

Trentino: Saving the wood and the trees

Three years ago, a violent storm devastated northern Italy's iconic forests. **Chris Fitch** investigates what makes these trees so special and how people from around the world are helping to bring them back to life



Norway spruce comprise around 85 per cent of Paneveggio forest. Damage to some portions from the 2018 storm are still visible

CHRIS FITCH



- **Population (Trentino):** 541,098 (2019)
- **Capital city:** Trento (pop. 55,000)
- **Land area:** 6,214 square kilometres
- **Highest point:** 3,769 metres (the southern summit of Monte Cevedale)
- **Region:** Trentino and the neighbouring northern province of Alto Adige (also called South Tyrol) make up what's commonly referred to as Trentino-Alto Adige

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n the evening of 29 October 2018, Paolo Kovatsch was sitting at home in the picturesque town of Cavalese, in the northern Italian province of Trentino. Wind howled in the darkness outside and Paolo's windows were battered by heavy raindrops.

'It's an old house, close to a small river,' he says. 'Normally, when it's raining, you hear the noise of small rocks and stones, but that night, it was a super noise – the whole house was trembling – because the stones were not so small! At that moment, you understand that something big is happening.'

Paolo pauses and sips his espresso. His beard is fluffy and white, accompanied by shoulder-length silvery hair and wild eyebrows. If you were asked to pick a man with 30 years experience working in mountain forests out of a crowd, Paolo is the man your finger would immediately gravitate towards.

'Did you feel scared?'

He takes a second before replying. 'You feel that you can't control anything; you feel a bit powerless. I wasn't scared, but I didn't know what to do. I didn't know what was happening. Nothing is working, it's dark, the clouds were low, so you couldn't see anything. And it was dangerous to go outside. So you are just waiting. But, waiting for what?'

MAKING MUSIC

The Italian province of Trentino – which borders Lombardy, Veneto and the northern province of South Tyrol (also called Alto Adige) – is 56 per cent forest,

Ciro Doliana demonstrates how to turn simple blocks of wood into musical instruments



Wood, specially selected from the very best Norway spruce trees, is broken along natural fractures and stored in wedges, ready for instrument makers to use

TIMELINE

- **1st century BCE**
Romans conquer the region and Trento becomes a Roman city
- **1027**
The Holy Roman Emperor gives the area to the Bishopric of Trent, an entity that survives for eight centuries and which grants Trentino some autonomy
- **15th century**
Troops from the Republic of Venice enter parts of Trentino but are stopped in the battle of Calliano
- **1801**
Most of the region is conquered by Napoleon and becomes part of his Kingdom of Italy
- **1815**
The Bishopric of Trent is dissolved and Trento is assigned to the Habsburg Empire
- **Early 20th century**
Austro-Hungarians strengthen troop levels and fortify the area in anticipation of war
- **1915**
Italy enters the First World War and the territory becomes a main front between Italy and Austria-Hungary; it suffers heavy damage
- **1919**
Under the Treaty of Saint-Germain-en-Laye, Trentino is united with Italy
- **1996**
The Euroregion Tyrol-South Tyrol-Trentino is formed between the Austrian state of Tyrol and the Italian provinces of South Tyrol and Trentino, with the aim of promoting regional peace and cooperation

comprising an estimated 500 million trees. These forests have a prestigious heritage. Fourteenth century Venetians, in the midst of imperial delirium, headed to the region in search of enormous tree trunks to turn into trading vessels, warships and the foundations necessary for constructing a city across marshy islands.

Some communities willingly handed over the right to have their forests plundered, in exchange for political favours. Others, such as the community of Paneveggio, resisted. Now a 2,793-hectare forest located about 64 kilometres northeast of the regional capital, Trento, Paneveggio remains important to the local economy, producing timber that's strong, sturdy and suitable for construction, all obtained by selective cutting. No deliberate planting is required here; trees are cut in such small numbers that the forest simply replenishes itself naturally.

The wood is melodic, too. For centuries, instrument makers have travelled to Paneveggio in search of Norway spruce, which comprise around 85 per cent of the forest (alongside a mix of larch and both red and white fir). These trees possess the perfect resonating qualities for making string instruments – everything from violins, violas and cellos to guitars and lutes.

Renowned Italian master craftsman Antonio Stradivari famously favoured wood from these forests – there are legends of him wandering among the trees, hunting for the perfect timber for his masterpieces (of the estimated 1,200 instruments Stradivari crafted, about 500 are believed to still be in circulation, one of which sold at auction a decade ago for US\$15.9 million).

