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# Validation and Improvement of High Nature Value Farmland Identification

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# Validation and Improvement of High Nature Value Identification

## National approach in the Walloon Region in Belgium and in the Czech Republic

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## Executive Summary

The Concept of High Nature Value (HNV) farmland has been evolving over the last fifteen years in Europe. In the European Union this has been closely linked to the aim of integrating environmental concerns in the Common Agricultural Policy. The idea that nature values, environmental qualities, even cultural heritage are linked to or dependent on farming, also underlies and supports the concept of a multifunctional 'European model of farming which provides benefits beyond food production. The 'High Nature Value farming' idea thus ties the preservation of biodiversity and wildlife value of the countryside to the need to safeguard the continuation of farming in certain areas with maintenance of specific farming systems associated to the long-term management of these areas.

High Nature Value farmland is defined as "*those areas in Europe where agriculture is a major (usually the dominant) land use and where agriculture sustains or is associated with either a high species and habitat diversity, or the presence of species of European conservation concern, or both*" (Andersen and Al. 2003).

According to preliminary estimates, **roughly 20% of the European countryside qualifies as HNV farmland**. Agriculture in these areas is usually extensive and vulnerable to change. HNV areas are often under severe pressure due to a vulnerable economy and depopulation. Predominant agricultural trends are, on one hand, intensification, and land abandonment on the other. Both are considered detrimental to biodiversity value.

The HNV farmland methodology distinguishes the following types of High Nature Value farmland:
**Type 1**: Farmland with a high proportion of semi-natural vegetation.
**Type 2**: Farmland where low intensity agriculture or a mosaic of semi-natural and cultivated land and small-scale features are dominant.
**Type 3**: Farmland supporting rare species or a high proportion of European or world populations.

High Nature Value farmland comprises biodiversity 'hot spots' in rural areas and is usually characterised by extensive farming practices. Its conservation value is acknowledged in several EU policy documents, such as the EU Regulation on rural development (EC 1257/1999). HNV farmland areas will be one of the indicators (IRENA 26) to assess the Rural Development Community Strategy (programming period 2007-2013) and particularly one of the three priorities of axis 2 "biodiversity and preservation of high nature value farming and forestry systems".

Support to HNV and low input farmland systems by the implementation of the measures of the first and second CAP pillars are also part of the Biodiversity Action Plan (COM 2001 – 162). In their 'Kyiv Resolution', the European Environment Ministers agreed to complete the identification of all high nature value areas in agricultural ecosystems in the pan European region areas by 2006, applying common criteria previously agreed upon. By 2008, financial subsidy and incentive schemes for agriculture will be under biodiversity-sensitive management through the implementation of appropriate mechanisms such as rural development instruments, agri-environmental programmes

and organic agriculture to among others, support their economic and ecological viability (EEA/UNEP, 2004)**.**

**The objective of this study is to better identify and characterise HNV farmland at national level (the Walloon Region in Belgium) with a Farm System Approach based on FSS statistical data and specific national surveys, taking into account the whole farm with the total agricultural area and its characteristics.**

The methodology is built on two different approaches: the natural zones approach and the farm system approach. The natural zones approach uses spatial data to define agricultural zones with a verified high biodiversity interest, based on a reference biodiversity layer for the Walloon Region (WR) called the principal ecological structure (SEP). The farm system approach analyses the farm structure and farming practices on the basis of data available in the WR agricultural database – SIGEC containing information on agricultural plots, combined with other relevant datasets (national agricultural census, national land use plan). In the first step relevant variables have been selected to calculate the HNV indicators for the farm system approach at NUTS 5 level. The selected indicators were: “1) crop diversity and grassland presence, 2) extensive practices, and 3) landscape elements. In the second step the three indicators were combined to calculate the HNV score. It was decided to limit the HNV zone to 25% of the UAA corresponding to the indicator value of 21.6 (where a maximum value is 30). In the third step the areas delimited through the farm system approach were overlaid with a map resulting form the natural zones approach. In the last step HNV farmland was analysed with regard to prevailing trends in farming practices and production types with the aim of identification of farming systems which might be associated with HNV farmland occurrence in the WR in Belgium.

The comparison of results of farm system and natural zones approaches shows that 63% of SEP area is located in the HNV zone. The percentage of SEP area under agricultural management is the same within and outside the HNV zone. There is a strong correlation between the HNV zone and the Less Favoured Area (LFA) in the Walloon Region. Indeed, 97.6% of the UAA in the HNV zone is also located in the LFA.

The analysis of spatial distribution of HNV farmland delimited in the study shows that 91% of the HNV farm system zone identified in the study is located in Ardenne, Fagne and Fammenne. The dominant farming system types are grazing livestock system specialised in milk or meat production, depending on the region. The average livestock density is less than 2.0 LU/ha. Over 60% of UAA is used as permanent grassland.

The HNV farmland identified in the WR in the present study most closely represent type 2 HNV farmland. They are defined by extensive farming practices and the presence of landscape elements favourable for biodiversity enhancement.

The strength of the Farm System Approach methodology is the possibility of producing a map at the NUTS 5 level with an accurate description of the farm systems. The methodology can be improved by crosschecking the results with regional experts and getting feedback on the thresholds and the weighting of the indicators.

The weaknesses of the Farm System Approach methodology are mainly due to the way agricultural practices are modelled. The lack of comprehensive and reliable data on

landscape elements and grassland management hampers further validation of HNV farmland identification results. A development of additional relevant surveys is therefore recommended.

An attempt at assessing the applicability of the FSA for HNV farmland identification was undertaken for the Czech Republic. Statistical data on farming practices are still incomplete and insufficient to build the methodology similar to the Walloon Region FSA. Conversely, biodiversity and habitat data are abundant and of high quality and currently are the best datasets for HNV farmland identification in the Czech Republic.

# 1 Introduction: Context and objectives of the study

## 1.1 The concept of High Nature Value farmland

The concept of High Nature Value (HNV) farmland has been evolving over the last fifteen years in Europe. In the European Union this has been closely linked to the aim of integrating environmental concerns into Community policies. The idea that nature values, environmental qualities and even cultural heritage are linked to or dependent on farming also underlies and supports the concept of a multifunctional 'European model of farming' which provides benefits beyond food production. The 'High Nature Value farming' concept thus ties the preservation of the diversity and wildlife value of the countryside to the need to safeguard the continuation of farming in certain areas and to the maintenance of specific farming systems associated with the long term management of these areas.

‘High Nature Value farmland’ comprises the ‘hot spots’ of biodiversity in rural areas and is usually characterised by extensive farming practices. Its conservation value is acknowledged in several EU policy documents, such as the EU Regulations on rural development (EC 1257/1999 and Council Reg. (1698/2005)). Unfortunately, until now, HNV farmland has only been loosely defined and the knowledge of what constitutes High Nature Value farmland has been quite limited. Therefore, distribution and conservation status could not yet be assessed at the pan-European level. Consequently, the lack of distribution and monitoring data has prevented insight into the targeting and effectiveness of policy measures. During the programming period 2000-2006, some mid-term evaluation showed there was no relation between present expenses in the different countries and their share of HNV farmland.

In their ‘Kyiv Resolution’, the European Environment Ministers agreed to complete, by 2006, the identification of all high nature value areas in agricultural ecosystems in the pan European region areas, using agreed common criteria. By 2008, financial subsidy and incentive schemes for agriculture will be under biodiversity-sensitive management by using appropriate mechanisms such as rural development instruments, agri-environmental programmes and organic agriculture to, among other objectives, support their economic and ecological viability (EEA/UNEP, 2004). Also planned in the Rural Development Community Strategy (programming period 2007-2013) is an HNV farmland indicator to monitor trends in HNV farmland.

## 1.2 Background

The HNV concept has been gradually integrated in the Common Agricultural Policy:
- Integration in Rural Development Regulation CE n°1257/1999 "*preserve and promote a high nature value sustainable agriculture* " – (article 2)
- Integration of HNV as an indicator to evaluate the environmental impact of the CAP (COM(2000) 20, COM(2001) 144 )
- Integration in the new Rural Development Regulation (COM (2004) 490): "*The payments have to contribute to preserve the landscape and the natural environme*nt"
- The Rural Development Extended Impact Assessment indicator (DOC STAR VI/2004/00 Final): Part D –Questions VI. 2.B on the impact of agri-environmental measures on biodiversity (and especially on the conservation of HNV habitats); assessment criteria VI.2.B-1 "*conservation of HNV habitats on farmland"*
- *The new Council Regulation (Reg. 1698/2005)*

Other studies / documents on the HNV concept are:
- Agro-environmental indicators from OECD on natural habitats: indicator *"percentage of HNV farmland surface on the total agricultural area*" 2001
- Proceedings of an expert meeting on HNV Farmland – November 2004
- First report realised by EEA in 2004 "Developing a High Nature Value Farming area indicator" and publication of the document "HNV Farmland – Characteristics, Trends and Policy Challenges"
- IRENA Operation on the agri-environmental indicators for monitoring the integration of environmental concerns into the CAP – Indicator n°26 on "High nature value (Farmland) areas" to assess agricultural impact on biodiversity and landscapes (EEA 2005)
- Work done by the JRC in collaboration with the EEA

## 1.3 Technical considerations

*High Nature Value farmland comprises those areas in Europe where agriculture is a major (usually the dominant) land use and where agriculture supports or is associated with either a high diversity of species and habitat, or the presence of species of European conservation, concern or both – (Andersen et al., 2003)*.

