ARE I

A - agricultural R - relevant E - effective I - innovative

Farmland Habitat Biodiversity Indicator

Latvia case

Pēteris Lakovskis

Linda Ieviņa

Institute of Agricultural Resources and Economics

www.arei.lv

Aims & approach of FHBI

Aim: Development of an OECD farmland habitat biodiversity indicator - to calculate an indicator based on all agricultural habitats within a country, both those of high nature value, but also the ordinary and those that are currently of very low value;

- Indicator is based on habitats;
- Indicator helps to monitor changes in biodiversity over time (rather than provide a comparison between countries).

General guidelines

- Use of the **existing data** from monitoring/reporting;
- Definition of the total farmland area (inclusion/exclusion of certain land uses);
- **Spatially explicit data** (maps), instead of solely statistical data;
- Regional differences within a country can mean that a different value for the same broad habitat type is given in different regions;
- It is essential to define whether the assessed value for biodiversity takes into account the current quality of the habitat - whether it is based on the **potential value or the actual value** of the habitat (e.g. how many species could live there vs. how many species currently live there);
- Once the habitat classifications and the assignment to a category of value for biodiversity have been made, they should **remain consistent** over time;

Types of analysis and indicators

- **Genetic diversity:**
  - the number of populations with effective population size (Ne) above versus below 500;
  - the proportion of populations (or geographic range) maintained within species;
  - the number of species and populations in which genetic diversity is monitored using DNA-based methods;
- **Species diversity:**
  - e.g. farmland birds, bats, butterflies;
- **Functional diversity:**
  - Characteristics of species that affect their ecological role (e.g. timing and duration of flowering, size of plants, leaves etc.);
- **Habitat diversity:**
  - The concept of High Nature Value farmland (HNVf), the area should fulfill one or more criteria:
    - farmland with a high proportion of semi-natural vegetation;
    - farmland with a mosaic of low intensity agriculture and natural and structural elements, such as field margins, hedgerows, stone walls, patches of woodland or scrub, or small rivers;
    - farmland that supports rare species or a high proportion of European or World populations;
- **Essential biodiversity variables (EBVs):**
  - The EBVs most relevant to habitat are ecosystem composition by functional type; habitat structure (the three-dimensional organisation of the ecosystem, including the height, density and patchiness of the ecosystem) and ecosystem extent and fragmentation.

Steps to calculate the indicator

1. Define the farmland habitats to be monitored
2. Categorise each habitat type according to its value for biodiversity using the following ratings: Very low, Low, Moderate, High, Very high
3. Calculate the proportion of farmland habitats in each class
4. Calculate the index: (% Very low x 0) + (% Low x 0.25) + (% Moderate x 0.5)+ (% High x 0.75) + (% Very high x 1)

Result: Index between 0 and 100 (0 - all farmland habitat is in the worst class; 100 - all land is in the best class)

Box 5.1. Example: index calculation

Scenario (i): 100 hectares of farmland bordering a stream are allocated such that 50 hectares are in habitat type A and 50 hectares are in habitat type B, where habitat type A is categorised as Very low value for biodiversity and habitat type B is categorised as Moderate value for biodiversity.

Scenario (ii): a riparian buffer, habitat type C, is installed on 20 hectares of land, displacing 5 hectares from habitat type A and 15 hectares from habitat type B. Habitat type C is categorised as High value for biodiversity.

	Scenario (i)	Scenario (ii)	Value for biodiversity
Habitat type A	50 ha	45 ha	Very low
Habitat type B	50 ha	35 ha	Moderate
Habitat type C	0 ha	20 ha	High

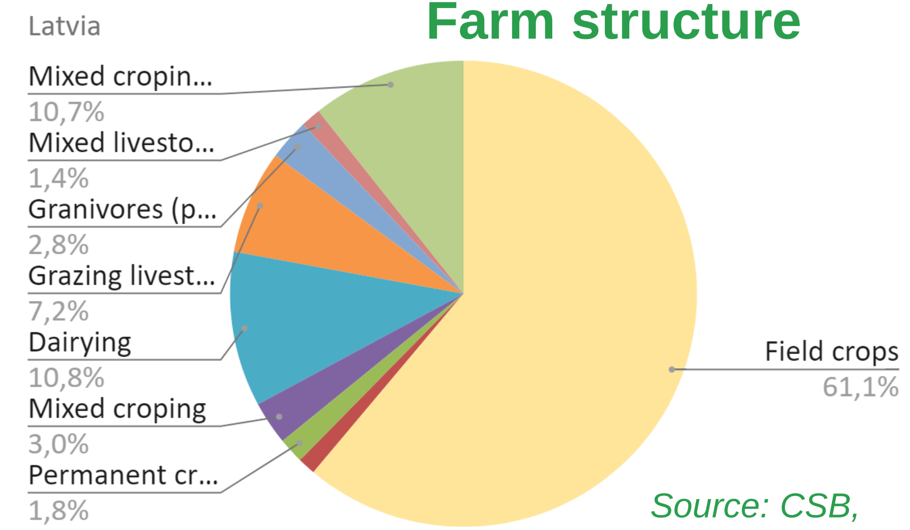
The index value for scenario (i) is: *(50 x 0) + (0 x 0.25) + (50 x 0.5)+ (0 x 0.75) + (0 x 1) = 25*. The index value for scenario (ii) is: *(45 x 0) + (0 x 0.25) + (35 x 0.5)+ (0 x 0.75) + (20 x 1) = 32.5*. The installation of the riparian buffer thus increases the index value by 7.5 points.

