Review of the article
"MULTISTABILITY AND DYNAMIC SCENARIOS IN THE PREY-PREDATOR-SUPERPREDATOR MODEL"

In this paper, a system describing the interaction of populations: prey, predator and superpredator are investigated. The interaction of the community is described by autonomous differential equations of the first order. The logistic law is used to model the growth of prey, the Beddington–DeAngelis model is used to describe the interaction of prey, predator and superpredator. The system is characterized by seventeen dimensionless parameters. An approach using the apparatus of symmetry theory is used to study possible scenarios. The analysis of the system with parameter fixation is carried out, a two-parameter bifurcation diagram is numerically constructed for the cosimmetric and general cases.

Various scenarios of community disintegration have been studied using quantitative analysis and creating two parametric bifurcation graphs for two indicators reflecting the dynamics of the super predator - the mortality rate of the superpredator μ_2 and the volume of resource consumption by the superpredator η_2. In the future, the authors consider scenarios with different functional reactions.

It is shown that when the symmetry conditions are violated, the family collapses and isolated equilibrium positions arise. At values of parameters close to those providing cosimmetry, movements towards various isolated equilibrium occur. A study of dynamic scenarios for community parameters (mortality coefficients and nutritional value) was conducted and it was found that the range of parameter values at which oscillatory modes are realized is far enough from the point of cosimmetry.

This model demonstrates various environmental scenarios and can be used to predict the behavior of systems that need to be investigated taking into account seasonal factors, environmental heterogeneity, and others.

To describe the dynamics of the community, a model with Beddington–DeAngelis functions is presented, the authors do not specify which real species compositions can be described by the model and why.

The authors have shown the presence of several kinetic curves for which there are different dynamics. It would be ideal to specify restrictions on cases of extinction, competitive exclusion, for example, of a predator or superpredator, and coexistence.

The article can be recommended for publication when the authors add information on these comments.

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