 native seedlings a year.

Restoration is expensive, Paolo points out, at around US$10,000 per hectare, and receives no public money. One of the challenges in Bahia is to find funding to keep the work going. They're looking at

ways to reduce costs, make the business case for restoration to landowners, and persuade Brazilian society of the benefits – for example in terms of ecosystem services.

Virginia Camargos and Humberto Amoedo from Veracel, a joint venture between Fibria and Stora Enso, talk about their experience of forest restoration and landscape planning. Around half of Veracel's 211,000 hectares – most of which used to be cattle pasture – is set aside for conservation. Under Brazilian law, landowners need to retain native vegetation on 20 per cent of their land, as well as around watercourses, and the company also owns a private nature reserve and areas of high conservation value.

Veracel's model is to plant eucalyptus on plateaus, leaving steep slopes and valleys for native forest. Much of this has regenerated naturally, but some areas are too degraded, so each year the company actively replants 400 hectares, with almost 5,000 hectares completed to date. They use planning tools such as satellite imagery to see where replanting will be most effective – for example, by making connections between existing biodiversity corridors. Veracel's location means it has a significant role to play in an ambitious aim of restoring a connection between two of the largest Atlantic rainforest national parks in Brazil.

Tatiane Sarcinelli from Fibria outlines her company's large-scale restoration efforts in the biodiversity hotspots of the Atlantic rainforest and the Cerrado. Fibria is planning to restore 40,000 hectares of native forest on its own land between 2012 and 2025. This long-term commitment is helping to generate jobs in economically vulnerable regions: Fibria has helped to set up 16 nurseries to help meet its demand for seedlings of native species, creating 400 permanent jobs.

The limited stock of native seeds and seedlings is one of several challenges facing large-scale restoration in Chile, discussed by Professor Antonio Lara from Austral University. As he points out, restoration is not as simple as merely planting trees. There's an increasing amount of research into how restoration can be carried out to recover ecosystem services – to realize the benefits of restoration, it's important to improve our understanding of how ecosystems function. In practice, restoration is unlikely to mean returning a whole landscape to a pristine state in perpetuity. We need to be smart about prioritizing areas for restoration that will bring the biggest ecological gains – for example through creating corridors or securing water resources – while taking account of other land uses and socio-economic aspects.

"How do we move from small units to large-scale restoration, from tens of hectares to hundreds of thousands?" Professor Lara asks. "If we don't dream about that, we're not going to accomplish it."

That question, and that dream, is at the heart of this study tour.

Native forest regenerating between eucalyptus plantations, Valdivian Coastal Reserve

Tuesday 26 November

On a sparkling spring morning, we travel by coach and ferry to Chaihuin. Stretching south of here along the Pacific coast is one of the largest patches of the native temperate rainforest that once covered this region. Much of this is now conserved within the Valdivian Coastal Reserve, a protected area privately owned by The Nature Conservancy (TNC), the US environmental charity.

Back in the 1990s, a private forestry company (now defunct, for reasons we'll come to) acquired concessions in this area. Their plan was to convert around 25,000 hectares of native forest to eucalyptus plantations – though in the end only around 3,500 hectares were converted. A planned road project attracted strong local opposition, which led to the national forest service becoming involved. Their investigations revealed that the company weren't complying with their forest management plan, and had carried out unauthorized harvesting on several hundred hectares. The upshot was that the company went bankrupt, and 60,000 hectares of largely unspoilt forest came up for auction. And that's when TNC stepped in, with support from WWF and other partners.

The creation of the reserve has been the catalyst for various environmental, social, economic and research initiatives. We're here to look at how the eucalyptus plantations are being restored back to native forest. The work is being carried out in partnership by TNC, which is in charge of upholding environmental standards and leading work with neighbouring communities; Masisa, which brings its technical knowhow in forestry and commercial links; and Austral University, which is experimenting on the best methods for restoration and monitoring the impacts.

