

Supplemental material for

“Comparison of Surface and Planimetric Landscape Metrics for Mountainous Land Cover Pattern Quantification in Lancang Watershed, China” by Zhang Zhiming, Frieke Van Coillie, Robert De Wulf, Eva M. De Clercq, and Ou Xiaokun, published in *Mountain Research and Development* 32(2), 2012.

Table S1 Selected landscape pattern indices (LPIs) and their formula; P = perimeter, A = area of patch. (Source: McGarigal et al 2002).

| Levels | LPIs | Explanation | Formula |
|-----------------|---|---|---|
| Patch | Patch area (A) | The area (m ²) of each patch | – |
| | Patch perimeter (P) | The perimeter (m) of each patch | – |
| | Fractal dimension index (FRAC) | FRAC reflects shape complexity across a range of spatial scales; range of values: $1 \leq \text{FRAC} \leq 2$ | $\text{FRAC} = \frac{2 \times \ln(0.25 \times P)}{\ln A}$ |
| | Shape index (SHAPE) | SHAPE is a simple and straightforward measure of shape complexity; $\text{SHAPE} \geq 1$; when the patch is square $\text{SHAPE} = 1$ | $\text{SHAPE} = \frac{0.25 \times P}{\sqrt{A}}$ |
| | Euclidean nearest-neighbor distance (ENN) | ENN equals the distance (m) to the nearest neighboring patch of the same type, based on shortest edge-to-edge distance. | – |
| Category | Category area (CA) | The sum of the areas (m ²) of all patches of the corresponding patch type, that is, total category area. | $\text{CA} = \sum_{j=1}^n A_{ij}$ |
| | Mean patch area (A_MN) | Equals the sum, across all patches of the corresponding patch type, of the corresponding patch A values, divided by the number of patches of the same type. | $\text{A_MN} = \frac{\sum_{j=1}^n A_{ij}}{n_i}$ |
| | Number of patch (NP) | The number of patches of the corresponding patch types (category) | – |
| | Mean fractal dimension index (FRAC_MN) | Equals the sum, across all patches of the corresponding patch type, of the corresponding patch FRAC values, divided by the number of patches of the same type. | $\text{FRAC_MN} = \frac{\sum_{j=1}^n \text{FRAC}_{ij}}{n_i}$ |
| | Mean shape index (SHAPE_MN) | Equals the sum, across all patches of the corresponding patch type, of the corresponding patch SHAPE values, divided by the number of patches of the same type. | $\text{SHAPE_MN} = \frac{\sum_{j=1}^n \text{SHAPE}_{ij}}{n_i}$ |
| | Mean nearest-neighbor distance (ENN_MN) | Equals the sum, across all patches of the corresponding patch type, of the corresponding patch ENN values, divided by the number of patches of the same type. | – |
| | Proportion of category (P _i) | Equals the proportion of areas of corresponding category in the whole landscape | $P_i = \text{CA}/\text{TA} \times \%$ |

| | | | |
|------------------|---|---|--|
| Landscape | Total area (TA) | The total area (m ²) of all patches in the landscape | $TA = \sum_{i=1}^n A_i$ |
| | Number of patch (NP) | The number of patches in the landscape | – |
| | Mean fractal dimension index (FRAC_MN) | Equals the sum, across all patches of the landscape, of the corresponding patch FRAC values, divided by the number of patches. | $FRAC_MN = \frac{\sum_{i=1}^n FRAC_i}{n_i}$ |
| | Mean shape index (SHAPE_MN) | Equals the sum, across all patches of the landscape, of the corresponding patch SHAPE values, divided by the number of patches. | $SHAPE_MN = \frac{\sum_{i=1}^n SHAPE_i}{n_i}$ |
| | Shannon's diversity index (SHDI) | SHDI equals minus the sum, across all patch types, of the proportional abundance of each patch type multiplied by that proportion (P _i). | $SHDI = - \sum_{i=1}^n (P_i \times \ln P_i)$ |
| | Shannon's evenness index (SHEI) | SHEI equals minus the sum, across all patch types, of the proportional abundance of each patch type multiplied by that proportion (P _i), divided by the logarithm of the number of patch types. | $SHEI = \frac{- \sum_{i=1}^m (P_i \times \ln P_i)}{\ln m}$ |
| | Mean nearest-neighbor distance (ENN_MN) | Equals the sum, across all patches of the corresponding patch type, of the corresponding patch ENN values, divided by the number of patches of the same type. | – |

Copyright by the authors, 2012

REFERENCE:

McGarigal K, Cushman SA., Neel MC, Ene E. 2002. *FRAGSTATS: Spatial Pattern Analysis Program for Categorical Maps*. Computer software program produced by the authors at the University of Massachusetts, Amherst. www.umass.edu/landeco/research/fragstats.html; accessed in March 2012.