According to preliminary estimates, roughly 20% of the European countryside qualifies as HNV farmland. The largest areas of HNV farmland are found in eastern and southern Europe. They consist of habitats such as semi-natural grasslands, dehesas, montados, steppe habitats and small-scale mosaic fields with abundant landscape features. HNV farmland is also relatively abundant in mountainous areas. Examples are grazed uplands in the UK and Alpine pastures and meadows. Furthermore, the wet heaths and moors of Western Ireland and the grazed salt marshes of Northern Germany qualify for HNV as well. These, at first glance, very diverse areas, are in fact landscapes that have in common the presence of valued habitats and species and specific types of farming - mostly characterised by low stocking densities ,and/or low use of chemical inputs.
Agriculture in these areas is usually extensive and vulnerable to change. HNV areas are often under severe pressure due to a vulnerable economy and depopulation. Predominant agricultural trends are, on the one hand, intensification, and land abandonment on the other. Both are considered detrimental to biodiversity value.

The HNV farmland methodology (cf. Andersen et al., 2003) distinguishes the following types of high nature value farmland:
**Type 1** : Farmland with a high proportion of semi-natural vegetation
**Type 2** : Farmland dominated by low intensity agriculture or a mosaic of semi-natural and cultivated land and small-scale features
**Type 3** : Farmland supporting rare species or a high proportion of European or World populations

The findings of the study by Andersen et al. (2003) are summarised below.

The three types of HNV farmland pose different problems regarding their characterisation and location. To address this, two complementary approaches have been developed to describe and locate types 1 and 2. The first approach used for the identification was the **land cover,** which is suited for the localisation. The second was the **farm system** typology, which combines agronomic and economic data derived from farms (e.g. FADN). By analysing the pressure from farming practices, it gives a general indication of the presence and character of farming systems that are likely to manage HNV farmland. When combined, these two approaches give information on distribution of HNV farming characteristics.

Type 3 areas can only be identified on the basis of species distribution data. Due to data limitations, the species approach has not been properly developed so far.

*Expected output of the different approaches in relation to the different types of HNV farmland*

| | **HNV farmland type 1** | **HNV farmland type 2** | **HNV farmland type 3** |
|---|---|---|---|
| Land cover approach (based on CORINE LC) | Presence of CLC categories related to HNV farming. Indicative maps of the location of HNV farmland. | Presence of CLC categories related to HNV farming. Indicative maps of the location of HNV farmland. | - Not applicable |
| Farming system approach (based on FADN) | Presence and extent of HNV farming systems. Indicators on the extent of HNV farmland. Indicators on the pressure from farming on HNV farmland. | Presence and extent of HNV farming systems. Indicators on the extent of HNV farmland. Indicators on the pressure from farming on HNV farmland. | - Not applicable |
| Species and habitats approach | Predicted occurrence of the habitats of key farmland species. Indicative maps. | Predicted occurrence of the habitats of key farmland species. Indicative maps. | Species and habitats distribution maps show relationship to other approaches and help identify other types of farmland. |

The potential HNV farmland has been identified according to the combined minimum CORINE Land Cover selection and FADN based minimum estimates. Although useful for a general impression of the potential distribution of high nature value farmland, these

maps need revisions using updated and more detailed data and refinements on the basis of national data sets.
Due to the limitations of the CORINE land cover data, the minimum estimate tends to underrepresent Type 2 high nature value farmland (for example some bocage landscapes in north-western France).
Even though CORINE was the best source of land cover data identified, it is clear that using CORINE land-cover categories as a means of potentially locating High Nature Value Farmland has limitations.

The land cover approach is useful for identifying the potential location of HNV farmland, or at least where a higher or lower probability of HNV farmland occurs. The strength of the land cover approach is its potential to highlight areas where HNV farmland may be occurring and thereby it also provides a means of targeting any future validation more accurately. However, it cannot be used to assess the intensity of the farming systems or management practices occurring in those areas, or even whether the Land Cover categories mapped are presently under agricultural management at all (e.g. the CORINE categories “pastures” and “non-irrigated arable land” do not distinguish between intensive and extensively managed types).

The strength of the farming systems approach (using FADN) is that it relates to the management practices of the farms. This means that the approach can help understand the management needs of High Nature Value farmland and support the identification of further potential HNV areas. In monitoring terms this means that the farming system approach can be used to give indications on the pressure from farming in relation to nature values, and that it can be a tool for designing and assessing relevant policy initiatives. Data from the Farm Accountancy Data Network (FADN) were tested for this purpose because, firstly, FADN contains a broad set of data that enable links to environmental aspects. In particular, it contains data on farm area, stocking and input levels - all-important if intensity of use is at all related to HNV. Secondly, FADN contains data at the individual farms level, enabling the grouping of farms on the basis of a range of variables. Finally, FADN is updated regularly, which enhances its usefulness for monitoring purposes.

Therefore, in the study a combined CLC and FADN data approach was attempted. It was found that, although the FADN database is very extensive, its use imposes restrictions on the outcome. The most important limitation is that the sample farms that occur in FADN might not represent all HNV farming systems well. Due to the elimination of small farms, when compared to the data in the Farm Structure Survey (FSS), the total FADN represents 52% of the farms and 86% of the Utilised Agricultural Area in EU-15.

This varies from Ireland, where only 12% of the farms and 4% of the Utilised Agricultural Area are not included, to Austria, where 58% of the farms and 38% of the Utilised Agricultural Area are not represented. It is important to stress that economically small and 'non-professional' farms may in fact be physically large and provide full-time employment, particularly in marginal areas where the land has low productivity but alternative sources of income are scarce.

Lastly, a major weakness of FADN is that its largest data collection unit is the Utilised Agricultural Area (UAA), *not* the area presently occupied by the agricultural business. Seasonal lets (common in some countries, such as Ireland) or wintering/summering

arrangements, as well as the use of common land and the grazing of fallows, are excluded from consideration. Due to the sample methodology, maps can only be produced at NUTS2.

## 1.4 State of the art concerning methodologies

- **CORINE LAND COVER**

Maps drawn on the basis of CORINE Land Cover (CLC) need revision on the basis of updated and more detailed data and refinement on the **basis of national datasets**.
Due to the limitations of the CORINE Land Cover data, the minimum estimate tends to underrepresent Type 2 high nature value farmland (for example some bocage landscapes in North-Western France). The minimum map unit is 25 hectares. CORINE land cover cannot take into account the landscape elements, which are important for biodiversity.

The land cover approach cannot be used to assess anything about the intensity of the farming systems or management practices occurring in those areas, nor whether the Land Cover categories mapped are presently under agricultural management at all (e.g. the CORINE classes “pastures” and “non-irrigated arable land” do not distinguish between intensively and extensively managed types).

- **FADN**

The farming systems approach, which uses data from the Farm Accountancy Data Network (FADN), limits the scale to NUTS 2 which is a quite large scale for HNV. Many NUTS 2 regions can have both intensive and extensive farming. All information is provided in euros and not in input quantity.
On the other hand, FADN can give good indication on the pressures from farming by type of system (mainly input in euros and stocking density).
The most important limitation is that the sample farms that occur in FADN may not represent very well all HNV farming systems (or not at all). Only professional farms are taken into account.

- **LUCAS**

The new Lucas Survey (2001 and 2003) is not precise enough concerning the nomenclature of land use level, and the number of sample points is limited. Lucas could be used to assess the land use evolution. However, it seems that Lucas is not accurate enough to locate or define HNV. Some research results indicate that the direct use of LUCAS to assess the thematic accuracy of CLC2000 is not adequate.

- **Rare species**

The Type 3 HNV « Species and habitats approach » was designed only taking into account bird species (number of species, presence/absence). The **abundance and the stock evolution** (breeding success) were not taken into account. The resolution used for the data was a square of 50x50 km, which is too large. It would be better to consider **species assemblages,** and not only all farmland bird species.
Fundamental differences in these approaches make it difficult to combine them into a single map.

FSS 2000 was not used during this first approach of HNV Farmland. In the future it could be used in combination with CLC to improve the map.
In the future, the Integrated Administration and Control system (IACS) could be a new source of information. IACS could provide yearly data on crops and cattle getting direct payments. Access to these administrative data is still under question.

## 1.5 Objectives

The existence of a wide range of predominantly low intensity farming systems, of value for the rural environment, has been recognised for more than a decade. However, studies focus on very specific farming systems such as the Mediterranean dehesas and montados, steppe areas of Eastern Europe, extensively grazed uplands in the United Kingdom or alpine meadows and pastures. There is a lack of data on the precise distribution, character and evolution of the farmland and farming systems under study. The current method based on separated approaches (land-cover and farming system) does not allow for detailed and quantified geographical analysis.
The land cover data gives the best idea of the spatial distribution of HNV farmland, whereas in most countries, farm data are considered a more reliable indicator for the total share of HNV farmland.

This study had the following objectives:

- revision of the state of the art, at the European level, of the definition / concept of High Nature Value farmland.
- testing, based on the farm system approach and on statistical survey variables (or combination of variables) of the possibility to characterise HNV farms better than using FADN. The scope is to improve the FADN method, in particular the management intensity aspect of the farm (and its grassland) and the livestock density. It may very well be that a combined approach using FSS + FADN is necessary. This is checked, together with the resolution of the statistical data to be used (aggregated or individual farm data).
- comparison of the European approach based on land cover information with the available ground level biodiversity data (animal species atlases, botanical surveys, semi-natural grassland surveys, Natura 2000, CORINE Biotopes, EUNIS databases, Important Bird Area, Regional or National parks info…), in order to identify where the problems are and to refine and improve the CORINE approach.

The methodological developments were tested on the Walloon region in Belgium, based on availability and access to national datasets.

