Land use indicator LAN (EUSALP)

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Summary Classification of land use categories according to their influence on ecological connectivity and based on principles of sustainability. It is one of the indicators belonging to the continuum suitability indices CSI (consisting of LAN, POP, FRA, TOP and ENV).

Legend

10	6	2
9	5	1
8	4	0
7	3	

1 Introduction

Land use and land cover changes are so pervasive that they directly impact biotic diversity worldwide (Sala et al., 2000). They are seen as the most important driver with regard to biodiversity loss (Foley et al., 2005; Geneletti, 2013; Metzger et al., 2006). Taking into account that current rates of extinction are estimated at about 1000 times the likely background rate of extinction (Pimm et al., 2014), land use plays a key role with regard to ecological connectivity analyses. Ecological connectivity is usually defined as the “degree to which the landscape facilitates or impedes movement” (Taylor et al., 1993). A distinction is made between species-specific connectivity of habitats, connectivity of human-defined patterns of landcover or the connectedness of ecological processes (Lindenmayer and Fischer, 2007). With the land use indicator, land use and land cover categories are classified according to their influence on ecological connectivity.

2 Data

We used the Corine Land Cover dataset 2012 (EEA, 2016) with a spatial resolution of 100m. The dataset contains 39 countries and covers the whole EUSALP perimeter. It was produced by interpreting satellite images and classifying land cover into 44 categories with a minimum mapping unit of 25 hectares. Height-dependent analyses were conducted with the ASTER Global Digital Elevation Model (NASA et al., 2011) with a spatial resolution of 30m. For forested areas, we consulted the map of Natural Vegetation of Europe (Bohn et al., 2003) .

3 Processing and classification

The land use indicator was created by a three-step procedure accounting for the relation between actual and native land cover.

1. Classification of the Corine Land Cover 2012 (CLC2012) classes according to their influence on ecological connectivity and based on principles of sustainability.
2. Reclassification of coniferous forests
3. Reclassification of high-altitude forests

3.1 Classification of CLC2012 land cover classes

The land cover classes of CLC2012 were reclassified according to the classification scheme in Table 1. The classification scheme is based on a literature review, the evaluation of questionnaires, former workshops and a workshop on CSI indicators within the framework of the Interreg IV project Alpbionet2030 held in Trenta (SI) in October 2017.

Table 1: Land cover classification scheme.

	Land Cover Class	Indicator value (0 – 10)
1.1.1.	Continuous urban fabric	0
1.1.2.	Discontinuous urban fabric	0
1.2.1.	Industrial or commercial units	0
1.2.2.	Road and rail networks and associated land	1
1.2.3.	Port areas	1
1.2.4.	Airports	0
1.3.1.	Mineral extraction sites	2
1.3.2.	Dump sites	0
1.3.3.	Construction sites	0
1.4.1.	Green urban areas	2
1.4.2.	Sport and leisure facilities	2
2.1.1.	Non-irrigated arable land	4
2.1.2.	Permanently irrigated land	2
2.1.3.	Rice fields	4
2.2.1.	Vineyards	4
2.2.2.	Fruit trees and berry plantations	2
2.2.3.	Olive groves	4
2.3.1.	Pastures	5
2.4.1.	Annual crops associated with permanent crops	4
2.4.2.	Complex cultivation patterns	2
2.4.3.	Land principally occupied by agriculture, with significant areas of natural vegetation	6
2.4.4.	Agro-forestry areas	5
3.1.1.	Broad-leaved forest	7
3.1.2.	Coniferous forest	6
3.1.3.	Mixed forest	7
3.2.1.	Natural grasslands	8
3.2.2.	Moors and heathland	10
3.2.3.	Sclerophyllous vegetation	8
3.2.4.	Transitional woodland-shrub	9
3.3.1.	Beaches, dunes, sands	7
3.3.2.	Bare rocks	7
3.3.3.	Sparsely vegetated areas	8
3.3.4.	Burnt areas	8
3.3.5.	Glaciers and perpetual snow	7
4.1.1.	Inland marshes	10

	Land Cover Class	Indicator value (0 – 10)
4.1.2.	Peat bogs	10
4.2.1.	Salt marshes	10
4.2.2.	Salines	10
4.2.3.	Intertidal flats	10
5.1.1.	Water courses	8
5.1.2.	Water bodies	7
5.2.1.	Coastal lagoons	10
5.2.2.	Estuaries	10
5.2.3.	Sea and ocean	10

3.2 Reclassification of coniferous forests

Spruce monocultures and clear-cut areas are viewed as the main issues with regard to ecological connectivity in forests. Therefore, an attempt was made to differentiate between coniferous forests being the natural vegetation of an area and those areas which would not naturally be vegetated by coniferous forests. Coniferous forests located within an area where conifers would occur naturally (based on the map of natural vegetation of Europe) were classified as 7 and all other coniferous forests as 6.

3.3 Reclassification of high-altitude forests

Assuming that forests at higher altitude are in a more natural state than those at lower altitudes, the following procedure has been applied to forested areas: for every pixel, the altitude corresponding to the 70th percentile of the altitudes of the surrounding 5km (10x10km) was determined and taken as a threshold for forests at higher altitudes. For this purpose, the ASTER Global Digital Elevation Model was used and clipped to the extent of forested areas. We considered classes 3.1.1., 3.1.2 and 3.1.3 of the CLC2012 dataset (see Table 1). The statistical analyses of the raster data were performed with the statistical software R (R Development Core Team, 2008). All forested areas at altitudes above the 70th percentile were classified at a value of 8.

4 References

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