Project Database of ICP Forests
PROJECT DESCRIPTION

PROJECT INFORMATION

Project title: Space-time prediction of rodent-borne zoonosis outbreaks throughout Europe

Project ID: 22

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PROJECT DESCRIPTION

Objectives:
Development of a space-time early warning tool for epidemics of rodent-borne zoonotic infections (with focus on hantavirus infections)

Short project description:
There is a growing concern about several infectious diseases that are spreading in Europe and for which wild rodents act as direct or indirect reservoirs e.g. hantaviroses, Lyme borreliosis, tick borne encephalitis, anaplasmoses. This zoonotic infection risk in humans is linked directly or indirectly to the abundance of infected rodents, which in turn is dependent (with delays) on overall rodent population size. In temperate Europe, rodent population fluctuations are predominantly affected by tree masting (periodical mass production of tree seeds). The resulting rodent outbreaks have been associated with zoonotic epidemics (e.g. for hantaviruses) in humans. Recently, climate factors, tree ecology, bankvole ecology and disease epidemiology were combined to build temporal predictive statistical models for Puumala hantavirus disease in Belgium and Germany (Tersago et al., 2009; Schwarz et al., 2009). These models suggest that climate variables, through their effect on tree seed production and rodent ecology, have a strong predictive power for rodent-linked zoonotic infections in humans.

Within the EU7th framework project EDENext: emerging diseases in a changing environment (see (http://www.edenext.eu) for the partners involved) the production of a predictive model for these rodent-linked zoonoses through space and time is a major objective. This is of great interest to ECDC (European Centre of Disease Control), but also to local health institutes for anticipating zoonotic infection epidemics in humans.

The first focus of our work (the coming year) will be the production of a prediction model for human hantavirus infections in the temperate deciduous forest biome. To be able to build this model, static spatial environmental layers need to be taken into account (forest maps, soil, …), but also factors that vary significantly through space and time (climate and measures of tree seed production). To achieve this goal, the 'tree seed fall' data of the ICP Forests network would be a great added value to the model. We are currently building the separate data layers for the model. We first focus on

Western Europe (Belgium, Netherlands, France and Germany) for construction and first validation of the model. The next step would be extrapolation to a larger region if data availability allows us to.

The team mostly involed in this EDENext subproject consists of exp rienced modellers (Dr. Ir. ELs Ducheyne (AVIA-GIS, www.avia---gis.com, Belgium), Dr. Markus Neteler (http://gis.cri.fmach.it/research/), Dr. William Wint (University of Oxford, UK). Dr. Tersago (University of Antwerp, Belgium) is an ecologist, specialized in Puumala hantavirus eco-epidemiology, who currently coordinates this specific subproject. 2 The tree species most relevant for our modeling purpose are: mainly *Fagus sylvatica, Qercus sp. (robur, petraea),* but also possible patterns in seed production of *Fraxinus excelsior, Corylus avellana, Acer pseudoplatanus, Tilia cordite and Picea abies*.