Ecosystem Service	**Nursery populations and habitats**
CICES class name	Maintaining nursery populations and habitats (Including gene pool protection)
CICES Section	Regulation & Maintenance (Biotic)
CICES Class code	2.2.2.3

Sample Indicators

Indicator values from			
Experiment or direct measurement		Survey	
Expert assessment		Statistical- or census data	
Model or GIS		Literature values	
Stakeholder participation		Not provided	

Table 1: Field Scale

Indicator	Unit	Indicator values from
[1] Biodiversity & habitats: Earthworms	Not provided	
[2] Species richness of birds	#	
[2] Species richness of farmland birds	#	
[2] Species richness of birds listed as vulnerable or threatened in Annex I of the EU Birds Directive	#	
[6] Overall species richness of flowers relevant to pollinators	#	
[6] Overall species richness of flowers	#	
[15] Herbaceous species richness	#	
[9] Ant species richness as a predictor of overall bird species richness and abundance.	#	
[7] Aboveground biodiversity: number of trees species with DBH≥ 1 cm	# per plot	
[16] Number of carabid- and plant species (alpha diversity)	#	 , 

[16] Number of red listed species	#	
[7] Aboveground biodiversity: Shannon index of trees species with DBH≥ 1 cm in the plot	-	
[12] Diversity of plant community (calculated from species richness and structural diversity)	Dimensionless	
[13] Diversity of plant community (calculated from species richness and structural diversity)	Dimensionless	
[14] Abundances of soil microathropods (Acari: Oribatida, Acari: Mesostigmata and Collembola)	Not provided	
[7] Belowground biodiversity: Number of arthropods per soil pit (25 cm x 25 cm x 30 cm)	#	
[7] Belowground biodiversity: Number of earthworms per soil pit (25 cm x 25 cm x 30 cm)	#	
[7] Belowground biodiversity: macrofauna richness per soil pit (25 cm x 25 cm x 30 cm)	# of species	
[7] Belowground biodiversity: macrofauna diversity per soil pit (25 cm x 25 cm x 30 cm) calculated as Shannon index	-	
[1] Biodiversity & habitats: Microarthropod-based soil quality index	Not provided	
[1] Biodiversity & habitats: dsDNA content (Fornasier et al., 2014, DOI:10.1016/j.ecolind.2014.03.028)	µg dsDNA * g^{-1} soil	
[2] Connectivity. Weighted Euclidean distance between smaller patches of natural habitat and the nearest large habitat patch (i.e.>25 km^2). Distances were weighted by the resistance values of land use types in between areas of natural habitat. Resistance values were expert-based, and no distinction was made for species-specific dispersal capacities. In summary, built-up areas were assigned a high resistance value (10), cropland and open water were assigned intermediate resistance values (4), and other land use types, including pasture and recently abandoned farmland, were assigned low resistance values (1 or 2).	Not provided	
[3] Distance-to-Nature-Potential (DNP)	Index 0 - 1	
[9] Plant species richness as a predictor of butterfly abundance and species richness	#	
[6] Colour richness of flowers relevant for pollinators	# of colour groups visible to pollinators: green, white, yellow, purple, violet, UV	
[11] Habitat for arthropods: total number of plant species	#	

[9] Plant Simpson diversity as a predictor of bee and beetle abundance.	Index 0 - 1	
[9] Floristic Quality Assessment (FQA) as a predictor of butterfly species richness and abundance. FQA is the sum of the products of a species' "coefficient of conservatism" and its percentage of cover (or presence/absence data), calculated over all species.	-	
[17] Share of semi-natural habitats	%	
[11] Habitat for soil microbes and invertebrates: Soil carbon (0-100cm)	kg C * m^{-2}	
[12] Share of years within management period in which protection plant products were used	%	
[13] Share of years within management period in which protection plant products were used	%	
[5] Groundcover: annual mean daily value expressed as a fraction	%	
[3] Relative reduction in species richness	%	
[3] Relative reduction in species functional diversity	%	
[3] Number of species lost regionally and globally	# * m^{-2}	
[6] Functional stability: Average species richness of flowers within colour groups during the flowering season (of flowers relevant for pollinators)	# of species	
[6] Functional intensity: Average size of flowers or discernible sub-sets of inflorescence that are relevant for pollinators	cm	
[17] Carabidae diversity and traits	Not provided	
[16] Difference among carabid- and plant species compositions under different management types (beta diversity)	-	,
[14] Biodiversity indices for microbial communities (Shannon, Pielou, Evenness); based on genetic fingerprinting of microbial communities in DNA extracted from bulk soil, rhizosphere soil, and roots.	Not provided	

