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BioBio indicator factsheet

Habitat Diversity (HabDiv)

Refers to Chapter 5 ‘Habitat indicators’ of the Guidebook ‘Biodiversity Indicators for European Farming Systems’

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Habitat Diversity (HabDiv)

Description

Diversity of habitats available on the farm, including linear habitats, taking into account both the number of habitat types and their relative proportions of the total farm area. The **unit** of measurement is the Shannon Index, which will have a value of zero if there is only one habitat on the farm (no diversity) and will increase with increasing habitat richness, in particular if their share of farm area is similar. **Sub-indicators** can be generated such as the Habitat Diversity of cultivated forage and food crops, Habitat Diversity of semi-natural habitats, Habitat Diversity of areal habitats, Habitat Diversity of linear habitats etc.

Surveyor skills

The indicator is based on habitat mapping, which requires basic GIS, ecological and botanical skills.

Data collection method

The habitat mapping method is described in Deliverable 2.2[1].

Calculation method

HabDiv equals minus the sum, across all habitat types, of the proportional abundance of each habitat type multiplied by that proportion[2]:

$$HabDiv = -\sum_{i=1}^{N} A_i \, (\ln A_i)$$

in which *HabDiv* is Habitat Diversity, *N* the number of habitat types on the farm and A_i the proportion of the farm occupied by habitat type *i*.

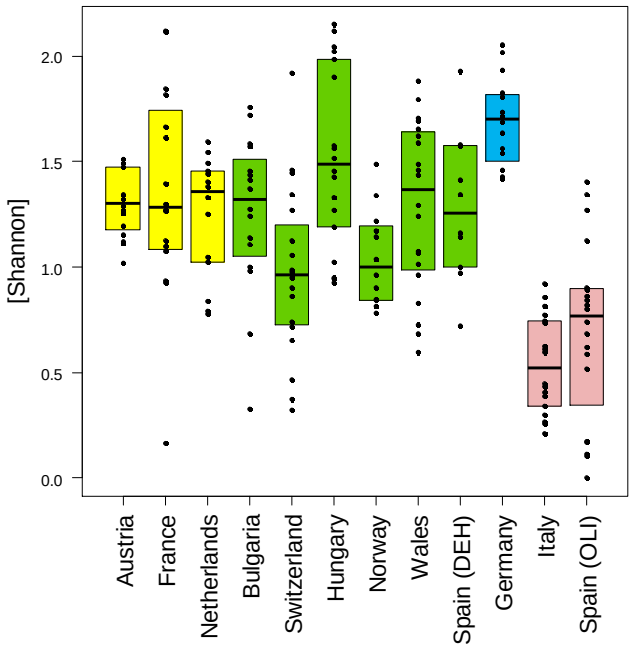
Results from BioBio case studies

The graph shows the mean values and their distribution across the 12 BioBio case study regions. HabDiv differentiates reasonably well amongst the farms in the individual case study regions. High values were obtained for e.g. the mixed farms in Germany and the grassland farms in Hungary. They consist of a relatively low number of habitat types but these are relatively evenly distributed (i.e. the different habitat types each occupy a similar share of the farm area). Low values were obtained for e.g. the wine farms in Italy, which are dominated by vineyards; for grassland farms in Switzerland and for the olive farms in Spain, which both have high habitat richness but unevenly distributed proportions of individual habitat types.

Estimated effort and costs (labour effort required, analysis)

The indicator measurement requires habitat mapping and subsequent GIS analysis. Medium effort.

Contrasting landscapes in southern Germany and in Wales Potos: Sebastian Wolfrum, TUM & Roland Kölliker, Agroscope



Distribution of indicator 'Habitat diversity'
Each point displays the indicator value of a farm. Farms are grouped in the respective case studies. Yellow: field crops & horticulture in Austria, France and the Netherlands, green: specialist grazing livestock in Bulgaria, Switzerland, Hungary, Norway, Wales and Dehesa in Spain,blue: mixed crops & livestock in Germany, pink: permanent crops in Italy and Olives in Spain. The colored box contains the values of 50 % of the farms of a case study. The line marks the median.

