

## **Climate change and biodiversity loss as drivers for zoonotic diseases emergence in the Alps: the case of Tick- borne encephalitis**

**Annapaola Rizzoli, Edmund Mach Foundation, [annapaola.rizzoli@iasma.it](mailto:annapaola.rizzoli@iasma.it)**

**Heidi C. Hauffe**

**Valentina Tagliapietra**

**Markus Neteler**

**Roberto Rosà**

In Europe, the number of human TBE (tick-borne encephalitis) cases has increased dramatically over the last decade, risk areas are expanding also toward higher altitude and new foci are being discovered every year. A number of parameters have been suggested to explain TBE upsurges, including climate change and biodiversity loss. In this paper, we analyse the correlation between the upsurge of TBE in 17 alpine provinces in northern Italy since 1992 with climatic variables, forest structure, and abundance of few large vertebrate tick host (roe deer), using datasets available for the last 40 years. No significant differences between the pattern of changes in climatic variables in provinces where TBE has emerged compared to provinces where no clinical TBE cases have been observed to date. Instead, the best model for explaining the increase in TBE incidence in humans in this area includes changes in forest structure, in particular the ratio of coppice to high stand forest, and the density of roe deer. Substantial changes in vegetation structure that improve habitat suitability for the main TBE reservoir hosts (small mammals), as well as an increase in roe deer abundance due to changes in land and wildlife management practices, are among the most crucial factors affecting the upsurge of TBE virus in western Europe.