# 2 National approach in the Walloon Region

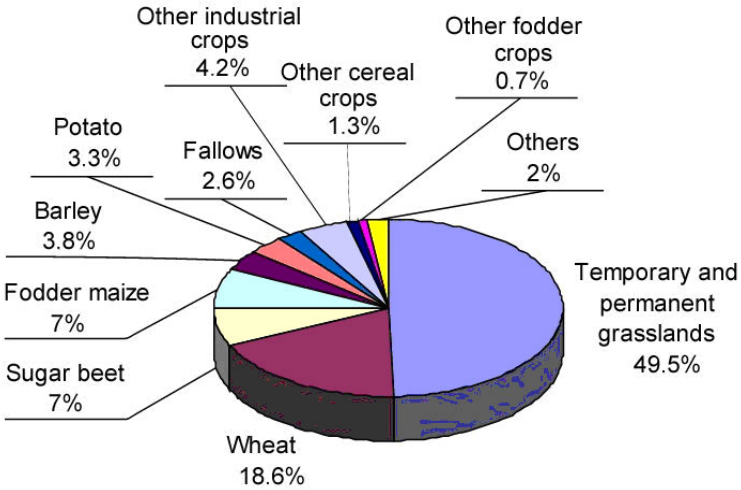
## 2.1 Agriculture in the Walloon Region

### 2.1.1 Overview

In the Walloon Region (WR), farmers currently manage about 50% of the territory. Between 1980 and 1992, the Utilised Agricultural Area (UAA) decreased by 40,000 ha to equal 756,559 ha. The UAA did not evolve much over the last 13 years.

The Walloon agriculture is based on 4 principal productions: milk, meat, cereals and sugar.

Figure 1: Distribution of crops in the WR (2005)




### 2.1.2 Trends in agriculture

During the past centuries, agriculture created high nature value (HNV) lands by diversifying the landscapes and habitats. However, since the second half of 20th century, intensification of agriculture has reduced this value and the diversity of landscapes.

Principal trends with environmental impacts[1]:

- The number of agricultural plots is in constant regression (39 % decrease from 1990 to 2004). This evolution is accompanied by an increase of the average plot size.

- The number of farms is steadily decreasing. As a consequence, the average size of remaining farms is constantly growing (from 20.7 ha in 1980 to 35 ha in 1999).

- Afforestation dropped from 4,500 ha in 1990 to approximately 2,300 ha in 1998.

- Compared to 1990, the number of cattle decreased by 11%, while the pig numbers increased by 17% and poultry numbers increased fourfold. Organic nitrogen production

[1] Source : Tableau de bord de l'environnement wallon 2005, Ministry of the Walloon Region

has followed a similar pattern. Nevertheless, more than 90% of organic nitrogen still comes from cattle. The average livestock density was 2.69 LU/ha in 2005. It has remained quite stable since 1990.

- In the WR, there has been a regular decrease of mineral fertilisers use since 1990. Total nitrogen inputs (both mineral and organic) have decreased during the last years, staying below the threshold fixed by national legislation (250 kg/ha). Between 1995 and 2003, pesticides use by cultivated area unit decreased by 25 % for cereals, 19 % for sugar beets, and 14 % for fodder maize.

- Different agri-environmental measures (AEM) have been proposed to farmers since 1994 (Walloon Government Law of 8/12/94).More details available in Appendix 1.

## 2.2 Collaborations established within the framework of the project

A collaboration agreement was established with the Inter-university Group for Research in Applied Ecology (GIREA). This research team focuses its work on nature conservation, natural zones management, landscape evaluation, environmental issues related to agricultural practices, etc. It is an official authority in environmental impact studies in the Walloon region.

This partnership brought several benefits to the project:

- I-Mage Consult gained access to restricted data such as SIGEC (Computerised system of management and control) or AEM, which would otherwise have been very difficult to work on;

- Several meetings and discussions have been held with experts for the development of the methodology and coherent indicators for the Walloon Region;

- GIREA helped in validating the maps, pointing out limitations of the method.

I-Mage Consult also cooperates with Gembloux Agricultural University, Department of Agricultural Economics (Mr Burny). Several meetings have been held with representatives of this unit, leading to important contacts for the Walloon Region study, and also for the Czech case study (contact with the Agricultural Economics unit of Prague University).

## 2.3 Data sets

In the Walloon Region, agriculture-related data availability is good. I-Mage Consult gained access to numerous databases concerning agricultural plots, land use, detailed statistics on farming systems, presence of natural zones with protection status and sites of high biological interest, agri-environmental measures, etc.

The precision range of the data is however variable, from statistical data at district level (NUTS 5) to geographical layers at 1:10,000 scale.

### 2.3.1 Data sources

Among the data sources identified, two of them deserve a dedicated paragraph, on account of to their particular contribution.

Agricultural plots database (Ministry of the Walloon Region (MRW))

The Directorate-General for Agriculture (DGA) of the Ministry of the Walloon Region and more precisely its IG 4 division (Agricultural Subsidies Payment Division) keeps a detailed agriculture database at the plot level. The IG 4 division (Division for rural space management) of the DGA developed the OER (rural space observatory) Geographical Information System, which includes the SIGEC database. The latter presents a precise localization of each plot with its corresponding crop cover, for the whole Walloon Region, and is updated each year.

The SIGEC database is a geographical database restricted to the use of DGA administrators. Thanks to the collaboration with GIREA, partial access to these data has been however allowed to I-Mage Consult in the framework of this study. Several test zones (100 km² each) were extracted from the SIGEC. These zones were used as study sites for the development of various indicators. Once the methodology has been developed, I-Mage Consult gained access to the full data set and calculated the indicators at the scale of the whole Walloon Region territory.

Biodiversity data (Research Centre of Nature, Forests and Wood (CRNFB))

The CRNFB is another important data provider, being the institution which prepared the proposal for Natura 2000 zones for the Walloon Region. As a public service subsidized by the Walloon Government, the CRNFB is open for external consultation.

Besides the designation of Natura 2000 areas, the CRNFB also developed the methodology for the designation of Principal Ecological Structure (SEP) zone[2] and High Biological Interest Zones (SGIB), which are other important biodiversity data sets for HNV identification.

### 2.3.2 Description of data sets

The following page presents a list (Fig.2) of identified and collected data sets and their potential use within the developed methodology. For detailed data sets description (including data sources), please refer to Appendix 2 of this document.

The use of AEM in methodology:

In the absence of useful data on landscape elements and grassland management (for example, inventory data on hedges or high biodiversity grasslands), the AEM database was used in this project as a replacement. Such use of AEM is not desirable and is not supported by the JRC, since the High Nature Value indicator is, among other things, an indicator for Rural Development policy assessment, and therefore should not be based

[2] See 3.3.2. Description of data sets, and 3.5.1. Methodology of Natural zones approach

on AEM. Identification of HNV areas should be based on data independent from policy measures in general.

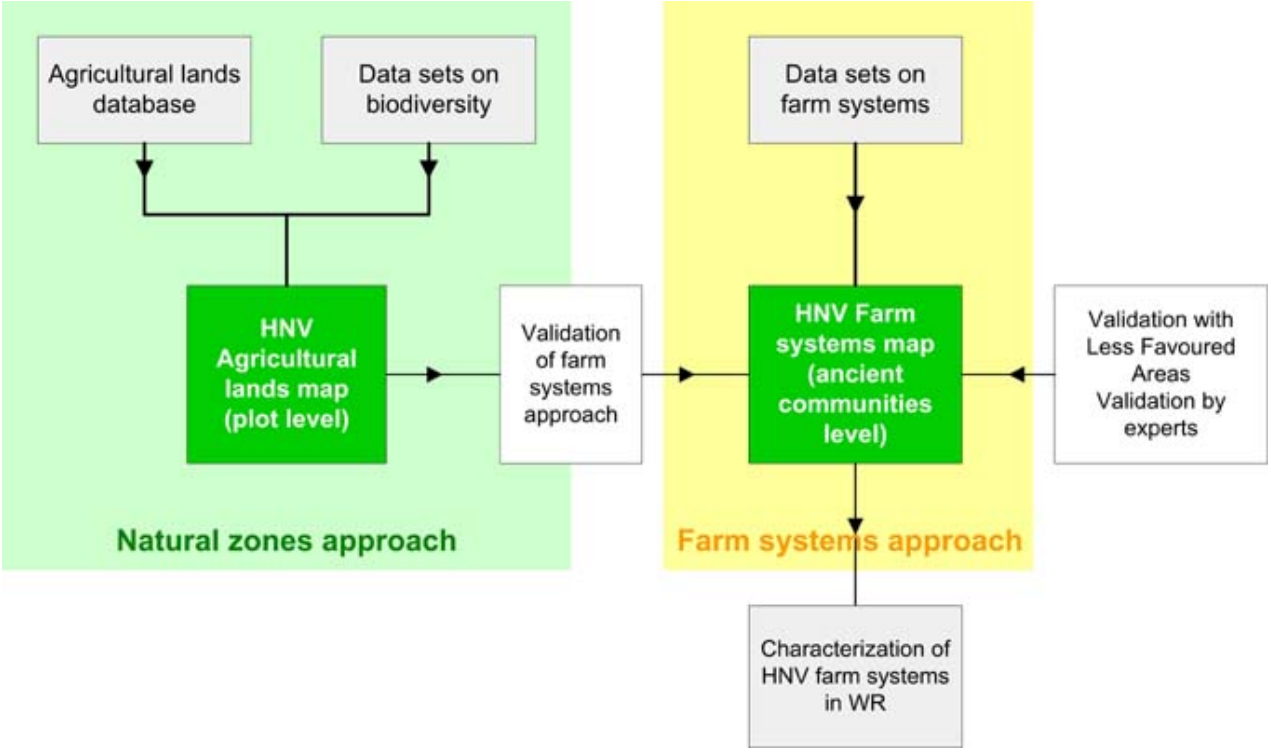
Nevertheless, these missing data sets were necessary for this project development and had to be replaced by information on AEM, being the only available data.

