

Studying the effects of density dependency and temperature change on the dynamics of tsetse flies

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Aim: Discuss the problems and prospects associated with modelling the population dynamics of tsetse flies (*Glossina* spp) and the disease (trypanosomiasis) that they transmit in Africa to game animals, domestic livestock and humans. The main focus will be on analysing the simultaneous impact of density dependency, index of vegetation and temperature change on the dynamics of tsetse flies (and on the disease itself).

Methods: We propose a mathematical model that incorporates both pupae and adults tsetse flies. The model accounts for temperature change and density-dependent mortality, and uses the normalised index of vegetation NDVI to explore the impact of vegetation density on the fly survival.

The proposed model is fitted to data on *G. m. morsitans* from Rekomitjie in Zimbabwe using Markov Chain Monte Carlo method.

Results: Our analysis reveals the importance of density dependency in capturing the scale of the distribution of the tsetse population while the shape is more governed by temperature change. Finally NDVI seems to have an impact though it is insignificant compared to aforementioned factors. .

Discussions: The findings clearly highlight the importance of temperature as key factor in shaping the dynamics of tsetse flies. Density depend is equally important and should be taken into account when modelling the transmission dynamics of the trypanosomiasis.