



## **Contributions to integrative knowledge of West Nile virus reported in Romania - methods and tools for managing health-environment relationship at different spatial and temporal scales**

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### Abstract

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After 1990 there were environmental changes at national, European and global level which led to the emergence and re-emergence of infectious diseases. Among these diseases, those transmitted by vectors were installed on very large areas where pathogens entered the complex transmission cycles within the local ecosystems.

Environmental changes were generated by climatic (temperature and precipitation), geomorphologic (altitude) and anthropogenic (land cover / land use) changes. Due to these environmental changes it became necessary to anticipate, prevent and control the epidemics in order to avoid major crises of natural and socio-economic systems. In these circumstances, the risk of re-emergence of West Nile virus infection increased, thus becoming a public health problem for Romania.

Our research consisted in assessing this risk, depending on environmental changes that can influence the presence and space-time distribution as well as the dynamics of the elements of virus transmission cycle.

Study areas were selected so that they should meet, on the one hand, very different natural ecosystems and on the other hand should include continuously changing anthropogenic ecosystems that provide optimal conditions for the vector-borne West Nile virus. These areas were: the Danube Delta including Razim-Sinoe complex (Tulcea County), Bucharest Metropolitan Area (BMA) (Bucharest and Ilfov & Giurgiu Counties). The Danube Delta lagoon area is the gateway to West Nile virus in Romania. During the neurological infection epidemic with West Nile virus in 1996, in BMA were recorded 60% of the total number of human cases.

For the period 2009 - 2011 the authors developed risk maps to West Nile virus vectors to vertebrate hosts depending on climatic, geomorphologic and anthropogenic changes. Maps were made using ArcGis - ArcMap software, depending on the mean annual temperature and precipitation. We were used by the altitude risk map the hypsographic map of Romania and for the risk map by land cover/land use, information provided by the Land Cover/Land Use Classification System for Romania (2003) data. The four (4) types of risk maps (depending on temperature, precipitation, altitude and cover / land use) were overlaid, thus achieving the final risk maps.

Also, space-time distribution maps were made at national and regional level for vertebrate hosts and vectors.

On the basis of the information forecasts are developed concerning the occurrence of these diseases in different types of ecosystems, as well as early warnings and strategies at national and European level in order to protect the human population.