Selection of *tier*

- The level of analysis (*tier*) is determined by each country according to the availability of data:
  - Tier III - **limited** data availability (e.g. cereals, other land). Remote sensing + most probable values.
  - Tier II - **moderate** data availability (e.g. large cereal fields, small cereal fields in heterogeneous landscape, woodlots, hedges). Very high resolution remote sensing + analysis of species distribution maps.
  - Tier I - **high** data availability. If the monitoring of farmland biodiversity is already in place. Field recording of habitats and species. Value given based on an empirical basis.
- Lower tiers are based on lower resolution data (satellite remote sensing) and higher tiers on higher spatial resolutions (aerial photography and field recording).
- *Countries can switch to a higher definition tier as more detailed data is gathered.*

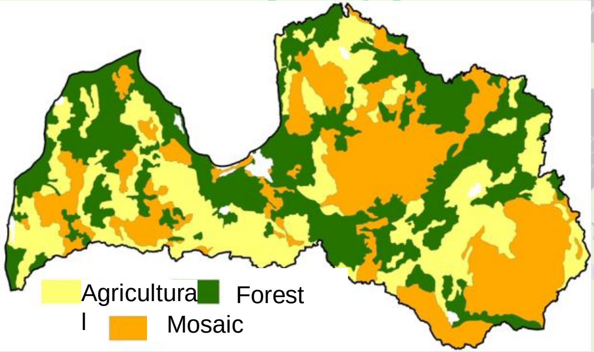
FHBI Latvia: *key characteristics*

Farm structure



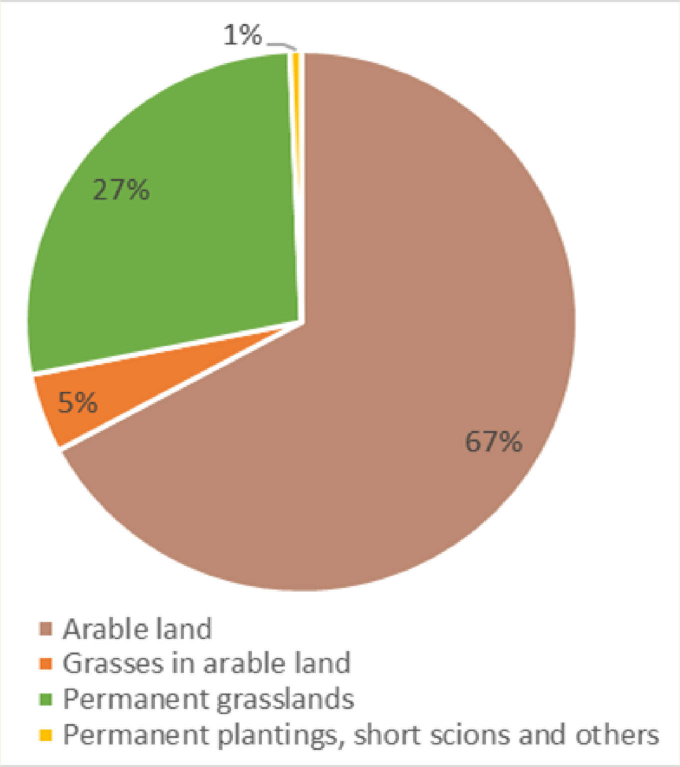
Source: CSB, 2020

Landscape types



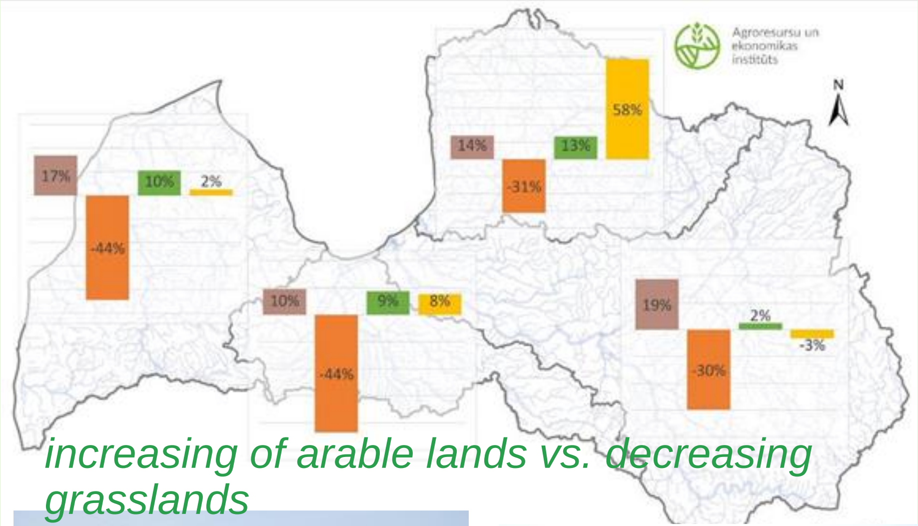
Latvia:

Farmland structure



Source: RSS, 2023

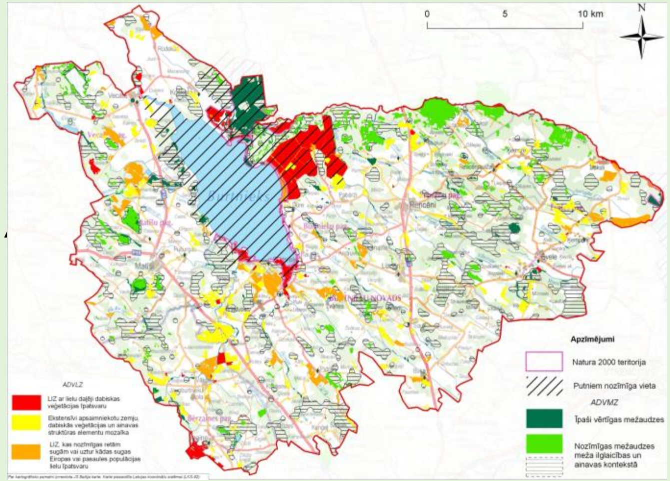
Changes (%) of farmland structure



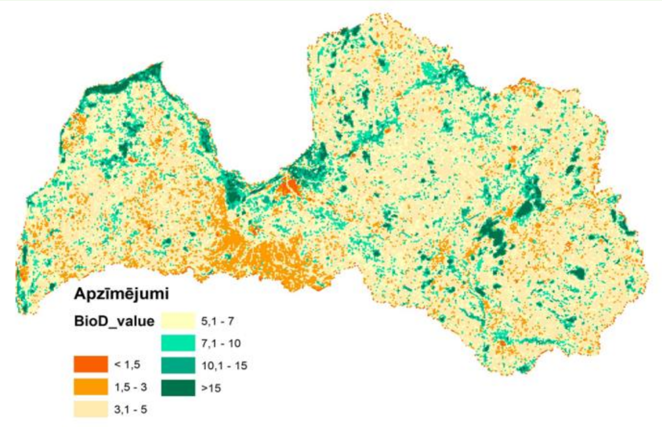
increasing of arable lands vs. decreasing grasslands

Data availability for Latvia

- Natura 2000 network based on protected areas;
- Implemented project on EU habitats (Dabas skaitīšana);
- Partly developed protection plans for protected areas and species.