Figure 2: Description of data sets and their use in methodology

| Name | Administrative level or scale | Year | Use in methodology |
|---|---|---|---|
| Administrative limits, present and ancient | - | 2006 | Administrative levels are used to aggregate data to develop indicators linked to coherent administrative areas. When possible, indicators are built on the ancient communities limits. When data precision do not allow that, indicators are linked to the present communities. |
| Agricultural plots | 1:10 000 | 2005 | In "natural zones" approach, this data makes possible to restrict the high biodiversity zones to agriculture land use. In the "farm system" approach, it is mainly used to calculate indicators on : plots average area, crop diversity, presence of grassland and permanent grassland. |
| Agri-environmental measures | 1:10 000 | 2005 | In the "farm systems" approach, the data gives indication of grassland-related AEM (natural grasslands, high biological value grasslands, low cattle load) and allows the calculation of indicators based on lengths of hedges, presence of ponds, isolated trees, helping to assess the value of landscape elements in an area. |
| Ornithological data | 1:10 000 | 2002 | Data indicates presence of interesting birds. It is used indirectly in the natural zones approach (taken into account in the SEP zones). |
| National Agricultural Census | present communities | 2005 | Data corresponds to the farm structure survey in the Walloon Region. Data is provided aggregated by present communities. It is used to calculate an indicator of the cattle load. It can be used to calculate crop diversity indicator and grassland presence indicator, but for this, the agricultural plots database is more relevant because it is more accurate. |
| National land use plan | 1:10 000 | 1989 | The national land use plan describes the legal land use, for the entire Walloon Region. It is used to calculate the lengths of wood edges. |
| Natura 2000 | 1:10 000 | 2006 | The Natura 2000 zones are used indirectly in the natural zones approach. The zones were used to build the SEP zones, which are the ecologically valuable zones in the Walloon Region. |
| Nitrates database | present communities | 2004 | The organic nitrates pressure is an indicator of the intensification of practices. Nitrates database can reveal problems in spreading all the organic nitrogen on crops and grasslands. It is used along with cattle load indicator to discriminate extensive breeding farm practices. |
| Particularly rare species habitats | 1:10 000 | 2006 | Data on European hamster and chiropter species distribution could be used in the natural zones approach, in addition to the SEP zones. |
| Soil map | 1:20 000 | 1991 | The soil map, crossed with the agricultural plots, gives localization of permanent humid grassland. |
| SEP (principal ecologic structure) | 1:10 000 | 2006 | Sep zones (Natura 2000 + SGIB zones) are the core of the "natural zones" approach. Crossed with the agriculture plots, they give the agricultural zones where high biodiversity is found. |
| SGIB (High Biological Interest Sites) | 1:10 000 | 2006 | The SGIB zones are used indirectly in the natural zones approach. The zones were used to build the SEP zones, which are the ecologically valuable zones in the Walloon Region. |

## 2.4 General methodology

Figure 3: General presentation of the methodology




**The methodology (Fig.3) includes two completely different approaches, focusing each on different data sets :**

a. The natural zones approach uses spatial data to define agricultural zones presenting a verified high biodiversity interest. The basis for the method is the reference biodiversity layer for the WR: the principal ecological structure (SEP). SEP are restricted to agricultural land by crossing the geographical layer with SIGEC layer (agriculture database).

**The result of the approach is a HNV Farmland map, locating agricultural land (plots or parts of them) found in the high biodiversity reference zones.**

b. The farm system approach analyses the farm structure and practices, using available data to calculate indicators such as: crop diversity, plot area, presence of natural landscape elements, livestock density, presence of permanent grassland…

The base of the method is the SIGEC database but other datasets were used in the calculation of indicators as well (national agricultural census, official land use plan…). Indicators were given different weights in the calculation of an HNV score, allocated to each of the ancient communities of the WR (before the grouping into the present “NUTS 5” communities).

Finally, only the ancient communities with the best HNV score were selected to constitute the HNV zone. It was decided to limit the HNV zone to 25 % of the UAA in this study (this limit can be moved to test different scenarios). This indicative threshold is based on the European estimates made within the IRENA operation for the HNV indicator development (EEA, 2005). It also takes into account the fact that the results of the analysis are zones, defined by particular farming types, with a potential to shelter a large proportion of HNV Farmland in its UAA. This is the most important difference from the natural zones approach.

**The result of the approach is a HNV farm system map, constituted of the ancient communities with the best HNV scores (25% of UAA). The map indicates the location of farming systems have a high potential of HNV farmland occurrence.**

The map obtained with the natural zones approach was used to validate the map resulting from the "farm system approach". If the method is successful, the proportion of agricultural SEP zones in the resulting HNV farm system zone should be significantly higher than the proportion of agricultural SEP zones in the rest of the territory. Less Favoured Areas (LFA) are also compared with the HNV farm systems map. Interviews with experts were held to validate the map.

Finally, the types of farming found in the HNV zone were described.

## 2.5 Natural zones approach

### 2.5.1 Methodology

Combination of spatial data on zones presenting a high biodiversity and spatial data on plots gives the location of agricultural zones with high biodiversity. The reference biodiversity layer in the WR is the Principal Ecological Structure (SEP).

Principal ecological structure (SEP)[3] :

Area where environmental stakes for biodiversity are markedly superior to those on the rest of the territory. It is the mapping of the "ecological network" concept and is defined as the ensemble of habitats and biotopes allowing the long term conservation of biodiversity in the territory.

SEP zones cover about 298,000 ha, are still evolving, and comprise:

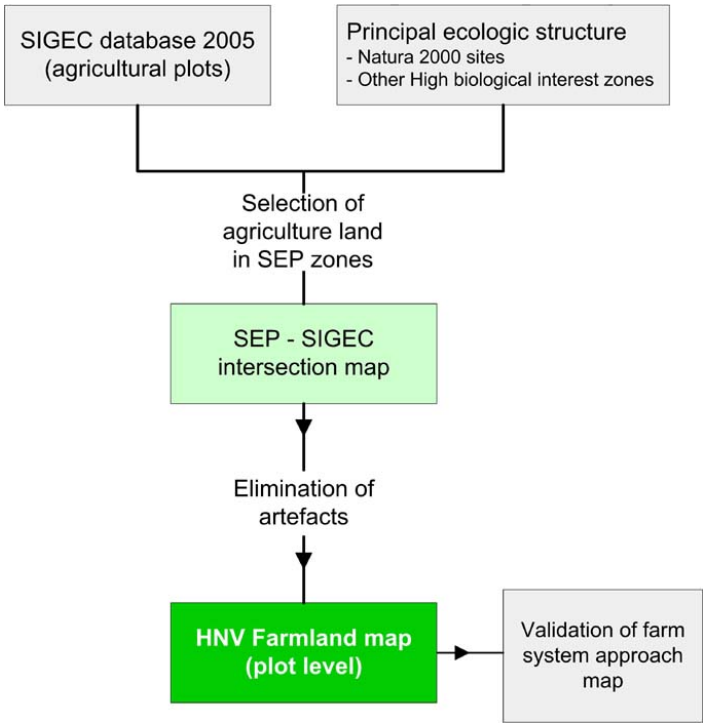
- Natura 2000 ZONES (220,944 ha) ;
- Complementary perimeters mapped by CRNFB for prospective Natura 2000 sites and not retained by the Walloon government;

[3] Definition provided by GIREA, translated into English

- High Biological Interest Sites (SGIB) inventories, led by CRNFB. They comprise sites with high national heritage interest and gather inventories made over the last 30 years.

In the methodology, SEP are restricted to agricultural land by crossing them with SIGEC (agriculture database), resulting in an HNV Farmlands map. The HNV Farmlands map from natural zones approach was also used to validate the HNV Farm systems map from the farm systems approach.

Figure 4: Presentation of "Natural zones" approach

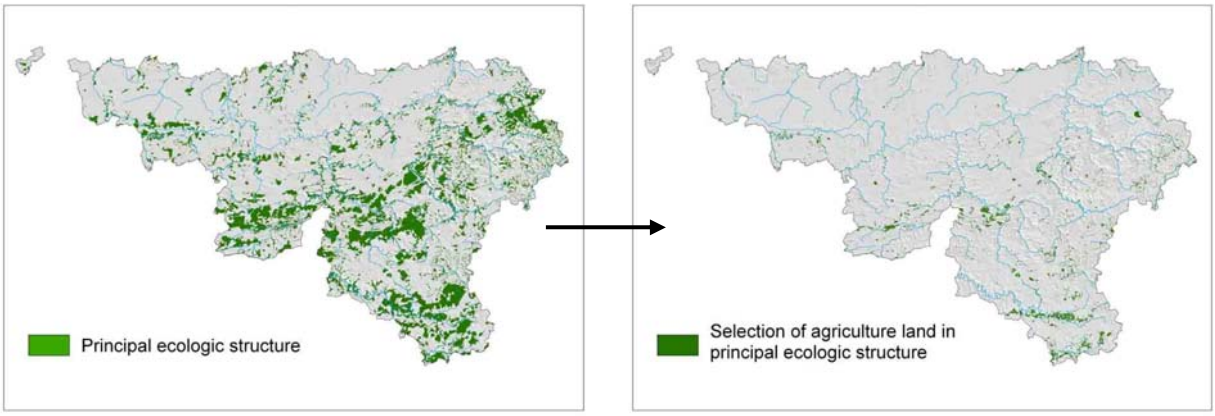



## 2.5.2 Data processing and maps

### a) Selection of agricultural land in SEP zones

Crossing the biodiversity layer (SEP) with agricultural plots layer (SIGEC) provides a map of the agricultural zones in the Walloon Region with a high biodiversity interest (Fig.5).

