Lifewatch-WB geodatabase (v2.7): attribute description.

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1 Climatic variables

1.1 Variables extracted from the Worldclim dataset

Bioclimatic variable were extracted from Worlclim (http://www.worldclim.org/methods), a regular grid at 30 arc-seconds (~1km) resolution, based on meteorological observations between ~1950 et 2000.

Due to the scale difference between the ecotopes and Worldclim, values are extracted from the centroid of each ecotope using a bilinear interpolation. Temperature values (*_T) are recorder in tenth of degrees et rainfall (*_P) is measured in mm.

AnM_T comes from BIO1, mean annual temperature
MDRg_T comes from BIO2, mean diurnal difference (mean difference between diurnal minimum and maximum temperature each month)
isotherm_T comes from BIO3, l'isothermality, the ratio between mean diurnal difference (BIO02) and annual temperature difference (BIO07) multiplied by 100.
STD_T comes from BIO4, la temperature seasonality, the standard deviation of temperature multiplied by 100.
MaxWarmM_T comes from BIO5, max temperature of the warmest month
MinColdM_T comes from BIO6 min temperature of the coldest month

BIO7, annualt temperature difference, is not stored because it can easily be derived (BIO5-BIO6)
MWetQ_T comes from BIO8, mean temperature of the wettest quarter
MDryQ_T comes from BIO9, mean temperature of the driest quarter
MWarmQ_T comes from BIO10, mean temperature of the warmest quarter
MColdQ_T comes from BIO11, mean temperature of the coldest quarter
AnTot_P comes from BIO12, sum of annual rainfall
WetM_P comes from BIO13 , rainfall of the wettest month
DryM_P comes from BIO14, rainfall of the driest month
CV_P comes from BIO15, rainfall seasonality (Coefficient of Variation of monthly rainfall)
WetQ_P comes from BIO16, total rainfall of the wettest quarter
DryQ_P comes from BIO17 , total rainfall of the driest quarter
WarmQ_P comes from BIO18, total rainfall of the warmest quarter
ColdQ_P comes from BIO19, total rainfall of the coldest quarter

1.2 Metrics extracted from Lifewatch-WB land surface dynamics products

Those metrics are derived from the Lifewatch WB snow analysis, which consists in the filtering and analysis of MODIS snow product since 2000. (www.uclouvain.be/lifewatch)

Because of the spatial resolution of 500m, values are extracted at the location of the centroid (with a nearest neigbour interpolation)

SnowStart is the earliest date of snow with more than 50 % probalities (in weeks since the European least snow cover week, i.e. week #32). The probabilities are estimated based on filtered snow cover frequencies between 2000 and 2012. A value of 999 is assigned if the probability never exceeds 0.5.

SnowEnd is the latest date of snow without more than 50 % probalities (in weeks since the European least snow cover week, i.e. week # 32). The probabilities are estimated based on filtered snow cover frequencies between 2000 and 2012. A value of -1 is assigned if the probability never exceeds 0.5.

SnowLength is the average snow duration, in weeks.

2 Topographic variables

SlopeDeg is the slope, in degree, measure at the centroid of the ecotope. Slope is derived from ERRUISSOL data.

Elev is the elevation, in m, measured at the centroid of the ecotope

Azimuth is the orientation of the normal of the slope measure in the centroid of the polygon. The values is measure clockwise in centiDegrees, with 0 at the cartographic North.

SunSpring potential incident light energy in W/m² for the first day of spring, measure at the center of the polygon. This variable integrates the clear sky sun energy reaching the ground during 24h (measure every hour) on march 21. Slop is measured in the center of 4 pixels. Topographic shadows are taken into account.

Roughness mean roughness of the ecotope. Difference between the min and max slope inside o 3*3 moving window on a 10 m resolution DEM.

Slope_prc mean percentage of slope of the ecotope. Slope is derived from 1-m LIDAR data resampled at 10 m with Lancsoz method.

position is the mean relative position of the ecotope in a 200 m radius. This value ranges from 0 (lowest elevation of the neighbourhood) to 100 (highest elevation of the neighbourhood).

3 Land cover

3.1 Proportions inside ecotopes

Ten land cover classes are used to characterise the ecotopes. The proportion of each class are computed based on a 2m resolution layer from the Lifewatch-WB project based on the analysis of ortho-images, LIDAR data and Sentinel-2 time series. This product is not yet validated but this is under process. A preliminary analysis showed high (> 80%) overall accuracy with a poor distinction (~65%) between crops and herbaceous cover.

BroadLV : broadleaved trees (angiosperms), located in forests or other land use (hedges, orchards…)

NeedleLV : Coniferous trees (gymnosperms) located in forests or other land use (hedges, gardens…)

Shrub : small ligneous vegetation (between 1 and 4 m)

Crop : arable lands (annual crops and temporary herbaceous cover)

Herbac : permanent herbaceous cover

Water : permanent water bodies

NonConso : disturbed bare soils, mainly includes recent clear cuts.

Conso : bare rocks, mainly quarries

Ice : permanent snow and ice (absent in Wallonia)

Artif: artificialised surfaces and buildings

3.2 Contextual land cover proportions

Contextual information is based on the 2-m land cover information resampled at 10-m with a majority rule. Two circular neighborhoods are used : the first has a radius of 25 pixels and the second has a radius of 50 pixels. The size of the radius, in meter, is mentioned in he field name. The average of the proportion of each land cover is computed for each ecotope and rescale between 0 and 100%.

Warning : currently, land cover information is only available inside the boundaries of Wallonia. Pixels outside of this boundary are therefore ignored by the neighbourood, which means that polygon along the boundaries are not characterized identically to the boundary polygons. A quality flag allows you to know how much data is missing.

