Symbolic Alpine plants and animals, landscapes- Supply

General description:

The distribution of selected plant and animal species (Table 1) in the study area was derived from actual distribution maps of the individual species or by modelling their potential habitat if the former were not available.

Table 1: Selected symbolic species that were identified for the European Alps (Schirpke et al., submitted).

	Symbolic species
Fauna	Alpine ibex (*Capra ibex*)
	Brown bear (Ursus arctos)
	Chamois (*Rupicapra rupicapra*)
	Golden eagle (*Aquila chrysaetos*)
	Marmot (*Marmota marmota*)
Flora	Alpenrose (*Rhododendron hirsutum*, *Rhododendron ferrugineum*)
	Edelweiss (*Leontopodium alpinum*)
	Gentian (*Gentiana acaulis, Gentiana clusii*)
	European larch (*Larix decidua*)
	Pine (*pinus cembra, Pinus halepensis* and *P. brutia, Pinus mugo, Pinus nigra, Pinus pinaster, Pinus pinea, Pinus sylvestris*)

Input Data

- DEM
- Land cover
- Temperature

Calculation processes:

(1) Calculate distribution of Alpine ibex

The distribution map of Alpine ibex (Capra ibex) (Aulagnier et al., 2008a) was downloaded from http://www.iucnredlist.org/details/42397/0 and converted to a raster map. The values of the raster map indicate the presence (1) or absence (0) of the species.

(2) Calculate distribution of brown bear

The distribution map of brown bear (Ursus arctos) was redrawn from the DINALP BEAR Population Status Report 2016[1] , distinguishing between permanent and sporadic distribution. The polygon shapefile was converted to a raster file. The values of the raster map indicate the presence (1), sporadic presence (0.5), or absence (0) of the species.

(3) Calculate distribution of chamois

The distribution map of chamois (Rupicapra rupicapra) (Aulagnier et al., 2008b) was downloaded from http://www.iucnredlist.org/details/39255/0 and converted to a raster map. The values of the raster map indicate the presence (1) or absence (0) of the species.

(4) Calculate distribution of golden eagle

Occurrences of golden eagle (Aquila chrysaetos) since the year 2000 were downloaded from GBIF.org[2] . For all points, a buffer of 9 km, which corresponds to the core home range (Soutullo et al. 2006), was calculated using ArcGIS standard routines and converted to a raster map with a spatial resolution of 100 m. The values of the raster map indicate the presence (1) or absence (0) of the species.

(5) Calculate distribution of marmot

The spatial distribution of marmot (Marmota marmota) was modelled based on Galluzzi et al. (2017), applying the following steps:

- Selection of raster cells with elevation between 2,000 and 2,500 m a.s.l. from DEM
- Calculation of slope from DEM and selection of raster cells with slope between 0° and 20°
- Calculation of aspect from DEM and selection of raster cells with south-facing aspect (112.5–247.5°)
- Selection of raster cells with subalpine–alpine open grasslands, shrubs and heath (CORINE 231-Pastures, 321-Natural grasslands, 322- Moors and heathland, 323-Sclerophyllous vegetation, 333-Sparsely vegetated areas)

All raster cells were classified to 1 if they met the selected criteria; all other raster cells were reclassified to 0. All raster cells fulfilling all different criteria were then mapped by multiplying all single layers.

(6) Calculate distribution of edelweiss

The spatial distribution of edelweiss (Leontopodium alpinum) was modelled based on Ischer et al. (2014), applying the following steps:

- Calculation of slope from DEM and selection of raster cells with slope > 30°
- Selection of raster cells with a mean summer temperature (June–August) < 10°
- Calculation of aspect from DEM and selection of raster cells with south-facing aspect (112.5–247.5°)
- Selection of raster cells with subalpine–alpine open grasslands with a low grass cover (CORINE 321-Natural grasslands, 333-Sparsely vegetated areas)

All raster cells were classified to 1 if they met the selected criteria; all other raster cells were reclassified to 0. All raster cells fulfilling all different criteria were then mapped by multiplying all single layers.

(7) Calculate distribution of gentian

The spatial distribution of gentian (Gentiana acaulis, Gentiana clusii) was modelled based on Bilz (2013) and Oberdorfer et al. (2001), applying the following steps:

- Selection of raster cells with elevation between 800 and 3,000 m a.s.l.
- Selection of raster cells with subalpine–alpine grasslands with a low grass cover (CORINE 231-Pastures, 321-Natural grasslands, 333-Sparsely vegetated areas)

All raster cells were classified to 1 if they met the selected criteria; all other raster cells were reclassified to 0. All raster cells fulfilling all different criteria were then mapped by multiplying all single layers.

(8) Calculate distribution of alpenrose

The spatial distribution of alpenrose (Rhododendron hirsutum, Rhododendron ferrugineum) was modelled based on Francon et al. (2017), applying the following steps:

• Selection of raster cells with elevation between 1,600 and 2,200 m a.s.l.

• Calculation of slope from DEM and selection of raster cells with north, west, and northwest-facing slopes (0–67.5°, 292.5–365°)

• Selection of raster cells with mainly shrubs (CORINE 323-Sclerophyllous vegetation, 324-Transitional woodland-shrub, 333-Sparsely vegetated areas)

All raster cells were classified to 1 if they met the selected criteria; all other raster cells were reclassified to 0. All raster cells fulfilling all different criteria were then mapped by multiplying all single layers.

