Dinamika dari stochastic ratio dependent predator prey model under regime switching = Dynamics of stochastic ratio dependent predator prey model under regime switching

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Abstrak

Interaksi antara mangsa dan pemangsa merupakan salah satu hal yang paling sering didiskusikan dalam bidang biologi karena relevansinya pada kehidupan sehari-hari. Untuk dapat menggambarkan interaksi tersebut, diperlukan suatu model mangsa-pemangsa. Dengan mempertimbangkan interaksi antara mangsa-pemangsa yang bersifat ratio-dependent, kondisi fluktuatif dari lingkungan, serta perubahan kondisi alam yang dapat mengubah kebiasaan hidup mangsa dan pemangsa, digunakan stochastic ratio-dependent predator-prey model under regime switching. Pada skripsi ini, dibahas dinamika dari stochastic ratio-dependent predator-prey model under regime switching dari segi eksistensi serta keunikan dari model, serta sifat asimtotik model. Pertama-tama, diperoleh solusi unik bernilai positif dari model jika diberikan nilai awal bernilai positif. Selanjutnya, diperoleh kondisi cukup untuk kelestarian secara rata-rata dan kepunahan dari model. Kondisi yang mengakibatkan sifat kelestaarian secara rata-rata dan kepunahan dari model ini didukung oleh simulasi numerik yang dilakukan.

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The interaction between prey and predator is one of the most frequently discussed section in biology because of its relevance to the natural life everyday. To be able to describe these interactions, a predator-prey model is needed. Taking into account that the interaction between the predator-prey is ratio-dependent, fluctuating conditions of the environment, as well as changes in natural conditions that can change the life habits of prey and predator, a stochastic ratio-dependent predator- prey model under regime switching are used. In this skripsi, dynamics of stochastic ratio-dependent predator-prey model under regime switching in terms of the existence and uniqueness of the model, as well as the asymptotic properties of the model, are discussed. First of all, a positive unique solution is obtained from the model with a given positive initial value. Furthermore, sufficient conditions for persistence in mean and extinction of the predator-prey model are acquired. These conditions are supported by numerical simulations.