

Modelling the Emergence of Tick-Borne Zoonoses in Belgium: An Agent-based Perspective

Tick-borne zoonoses are infectious diseases that can infect a variety of vertebrates via infected tick bites and are also transmissible to humans. Over the past decades, the emergence of tick-borne zoonoses throughout Europe has attracted increasing public health concern. These diseases have strong links to the environment, particularly in forested landscapes, where ticks and their hosts are found and where human risk activities are carried out. There is a crucial need for a better understanding of the underlying processes in the transmission system, in order to explain the upsurge of tick-borne zoonoses observed throughout Europe over the past decades. This particularly involves environmental change issues, such as climate change, landscape change, including land management, and risk land uses.

The proposed project focuses at Lyme borreliosis (LB), the most important tick-borne zoonose in Europe, and aims to model the natural transmission system of LB for Wallonia, Belgium. The model will be build on empirical knowledge of of (i) habitat suitability and host community; (ii) climate, and; (iii) policies and behaviours of human will be considered. Their impacts on the biological processes for LB transmission will be explored either quantitatively or qualitatively, upon which an integrated agent-based model for LB transmission can be established. By enabling the assessment of human risk for LB under different environmental conditions and socio-economical policies, this model will allow stakeholders to be fully informed of the potential consequences of various environmental changes and management practices.