Q_boundary : distance to boundaries used to identify incompletely characterized polygons. A value of one indicates that the polygon is touching the boundary, 250 that the object is at less than 250m of the boundary and 500 the distance is smaller than 500 m. Features far enough from any boundary have a null value. This value could be converted to 0 with some data formats (e.g. shapefiles).

BroadLV250 ou 500 : broadleaved trees (angiosperms),

NeedlLV250 ou 500 : coniferous (gymnosperms)

Shrub250 ou 500 : shrub

Crop250 ou 500 : arable land

Herbac250 ou 500 : permanent herbaceous cover

Water250 ou 500 : open water bodies

Bare250 ou 500 : permanent bare soil

Artif250 ou 500 : built up and impervious surfaces

3.3 Quality

Quality : A subjective quality scale reflect the consistence of our data with other data sources on a scale from 10 to 50. Quality is estimated for each pixel and average at the object level.

Valeur	Définition	Expected accuracy
10	No data or conflict with ancillary data	indetermined
20	Conflicting multi-source classification results	65-75%
30	Consistent multi-source classification results	80-90%
40	Confirmed by photointerpretation	95%
50	Confirmed on the field	100%

3.4 Land cover categories

For the sake of representation, LCCS categories based on the ESA land cover CCI legend are available in field CCI_1.

3.5 Land cover features

L_trees length per hectare of tree alignment.

L_hedges length per hectare of hedges.

I_trees number of isolated trees per hectares.

4 Soil attributes

Soil attributes are derived from the digital soil map of Wallonia (Source : Copyright – SPW-licence n° 160114-0837 – Legrain et Brieuc, 2012). Proportions are integer values between 0 and 1000. Data is not complete : values are missing in and around urban and military areas.

4.1 Marginal soils

Type	Texture	Definition
Organic	V-E	Peat and clay
	V	Peatland
	W	Inactive peatland
	(v)	Organic soil (more than 40 cm)
	(v3)	Organic soil (between 20 and 40 cm)
	(v4)	Organic soil (less than 20 cm)
Sandy	Z	Sandy soil
	S-Z	Sand and silty sand complex
	S	Silty sand
	E-Z	Light clay and sand complex
	G-Z	Silt, pebble and sand complex
	S-G	Silty-sand and silty-pebble complex
	A-S	Silt and silty-sand complex
	A-S-U	Silt, silty-sand and clay complex
	S-U	Silty-sand and clay complex
	E-L-S	Clay, silty-sand and asndy-silt complex
	U-L-S	Clay, silty-sand and asndy-silt complex
	P	Silty-sand complex

Type	Charge	Definition
Calcareous	n	Chalk
	nx	Chalk and silex
	N	Chalky complex
	k	Calcareous
	K	Clay-calcareous complex
	Km	Macigno-calcareous
	j	Calcareous sandstone
	J	Dicontinuous calcareous sandstone
	kf	Schisto-calcareous
	kr	Sell/sandstone/calcareous
	Kf	Sell/clay/calcareous

Type	Symbol	Definition
Source	B, B(1) ; B/o	Sources
AlluPebble	R ; R(1)*	Pebble alluvial soil
AlluSilt	S ; S(1)*	Silty alluvial soil
Alluvial	Soil profile p and drainage efg	Undefined soil profile with low drainage
	Soil profile p and drainage hi	Undefined soil profile with low drainage

4.2 Soil depth

Proportion of the soil depth classes inside each ecotope.

Dpt_Zero : no soil (flushing rock).

Dpt_Superf : superficial soil, less than 30 cm. Also includes the « no soil » class.

Dpt_Mid : depth between 30 and 80 cm

Dpt_Deep : deep soils, more than 80 cm

4.3 Drainage

Proportion of the soil drainage classes inside each ecotope.

Classe	drainage	Definition
Dr_Dry	a ; A (a+b+c+d) & texture=Sandy ; b & texture=Sandy	Very dry « sandy » (cfr 4.1) soils.
Dr_Mid	b & texture≠Sandy ; B & texture≠Sandy; A & texture≠Sandy ; c	Favourable (clay or silt) or moderate drainage
Dr_Humid	F (e+f); h ; f ; e ; I(h+i) ; D(c+d) ; d	Imperfect or poor drainage
Dr_VeryHu	g ; G (e+f+g) ; texture=1/2	Very humid soil (or peatland soil)

5 Other variables

5.1 Height

Height classes are derived from LIDAR data filtered in the frame of Lifewatch-WB project. Those height include both vegetation and built up areaq. Wallonia was covered in 2012-2013 with different sensors, therefore the quality differs.

H_L1m : Less than one meter, but larger than the threshold of 25cm used to exclude sensor noise.

H_1To4m : 1 to 4m (shrubs)

H_4To7m : de 4 à 7 m (small trees)

H_7To50m : de 7 à 50 m (trees)

5.2 Artificial light

Light is the night light intensity measured by DMSP (Defense Meteorological Satellite Program) and interpolated at the location of the centroid.

5.3 Distance

Distances are measured in meter from linear features

Dst_Road : Mean euclidian distance to roads (from Open street Map)

Dst_Rail : Mean euclidian distance to rails (from Open street Map)

Dst_River : Mean euclidian distance to rivers (from integrated river database of the Walloon region). Water bodies are not taken into account for this metric

Dst_Forest : Mean euclidian distance to forest blocks. Forest blocks are delineated using by filling « small » gaps (< 100m) and with an area of at least 10 ha. Distances inside forest blocks is negative.

Bibliography

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With the support of the Fédération Wallonie-Bruxelles