Biodiversity and Genes on Landscapes

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ABSTRACT

Modelling the relationship between the genetic distribution of a biological system on a landscape, and the diversity of this system, are fundamental concepts that can be studied using simulation models. This work examines the use of a simple species and landscape model to simulate the progression of evolution across a regular grid. The work examines a number of concepts relating to genetic distribution, including the influence on connectivity, the effects of creating toroid versus island-based grids, and the relationship between the diversity of environment types and the behaviour of the simulation. The results show that as environmental diversity increases the time required to reach a critical biodiversity also increases. Additionally, as the connectivity of a region increases, the critical biodiversity increases. However, since the model also implies that greater stability is possible for these types of systems, it is not clear whether increasing environmental complexity leads to an increased chance for overall stability of a biological system. The results shown here are preliminary, and suggest that further constraints of the model are required to produce realistic results that may have importance in the management and interpretation of natural ecosystems.

Keywords and phrases: biodiversity, criticality, landscape connectivity