

Vector-Borne Diseases: Impact of Climate Change on Vectors and Rodent Reservoirs
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Vector borne diseases and their control: An introduction

Jutta Klasen and Birgit Habedank

Federal Environment Agency, FG IV1.4, Berlin, Germany

In the view of climate change, vector-borne diseases of man and animals with vectors and reservoirs developing in natural habitats are of special interest. Vector density, spread of vectors into new geographical areas and the prevalence of infectious agents in the vectors are strongly influenced by micro- and macroclimatic and other environmental conditions. However, climate is only one factor among others: travelling and transportation, human behaviour, socioeconomic conditions, land use and immunity have to be considered for the evaluation of changes in the occurrence of vector-borne diseases. In the recent discussion concerning the impact of climate change on the occurrence of tick-borne diseases in Europe, some studies (e.g. Randolph and Rogers 2000, Randolph 2004, Sumilo et al. 2007) pronounced the importance to include these factors into the analysis.

Nevertheless, in awareness of forthcoming significant climate change it is necessary to work out the impact to be able to make predictions. Vector and reservoir surveillances are important components of such a strategy.

In 2003 the Federal Environment Agency (FEA) published a report on the *'Possible impact of climate change on distribution of pathogens primarily relevant to humans through animal vectors and to human parasites in Germany'*.

The study compiled all available data on occurrence and distribution of human parasites and disease vectors in Germany until 2001. The overall conclusions were:

- Many of the relationships concerning climate and vector-borne diseases remain postulated ones. Quantitative data are lacking.
- We need studies to close the information gaps about distribution and occurrence of vectors which already exist in Germany and its neighbouring countries.

Since then, studies from neighbouring countries have also been published which contributed to our current state of knowledge.

In contrast to the great vector-control campaigns on other continents to fight major human infections like malaria, leishmaniasis, trypanosomiasis and onchocerciasis, vector control programs are not yet common and necessary in Europe. The WHO has reviewed in its reports on vector-borne human infections of Europe (WHO 2004) and on cCASH (Menne et Ebi 2006) that chemical vector control measures should be limited to application in indoor conditions. Public education and preventive advices are more likely to be effective measures to reduce transmission of VBD in Europe than massive outdoor use of biocides. Ecological soundness and sustainability of chemical control measures are even more mandatory for Europe than for African or Asian areas suffering under lethal vector-borne diseases. Lack of effective drugs or emergence of resistance to drugs makes vector control the most important preventive measure in many areas of the world. Since 1998 the WHO proposes the Integrated Vector Management (Townson et al. 2005). Multiple interventions that target different points of the disease circle lead to significant decrease in disease transmission, e.g. the consequent destruction and avoidance of breeding places for mosquitoes can reduce

transmission rates of mosquito borne diseases significantly. A prerequisite for this strategy is excellent knowledge about biology and ecology of all stages of vector development and the transmission circle.

In many European countries we are far away from systematic knowledge even about the regional presence of potential disease vectors. The first outbreak of blue-tongue disease in ruminants in Germany in 2006 triggered a first large Midge-Monitoring-System established in March 2007 at 90 German farms, funded by the German Federal Ministry of Food, Agriculture, and Consumer Protection. Shall we wait until an epidemic outbreak of a severe human infection like leishmaniasis or dengue before we start looking for competent vectors systematically?

Although the vector-borne diseases in Europe do not cause approximately as many deaths than in other continents, we must be prepared for the occurrence of new emerging diseases which can become more likely in a changing environment.

International networking, interdisciplinary cooperation in research and public education are key words to be discussed during the conference.

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