

**Method and Tools:** The GIS model created to satisfy the project objectives consists in a combination of two ArcGIS spatial analysis tools, *CorridorDesign* and *Linkage Mapper*. These tools were used to create the Habitat Suitability Model (HSM) and the Linkages Network. The model identifies the best habitats for maintaining a viable population, detecting the main core areas and the least-cost paths between them.

**Habitat Suitability Model (HSM):** *CorridorDesign* allows the creation of the raster suitability map of the landscape using a combination of factors such as land cover, elevation, topography and distance to human disturbance. Once the factors are weighted according to the species preferences, the system calculate the geometric means, producing a unique percentage suitability value for each pixel. The raster map represents the appropriateness of a habitat according to the ecological preferences of a certain species.

For more info: <http://corridordesign.org/>

Factors:

1. Land cover: Land cover was reduced from the original 64 categories to six: (1) Forest; (2) Grasslands; (3) Open Areas; (4) agricultural areas; (5) Urban Areas and (6) water bodies (lakes and rivers wider than 100 m).
2. Elevation: Digital Elevation Model
3. Topographic position was generated from the command GIS Spatial analyst tool slope ArcGIS 10 and by using the Digital Elevation Model (DEM).
4. Distance to human settlements was created as a raster image by using the GIS spatial analysis tool Euclidean distance and the CORINE Land Cover 2006.
5. Distance to roads was created as a raster image by using the GIS spatial analysis tool Euclidean distance and the CORINE Land Cover 2006

**Linkage mapper** is a GIS tool designed to support regional wild field habitat connectivity analysis. It consists of python scripts packaged as an ArcGIS toolbox. This tool is used to create least cost paths and develop a network of ecological corridors. It uses vector maps of core areas and a raster map of resistance to identify least cost linkages between core areas.

For more info: <http://code.google.com/p/linkage-mapper/>

**Habitat Suitability:** it represents an area able to support the survival and the reproduction of a certain species. The suitability for each species is calculated by multiplying selected factors classes (e.g. land use, elevation, topography, distance to road) with the factor's weight (weight are assigned to each factors according to their relative importance for the species ecological needs). The values of the pixel so obtained depend very much on species' ecological preferences and express the suitable or not suitable areas for a species to live in. To assign a suitability score to each class within each factor, we use a fixed scale between 0 (no suitability) and 100 (high suitability) considering that: 100=best habitat, highest survival and reproductive success; 50= sub optimal habitat, food availability and passage; 25=occasional use and passage;0=barrier.

Factor and weight (%) for each species:

Species	Land Cover	Elevation	Topographic position	Distance to roads	Distance to urban
Lynx	40	10	20	15	15
Brown Bear	30	10	30	20	20
Grey Wolf	30	20	10	20	20
Chamois	50	15	20	5	10
Otter	40	15	20	20	5
European Hare	40	15	20	20	5
Capercaillie	40	15	20	20	5

**Resistance:** it represents the ecological cost (risk of mortality and use of energy) for a species to travel within the landscape. Resistance is calculated by subtracting the maximum suitability value (100) minus the pixel suitability. A high resistance value of the pixel indicates that the landscape is not favorable to the animal's passage, reflecting the energetic cost, difficulty or mortality risk of moving across the cell.

**Core areas:** core areas is a cluster of pixel with a high level of suitability and big enough to support the survival of a particular population species. They represent the main distribution areas and the "hot spots" of biodiversity, inside and outside of the protected areas. Core areas can be identified only for the species having great home ranges and distribution occurrence, according to the species preferences, selecting cluster of pixels' suitability above a certain threshold and a certain size.

#### Identification of core areas

Species	Suitability	Size
Lynx	> 50%	> 10.000ha
Brown Bear	> 75%	> 5.000ha
Grey Wolf	> 50%	> 1.00ha
Chamois	> 50%	> 1.000ha

**Least cost paths between core areas:** they represent stripes of lands (1-pixel wide) having the lowest resistance to animal movement connecting core areas. They can be used to identify the continuous swaths of land expected to encompass the best route for a species to travel between habitat blocks

**Sticks:** they represent the network of links that connects existing core areas using adjacency and distance data.