

Supplementary material

Appendix 1. Description of the procedure used to generate artificial landscapes.

Appendix 2. Landscape connectedness (black line) and modularity (gray line) along a gradient of dispersal ability in simulated landscapes, e.g., threshold distances to link patches. Networks at the percolation point are depicted within each plot and the percolation distance is indicated by a vertical dotted line. Plots include the full set of spatial aggregations (H) and spatial occupancies (p).

Landscape modularity was estimated for each of the networks using an algorithm based on simulated annealing implemented in the R software (igraph package, Csardi and Nepusz 2006, R Development Core Team 2012). SA identifies modules in a graph by maximizing a function of modularity (Guimera and Amaral 2005, Reichardt and Bornholdt 2006). In this case, the modularity function is given by (Newman and Girvan 2004):

$$M = \frac{1}{2m} \sum_{ij} A_{ij} - \frac{k_i k_j}{2m} \Delta(c_i c_j)$$

where m is the number of links, A_{ij} is the element of the A adjacency matrix in row i and column j , k_i is the degree of i , k_j is the degree of j , c_i is the module of i , c_j is the module of j and $\Delta(x, y)$ is 1 if $x = y$ and 0 otherwise.

Appendix 2. Table 1. AIC values for the four non-linear models used to evaluate the response of simulated landscape modularity (m) to a gradient of linkage

distance (d_t). The four models were: i) $m = a + cd_t + bd_t^2$; ii) $m = (a + cd_t)e^{bd_t}$; iii) $m = ae^{(bd_t)}$ and iv) $m = ad_t^b$. H is the level of landscape aggregation and p is the proportion of occupancy among cells.