Around 50 hectares was replanted in 2013, bringing the total area being restored to date to just under 100 hectares. Harvesting the eucalyptus plantations within the reserve provides a source of income that keeps the project commercially viable, while clearing the area for restoration. Masisa runs its own FSC-certified industrial-scale logging operations, and has exported around 20,000m^3 of wood chips to Japan.

Small-scale harvesting and restoration is also being carried out by members of the local community through the Agricultural and Forestry Committee of Chaihuin (COAFOCH). This was set up by the local fishermen's union, with support from TNC. Masisa has provided technical training and support in forestry operations. So far, COAFOCH has harvested around 10 hectares using chainsaws and ox-drawn carts. The wood is theirs to use – they've sold some independently and some through Masisa. Local people restored two hectares in 2011 and another two hectares in 2012 by planting seedlings of coigue *(Nothofagus dombeyi)*, a pioneer species that aids the natural regeneration of other native plants. The seedlings are grown in a nursery run by the community, mostly by women.

Ivan Reilaf, president of the fishermen's union, says they're pleased to be involved and proud to have become "fishermen-foresters". The forestry work has provided employment for up to 14 families. It's also a more secure job than fishing, meaning they've been able to start making social security payments.

Ivan was born and grew up in the area, and remembers when it was all pristine forest. The nearest school was five hours' walk away. When the forestry company came, people didn't think about them cutting down the forest. "In those years people only wanted jobs," he says. "They didn't think of environmental issues. People knew less in those days. It's a stage, it's over, the same as in many countries. Now people have a different vision. We would never want to harm the forest. We could live here for thousands of years without damaging the forest."

During the day we visit several sites to see different stages of restoration, which are being carefully monitored by researchers from Austral University (and will be for the next 30 years). Over the top of some particularly vociferous frogs, Christian Little from the Centre for Climate and Resilience Research explains how he's monitoring stream flow to measure the effect of clearing plantations and restoring native forest on water resources. The massive conversion of native forests to plantations that's happened in Chile over the last 40 years has resulted in a 42 per cent decrease in water run-off. The evidence from this project already shows that reconversion increases water yield in a short period. While there's still much to learn, that could have significant implications in a water-stressed country like Chile.

"Now people have a different vision" – Ivan Reilaf from COAFOCH

Later, we drive deeper into the forest to see one of Chile's most remarkable species, and one of the main conservation objects of the Valdivian Coastal Reserve – the alerce tree. These giants can grow up to around 60m tall and live for thousands of years, growing incredibly slowly – about 1cm in diameter every 15 years. But they've endangered, having been

heavily logged over the last couple of centuries, and are protected in Chile as a national monument. Their presence provides opportunities for ecotourism – visitors are expected to contract a guide from the local community.

As we make our along a boardwalk trail into the alerce grove, it's impossible not to feel moved. Towering, ragged barked, draped in creepers, the trees seem to exude a sense of wisdom and dignity. The oldest individual in this group is reckoned to be 2,500 years old – an age almost impossible to comprehend. This tree has endured through all the destruction mankind has unleashed upon the planet over the centuries past. Let's hope it will witness a change for the better in the centuries to come.

Grandaddy alerce

Wednesday 27 November

We're certainly getting a sense of what a temperate rainforest is like this morning: there's a persistent misty rain and the temperature, although it's late spring, is anything but tropical. It's surprisingly cold and wet, even to an Englishman. We're in the hills outside Valdivia to learn more about Masisa's restoration plan.

When Chile's big plantation companies sought FSC certification toward the end of the last decade, it brought the controversial issue of forest conversion into the spotlight. Essentially, all plantations in Chile are in places where deforestation occurred at some stage in history – but the companies argued that conversion was no longer an issue, being confined to the 80s and earlier, with more recent planting taking place on degraded land.

