Habitat provision / simplified

Responsible partner: CUEI

Actuality: November 2021

Interpretation

The indicator reflects the quantity and quality of floodplain-typical habitats for the 1-10 km floodplain compartments of riverine floodplains via "integrating" features, i.e. no explicit habitat or species data, but land use and restrictions or protection status as proxies. Thus, it represents a measure of ES habitat provision on a Danube-wide scale.

Due to the heterogeneous nature of the data and difficulties in spatial classification at the floodplain compartment level, no additional extensions were made such as the inclusion of data about typical floodplain species. Only the five parameters or variables listed below were selected since currently only these are mostly available for the total area, and thus enables nationwide/basin-wide evaluations.

References

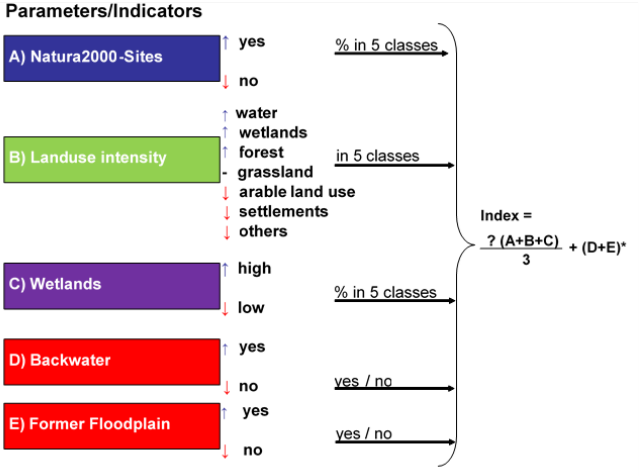
Scholz, M., Mehl, D., Schulz-Zunkel C., Kasperidus, H. D., Born, W. & Henle, K. (2012). Ökosystemfunktionen von Flussauen. Analyse und Bewertung von Hochwasserretention, Nährstoffrückhalt, Kohlenstoffvorrat, Treibhausgasemissionen und Habitatfunktion.

Fischer, C., Damm, C., Foeckler, F., Gelhaus, M., Gerstner, L., Harris, R., Hoffmann, T.G., Iwanowski, J., Kasperidus, H., Mehl, D., Podschun, S.A., Rumm, A., Stammel, B. & Scholz, M. (2019). The "habitat provision" index for assessing floodplain biodiversity and restoration potential as an ecosystem service—Method and application. Frontiers in Ecology and Evolution, 7, 483; https://www.frontiersin.org/articles/10.3389/fevo.2019.00483/full

■ Original approach according to River Ecosystem Service Index (RESI) (Podschun et al., 2018)

Class	Abbr.	Description	Spatial reference
Regulating	HPI_{simple}	"Habitat Provision covers the functional and structural quality of habitats and their communities as a basis for multiple human uses. In this case, habitats provide a diversity of animal and plant communities typical for rivers and floodplains both of natural and cultural landscape." (Fischer et al. 2019)	Floodplain segment or compartment ☒ former floodplain ☒ active floodplain ☐ river

Variable	Abbr.	Unit	Variable description	Data basis
Natura 2000 areas	Nat2000	Ordinal (1-5)	Proportion of Natura 2000 areas in the river-floodplain segment	Natura 2000 areas
Land use intensity	LUI	Ordinal (1-5)	Intensity of use	Corine Landcover Classification (CLC) National Land Cover Model (LBM)
Wetland habitats	WH	Ordinal (1-5)	Proportion of wetland habitats and protected habitats	National maps on wetlands and habitats
Backwater influence	BI	Nominal (yes/no)	Penalty of -1 if backwater influence exists	Information on traverse structures
Former floodplain	FFP	Nominal (yes/no)	Penalty of -1 if floodplain is disconnected from river by anthropogenic structures	Delineation of river-active and former floodplain segments

