

Review of a Manuscript

Title: Modeling and Simulation of the Population Dynamics of Snails *Biomphalaria tenagophila*, in Tres Palmeras, Salta, Argentina, Ms_BJMCS_34591

Submitted To: *British Journal of Mathematics & Computer Science*

The present paper involves the analysis of population data for the snail species *Biomphalaria tenagophila* in water bodies caused by floods of tributaries of the river Arias in Salta, Argentina, in the Tres Palmeras zone. Also, data on associated parasitic infections is included. The data were analyzed assuming a logistic model for the number of accumulated snails. Various computational simulations were also carried out on the dynamics. The subject matter may be of interest to readers of the journal *British Journal of Mathematics & Computer Science*. Unfortunately, the paper is not well written and not enough details, explanation, and motivation are presented regarding the mathematical models.

Compulsory Revision Comments

The data of the present paper are interesting and with appropriate mathematical models may yield some useful information. Unfortunately, the models in the paper do not appear appropriate and, as well, are not clearly explained. It is not clear why logistic model (2.1) for the “total number of accumulated snails” is used. It appears much more useful to model the measured snail population level using a logistic model with a time-varying, periodic carrying capacity such as equation (13) described in the paper J. J. Shepherd and L. Stojkov, The logistic population model with slowly varying carrying capacity, *NZIAM J.* 47 C492-C506 (2007).

In addition, simulations are made using a stochastic logistic version based on Renshaw’s 2008 text. However, no mathematical description of the model is given and it is not clear whether the stochastic model includes, for example, demographic and/or environmental variability. The authors need to clearly explain their stochastic model.

It is recommended that the authors consider a deterministic model for the number of snails (not number of accumulated snails) of the form

$$\frac{dy(t)}{dt} = s \left(1 - \frac{y(t)}{K(t)} \right)$$

where $K(t)$ is the periodic carrying capacity. The carrying capacity can have the form

$$K(t) = a \sin(\omega t + \alpha)$$

where $\omega = 2\pi/12$. The parameters can be found by fitting the equation to the data that are illustrated in Figure 1.

For including stochastic variability, it is suggested that environmental variability be considered by assuming that the carrying capacity randomly varies about a periodic mean value. In particular, assuming an Ornstein-Uhlenbeck mean-reverting process, $K(t)$ would satisfy the stochastic differential equation

$$dK(t) = c(K_e(t) - K(t)) dt + b dW(t)$$

where $K_e(t) = a \sin(\omega t + \alpha)$ and $W(t)$ is a Wiener process.

Minor Revision Comments

The paper is not written well. In addition, to not explaining well the mathematical models, the paper is poorly wrtitten grammatically. For example, some of the phrases in the Abstract that need to be improved are:

- (*) In the Aims of the Abstract, “monthly samples dynamics”.
- (*) In the Methodolgy of the Abstract, “for to detect”, “for observe”, “linear adjustment for”, and ”experiments of simulations”.
- (*) In the Conclusion of the Abstract, “is the that”, “dependent provides estimation”, and “about of the fit”.

Such phrases makes the paper difficult to read and the entire paper needs to be carefully modified.