WWF, as a member of the FSC panel in Chile, carried out a study comparing land-use maps from 1994 (the FSC's cut-off point) with the present, to identify areas where there was a high probability that native forest had since been converted to plantations. Presented with these findings – which caused some surprise – the companies commissioned their own study. There were some discrepancies – should scrubland that shows the potential for forest regrowth be counted, for example? – but eventually a common agreement was reached.

Together, Masisa, CMPC and Arauco are obliged to restore a total area of more than 35,000 hectares as a condition of their FSC certification. It breaks down like this:

- Masisa – 1,588ha over 10 years
- CMPC – 8,738ha over 15 years
- Arauco – 25,064ha over 25 years.

It should be said in the companies' defence that we're not talking about clear-cuts of huge swathes of primeval forest in the last few years – the post-1994 conversion was more likely to be scattered

areas of secondary forest, and largely took place in the mid-90s. Nevertheless, it adds up to a significant total, with a lot of potential to regain ecosystem services that have been lost. The area we're looking at today is part of a buffer around the watershed that provides most of Valdivia's water, so restoration can help to secure the city's water supply (although on a morning like this, it's hard to imagine Chile being a water-stressed country!)

Realizing that effective restoration wasn't quite as simple as cutting down the pines and eucalypts and planting native trees in their place, Masisa formed a long-term cooperation agreement with Austral University to guide their correction plan. Solutions are determined on a site-by-site basis, Pablo Donoso from the university explains. Each site is given a score based on i) what regeneration is already occurring under the plantation; ii) the state of the surrounding forest; and iii) the size and shape of the site and the distance from its centre to the surrounding forest. That determines whether it can be left to regenerate naturally after harvesting, needs partial planting, or needs to be totally replanted.

But that's only part of the challenge. We visit one stand where there are lots of native saplings and seedlings growing beneath the pine trees – so Masisa is going to need to adjust its harvesting operations to take the pines out without damaging this regeneration. Conversely, in another area that's been harvested and planted with two native pioneer species, there are lots of pine seedlings growing and more cones on the ground – so continued management will be needed to control these.

Good relationships with the neighbouring communities are important too. So that the restoration areas will be left undisturbed, a separate zone has been set aside where local people can collect wood for charcoal. We saw a similar situation yesterday with cattle grazing, where a restoration area had been fenced off to prevent cattle trampling or grazing on saplings, but TNC had provided an alternative forage site. These are the kind of issues that could cause serious disputes or resentments and set back restoration efforts, but that can be easily solved with a bit of communication and understanding.

Our final stop of the morning is to see a typical example of old-growth Valdivian rainforest, where the dense trees form a green curtain, ancient trunks blanketed in thick layers of moss. It's a reminder that, while restoration can bring short-term gains, it's a long-term process. To regain this sort of state will take another few hundred years.

Inevitably the sun comes out as we get on the coaches to drive to Temuco, our base for the rest of the tour. We reconvene in the hotel conference room for a presentation on Forestal Mininco/CMPC's restoration plan. Although the restoration has been imposed as a condition of FSC certification, they say it's become about more than just compliance – it's a long-term commitment that's changing the culture of the company. They acknowledge it's a continuous learning process – the

restoration plan is being presented in a “humble” way, and they’re keen to listen.

While working with FSC Chile on a national native forest restoration plan, CMPC is developing its own programmes, with support from Austral University (of course!), the University of Concepcion and University de La Frontera, based here in Temuco. The company has reached an agreement with FSC that some of the restoration will be carried out in the same places where the conversion occurred, but that compensation can also happen in other areas. That means that, rather than restoring many small, scattered areas, they can focus on larger units that will have a greater positive impact (which is also likely to be more economical).

CMPC considers 14 criteria in selecting an area for restoration, based on the potential for restoring or enhancing ecosystem services and conservation values. These include protecting watersheds, connecting areas of high conservation value, restoring or protecting forest types of particular interest, restoring degraded soils, and providing recreational and landscape benefits. Once a site is selected, they’ll develop specific aims, strategies and plans for that site, working with their university partners to monitor the results.