- No national biodiversity protection strategy;
- Biodiversity assessment at the ecosystem level for the entire country has not been carried out in the last 20 years;
- **No national monitoring for farmland-specific biodiversity.**



Applicable data

Sub-indicator	Definition*	Year	Source	Weight
Protected grassland habitats			Nature conservation agency	
Rare	Tier I	2024		1
Frequent	Tier I	2024		0.75
AEM area: maintenance of biodiversity in grasslands (BDUZ)	Tier I	2023	Rural support service	0.5
AEM area: organic farming in grasslands (BLA)*	Tier II	2023	Rural support service	0.75
Permanent grasslands*	Tier II	2023	Rural support service	0.5
Small woody features*	Tier III	2018	CORINE Land Cover	0.75

Specific

Measurable

Relevant

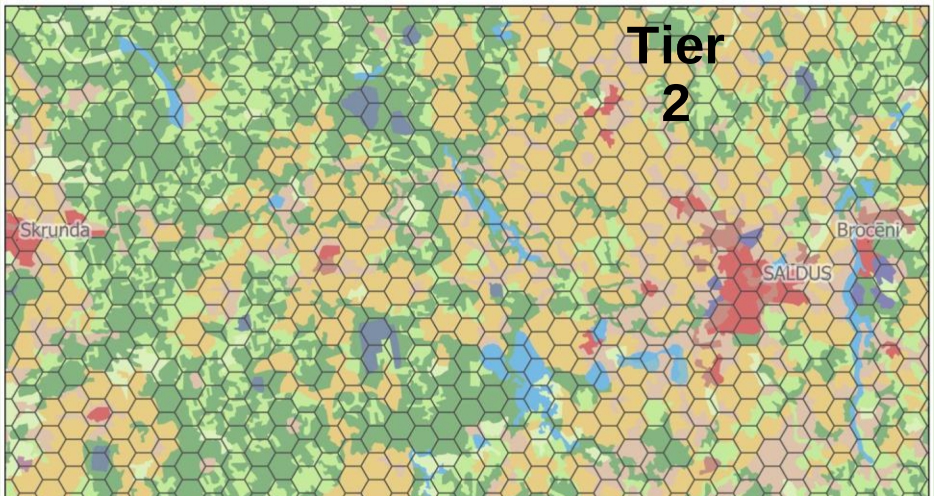
Time-bound

*For the calculation of each subindicator, additional weight is assigned for its data definition (Tier I - 1; Tier II - 0.75; Tier III - 0.5);
**Subindicators with a definition of Tier II and Tier III have only been considered in hexagons where the share of agricultural land is >5%.

Data assesment and selection of *Tier* level

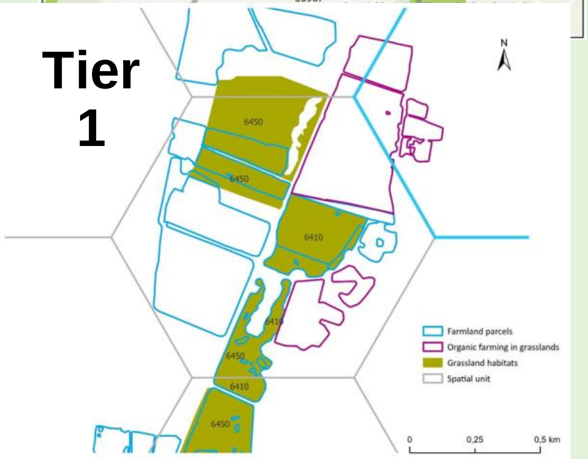
- Assessment of available databases, habitats monitoring reports, scientific paper, case studies etc.