Calculation	
Evaluation scheme	**Indicator**
	**Calculation of the Index:** The indicator integrates 5 variables. Three of them can gain values between 1 and 5: Nat2000: Proportion of Natura 2000 areas in the river-floodplain segment LUI: Intensity of land use following the LUI decision tree below WH: Proportion of wetland habitats and protected habitats. Two variables are rated as penalities (-1) when they occur: BI: Backwater influence FFP: Former floodplain $HPI_{simple} = \frac{\sum(Nat2000 + LUI + WH)}{3} + (BI + FFP)$

Scaling ☒ national ☐ local	HPI_{simple}	≥ 4.5	< 4.5 - ≥3.5	< 3.5 - ≥2.5	< 2.5 - ≥1.5	<1.5
IDES class		**5**	**4**	**3**	**2**	**1**
Qualitative Evaluation		**Very high** importance for habitat provision	**High** importance for habitat provision	**Moderate** importance for habitat provision	**Low** importance for habitat provision	**Very low** importance for habitat provision

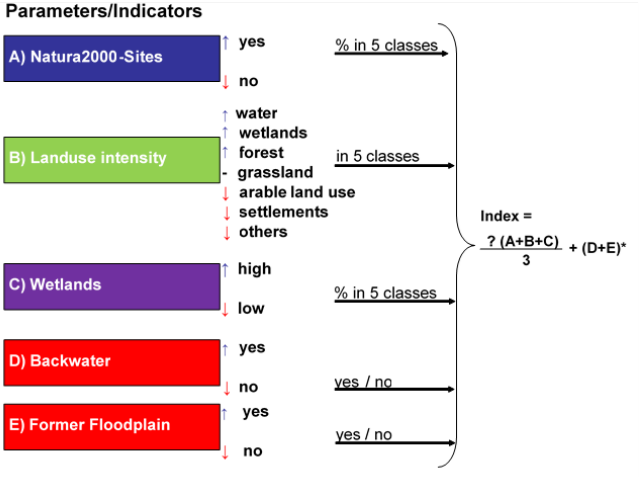
■ Adaption for Danube-wide application

Class	Abbr.	Description	Spatial reference
Regulating	HPI_{simple}	"Habitat Provision covers the functional and structural quality of habitats and their communities as a basis for multiple human uses. In this case, habitats provide a diversity of animal and plant communities typical for rivers and floodplains both of natural and cultural landscape." (Fischer et al. 2019)	Floodplain segment or compartment ☒ former floodplain ☒ active floodplain ☐ river

Variable	Abbr.	Unit	Variable description	Data basis
Natura 2000 areas	Nat2000	Ordinal (1-5)	Proportion of Natura 2000 areas in the river-floodplain segment	Natura 2000 areas, in non-EU countries protected areas and habitats
Land use intensity	LUI	Ordinal (1-5)	Intensity of land use	Corine Landcover Classification (CLC)
Wetland habitats	WH	Ordinal (1-5)	Proportion of wetland habitats and protected biotopes	Wetland habitats of Copernicus riparian zones LCLU (MAES_4)
Backwater influence	BI	Nominal (yes/no)	Influence of hydrologic flow alteration by hydropower dams and traverse structures (impoundment)	Hydrological Alterations – Impoundments, Danube River Basin Management Plan (DRBMP)
Former floodplain	FFP	Nominal (yes/no)	Former Floodplain where regular flooding is inhibited by anthropogenic structures	Active floodplain delineated by Danube Floodplain Project

Calculation

Evaluation scheme



Indicator

Calculation of the Index:

The indicator integrates 5 variables. Three of them can gain values between 1 and 5:

Nat2000: Proportion of Natura 2000 areas in the river-floodplain segment

LUI: Intensity of land use following the LUI decision tree below

WH: Proportion of wetland habitats and protected habitats.