[9] AntQA index as a predictor of abundance of grassland bird and butterfly species. AntQa is the sum of the products of an ant species' "coefficient of conservatism" and its percentage of presence/absence in an area, calculated over all species.		
[10] EPX (ecosystem-service performance index) Indicator value calculated as: $$I = \frac{\sum \lvert \log(\frac{i}{i_{max}}) \rvert}{n}$$ With: I – Indicator value, i – variable i measured, i_{max} – maximum ecologic potential of variable i in benchmark reference, n – number of variables. Where performance is considered better than in the benchmark and deviation, therefore, has a positive effect, $\lvert \log(\frac{i}{i_{max}}) \rvert$ is subtracted from the sum instead of added. For this ecosystem service, variables were: -pH in KCl -Number of earthworm taxa [-] -Number of nematode taxa [-] -Number of micro-athropode taxa [-] -Physiological diversity bacteria [biolog. CLPP: Hill's slope]	-	,
[8] Soil biodiversity indicator) based on a principal component analysis (PCA) of soil macro invertebrate data. Variables included: -Abundance of soil macro invertebrate communities (endogeic earthworms, epigeic earthworms, termites, ants, coleoptera, myriapoda, other litter invertebrate) [individuals * m^2] -Taxonomic richness of soil macro invertebrates [not provided] -Sum of soil macro invertebrate collected at each plot [individuals * m^2] Variables with significant contribution (>50% of the maximum value) to either of the first two principal components, axes were selected and their contribution to PCA axes 1 and 2 multiplied by the overall variability explained by each PCA axis. These weighted factors were summed up and scaled to a range of 0.1 - 1.0.	-	
[4] Coffee plantations: 5 level shade index	Index 5 (unshaded monoculture) - 1 (leguminous trees and other plants)	

Table 2: Farm Scale

Indicator	Unit	Indicator values from
[18] Vegetation richness: Number of planted crop species The index is calculated by dividing the observed value with a target value. Target values may be average or maximum values found in region or empirical values from the literature. If the calculated index is higher than 1, it is set to one.	Index 0 - 1	
[18] Number of different land cover types The index is calculated by dividing the observed value with a target value. Target values may be average or maximum values found in region or empirical values from the literature. If the calculated index is higher than 1, it is set to one.	Index 0 - 1	
[18] Share of the farmland in non-crop vegetation (percent of non-crop) The index is calculated by dividing the observed value with a target value. Target values may be average or maximum values found in region or empirical values from the literature. If the calculated index is higher than 1, it is set to one.	Index 0 - 1	
[18] Share of the farmland covered by rare landscape elements (e.g. wetlands, riparian areas, primary forest and prairie) The index is calculated by dividing the observed value with a target value. Target values may be average or maximum values found in region or empirical values from the literature. If the calculated index is higher than 1, it is set to one.	Index 0 - 1	
[18] Birds: observed of indicator species The index is calculated by dividing the observed value with a target value. Target values may be average or maximum values found in region or empirical values from the literature. If the calculated index is higher than 1, it is set to one.	Index 0 - 1	
[18] Native to total bird species ratio: Index based on observation of indicator species The index is calculated by dividing the observed value with a target value. Target values may be average or maximum values found in region or empirical values from the literature. If the calculated index is higher than 1, it is set to one.	Index 0 - 1	
[19] Structural vegetation diversity: four-level index based on the number of different vegetation height classes that occur together (grass, shrubs, trees)	Index poor-fair-good-excellent	
[21] Number of plant species observed during surveys within 1000 m from a farmhouse. Values were scaled [0-1].	#	,

[17] Carabidae diversity and traits	Not provided	
[20] Biodiversity index based on number of moths, birds, bees, fruit flies, spiders, ants, soil macrofauna, termites, earthworms, and small, medium, and tall plants	Index 0.1 - 1	
[21] Number of bird species observed during surveys within 300 m from farmhouse. Values were scaled [0-1].	#	
[22] Red-list biodiversity potential: weighted sum of red-listed species; number of red-listed species across all sampled taxonomic groups in each landscape, weighted by the respective IUCN category in the Swedish national red list. Multiplicators were: near threatened (1), vulnerable (2), endangered (3), regionally extinct (4).	#	
[22] Use of bundles of indicator species identified for a certain region. Species may belong to different taxonomic groups	Not provided	
[19] Wildlife diversity: four-level index based on the number of species occurring	Index poor-fair-good-excellent	
[17] Share of semi-natural habitats	%	
[21] Landscape variation: length of land cover "edges" per hectare land surface. Values were scaled [0-1].	km * ha^{-1}	
[21] Share of farmers surveyed that consider open landscapes valuable landscape elements. Values were scaled [0-1].	%	