Tier 2



100 ha

Tier 1



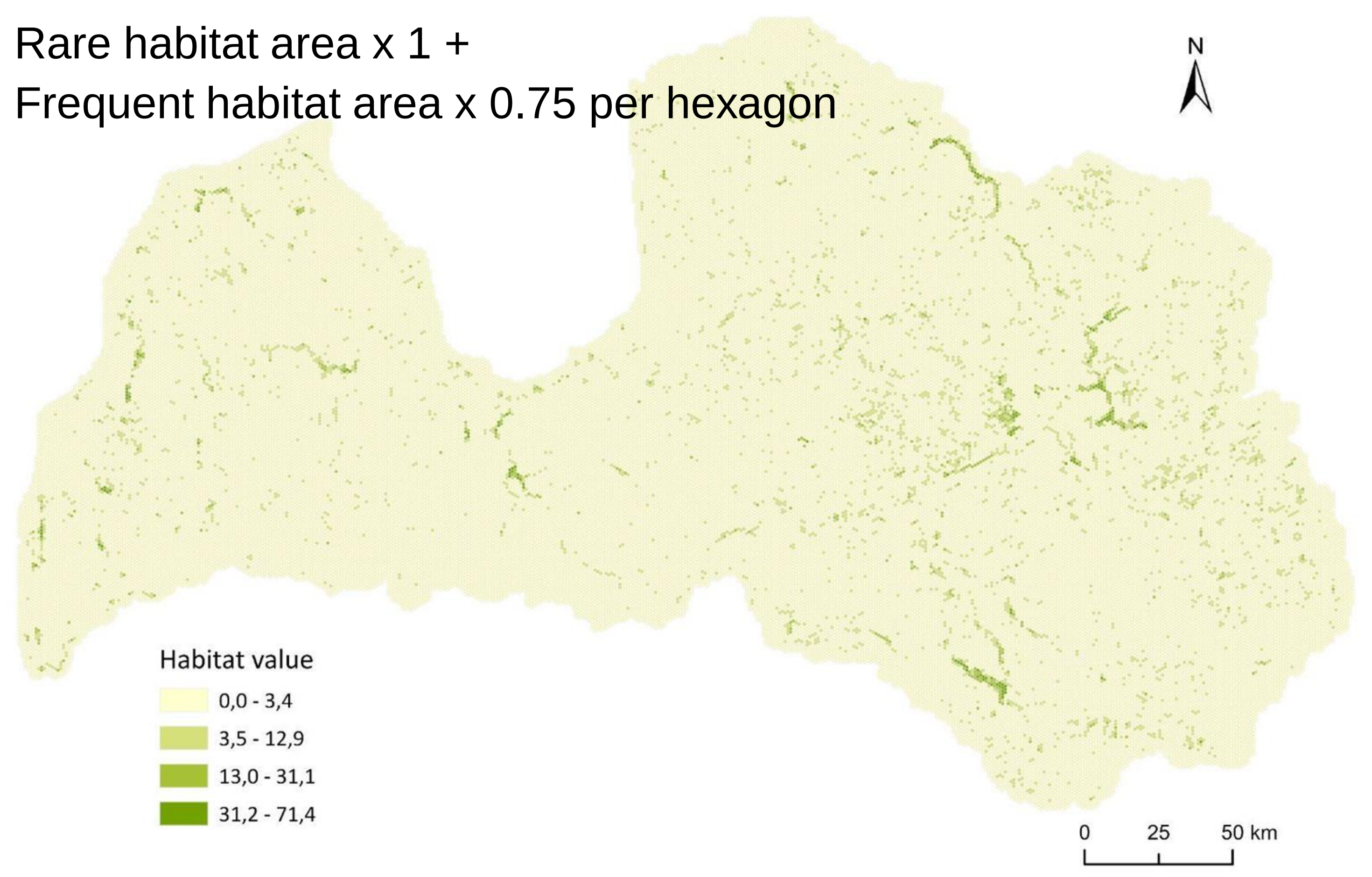
Tier 3

68 407 hexagons

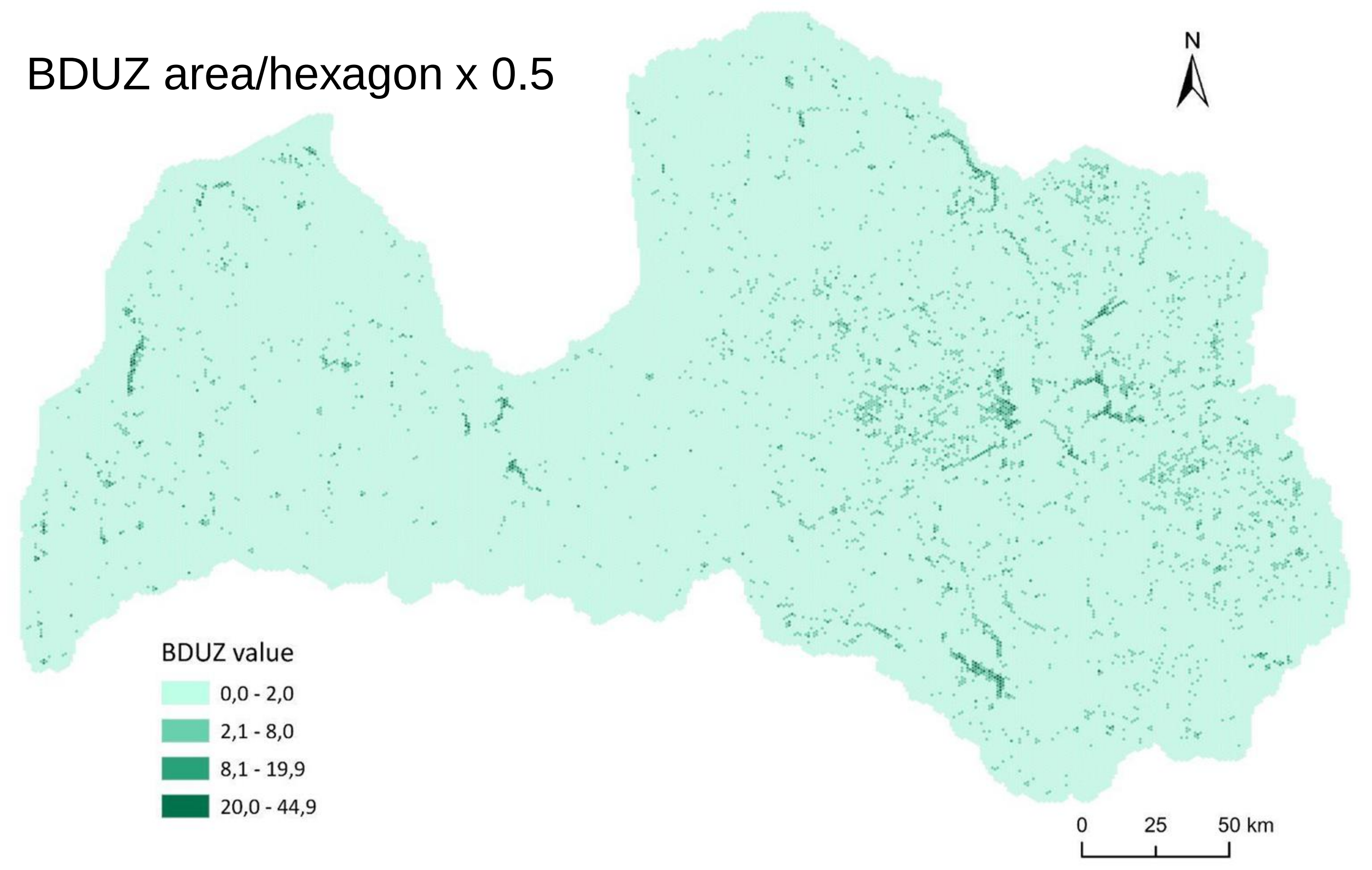