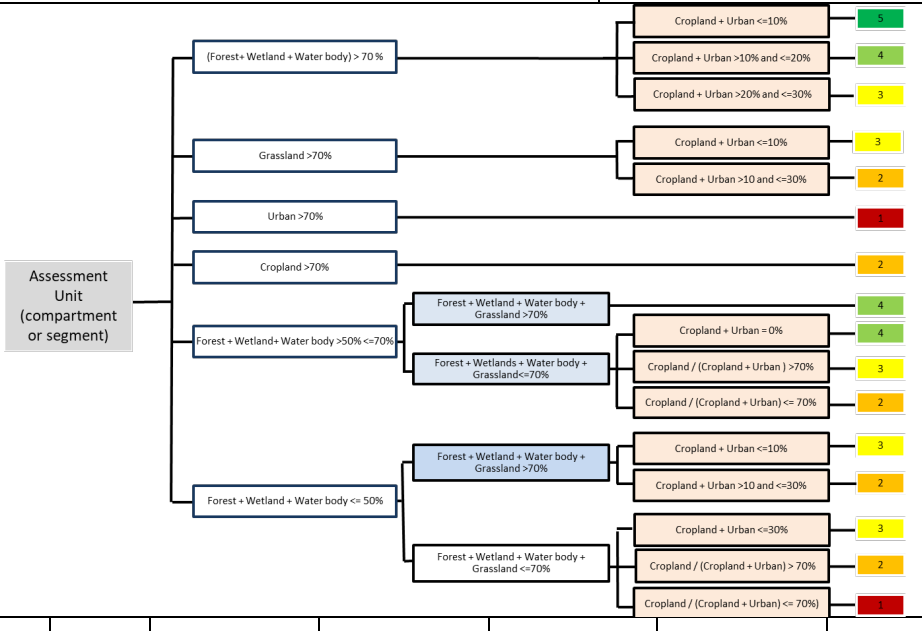
Two variables are rated as penalities (-1) when they occur:

BI: Backwater influence

FFP: Former floodplain (only where active floodplain is delineated)

$$HPI_{simple} = \frac{\sum(Nat2000 + LUI + WH)}{3} + (BI + FFP)$$

LUI



Scaling ☒ national ☐ local	HPI_{simple}	≥ 4.5	< 4.5 - ≥3.5	< 3.5 - ≥2.5	< 2.5 - ≥1.5	<1.5
IDES class		**5**	**4**	**3**	**2**	**1**
Qualitative Evaluation		**Very high** importance for habitat provision	**High** importance for habitat provision	**Moderate** importance for habitat provision	**Low** importance for habitat provision	**Very low** importance for habitat provision

■ Data sources

Data set	Data type	Spatial reference	Spatial resolution	Source	Creation date	Comments
Nat2000 Natura 2000 areas, protected areas in RS	Polygon	International/ segments		https://www.eea.europa.eu/data-and-maps/data/natura-12	2020	5: <75%, 4: >50%-75% 3: >25%-50% 2:>0%-25% 1: 0%
LUI Corine land cover (CLC 2018)	Polygon	International/ Active FP	Minimum Mapping Unit (MMU): 25 ha	https://land.copernicus.eu/pan-european/corine-land-cover/clc2018	2018	For assessment see LUI decision tree
WH Copernicus riparian zones LCLU (MAES_4)	Polygon	International/ Active FP	Minimum Mapping Unit: 0.5 ha Minimum Mapping Width: 10 m	https://land.copernicus.eu/local/riparian-zones/land-cover-land-use-lclu-image	2012	MAES 4 codes: 3111, 3121, 3211, 3221, 3311, 3321, 7111, 7121, 8111, 8113, 8211, 8221, 9111, 9112, 9121, 9211
BI Hydrological Alterations - Impoundments from DRBMP	Line shape file	international/ river		https://www.danubegis.org/	2015	
FP Active floodplain delineated by Danube Floodplain Project	Polygon	international/ Former FP		http://www.geo.u-szeged.hu/dfgis/	2020	Optional, for the segments which contain active floodplains from the Danube Floodplain Project only