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Increased temperatures and changes in rainfall pattern are likely to facilitate the spread and establishment of new vector borne diseases in the Baltic See Region. There are a large number of potential vector borne threats to the area. Existing endemic vector borne diseases are likely to increase and new exotic diseases like Usutu and West Nile Virus may lead to outbreaks in the region. In the worst case the combined effect of climate change and globalization may potentially lead to European outbreaks of important zoonotic mosquito borne infections like Rift Valley Fever in cattle and Japanese Encephalitis in swine. Being able to model the impact of climate and environmental change on the transmission intensity of vector borne diseases is potentially a powerful tool to both monitor and prevent outbreaks in a cost effective way.

The recent unexpected outbreaks of bluetongue and Schmallenberg virus in ruminants have been attributed an increase in European temperatures. Mathematical models clearly demonstrate the potential for increased virus transmission at elevated temperatures. however there is little evidence to support the idea that the spread of these tropical viruses in northern Europe is the direct result of climate change. The potential for virus transmission by biting midges was here modeled monthly for the Baltic See Region and the rest of Europe. The results showed that Baltic See Region has a lower transmission potential than most other areas in Europe. And the model identified an increasing trend in transmission potential over the last 25 years. However the model suggested that the climate in the Baltic See Region has always permitted transmission of these diseases. The model therefore suggests that a presently unknown factor until recently prevented introduction and spread in Northern Europe.

This model approach may be used as a basis for risk based surveillance. In risk based surveillance limited resources for surveillance are targeted at geographical areas most at risk and only when the risk is high. This makes risk based surveillance a cost effective alternative to the present surveillance strategies based on random samples.

We still don't understand the mechanisms underlying the recent outbreaks of bluetongue, Schmallenberg, Usutu virus, tick borne encephalitis or dirofilarial worms in the Baltic See Region. It is therefore not possible to use mathematical models to pinpoint the next outbreak of an exotic vector borne disease. A new outbreak will most likely be detected by a veterinarian deciding to submit a sample based on a subjective clinical suspicion. But the question is how far the epidemic will progress before a veterinarian decides to submit this crucial sample to a diagnostic laboratory. Risk based surveillance models may reduce this delay. An important feature of risk based surveillance models is their ability to continuously communicate the level of risk to veterinarians and hence increase awareness when risk is high. This is essential for submission of samples and hence early detection of outbreaks. Models for vector borne diseases in Denmark have demonstrated dramatic variation in outbreak risk during the season and between years. The Danish VetMap project aims to make these risk based surveillance estimates available on the veterinarians smart phones, thus allowing easy access to risk estimates when in the field. Knowing when and where the potential risk for transmission of a specific vector borne disease is high is likely to help veterinarians decide when and when not to submit a sample to a diagnostic laboratory. This may both increase sensitivity of national surveillance and reduce the cost.