

*Population Dynamics on Non-Flat Landscapes*¹

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ABSTRACT

Population dynamics have long been modeled using the assumption of a homogeneous landscape. However, actual circumstances in nature demonstrate that the characteristics of a landscape such as topography and climate can strongly influence population dynamics. This project utilizes the FEMLAB program to demonstrate that non-homogeneous landscapes can indeed be incorporated into population models and analyzed. Specifically, we utilize a system of partial differential equations utilizing standard diffusion over a non-flat landscape and incorporate a two-species competition model in order to simulate a new species invading an environment that contains a single species at a constant rate. We incorporate dependencies upon the altitude and gradient of the landscape into the competition model to see how each of these alters the invasion. We discuss the effects of these dependencies on two arbitrary landscapes and consider ideas for further exploration.

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