[1] Dennis P. et al. 2012. Biodiversity in organic and low-input farming systems ALTERRA Report 2308.
[2] Sensu Shannon's diversity index in FRAGSTATS,

Habitat Diversity change as an indicator

A decrease in indicator value (change in state) may indicate a reduction of the number of habitat types (then accompanied by a decrease in HabR) or less evenly distributed proportions of the area of individual habitat types (e.g. fields getting larger in the course of a farm re-allocation program, associated with changes in PatchS) or both. The indicator can therefore only be interpreted in conjunction with other habitat indicators such as HabRich and PatchS.

Interpretation

In contrast to 'Habitat Richness', which is solely based on the number of habitat types present on a farm, 'Habitat Diversity' also takes into account the relative share of the farm area occupied by each habitat type. When the area of the different habitat types is evenly distributed (all have a similar area) the farm will have a higher diversity value than farms with the same number of habitat types (the same value for 'Habitat Richness') but where one or two habitat types dominate, occupying most of the farm area.

'Habitat Diversity' is complementary to 'Habitat Richness' and 'Patch Size'. All three indicators are needed for a meaningful interpretation. For example, two farms may have similar values for HabDiv, Farm 1 consisting of relatively few habitat types having similar shares of total farm area and Farm 2 consisting of a greater number of habitat types than Farm 1, but one of them dominating. The difference in the number of habitat types is then indicated by HabRich.

None of these indicators allows conclusions on the quality of habitats in terms of supporting species diversity as similar values can be reached by either intensively managed fields or semi-natural habitats.

Strengths and weaknesses

Habitat mapping requires fieldwork, but the indicator is easily computed once the habitat map is available. Indicator values depend strongly on the definition of habitats and on the habitat mapping method (thematic and spatial resolution) so comparisons between farms/countries require standardization (as in BioBio). 'Habitat Diversity' represents both the number of habitats and their relative proportion on a farm. However, different farms can have the same values even if the habitats are not of equal value for biodiversity. Sub-indicators can be used to distinguish between the diversity of intensively farmed habitats and the diversity of semi-natural habitats. Other map-derived and management indicators aid interpretation of this indicator.

The addition of habitats such as wildflower strips to a farm is associated with increased habitat richness and potentially decreased field size. Photo: Gabriela Brändle, Agroscope

This factsheet is part of the Guidelines **Biodiversity Indicators for European Farming Systems**.
More detailed information on the set of indicators developed in the EU FP7 research project BIOBIO (Biodiversity indicators for organic and low input farming systems, KBBE-227161) is given in a printed report, published as ART Publication Series Nr. 17. The report can be downloaded from the BIOBIO website.
Printed versions can be ordered at www.agroscope.admin.ch or at Agroscope, Reckenholzstrasse 191, 8046 Zurich, Switzerland

BIOBIO Indicator Factsheets

Genetic diversity	
Breeds:	Number and amount of different breeds
CultDiv:	Number and amount of different varieties
CropOrig:	Origin of crops

Species diversity	
Plants:	Vascular plants
Bees:	Wild bees and bumblebees
Spiders:	Spiders
Earthworms:	Earthworms

Habitat diversity	
HabRich:	Habitat richness
HabDiv:	Habitat diversity
PatchS:	Average size of habitat patches
LinHab:	Length of linear habitats
CropR:	Crop richness
ShrubHab:	Percentage of farmland with shrubs
TreeHab:	Tree habitats
SemiNat:	Percentage of semi-natural habitats

Indirect management indicators / parameters	
EnerIn:	Total direct and indirect energy input
IntExt:	Intensification/Extensification - Expenditure on inputs
MinFert:	Area with use of mineral nitrogen fertiliser
NitroIn:	Total nitrogen input
FieldOp:	Field operations
PestUse:	Pesticide use
AvStock:	Average stocking rate
Graze:	Grazing intensity