Table 3: Regional Scale

Indicator	**Unit**	**Indicator values from**
[21] Number of plant species observed during surveys within 1000 m from farmhouse. Values were scaled [0-1].	#	
[23] Biodiversity of plant species: number of species	#	
[23] Biodiversity of plant species: total abundance (i.e. species cover)	Not provided	
[23] Biodiversity of plant species: true species diversity (i.e. exponential of Shannon entropy)	-	
[25] Richness of wild higher plants	#	
[37] Plant diversity: Plants Simpson's biodiversity index	Index 0 - 1	

[41] Number of weed species on arable land per relevé (method of Braun-Blanquet, 1964)	#	
[17] Carabidae diversity and traits	Not provided	
[21] Number of bird species observed during surveys within 300 m from farmhouse. Values were scaled [0-1].	#	,
[25] Richness of wild higher animals	#	
[29] Terrestrial vertebrate species richness, calculated with the GAP Analysis program from the U.S. Geological Survey	# of species * ha^{-1}	
[31] Biodiversity & biological activity index: The index is based on the collection and sorting of soil macrofauna (including ants) into 16 taxonomic groups (e.g., Oligochaeta, Isoptera, Coleoptera) largely separated by order.	Index 0.1 - 1	
[31] Bio-indicator: Presence of specific ant species is used as an indicator for high, medium or low provision of this ecosystem service. Suitable indicator species must first be identified by a correlation between the presence of species and ecosystem service provision.		
[46] Number of endangered species of vertebrates, invertebrates and plants	# * km^{-2}	
[22] Red-list biodiversity potential: weighted sum of red-listed species; number of red-listed species across all sampled taxonomic groups in each landscape, weighted by the respective IUCN category in national red list. Multiplicators were: near threatened (1), vulnerable (2), endangered (3), regionally extinct (4).	#	
[22] Use of bundles of indicator species identified for a certain region. Species may belong to different taxonomic groups	Not provided	
[24] Biological diversity: composition of flora and fauna communities in relation to the potential natural communities	Not provided	
[25] Number of endemic species	#	
[28] Wetland habitats: Number of unique species in wetlands and floodplains	#	
[34] Bioscore index based on national biodiversity map. Scores are calculated as sum of scores for the distribution of endangered species (1-9), and from scores based on selected species and habitat indicators (1-11). All intensively cultivated fields are assigned a score of 0 by default.	Index 0 - 20	

[35] Alpha, beta and gamma diversity of bird species and woody species. Bird species values based on point measurements, recording all birds seen or heard up to a 30 m radius within a 10 min period (except flyover birds). Woody species values based on determining all woody plants with diameter at breast height > 5 cm.	-	
[36] Habitat scores: number of species found in a specific land use class divided by benchmark value (number of species in land use class with the highest absolute number of species).	%	
[36] Habitat scores for endangered species: number of endangered species found in a specific land use class divided by benchmark value (number of endangered species in land use class with the highest absolute number of endangered species).	%	
[45] Number and identity of selected species in rivers or lakes	#	
[45] Biodiversity value (e.g., species richness, species composition)	Not provided	
[49] Mean species value per hectare: score based on the habitat suitability for all vertebrate and vascular plant species listed in the UK Biodiversity Action Plan, each rated [0 – 1] multiplied by their respective colonization potential, each [0 – 1]. The scores are weighted so that each species contributes equally, regardless of how many habitat types it occurs in.	-	
[40] Genetic Resources: Number and varieties of species	#	
[17] Share of semi-natural habitats	%	
[44] Share of semi-natural habitat	%	
[44] Number of the semi-natural habitat types	#	
[21] Landscape variation: length of land cover "edges" per hectare land surface. Values were scaled [0-1].	km * ha^{-1}	
[25] Diversity of ecosystem types	#	
[25] Proportion of woodland, garden and grassland area in total	%	
[26] Area of "*ecological compensation areas*"	ha	