Farmland (protected) habitats

Rare habitat area x 1 +

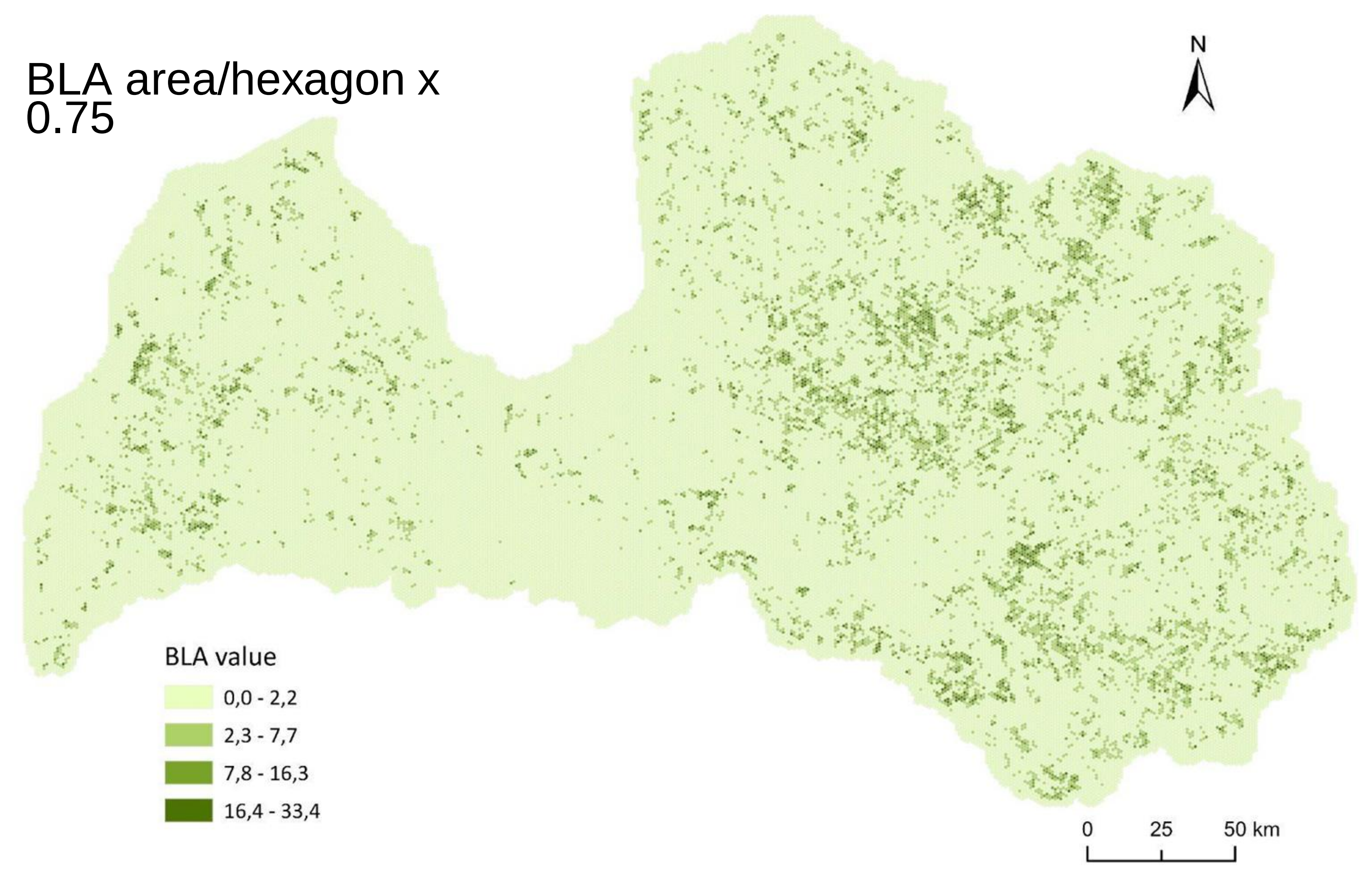
Frequent habitat area x 0.75 per hexagon