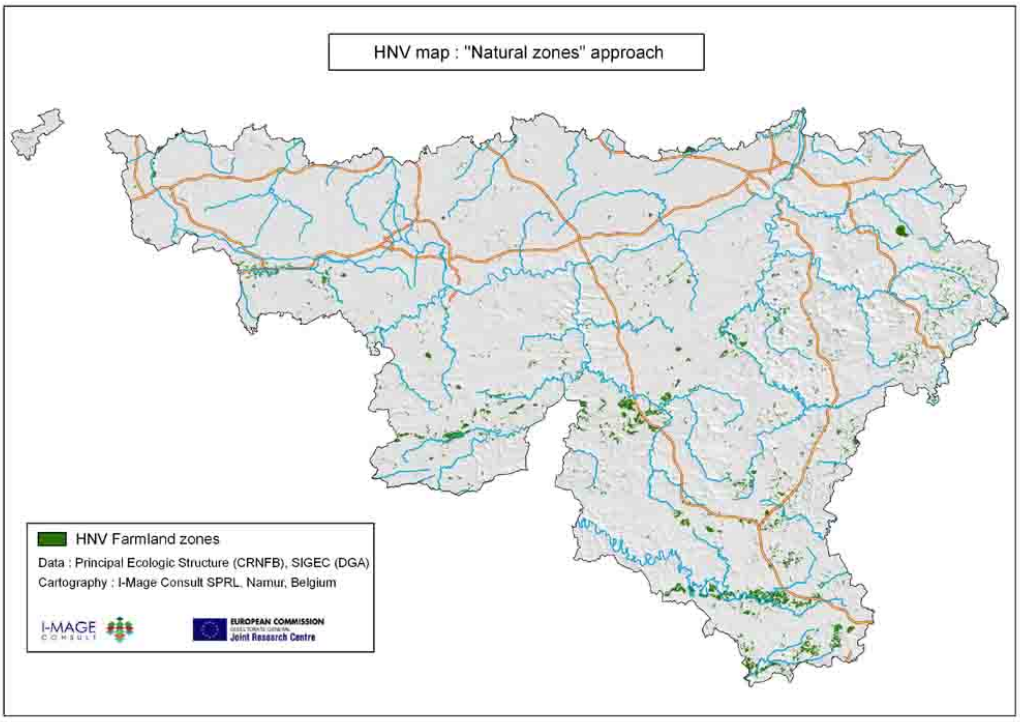
Figure 5: Selection of agricultural land within the principal ecological structure




**b) Elimination of artefacts**

SEP and SIGEC geographical layers come from different data sources. Crossing the layers produces a certain number of artefacts. Before exploiting the map, it is necessary to remove these unwanted features. Most of them are threadlike polygons produced by the imperfect juxtaposition of features limits in SEP and SIGEC.

Map 6: HNV Farmland map based on the natural zones approach




## 2.5.3 Discussion of results

The HNV Farmlands map covers 43,527 ha (Fig.7), or 5.7% of total agricultural land in the WR.

Figure 7: Distribution of crops in HNV "Natural zones"

| Agriculture land use | Walloon region (ha) | HNV "Natural zones" Area (ha) | % of HNV "Natural zones" | Part in HNV "Natural zones" |
|---|---|---|---|---|
| Permanent grasslands | 308,583 | 32,708 | 75.1 | 10.6 |
| Temporary grasslands | 66,300 | 5,293 | 12.2 | 8.0 |
| Cereal crops (wheat, maize, barley...) | 176,063 | 1,916 | 4.4 | 1.1 |
| Fodder crops | 60,267 | 1,534 | 3.5 | 2.5 |
| Industrial crops (sugar beet, rape seed, soja...) | 86,311 | 553 | 1.3 | 0.6 |
| Graminaceous (also mixed with leguminous) | 12,048 | 358 | 0.8 | 3.0 |
| Oats, triticale, rye, sorghum | 7,997 | 332 | 0.8 | 4.1 |
| Headlands with grass | 6,018 | 323 | 0.7 | 5.4 |
| Other | 9,498 | 303 | 0.7 | 3.2 |
| Potatoes, dry vegetables | 33,902 | 210 | 0.5 | 0.6 |
| **Total** | **766,987** | **43,527** | | **5.7** |

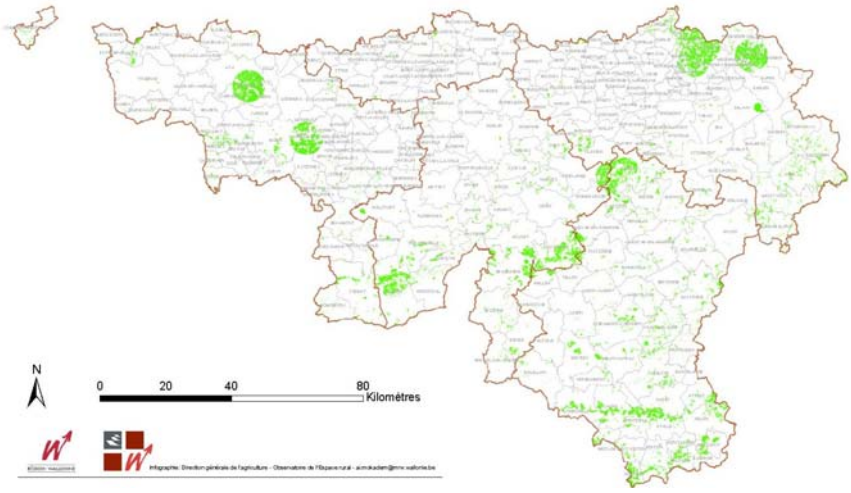
75.1% of the HNV zone is composed of permanent grassland (10.6% of permanent grassland in the WR) and 12.2 % corresponds to temporary grassland. This method provides good results for HNV identification in the Walloon Region, although there is a need for deeper analysis of the results by the Ministry of agriculture (DGA), GIREA and CRNFB. Some parts of the methodology should evolve, taking into account the following points:

1. The HNV zone could be enlarged by adding the high biodiversity grassland areas which were not integrated into the SEP, which is continuously evolving. It is possible to identify some of this grassland through the agri-environmental programme (measure n° 8: “high biodiversity grassland”). This data could be used by CRNFB to complete the principal ecological zones (SEP).

2. Integration of presence data for some rare species is still problematic. Bats for example are good indicator for global biodiversity of a site, being at the top of a food chain comprising insects, fruits, etc. Their presence – conditioned by the existence of hedges, fruit orchards and extensively grazed grassland - confirms the existence of agricultural areas with high nature conservation value. These data should consequently be integrated in the natural zones approach.

However, as the current estimation of the habitat zones for bats is a 10 km wide circle around inventoried bat colonies, simply adding these zones to the SEP zones would lead to an HNV overestimation. Comparison of Map 6 with Map 8 shows clearly that large circular areas are included in the HNV zones only because of bat presence, sometimes without other indication of biodiversity. It was however the approach taken by the Ministry of Agriculture in the WR (at least until May 2006).

Map 8: Draft HNV map as prepared by the WR Ministry of Agriculture (May 2006)




To refine the method and avoid HNV overestimation with the integration of bat species, GIREA and I-Mage Consult propose a specific analysis using aerial photos around those sites to take into account only the plots and landscape elements that really interact positively with the existence of bat colonies. The large zones selected only because of bat presence could then be restricted to genuinely interesting zones.

## 2.6 “Farm system” approach

### 2.6.1 Methodology

The farm system approach analyses the structure and farming practices at farm level to determine the areas which include High Nature Value farmland.

Available data is used to calculate indicators related to high biodiversity in rural areas. The combination and weighting of the different indicators gives a score for each area (community), which corresponds to the level of HNV presence in the area. The weights take into account the significance of the indicator for biodiversity and the completeness of the data they are derived from.

The basic dataset of the method is the SIGEC database (agricultural plots) but other datasets are also included in the calculation of the indicators (Fig.9). The farm system approach intentionally overlooks data used in the natural zones approach. It is based on the actual farming practices and structure, rather than on the level of biodiversity observed in the field.

The natural zones and farm system approaches are thus basically diverse, which enables the comparison of the results obtained by each method.

Figure 9: Data sets and related indicators in the "Farm system" approach

| Name | Administrative level or scale | Year | Indicators |
|---|---|---|---|
| Agricultural plots (SIGEC) | 1:10 000 | 2005 | Crop diversity and grassland presence |
| | | | % of permanent grasslands in UAA |
| | | | % of humid permanent grasslands in UAA (in combination with soil map) |
| | | | Plots area |
| Agri-environmental measures | 1:10 000 | 2005 | % of UAA with grassland-related AEM |
| | | | Lengths of hedges / UAA |
| | | | Number of isolated trees / UAA |
| | | | Number of ponds / UAA |
| National Agricultural Census | Present communities | 2005 | Livestock units per hectare of grasslands and fodder crops |
| National land use plan | 1:10 000 | 1989 | Lengths of wood edges / UAA |
| Nitrates database | Present communities | 2004 | Organic Nitrogen pressure : Nitrogen produced - Nitrogen exported + Nitrogen imported - Nitrogen potentially usable outside the WR near community) / Nitrogen useable in community (legislation limits) |
| Soil map | 1:20 000 | 1991 | % of humid permanent grasslands in UAA (in combination with agricultural plots) |

