

# FIRST WORKSHOP

"DYNAMICAL SYSTEMS APPLIED TO  
BIOLOGY AND NATURAL SCIENCES "

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## ABSTRACT | Ricardo Águas

### Title

"Applicability of simple deterministic models in epidemiologically complex scenarios"

Instituto Gulbenkian de Ciência, Portugal  
ricaguas@igc.gulbenkian.pt

### Abstract

Malaria has recently been identified as a candidate for global eradication.

Key aspects such as the spread of drug resistance, the adverse effects of failed malaria control attempts, and appropriate deployment strategies, must then be considered within a properly detailed model framework in order to tackle such an issue. We built on a basic deterministic model of malaria transmission formalized as a set of differential equations, adding realism by subtraction of assumptions. Suspicions as to the applicability of the elimination prediction made by the basic model lie on the caveats of this type of models when dealing with very small numbers of infections.

Firstly, we tested how stochasticity influences the results obtained with the simple model, finding the general predicted phenomena to be maintained. Later, we recognized that vector borne infection dynamics are extremely heterogeneous in both space and time. Simulations of the same intervention strategy considered for the previous model formulations revealed that the results still hold for a spatially explicit formulation of the model in which transmission occurs at a high spatial resolution, as long as the difference in mosquito biting rate between the defined areas is not extreme.