[38] Share of special protection area relative to municipality's surface area. Values were normalized [0-1] using benchmark values where available and observed values otherwise.	%	
[38] Share of habitats of community interest relative to municipality's surface area. Values were normalized [0-1] using benchmark values where available and observed values otherwise.	%	
[39] Designated Natura 2000 areas	ha	
[27] Indicator for ecological integrity, based on: -Naturalness: Hemeroby index [not provided] -Land use diversity: Number of plant species [not provided] -Landscape fragmentation (landscape metrics): Effective mesh size [not provided], -Core area index [not provided] -Landscape diversity: Shannon diversity index [-] -Patch density [not provided] -Shape index [not provided] -Habitat connectivity: Cost distance analysis [not provided]	Index 1 - 100	
[32] Habitat index from InVEST model	Index 0 - 1	
[33] Size and distribution of strictly protected areas (nature reserves, biosphere reserve, Natura 2000)	Not provided	
[42] Landscape heterogeneity: Satoyama index, calculated as Simpson's diversity index for land uses multiplied by the proportion "non-urban, non-agricultural" land use classes.	Index 0 - 1	
[43] Providing nurseries, habitat for species and conserving genetic diversities: expert based index for ecosystem service provision by each land cover class [1-5], multiplied by the area of the land cover class	km^2	, ,
[43] Providing nurseries, habitat for species and conserving genetic diversities value: expert based index for ecosystem service provision by each land cover class [1-5], multiplied by the area of the land cover class and literature-based monetary value of the ecosystem service	km^2, $ * ha^{-1} * yr^{-1}	, ,
[44] Structural diversity measured by the Simpson diversity index	-	
[45] Ecological-morphological status	preferences, e.g., good, neutral, bad	
[45] Floodplain area	ha	

[23] Floodplains: Riparian Quality Index (RQI). The index considers (i) average width of riparian corridor; (ii) longitudinal continuity, coverage and distribution pattern of riparian corridor (woody vegetation); (iii) composition and structure of riparian vegetation; (iv) age diversity and natural regeneration of woody species; (v) bank conditions; (vi) floods and lateral connectivity; and (vii) substratum and vertical connectivity	Index 0 - 100	,
[46] Number of ecosystem types per area (based on classification in national ecosystem assessment)	# * area^{-1}	
[47] Habitat richness based on landscape metrics: Simpson diversity index	-	
[47] Habitat richness based on landscape metrics: Share of seminatural habitat	%	
[47] Habitat richness based on landscape metrics: Number of seminatural habitat types	#	
[48] Biodiversity conservation, calculated as: $BC = NPP * (1 - VC_{NNP}) * I_W * N_f$ With: BC – Biodiversity conservation, NPP – Net Primary Production calculated from NDVI-values and expressed on a relative scale set to (0 -1000), VC_{NPP} – coefficient of variation of NPP [0 – 1], I_W – water input to the system, calculated as *rainfall* * (1−runoff coefficient) and scaled to a range of [0 -1], N_f – naturalness factor considering naturalness and structural complexity of the ecosystem [0 – 1]	-	
[49] Habitat conservation score, based on conservation priorities and significance of habitats. Conservation priorities were derived from the policy document, while significance was determined by calculating the proportion of the national and regional resource that occurred for each habitat type at each site, and particular site-specific features.	-	,
[21] Share of farmers surveyed that consider open landscapes valuable landscape elements. Values were scaled [0-1].	%	,
[30] Spatial mapping by stakeholders: stakeholders could place green stickers on a map to mark the supply hotspots of this ecosystem service. Red stickers were used to mark locations where the supply of this service is declining. Two different sizes of stickers were used to represent a radius of 0.75 km or 1 km, respectively.	-	

Table 4: National Scale

Indicator	Unit	Indicator values from
[53] Area weighted mean species richness of vascular plants	# of species	
[50] Diversity of breeding bird species (Simpson-index)	-	
[50] Number of farmland bird species	#	
[51] Species diversity: Expert assessment for each land use class, based on the indicators: species number; endangered species; invasive species (units not given)	very negative (−3) to very positive (+3)	
[52] Species of conservation concern: based on species listed in U.K. Biodiversity Action Plan and recorded in a grid cell (further specification lacking)	not provided	 , 
[51] Genetic diversity: Expert assessment for each land use class, based on the indicator: crop variety (units not given)	very negative (−3) to very positive (+3)	
[51] Habitat diversity: Expert assessment for each land use class, based on the indicators: intensive agriculture; homogeneity; fragmentation; extensive/organic agriculture (units not given)	very negative (−3) to very positive (+3)	
[53] Degree of naturalness: 7-point scale indicator	1 (natural) - 7 (artificial)	
[54] Area of high nature value farmland	ha	
[55] Share of high nature value farmland	%	

Table 5: Multinational Scale

Indicator	Unit	Indicator values from
[56] Biodiversity: Values assigned for Corine land cover classes, based on values published by Burkhard et al. (2009; DOI: 10.3097/LO.200915) and modified for the context of riparian zones.	Index 0 - 5	

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