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## Tree vitality and forest health: any better indicators?

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Forest health, although not yet unanimously defined, has been monitored in the past forty years assessing tree vitality, trying to estimate tree photosynthesis rates and productivity. Used in monitoring forest decline in Central Europe since the 1980s, crown foliage transparency has been commonly believed to be the best indicator of tree condition in relation to air pollution, although annual variations appear more closely related to water stress. Although crown transparency is not a good indicator of tree photosynthesis rates, defoliation is still one of the most used indicators of tree vitality. Tree rings have been often used as indicators of past productivity. However, long-term tree-growth trends are difficult to interpret because of sampling bias, and ring-width patterns do not provide any information about tree physiological processes. In the past two decades, tree-ring carbon and oxygen stable isotopes have been used to reconstruct the impact of past climatic events, such as drought. They have proven to be useful tools for retrospectively understanding physiological processes and tree response to stress factors. Tree-ring stable isotopes integrate crown transpiration rates and photosynthesis rates and may enhance our understanding of tree vitality. They are promising indicators of tree vitality. We call for the use of tree-ring stable isotopes in future monitoring programmes.