The reason why both past masters and contemporary artisans are so drawn to Paneveggio involves multiple factors that influence the quality of the wood in a living tree. The trunk must contain fibres that are dead straight and free of defects such as knots that interrupt these straight lines. It also requires tight, dense inner rings, formed by slow-growing trees. Paneveggio, a cool mountain region between 1,500 and 1,900 metres above sea level provides optimal growing conditions. With such a rich history, Paneveggio has become known as *la foresta dei violini* – the forest of violins.

Of the 4,000 cubic metres of wood retrieved from the carefully controlled tree-cutting process that takes place here every year, less than one per cent is identified as what's known as 'resonance wood' (also 'resonant' or 'resounding' wood) and set aside to become part of a musical instrument. Cutting takes

place in late autumn, when tree growth slows and there's less sap movement to potentially damage the quality of the wood. The last full moon of the year, when the trees are said to be at their most lethargic, yields the most sought-after resonance wood.

This elite wood is then 'broken' along natural fractures into wedge-shaped blocks, before being labelled and dried. These blocks, seemingly unnaturally perfect, straight and smooth, are left in a special storage shed known as a xylotheque, with wooden slats on the windows to allow constant air flow, but no direct sunlight. It will remain here, often for years, awaiting the arrival of sharp-eared perfectionists searching for the ideal material for their instruments.

NOTE PERFECT

In the basement of a picturesque white-and-pink house just off a small square in the town of Tesero, amateur lute maker **Ciro Doliana** demonstrates how to turn simple blocks of wood into exquisite musical instruments. It's a time-consuming process, he explains, taking roughly 300 hours per instrument.

One side of **Ciro's** workshop contains an assortment of chisels and hand planes covered in sawdust. The

other side contains gleaming violins and cellos in a glass display cabinet. The whole room is filled with a soft perfume – the scent of white fir, from the resin within one of the varnishes that are carefully and repeatedly applied to the finished instrument over a ten-day period.

Ciro explains that the most important part of a lute (in common with other similar instruments) is the soundboard, the curved surface that vibrates when the strings are plucked, resonating the desired sound into the surrounding air. While other parts of the instrument can be built from a mix of woods – in the case of the one he's currently working on, willow and maple, and decorated using ebony and pear – the soundboard must be made from the highly valued resounding wood. **Ciro** is extremely particular about the quality required to make this component.

'I want to see the trunk,' he says. 'I know what I'm looking for, from outside the bark.' He describes the characteristics he seeks: north facing, at high altitude, with other healthy trees around, a straight trunk with no leaning or curving and rich, fertile soil. 'But science can't predict everything,' he adds. 'I'm looking for regular growth... then the heart comes in. Then I fall in love.'

STORM VAIA

The final week of October 2018 saw extremely heavy rainfall across northern Italy as a rare cyclone, given the name Vaia, swept over the western Mediterranean. Storm surges occurred in both the Adriatic and Ligurian seas, either side of the Italian peninsula, with Venice recording one of the worst flooding events in its history. Over three days, 850 millimetres of rain fell across Italy's Alpine region, triggering numerous floods and landslides.

On the third night, Paolo Kovatsch was at home, in that old house by the river. As technical manager of the Provincial Agency for State Forests in Trentino, he's responsible for 11,200 hectares of trees spread across nine different state-administered forests, including both Paneveggio and Cadino, the nearest forest to him. It was because of this expertise that many people turned to him with their concerns about the impact of the storm.

'It had already been raining for three days; the rivers were full of water,' he recalls. 'So we were already in a state of emergency. Suddenly, there was a lot of rain, and super-strong wind. Around 8.30pm there was a blackout, no lights.'

Utilising the minimal communication that was possible (mostly radios), Paolo and his colleagues agreed that, despite their worries about the worsening weather, there was nothing they could do that night except hunker down, stay safe and wait for the light to return. When he stepped outside in the morning, Paolo saw the mountains coated in thick, impenetrable fog. Huge numbers of fallen trees, lying strewn across the mountain roads, hinted at significant damage at higher altitudes. However, the debris prevented anyone from driving up to observe the state of the forests. 'You couldn't go there to see,' he says, 'but you could realise that something had changed.'

The blackout lasted for 24 hours. Even then, it took two days of waiting before the lingering low clouds finally cleared and the level of devastation became fully apparent. 'We were all shocked when we saw what had happened,' says Paolo. 'Not one of the people here had experienced anything like this before. It was the first experience like this in their life. The feeling was, "Now what should we do?" You know, where do we start? Because everything is destroyed.'