AEM area: maintenance of biodiversity in grasslands

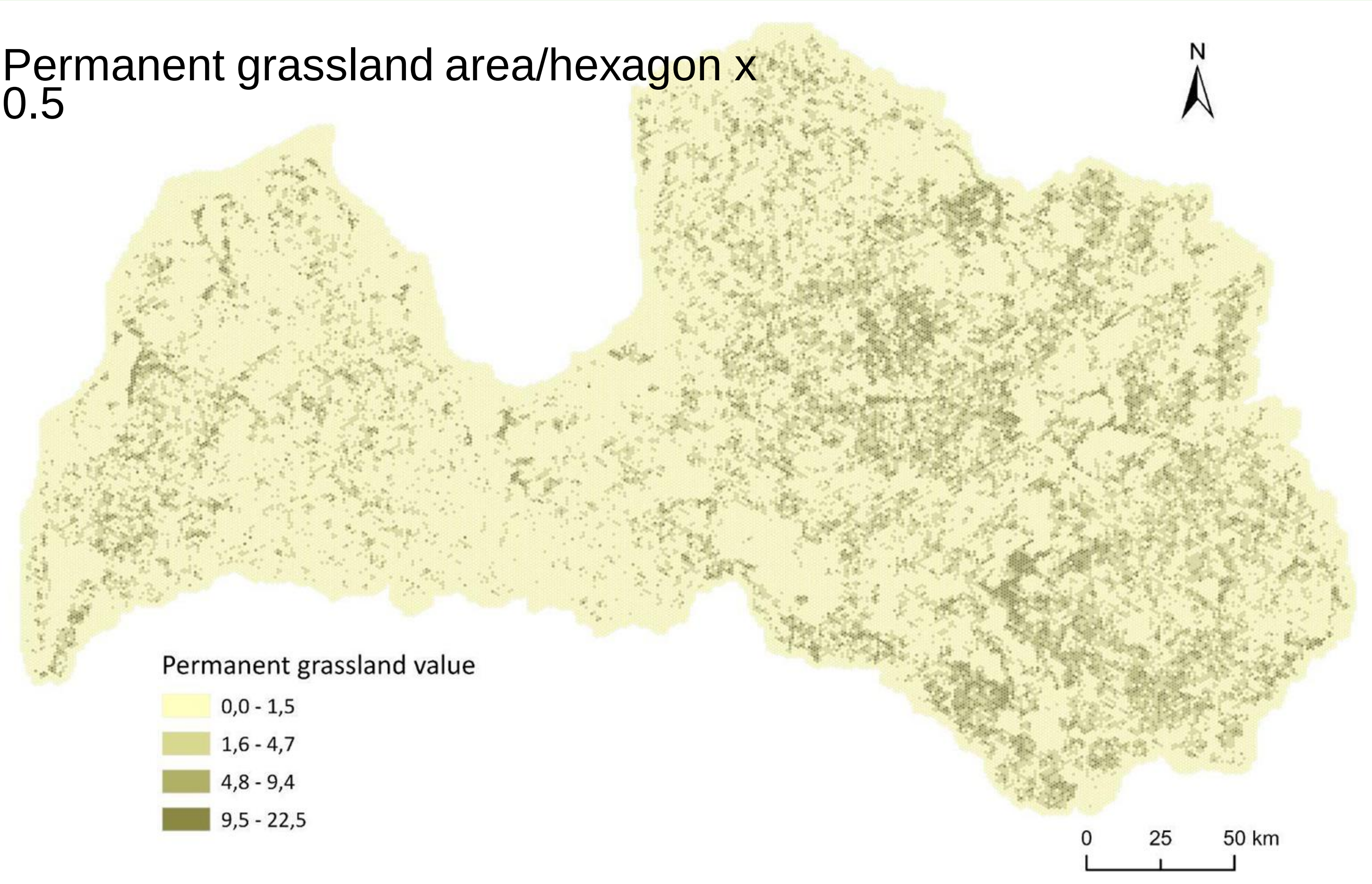


Organic farming in grasslands



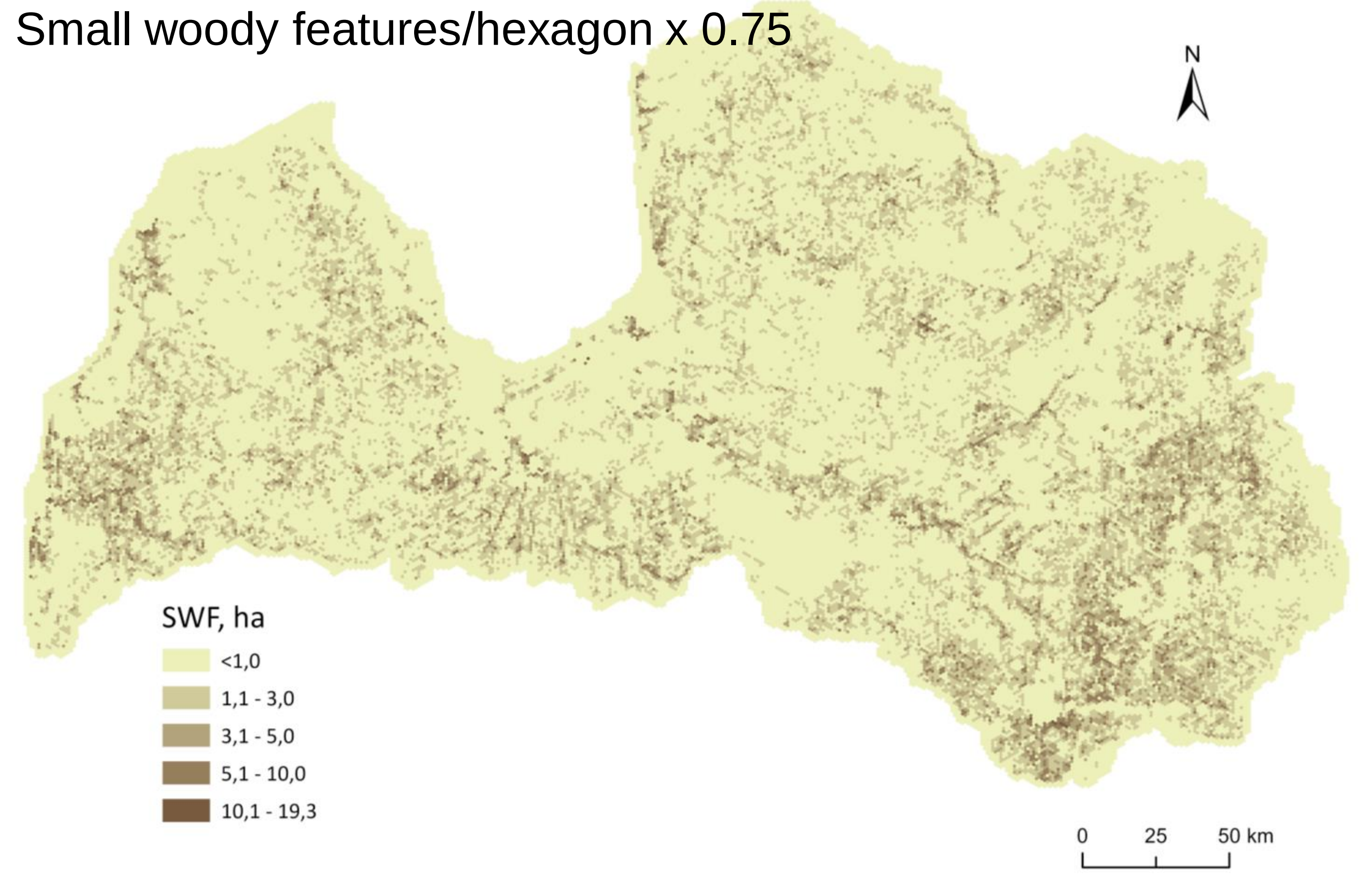
Permanent grasslands

Permanent grassland area/hexagon x 0.5



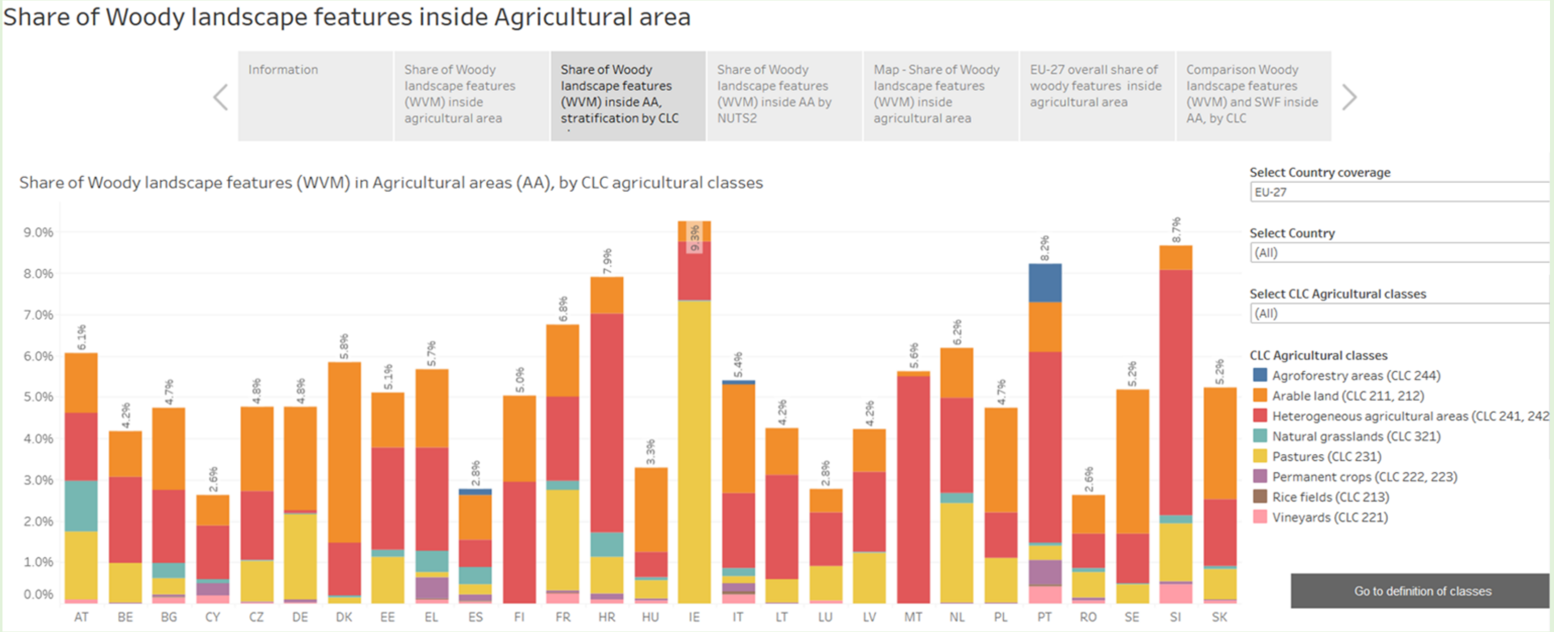
Woody landscape features

Small woody features/hexagon x 0.75



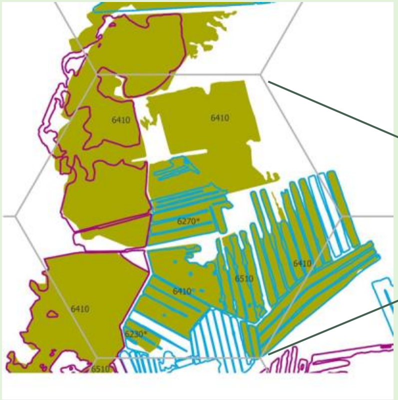
Potential additional data

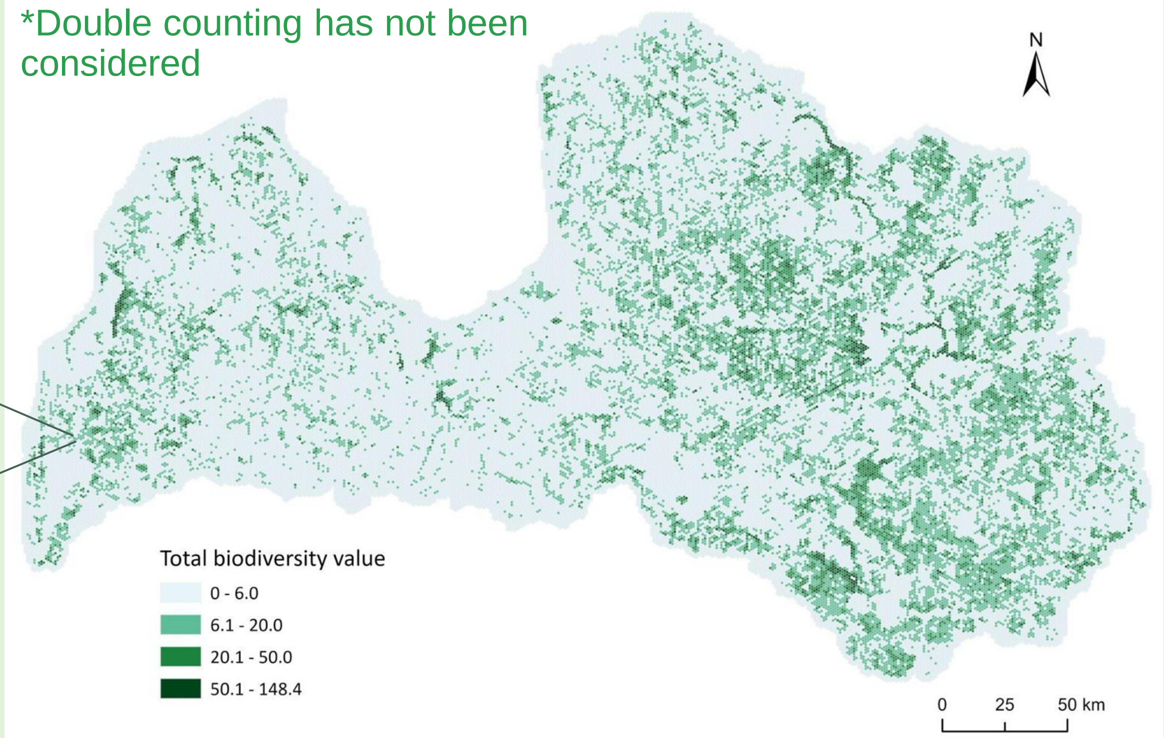
- *Corine Land Cover* data (farmland areas, perimeter for ecotons) - *Tier 3*
  - *Ecotone perimeter between Agricultural and Forest land*
  - *Water bodies (incl. farmland wetness)*



Total value

*Double counting has not been considered