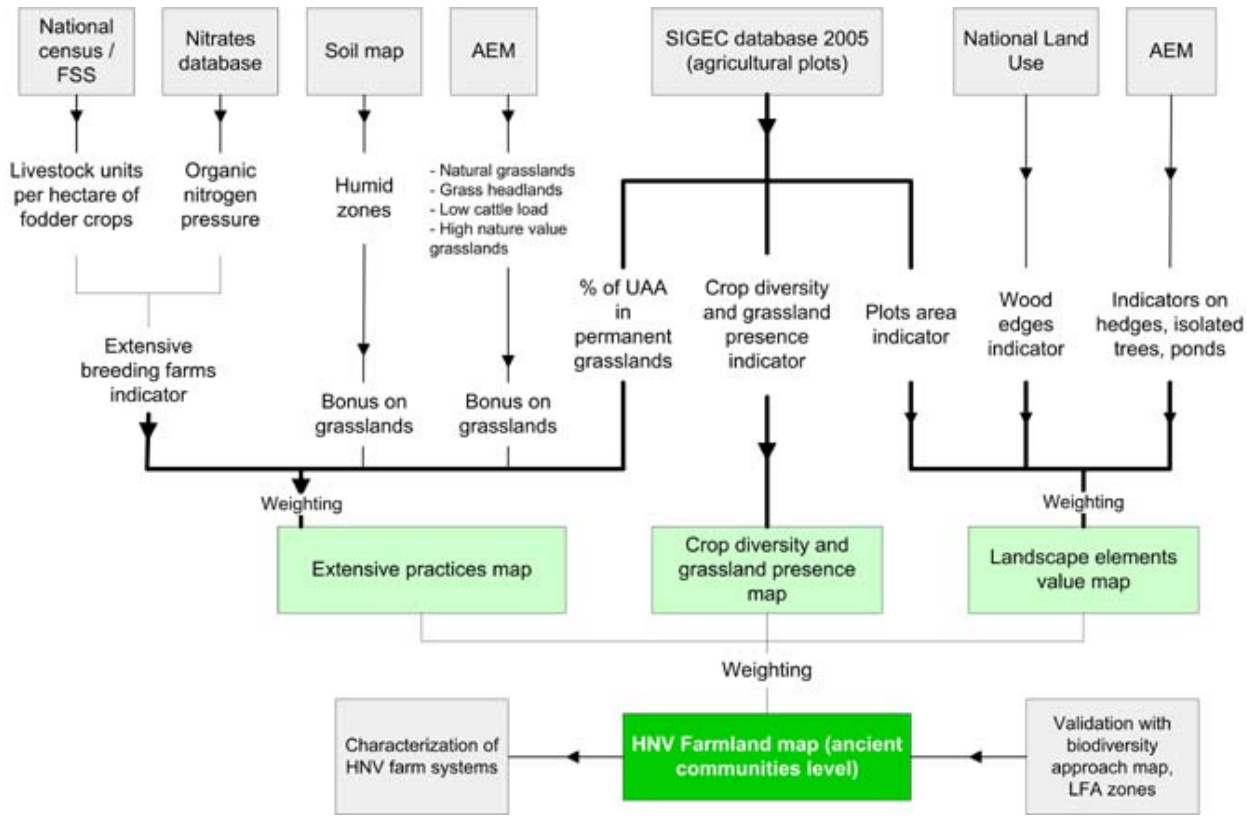
HNV scores could be attributed to administrative areas corresponding to the 262 present communities (NUTS level 5). However, considering their average size (+- 6,450ha) and

availability of accurate data, it seems preferable to focus on smaller areas. Limits of the 1 471 ancient communities (before administrative merging to the present communities) present the best accuracy while keeping the “administrative limit” aspect. Their average area is approximately 1,150 ha.
HNV indicators are first grouped into three categories:

- Crop diversity and grassland presence;
- Extensive practices;
- Landscape elements

Once calculated, the scores for the three groups of indicators are combined into the final HNV indicator (HNV score). Finally, only the ancient communities with the best HNV score were selected to constitute the HNV zone. As previously described (2.4) it was decided to limit the HNV zone to 25% of the UAA (this limit can be tested easily in the method).
The map obtained with the natural zones approach is then used to validate the map based on the farm systems approach. If the method is successful, the proportion of agricultural SEP zones in the resulting HNV farm system zone should be significantly higher than the proportion of agricultural SEP zones in the rest of the territory. Less Favoured Areas zones are also compared with the HNV farm system map. Interviews with experts validated the map.

Figure 10: Presentation of the farm system approach



## 2.6.2 Definition of indicators used to map out the data

### a) Indicator: "Diversity of crops"

This indicator is calculated with the plots database. It indicates the diversity of crops and the presence of pasture at the ancient community scale. This indicator gives information on the crop rotation and indicates the diversity of the landscape. Long rotation is an indicator of sustainable agriculture and permits a reduction of the pesticide treatments.

The score is calculated for the whole community. For each community, the total UAA of different crop types is first calculated. Similar crops have been regrouped into coherent categories (ex: wheat varieties are grouped in the wheat category, see Fig.11).

Crop types that exceed 10 % of the UAA of the community decrease the indicator value, as shown by the following formula:

Score = 10 + (1 - (C1/UAA)*10) + (1 - (C2/UAA)*10) +...

C1 is a crop type with a surface higher than 10% of UAA (except for temporary and permanent grassland which cannot have a negative impact on the indicator value)

The score ranges from 1 to 10.

Figure 11: Aggregation of the crops[4]

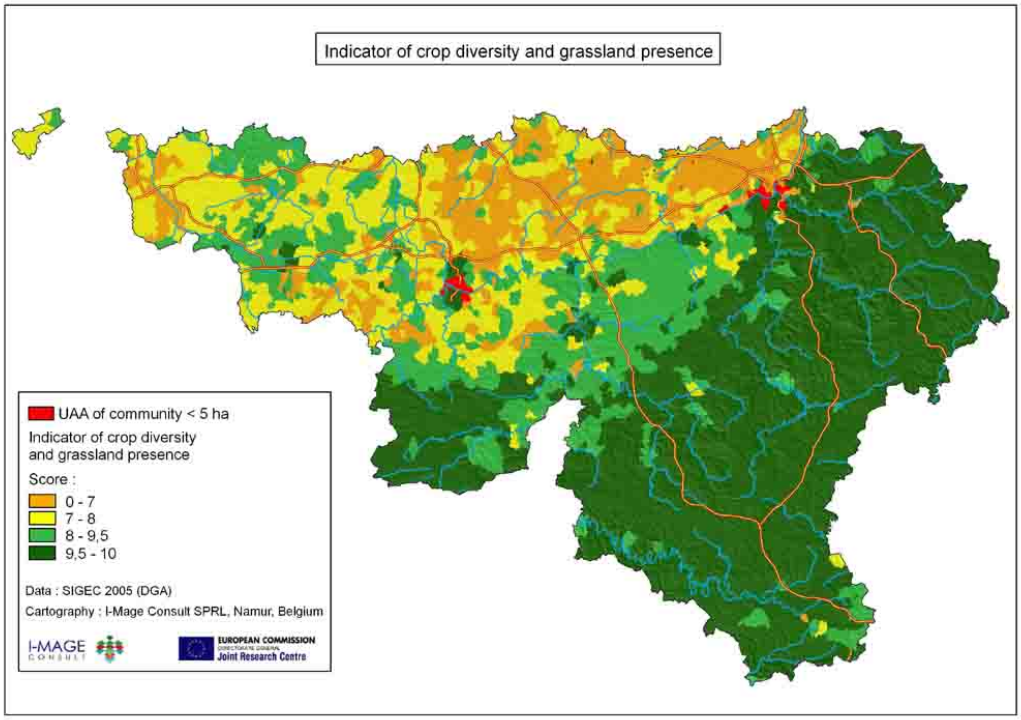
| | |
|---|---|
| Barley | Other industrial crops |
| Chicory | Other fodder crops |
| Rape seed | Pea |
| Flax | Potato |
| Fruit crops | Rye |
| Maize | Sorghum, millet, durum wheat |
| Oat | Soya |
| Other cereals | Wheat |

Results for the Walloon Region are:

- 8.29 points - mean of the community scores
- 8.48 points - mean of the community score weighted with UAA

[4]Aggregation of the crops depends in part of the source data (in this case, the SIGEC database).

Map 12: Crop diversity indicator value




Lowest scores are concentrated in the Hesbaye region (north-central part of the Walloon Region). The region is well-known for intensive agriculture with cereals and sugar beet as main crops. The south-eastern part of the WR obtains the highest scores and includes Fagne and Famenne, Pays de Herve, Ardenne, and Belgian Lorraine.

**b) Indicator group: "Extensive practices"**

To estimate the intensity of practices, the Walloon farm system approach focuses on permanent grassland presence and breeding farms characteristics.

The group combines the following sub-indicators:

a. Extensivity of breeding farms
b. Permanent grassland indicators:
   - % of permanent grassland in UAA
   - % of humid permanent grassland in UAA
   - Total areas of grassland-related AEM contracts / UAA

The sub-indicators are weighted and aggregated into the final "extensive practices" indicator.

<u>Development of indicators and maps</u>

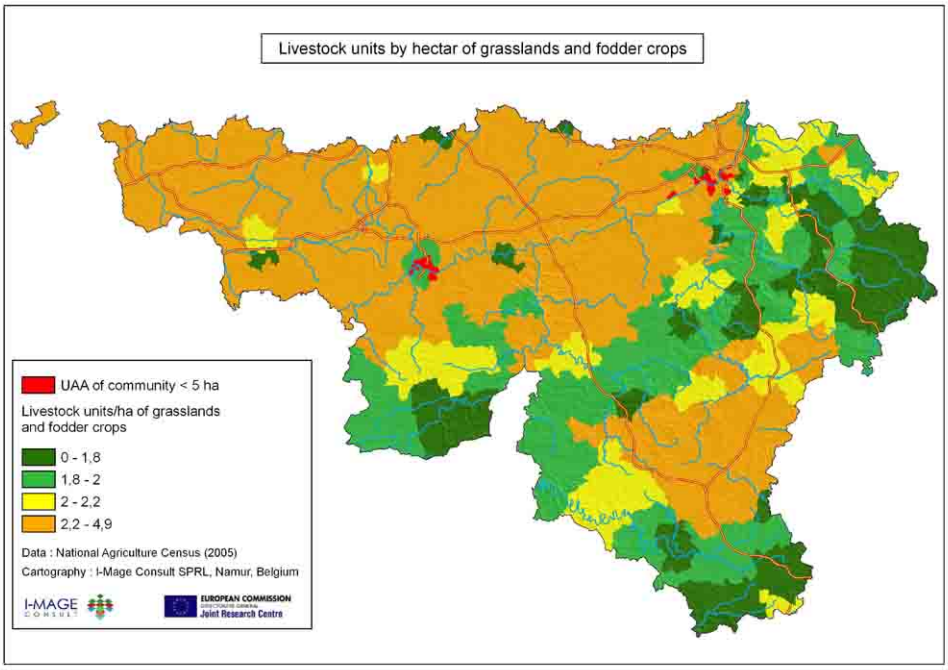
**- Extensivity of breeding farm practices**

The indicator is built at the present community level and is based on two data sets: the number of livestock units per hectare of fodder crops and the organic nitrogen pressure (quantity of organic Nitrogen spread / quantity acceptable). Both data are combined in a

single indicator delimiting zones where more extensive breeding farms practices are found.