Thanks to Vaia, four million cubic metres of timber was felled in forests across Trentino, equivalent to eight years of normal cutting. Cadino suffered even worse. A



Fallen trees are stripped down and piled up as part of the clear-up effort

CHRIS FROH

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region used to carefully removing 11,000 cubic metres of timber per year saw 200,000 cubic metres downed – equivalent to 18 years of cutting.

At its peak, the channelling of Vaia's strong gales through the tight valleys between the mountains saw wind speeds of more than 200 kilometres per hour recorded – likely the time when the majority of the damage was done.

Trentino had previously seen a large storm in 1966 that caused isolated pockets of damage across the province, but beyond that, there were no recorded incidents of such powerful weather crashing through the landscape in such a devastating way.

sedimentary layers. There's a particular focus on learning more about the impact of warming on local ecosystems. Many mountaintops are becoming more biodiverse, as species fleeing warming temperatures congregate at higher altitudes, but these same species can then become vulnerable to the 'summit trap' phenomenon, with nowhere higher (and cooler) to go. Many niche habitats – such as small pools of meltwater – are home to various plants, fungi and insects that have evolved to survive only in these unique conditions. The loss of these species could potentially cascade throughout the rest of the ecosystem.



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Forest guide Girolamo Scarian looks out at the damaged landscape



maintenance, there is utter silence. It feels as if we're standing in an ecological cemetery.

The circle of utter devastation raises some questions. 'These trees, only these,' mutters Paolo, more to himself than to anyone else. 'Why not these?' He waves an arm at the twin walls of trees on both sides of the clearing, standing upright as though the storm never happened. It could be that some species, such as red firs, which have shallower roots, were more vulnerable to the storm, while white firs and larches, which have deeper, carrot-like roots, were better able to withstand the powerful winds.

Our final stop is the summit, where we park in the middle of what was once a thick forest. The road up is only a year or so old, built simply so that the necessary machinery to clear the fallen trees could be transported to the top. After lugging fallen tree after fallen tree up the slopes on thick cables, like a reverse zip line, these machines strip them down to the bare trunk and pile them up. Large trucks navigate the winding roads then carry the timber away for export. Paolo estimates that by the time these final fallen trees have been collected and stripped, only ten per cent of the debris created by Vaia will be left behind – in regions of the valley that are essentially inaccessible.

'Come here! Come here!' he yells excitedly. I jog over. He kneels down among some fresh grasses and young flowers, and gently cradles a tiny green plant with long, pointed leaves, no more than a couple of inches tall, in the palm of his hand. 'This, is a new tree,' he announces, a mixture of pride and joy in his voice. 'A new tree, growing naturally.'

Young shoots such as this are extremely valuable. As well as helping to rejuvenate the forest, they are critical for stabilising the high-altitude soils, in the process mitigating the risk of future landslides, rockfalls and flash floods in the valley, which could put numerous lives at risk.

TRENTINO TREE AGREEMENT

Unfortunately, this natural regeneration isn't happening quickly enough, which is why I find myself being led up a long, winding forest path by Paneveggio forest guide Girolamo Scarian. Girolamo wants to demonstrate one positive legacy from the dramatic events of three years earlier. He leads me to a large fence that surrounds a

DAMAGE AND REBIRTH

We climb inside Paolo's Dacia and drive through Val di Cadino towards the damaged forests. Wispy clouds hang above the tree-covered mountains, the distant Dolomites ripping through larger passing clouds. 'This is all Vaia,' explains Paolo, pointing through the windscreen towards various scars in high-altitude treelines, prominently visible across the surrounding mountain slopes. They look like bald patches in the fur of an old dog.

Turning onto a thin gravel road, we slow to a stop. A large clearing appears among the trees, where thick shrubs and vegetation no more than a metre high are growing. 'This isn't Vaia, just Storm Paolo,' Paolo jokes.

This is what the forest looks like after the normal cutting process has taken place. After seven years, the vegetation in this spot is in a healthy process of ecological restoration, helped by the close proximity of the surrounding trees, which are naturally repopulating the sun-drenched clearing.

It's very different from the scene that confronts us ten minutes later. As the road turns sharply to the left, the car crunches to a stop. Here we find a huge gap in the trees, many times larger than the clearing we've just left, like a giant fist has punched a hole in the tree-covered mountainside. This is where Vaia left her mark. Even three years later, little more than barren earth – with a few pitiful grasses – fills the space. Aside from a mechanical banging sound that echoes up from distant

small patch of land, the size of a tennis court or two, with nothing more than some long grass and bits of wooden debris inside.