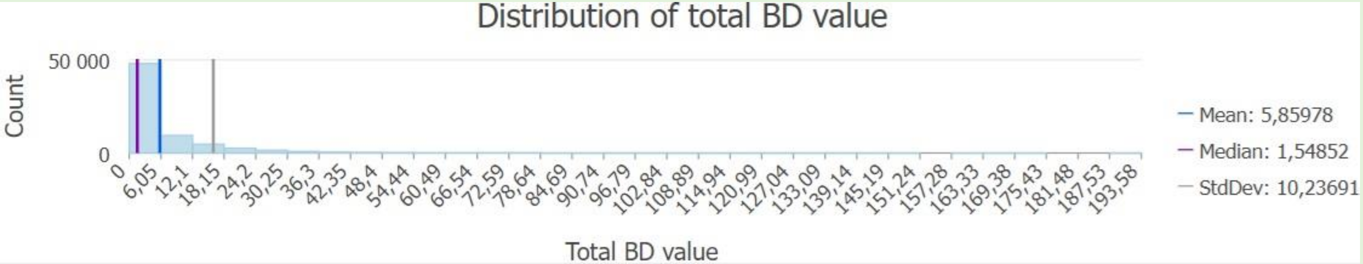




Calculation example:

$$(54.5\text{ ha x }\underline{0.25}\text{ x }\underline{0.75}) + ((24.3\text{ x }0.5\text{ x }0.5) + (7.0\text{ ha x }0.75\text{ x }1) + (63.6\text{ ha x }1\text{ x }1) = 85.1$$

Subindicator weight
Definition weight



Potential additional data

- *Landscape elements from RSS data – Tier 2*
- *Field bufferstrips and edges - Tier 2*

- Data from biodiversity monitoring (FBI, etc.) - *Tier 1*

Strengths & challenges

Strengths:

- Data availability;
- Measurability.

Weaknesses:

- No existing farmland long-term monitoring program.

Challenges:

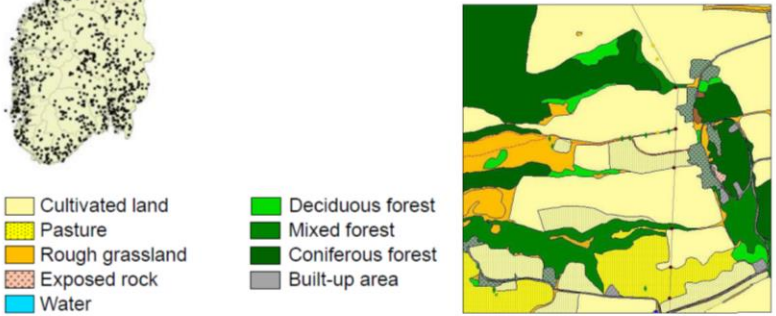
- Uniting data of different *Tiers*;
- Assigning FHBI data in only 5 value classes (criteria weight);