Local communities and other stakeholders are involved in the planning through workshops and other events. CMPC has employed people from local communities in seed collection. Although initially using its own nurseries, the company is now working local nurseries on producing quality seedlings for restoration. (This mirrors the approach Veracel and Fibria took – although the process should be easier in Chile, which doesn’t have nearly so many native tree species as Brazil’s Atlantic rainforest.)

Rodrigo from WWF-Chile goes on to lead a discussion on how we can build on the companies’ restoration plans – to go beyond FSC requirements to create “living landscapes”. The restoration work the companies are doing, and the skills and knowledge and closer relationships with local communities that they’re acquiring in the process, offer great opportunities for conservation, society and the companies themselves.

Recuperating ecosystem integrity and restoring ecosystem services, as we’ve seen, is a big part of this – with all the benefits that brings for nature, human well-being and the economy. But there’s also a big opportunity to build trust between the forest sector and a society – a big challenge in Chile, where there’ve undeniably been conflicts in the past and where, as recent protests have shown, environmental and social issues are becoming increasingly popular concerns. And there’s also potential to use the process to improve local governance and create mutually beneficial partnerships with government, communities, NGOs and other land users.

So how do we make the leap from local to landscape? How best to make the case for more restoration to government and society and motivate others to get involved? Can we build on multi-stakeholder initiatives that are already under way in certain areas? Is it possible to tap into government priorities and funding – as WWF and Mondi did with their wetland restoration work in South Africa? Or to influence policy, as in the Brazilian legislation that mandates landowners need to conserve a proportion of native vegetation? Are there opportunities for payment for ecosystem services schemes – would a big downstream water user pay to restore native forest around a watershed? Lots of questions to puzzle over…

Thursday 28 November

And talking of puzzles: today is all about *Araucaria araucana*, more commonly known in English as the monkey puzzle tree. We're visiting Villa Las Araucaria to see how CMPC is working to restore an important araucaria population on its land.

As areas of high conservation value go, it doesn't get much higher than this. The araucaria is Chile's national tree, and is endemic to the country (and a small slice of Argentina). Earlier this year IUCN upgraded its conservation status to Endangered, although it's been protected by law since 1971. It's one of the oldest tree species in the world – the genus reached its peak in the Jurassic era, and with its spiky reptilian branches, it's just the sort of tree you'd picture in a dinosaur scene. Its seeds provide an important source of food – so important that the name of one of the region's indigenous groups, the *Pehuenche*, literally means "people of the araucaria".

Since beginning the FSC certification process back in 2005, CMPC has identified more than 350 areas of high conservation value, covering around 11,000 hectares, which it's obliged to maintain and/or enhance. The remnant araucaria forest here is particularly significant since, studies show, it's genetically distinct from other populations in the Andes and the coastal range. But it's in a fairly sorry state. Some areas have been cleared or damaged by fire, others are smothered by pine plantations, and there's been limited natural regeneration.

Under the guidance of Professor Marco Cortes, who first studied the trees here more than 30 years ago, CMPC has identified potential sites for restoration and is trialling different approaches. We see areas that are being left to regenerate naturally (usually through vegetative propagation), and others that have been planted. Soil type, topography and so on are being monitored to study the most favourable conditions. This will provide useful evidence and experience to encourage successful restoration on a larger scale. Arauco also has sites with araucaria nearby, as do many smaller landowners who don't have the resources to run their own restoration projects. Although

there's been some exchange of knowledge, both companies agree they could be doing more to explore common goals and opportunities for collaboration.

We also visit a plantation (established nearly 40 years ago, long before CMPC appeared on the scene), where a few mature monkey puzzles survive among the pine trees which have gradually grown up to overshadow them. The pines are being carefully harvested one by one, under the professor's strict instructions, to avoid damaging the adult araucarias and any seedlings. Sadly, there's a lot of dead trees too, but you can almost see those that have been liberated opening up to enjoy the light.