(9) Calculate distribution of larch

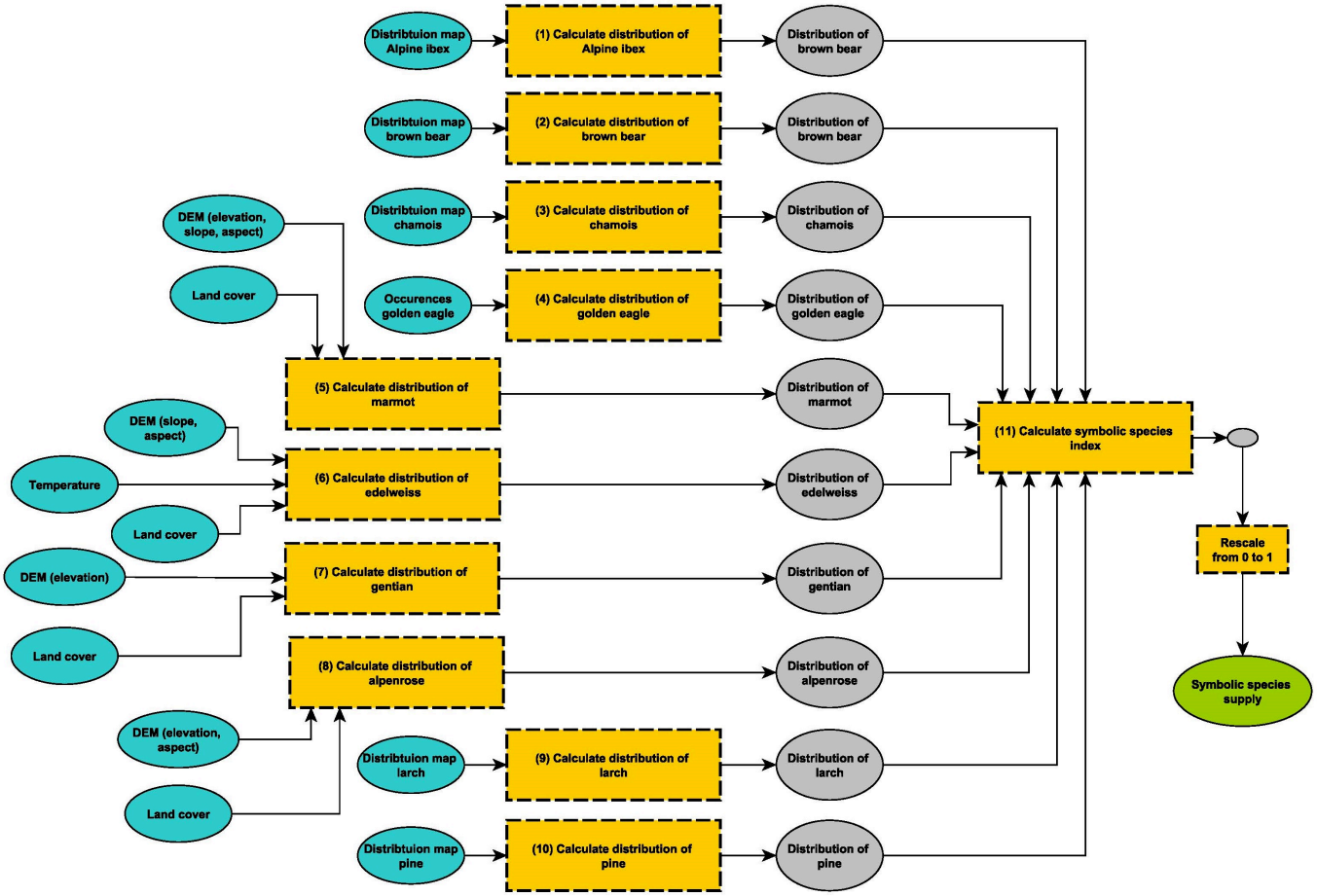
The distribution maps for the European larch (Larix decidua) provided by Da Ronch et al. (2016) were reclassified to presence (1) using a threshold of 0.3 or absence (0).

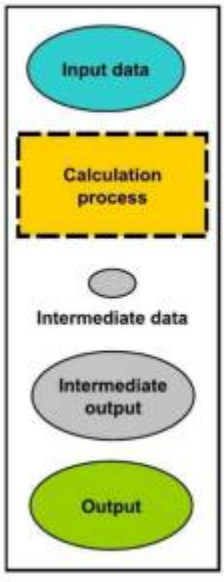
(10) Calculate distribution of pine

The distribution maps for the Pine (pinus cembra, Pinus halepensis and P. brutia, Pinus mugo, Pinus nigra, Pinus pinaster, Pinus pinea, Pinus sylvestris) provided by Caudullo and de Rigo (2016) were reclassified to presence (1) using a threshold of 0.3 or absence (0).

(11) Calculate symbolic species index

After calculating for all selected symbolic species the zonal statistics for all municipalities, an area-weighted index was obtained by summing the mean values of the different species within each municipality and rescaling them to values from 0 to 1.





Input data→elements that hold a value or a reference to data stored on disk. It is usually a spatial explicit information coming from official sources.

Calculation process→ the actual operation performed on the data. The number preceding the item refers to the number in the model description.

Intermediate data→ for each calculation process intermediate data is generated. This data, however, is usually not significant itself, but is used as an input for the next calculation step.

Intermediate output→ is intermediate data that has a significance for the ES evaluation.

Output→ is the result of the calculation process. It is typically one of the ES indicators, either Supply, Demand or Flow.

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