- Biodiversity characterisation of croplands;
- Avoiding double counting (overlaping of sub-indicator areas);
- Addressing areas (grasslands, forest, water) that are not part of farmland system.

Other case studies - examples

Norway – *Tier I*

Available data

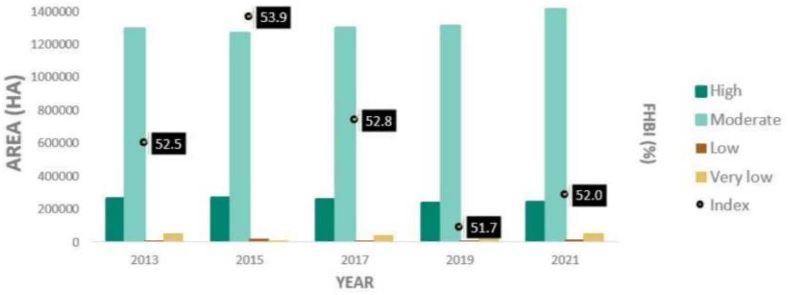
- 1000 monitoring squares of 1 x 1 km
- random sample from systematic grid
- all squares containing agriculture
- interpretation of aerial photographs
- monitoring cycle of 5-7 years



Other case studies - examples

Costa Rica – *Tier II*

Calculation of FHBI



YEAR	FHBI (%)
2013	52.5%
2015	53.9%
2017	52.8%
2019	51.7%
2021	52.0%
Mean	**52.6%**
Standar deviation	**0.85%**