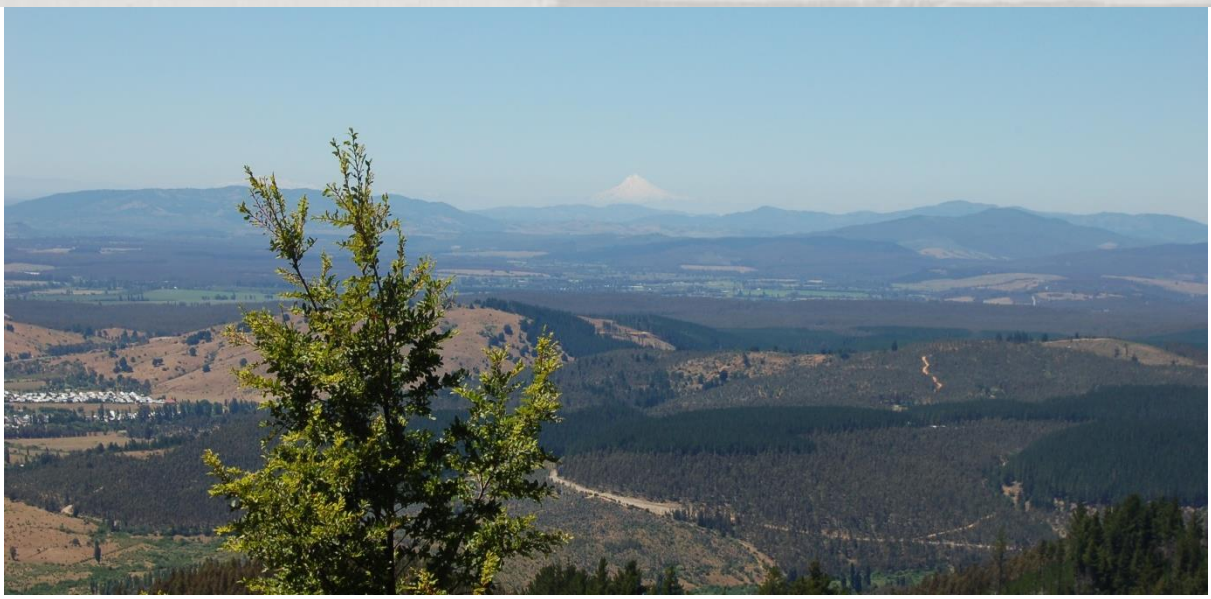
Once again, good community relations are paramount. Cattle need to be fenced out of the restoration areas, and people are being educated about harvesting the cones sustainably. (Araucaria seeds take 18 months to mature. The Pehuenche would harvest only the ripe cones, but that traditional knowledge has been largely lost, and people today tend to cut off whole branches – wasting the immature cones, and limiting the likelihood of new trees growing from seed.)

Our base today is the primary school that forms the hub of this remote community, and the children – all nine of them – have been involved in the replanting. They accompany us to one of the plots, eager to show us "their" trees, each one searching for the seedling he or she planted. With the help of Rebeca from SPT Chile – who, along with Trevor from WWF-Chile, has been doing a superb job of providing simultaneous English/Spanish translations throughout the trip – I ask them a few questions:

- Do you know why these trees are special?
- *Because they have the same name as our school. Because we like to eat the fruit. Because they're part of nature. Because you don't get them in other countries, except maybe Argentina.*
- How have you been helping?
- *We feel happy to have planted our own trees. We come in the summer to look after them by removing the weeds that take away the force they need to grow. We're looking forward to eating the fruit from these trees.*
- How long do you think it will be before your trees are fully grown?
- *Four years. One thousand years.*
- Who's going to win the World Cup?
- *CHILE! Um… or maybe Brazil.*