1. The national agriculture census gives **livestock units per ha of grassland and fodder crops**. It takes into account ruminants (cows, sheep, goats) and horses. Pigs and poultry are not included in the calculation.

Map 13: Livestock units per ha of fodder crops and grasslands




There are only a few zones with LU/ha lower than 1.8. They are located in the eastern part of “Botte du Hainaut”, in Lorraine, and in the northern part of Ardenne. The Fagne and Famenne zone has livestock density ranging between 1.8 and 2 LU/ha.

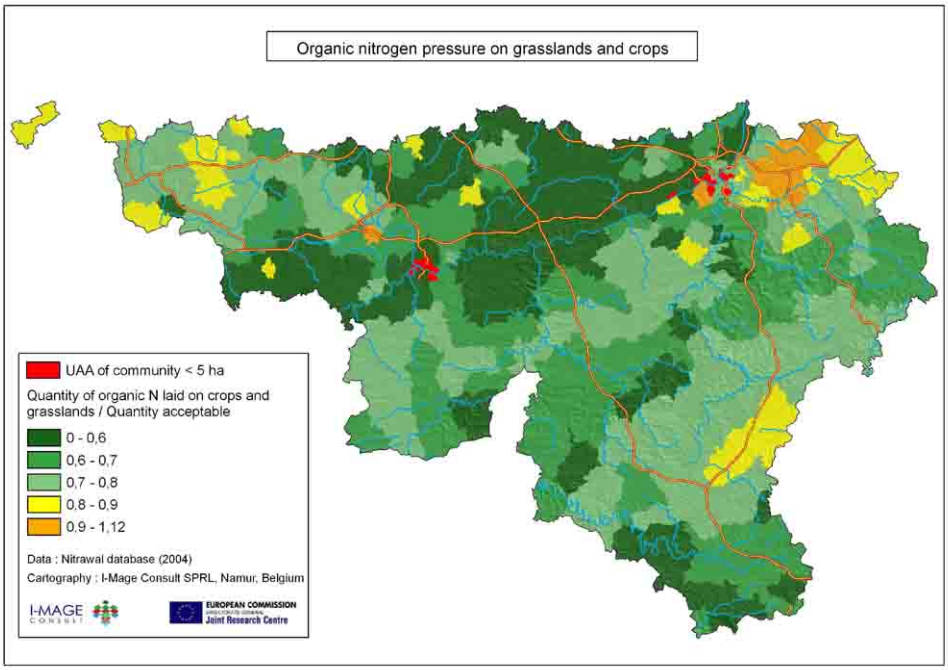
2. The Nitrawal database gives **organic nitrogen pressure** for crops and grassland. Pigs and poultry are included in the calculation. Data was directly provided by the Walloon Region Ministry of Environment (DGRNE). Organic nitrogen pressure is calculated using a formula described in the Walloon legislation :

**Nitrogen produced - Nitrogen exported + Nitrogen imported - Nitrogen potentially usable outside the WR near community) / Nitrogen usable in community.**

The maximum allowable input of organic nitrogen on crops and grassland depend on the crop type and is related to the Nitrates Directive.

Some zones present a higher organic Nitrogen pressure: central Ardenne, Pays de Herve and some zones in the alluvial plateaus in Hainaut and Brabant Wallon.

Map 14: Organic nitrogen pressure map



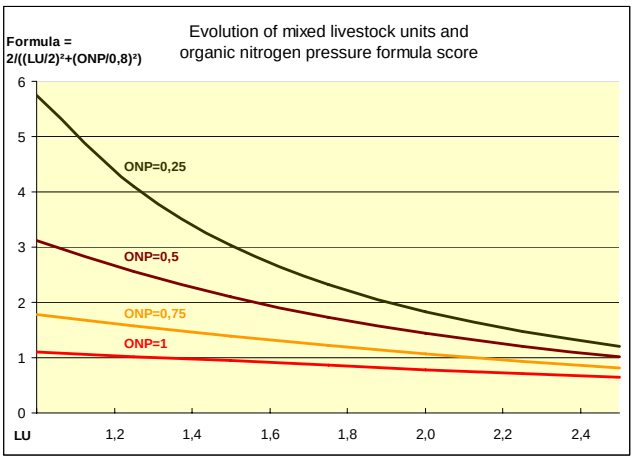

3. Both data sets are complementary. Indeed, the first indicator takes into account only the livestock units, while the second takes into account only the organic nitrogen pressure. Rather than including them in the methodology as separate indicators, it is better to combine them in a single indicator, in order to highlight communities where both indicators present a good score. A formula has been developed specifically to give more points to zones where both data values are good. The final indicator is calculated at the present community level.

Extensive breeding farms practices index (EBFI) was calculated in the following way:

> EBFI = 2 / ((LU/2)² + (ONP/0.8)²)
> where:
> LU: Livestock Units by hectare of grassland and fodder crops
> ONP: Organic Nitrogen pressure (quantity of N spread / acceptable quantity)

A value for LU of 2 and a value of ONP of 0.8 will give the index a value of 1. These limits were chosen to optimize discrimination of regions. The more the LU and ONP indicators are exceeding those values, the lower the index. Fig. 14 illustrates the evolution of the index with different values of LU and ONP. A value of 1 for ONP (meaning organic nitrogen pressure is high) will limit the score. A value of 0.25 for ONP results in a very high score, if LU is favourable as well.

Figure 14: Evolution of extensive breeding farming practices index



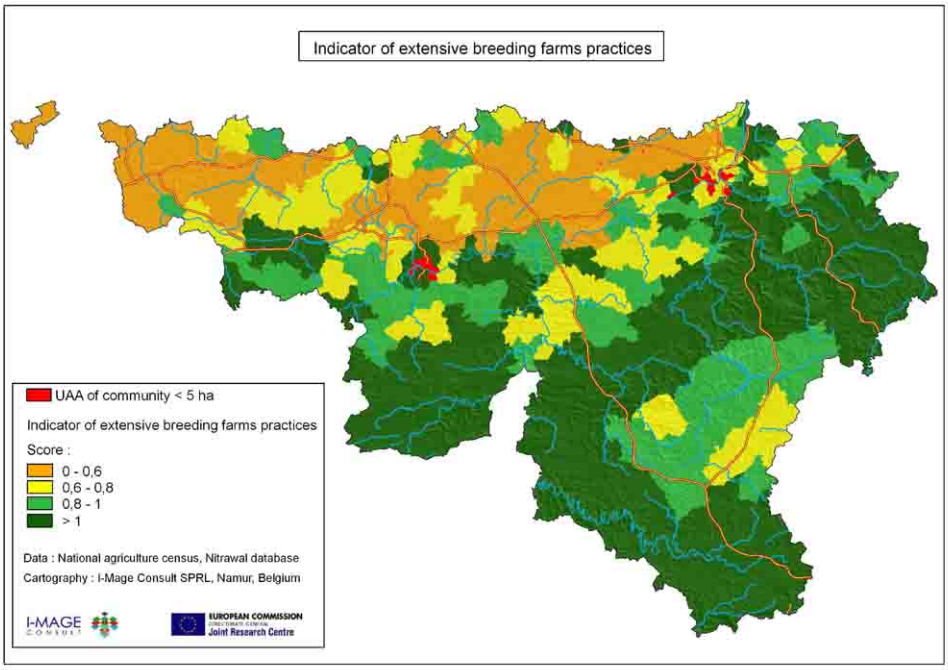
In the Walloon Region, EBFI ranges between 0.3 and 20.2. The following steps were taken to make sure that the final indicator value fits in a range from 0 to 1:

- To ensure that no point is given to communities with the worst score, 0.3 points was removed from each community EBFI score ;
- Maximum points were given to the 18 communities (out of 262) with an EBFI score above 1.5 (the reduced score being 1.2) by dividing all reduced EBFI scores by 1.2. This limit was chosen to optimize discrimination of regions.

Figure 15: Indicator calculation for extensive breeding farms practices

| EBFI : $2 / ((LU/2)^2 + (ONP/0.8)^2)$ | Indicator value (1 max) |
|---|---|
| 0.3 to 1.5 | (EBFI – 0.3) / 1.2 |
| Above 1.5 | 1 |

Map 16: Extensive breeding farms practices index




Map 16 shows that Hesbaye and alluvial plateaus of Hainaut and Brabant wallon obtain the lowest scores. More extensive practices are localized in Fagne and Famenne, Lorraine, and in the northern and southwest part of Ardenne.

