Climate change- GIS-based models for assessing changes in transmission patterns and human health risks of food-borne zoonotic trematode infections in south-east Asia

A number of food-borne zoonotic trematode (FZT) species can cause severe health problems to people in various parts of South-east Asia. The most common among these species are *Fasciola* spp., *Paragonimus* spp., *Opistorchis vivirini*, *Clonorchis sinensis,* heterophyids and others. All have specific snail species as first intermediate host, while the larval stage that is infective to people as well as a range of animals, i.e. metacercariae, is either found in a second intermediate host, such as crabs (*Paragonimus* spp.) or fishes (*Opistorchis vivirini*, *Clonorchis sinensis,* heterophyids) or on wet-cultivated vegetables (*Fasciola* spp.). Transmission occurs in both natural habitats and in managed water bodies, such as aquaculture ponds, and is very variable both geographically and temporally and the variability is related to climatic conditions. Future climate change expressed as more "extreme weather", change in temperature and precipitation regimes is expected to have significant effect of the FZT. More frequent episodes of extreme weather conditions is one of the most visible effects of climate change. Episodes of extreme weather conditions, mainly heavy rainfall, can easily change the transmission pattern through different mechanisms, i.e. flooding can change habitats drastically and effects could be either increasing or decreasing density of intermediate snail host species, flooding can spread snails to new areas, runoff from human settlements and areas with animal keeping can carry trematode eggs into transmission sites and thereby increase infection level in the first intermediate hosts. This PhD project aims to describe how climate changes affect the transmission of FZT.

As part of the PhD project, areas with intense transmission of some of the food-borne zoonotic trematodes will be selected and various transmission parameters (distribution of intermediate hosts and infection levels in the intermediate and final hosts) will be entered into a GIS system including environmental parameters like temperature, vegetation, soil and precipitation, primarily remotely sensed data combined with data on land use, crops and aquacultural informations. During the course of this project a number of extreme rain events are likely to occur and following such episodes, changes in FZT transmission patterns will be assessed using the same transmission parameters as above. These changes will be related to flooding patterns and surface run-off using topographical data. Flooding of village areas and run-off water from these will be used to test whether infection levels in the snail host increases as a result of increased contamination with trematodes eggs. Such data will also be combined with available data on tolerances and preferences of the snail species involved in parasite transmission in relation to various ecological factors, especially temperature to develop a regional predictive model on distribution of FZT and the possible changes that follow climatic changes. The PhD fellow will be working within the framework of ongoing research projects in South-east Asia and will be expected to spend substantial time in the region.

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