The children from Las Araucarias school

Later in the evening, the same children and others from neighbouring villages entertain us with traditional songs and dances as we're treated to a huge open-pit barbecue and plenty of Chilean wine. There's also a performance by a Mapuche woman, which – if I've understood the translation from Mapudungun to Spanish to English correctly – is a tribute to her friend from CMPC who drove her to hospital when she was ill. She's one of a group of around 20 local craftswomen who sell handicrafts woven from *ñocha*, a local plant. CMPC has helped them grow the plant in their own nurseries, instead of having to collect them from the wild, and to market their products – they're Fairtrade certified and have a website, and the lady we meet tonight has travelled to Europe and the US to sell her crafts in the last few years. Conflicts between landowners and the indigenous Mapuche are still a real issue in Chile – but this experience, at least, is cause for hope.



Friday 29 November

Our final field trip takes us to the hillside above the town of Angol, where there are stunning views of the Andes and a row of snow-capped volcanoes. We're looking at one of the projects that's under way as part of CMPC's restoration plan – restoring this area is part of the compensation agreement with FSC, although it's not one of those that was converted after 1994. As well as plantations, there are large areas that were colonized by pine trees after a fire in 2005. What we're seeing is mostly assisted regeneration – the native vegetation is recovering well once the exotic species (mainly pine and acacia) are removed, without the need for replanting.

This site was chosen as a priority for restoration because it's important for the water supply for the 60,000 people living in the town below, and because there are some endemic species of conservation concern, including orchids, in the surrounding areas of healthy native forest. CMPC also hopes to promote educational and outdoor activities – a mountain bike trail, regularly used by around 400 riders and for races, starts here (NGP participants have run successful mountain biking initiatives before).

Again there's strong collaboration with the university, and the site will be monitored for the next 10 years. But as always it's clear that restoration is as much a social issue as a technical/environmental one: identifying and planning for people's needs is as important as understanding the soil structure and vegetation. CMPC has held workshops with neighbouring communities (through local associations and other organizations like sports teams) to understand and map out the various land uses – again, the forest is used for (illegal) harvesting for firewood and cattle grazing, as well as for recreation and gathering non-timber forest products like mushrooms and rosehip. For the last six months, local people have also worked with the company to collect seeds from native species to use in the restoration.

It's important to build up a clear picture – where exactly are cattle being grazed, how much firewood do people need, which families are involved? – and to open up dialogue. That's the first step to finding solutions – like providing areas for grazing or where firewood can be cut. Restoration work is expensive, so it's in the company's interest to reach agreements that everyone is happy with, otherwise the whole project could be put at risk.

It comes down to the social licence to operate – a concept that's been mentioned a lot in recent NGP meetings, and that crops up again in our closing discussions. It's pointed out that forestry tends to happen in places where poverty indicators are high – and if a company doesn't do things right, that creates a stigma that affects the whole industry. Conversion from forests to plantations was a big issue in Chilean society, so restoration can be a way to redress this. But only if people can really see the impact – on biodiversity, on water, on employment, on the landscape. For those benefits to be visible, companies are going to need to collaborate with others to make restoration happen on a larger scale.

How can that happen? Bringing in government could be part of the solution – there are definitely possibilities for amending legislation and unlocking funding to support restoration. It's also important to open up the dialogue across other sectors and stakeholders within the landscape (which is something we'll be looking at on the next NGP study tour, to Brazil in April 2014). And we need to get better at communicating with different audiences.

But the results of the restoration work happening in Chile – and elsewhere – aren't just measured in hectares. Those who've been working in this area for a while note that there's been a huge change in thinking, in company culture, in the language used. After years of mistrust and conflict, companies, NGOs and communities are much more open to working together. That's something that's clearly apparent within NGP and on this study tour. And it shouldn't be underestimated – ultimately, everything comes down to individual people and the relationships between them.

Our tour ends with an invitation to return in 20 years from now to see the results of this restoration movement that's just beginning (although of course we all hope to come back sooner). I'll put it in my diary…