O15 Climate, biodiversity, land use changes and zoonotic infectious diseases in Southeast Asia

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Numerous parasitic and infectious diseases are emerging, re-emerging or causing recurrent outbreaks in Southeast-Asia, a hot spot of both infectious disease emergence and biodiversity at threat. Here, we present ongoing results of the BiodivHealtSEA project on the potential effects of global changes (climate, biodiversity and land use) on the epidemiology and diversity of infectious diseases, focusing on zoonotic diseases (and specifically rodent-borne diseases), from regional to local scales.

At regional level, we show, among countries, that the overall richness of infectious diseases is positively correlated with the level of biodiversity (i.e. richness of birds and mammals). However, the number of zoonotic disease outbreaks is positively correlated with the number of threatened mammal and bird species and the number of vector-borne disease outbreaks is negatively correlated with forest cover. These results suggest that, among countries, biodiversity is a source of pathogens, but also that the loss of biodiversity or its regulation, as measured by forest cover or threatened species, seems to be associated with an increase in zoonotic and vector-borne disease outbreaks.

A national level of Thailand, we show how the climate variability (ENSO), which explains the total amount of rainfalls, contributes globally to the leptospirosis incidence and scrub typhus during the last 10 years in Thailand. The ongoing climate change that seems to affect climate variability (monsoon intensity) will affect consequently the epidiological dynamics of these diseases.

A local scale, using an extensive data on rodents and their parasites/pathogens in 7 localities of Southeast Asia, for which land cover changes have been developed, we show that fast growing habitat fragmentation may affect parasite/pathogen species richness and particularly the diversity of rodent-borne pathogens. Moreover, using network analysis we show important effect of the habitat fragmentation on the network architecture with network becomes less connected and more modular. These effects suggest that parasites transmission between host species may become more difficult with the increase of habitat disturbance.

In conclusion the results presented here suggest that loss of biodiversity and land use changes affect negatively the diversity of pathogens, but may increase the risks of the remaining ones (through increase of outbreaks, or prevalence in the reservoirs).