

The forest of Mont Ventoux – a natural laboratory to study the effects of climate change

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Credit: Bioversity International/EUFORGEN

Mont Ventoux, near Avignon in southern France, is an outpost of the Alps that lie to the northeast. Today forests cover its slopes, but these trees are a relatively recent phenomenon. And they are threatened by climate change. In the new film produced in the framework of GenTree project, Dr Bruno Fady, Research Director at INRA, the French Research Institute for Agriculture, Food and the Environment, tells the story of the forests of Mont Ventoux and their uncertain future.

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Dr Fady explains how a Roman, visiting the area 2000 years ago, would have found the mountain covered with trees, and it was the Romans who first started to clear the trees for timber and fuel. Over the following centuries, visitors would have seen either bare slopes, in period of high exploitation of forest resources for mining or grazing, or forested land, as was probably the case during the plague outbreaks of the Middle Ages, when the reduced demographic pressure enabled the forest to recover, up until the 18th century when the forest was gone again. Today, thanks to reforestation by the state, "the landscape is really much different from what it used to be 150 years ago," Dr Fady says. Mont Ventoux once again looks like the landscape the Romans would have known.

Human perception about forests is very biased. What looks old and natural can be recent and the result of human activity. Science can provide tools to unveil the past history of the forest and can also provide solutions to preserve it in the long run. For Dr Fady and GenTree, the crucial element for future survival is forest genetic diversity, which is essential to allow adaptation to changing environmental conditions.

On Mont Ventoux, many trees died as a result of the Europe-wide summer heatwave in 2003. We can clearly see these individuals today as dead, bare trees sticking out of the green canopy that covers the mountain. Why did these particular trees succumb to the heatwave? What does their death imply for the future of the forest?

The first task of the GenTree project is to decipher the role of genetic diversity and environmental variability in shaping adaptive traits in trees.

One of the tools is to decode the genetic sequence of traits that matter for survival, for example size, number of seeds or when the tree comes into leaf in the spring. Another important line of investigation is to ask how demographic processes, such as the survival of some germinated seeds and not others, contribute to the genetic diversity we see today.

GenTree will generate the knowledge to provide insights on how and at what spatial scale tree species adapted to environmental changes in the past; the lessons learned can then be used as part of solutions for today's challenges. Both history and natural selection shape genetic diversity; some events are natural, such as forest fires, while others, like selective removal of some species, are the result of human activity.

The results of the various components of work will inform current conservation priorities and will help refine breeding approaches and foster the establishment of resilient and climate-fit forests.

In the end, information provided by GenTree will help develop scenarios showing how different forest management strategies can influence the ways in which forests might adapt to [climate change](#).

Different climatic zones on Mont Ventoux

Mont Ventoux is a steep mountain, so the local climatic conditions change rapidly as elevation increases. It has also been the site of human activities for centuries. For this reason, the site is particularly suited to scientific studies that look at the effects of both human and natural history on the genetic composition of tree species and at local adaptation of [tree species](#) to a changing climate.

Provided by Bioversity International/EUFORGEN

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