

**Bernard Cazelles**  
Ecole Normale Supérieure, UPMC |  
Paris, France  
cazelles@biologie.ens.fr

## **Rural origin of the propagation of dengue, an urban disease, in Southeast Asia**

Dengue is the most important arboviral disease worldwide and a major public health problem in tropical areas. Knowledge of spatial and temporal patterns in dengue transmission at a sub-national level is relevant for two main reasons: it can provide insights into the biological and ecological mechanisms that drive transmission, and it may facilitate predictions of the magnitude, timing and location of future dengue epidemics. For both of these purposes I analyze, with wavelet analysis, phase analysis and Granger causality, the spatial-temporal pattern of propagation of dengue epidemics in different countries in Southeast Asia.

The results reveal spatial heterogeneity in the propagation of the annual epidemic. Each year, epidemics are highly synchronous over a large geographic area at regional scale. In most of the cases, travelling waves emanate from a few rural areas and move towards the regional capital where epidemics occurred 1–3 months later than elsewhere. These results clearly refute the main paradigm of urban origin of dengue propagation; urban centres are thought to act as a reservoir of the virus from where it can spread to the rest of the country. These findings constitute a new starting point in the understanding of the processes driving dengue spread and can aid the targeting of vector-control interventions and the planning for dengue vaccine implementation.