This construction is part of the Trentino Tree Agreement, a locally organised collaborative effort (managed by the Autonomous Province of Trento, the official name for the region) to restore the damaged forests to health as quickly as possible. Three of Trentino's iconic forests – Paneveggio, Cadino and also San Martino di Castrozza, farther to the east – are in the process of being actively restored through the intentional planting of seeds. With no natural predators beyond a few wolves, the deer population here is substantial, so deer-proof enclosures are required to stop ravenous herbivores from devouring the soft, delicious new shoots.

'We didn't go geometrically – we didn't plant in lines,' Girolamo points out. 'Instead, we took a natural model. We analysed how trees are actually positioned in a forest and we tried to recreate the same dispersion of the trees. One of the best places to plant is next to the tree roots that are still there, because the roots trap humidity and it makes the soil more fertile. It makes a healthy micro environment.' They are also planting a mix of species together, since post-Vaia analysis showed that monocultures appear to have suffered more than areas with a diversity of species and ages (scheduled future plantings will ensure older and younger trees growing side-by-side).

Of course, all of this work – from obtaining satellite imagery and orchestrating tree clearing to carefully dispersing new tree seeds – costs money. Funding comes via the Trentino Tree Agreement, which works as a giant crowdfunding platform, inviting donations from people both locally and around the globe to pay for the replanting of new trees in the affected areas. In return for their hard-earned pennies, donors receive everything from regular updates to guided tours. Above this fenced-off area, a camera attached to the top of a long pole looks down upon the earth. 'The people that donate can see with their very own eyes what they're doing for the forest,' explains Girolamo. 'That's very important. They can come in person with a tour, or they can watch on a webcam.'

Despite the damage wreaked by Vaia, and the emotional trauma caused that night, in the long term there are more-substantial threats to these forests than the impact of one storm. Climate change brings unknown dangers and forest rangers are very worried about the spread of the European spruce bark beetle or bostrico, a tiny, copper-coloured insect that burrows deep into the crevices of weakened trees, feeding upon the internal tissues that supply nutrients from the roots, causing death within a matter of weeks. Even among lush, green forests unharmed by Vaia, it's not unusual to spot pockets of light brown – the ghostly remains of afflicted trees.

Now that the Vaia clear-up effort is almost complete, and the replanting in conjunction with the Trentino Tree Agreement is well underway, dealing with this secondary threat – which boomed in the years following the storm, with so many weak trees for the beetles to feast upon – has become the focus for conservation efforts.

PLUGGING THE 'HORRIBLE' GORGE

● As the city of Trento developed over the centuries, it experienced a number of disasters caused by a single river. Over 15,000 years, the River Fersina carved its way through the crumbly limestone and clay of the surrounding landscape, eventually creating a very deep, narrow, dark and gloomy canyon called Orrido, 'horrible' in Italian. 'It's not really a place where you are relaxed,' says Roberto Rossati, a local guide. 'It's more scary.'

It was certainly scary for the residents of Trento, who, for centuries, would have feared that any intense rainfall or passing storms would cause the river to surge and send large rocks crashing through the canyon. Stories abound of homes, churches, mills and bridges being demolished by enormous stones.

The first dam at the head of the Orrido canyon was built in 1537. Constructed using large logs, it had a very short lifespan – the beginning of a pattern that would repeat time and time again over the next three centuries. Eventually, in 1850, builders began to utilise limestone blocks, constructing a 40-metre-high artificial waterfall, designed to withstand the pressure of any rocks that were washed downstream.

After a large and deadly flooding event in 1882 (which the new dam resisted relatively well), the Austrian government, which administered the region at the time, made substantial investments in flood defences across Trentino. This included the construction of a second dam, 42 metres high, to provide some extra security for the residents of Trento. After it was opened in 1886, the stretch between the two dams began to collect debris and over the following century, enough rocky material accumulated to make it effectively impossible for the first dam to fail, as there was so much pressure pushing on it from both sides. Orrido also functions as a source of hydropower and is a popular tourist attraction, with a secure new viewing platform added in 2017.



CHRIS FITCH

Gazing wistfully at the surrounding mountains, decorated with a thick blanket of forest, albeit punctured with those pockmarked clearings left behind by Vaia, Paolo is adamant that replanting the forest as quickly as possible is a priority, one that requires a hands-on approach. 'Nature heals itself. With time, nature is self-healing,' he says, whimsically. 'But we need to help nature. We don't have patience. We don't have time to wait.' ●