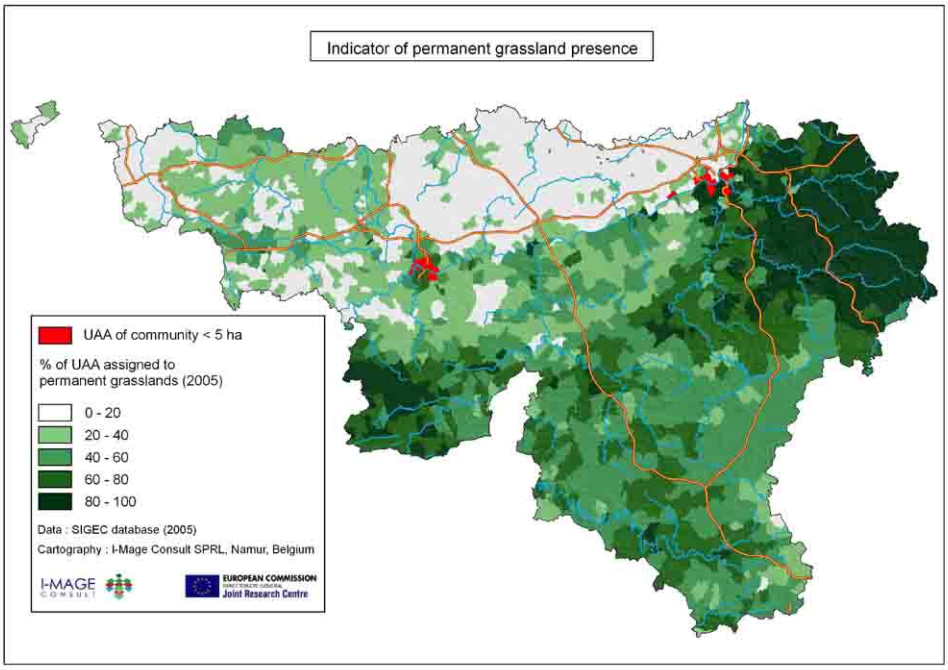
**- Permanent grassland indicators**

The indicator is the percentage of permanent grassland in the UAA.

Indicator = Permanent grassland (ha) / UAA (ha)

Permanent grassland (Map 17) represents the highest proportion of UAA in Pays de Herve and the northern part of Ardenne, and in the western Fagne (in “Botte du Hainaut”).

Map 17: Percentage of permanent grassland in UAA




Two other indicators give bonus points to some zones with:

- **High percentage of UAA covered by humid grassland**

Humid grasslands are potentially high natural value grasslands. This indicator is calculated using the soil map and the agricultural plots database of 2005. The objective is to determine the presence of marginal permanent grassland which in the Walloon Region mostly refers to moist areas or - to a lesser extent - to dry calcareous grasslands[5]. The permanent grassland was selected through the agricultural plots database while humid areas were defined using the drainage value or soil profiles from the soil map. The two resulting layers were then crossed to obtain the humid grasslands map.

For each community, the base score is:

| Humid permanent grasslands (ha) / UAA (ha) |
|---|

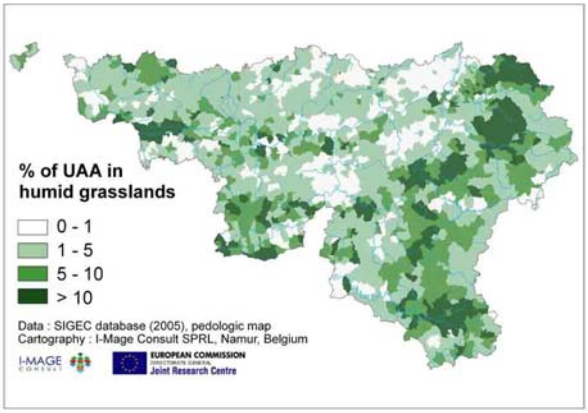
The base score is modified to obtain a range of 0 to 1 for the indicator. Zones where the percentage of UAA covered by humid grasslands reaches at least 10 % receive the full bonus points, as shown in Fig.18.

[5] Identification of dry calcareous grasslands, other potentially high natural value grasslands, would be a possibility to improve their identification.

Figure 18: Bonus score calculation for humid grasslands

| % of Humid permanent grassland (ha) in UAA | Bonus value (1 max) |
|---|---|
| 0 to 10 | 10 * Humid permanent grassland (ha) / UAA (ha) |
| Above 10 | 1 |

Map 19: Share of UAA in humid grasslands




- **High percentage of UAA with grassland-specific AEM measures.**

Grasslands zones which contain a lot of plots under grassland-specific AEM measures are awarded a bonus as they might potentially have a higher biodiversity conservation value. This concerns the following measures:

Figure 20: AEM measures used in the grassland-specific AEM indicator

| | |
|---|---|
| 2. Natural grassland | 7. Low cattle load |
| 3a. Arable field margins | 8. Management and conservation of grasslans with high biological value status |
| 3b. Field margins on grassland | |

This concerns only AEM contracts made in 2005. For each community, the areas of all plots with grassland-specific AEM contracts are cumulated. To take into account plots where multiple AEMs are applied, a plot's area can be counted several times. For example, a plot combining two different AEM contracts will add twice its area to the indicator calculation. The percentage of UAA with grassland-specific AEM is thus overestimated of course in the process, but the objective is only to compare communities with an indicator, not to calculate precisely this percentage.

The score was calculated at the present community level (less precise than ancient community level), because data is not complete (only 2005 AEM database and not a complete inventory).

For each community, the base score is:

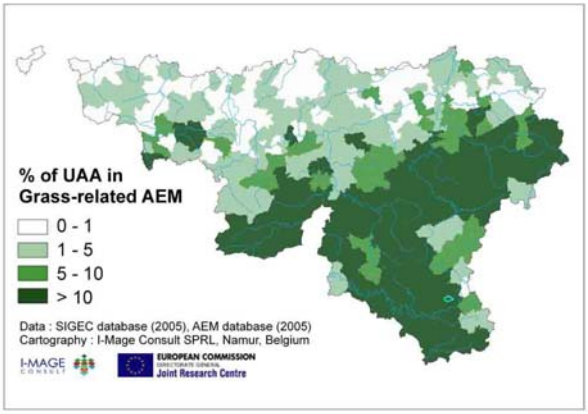
| |
|---|
| Total areas of grassland-related AEM contracts (ha) / UAA (ha) |

The base score is modified to obtain a range of 0 to 1 for the indicator. Zones where the total areas of grassland-related AEM contracts divided by the UAA reaches at least 0.42, receive the full bonus, as shown in Fig. 21. A tenth of communities reach this percentage and get the maximum bonus.

Figure 21: Bonus score calculation for grassland-related AEM

| Total areas of grassland-related AEM / UAA | Bonus value (1 max) |
|---|---|
| 0 to 0.42 | (Areas of grass. AEM / UAA) / 0.42 |
| Above 0.42 | 1 |

Map 22: percentage of UAA in grass-related AEM (cumulated areas of contracts)




It should be noted that instead of just using the AEM contracts which started in 2005, it would be better to use all the contracts that have been running for the past 5 years (a contract has a validity of 5 years). Data would be more complete. DGA administration has the possibility to perform this work, however, at the time this study was being carried out such data was not available.

It would also be beneficial to evaluate the possibility to use phosphorus data in soil to estimate grasslands biodiversity potentials. Some studies have been performed in the Walloon Region in that sense[6]. Data of this type exists and could be potentially acquired.

[6] "Relationship between soil chemical factors and grassland diversity", Janssens and al., 2004

Weighting of sub-indicators in the final “extensive practices” indicator

The “extensive practices” indicator is calculated from the weighted subindicators:

- Extensivity of breeding farms
- % of permanent grassland in UAA
- % of humid permanent grasslands in UAA
- Total areas of grassland-related AEM contracts / UAA

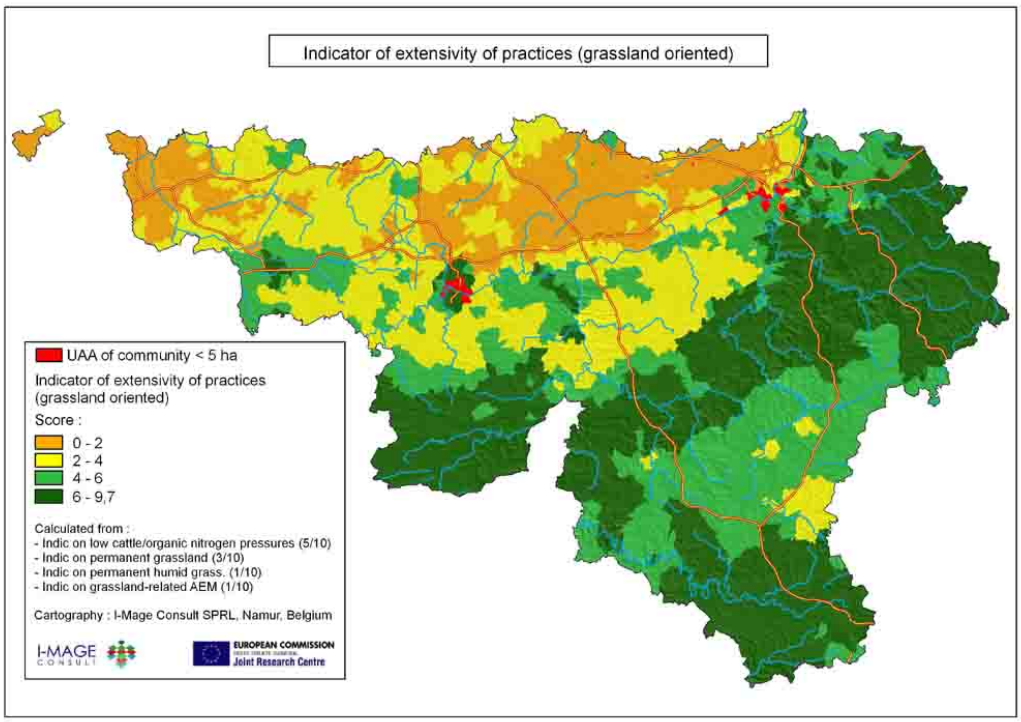
Weighting of the indicators was based on expert knowledge with the major input from GIREA and Solagro (France).

Maximum score of the indicator is 10. Half of the points is obtained from the indicator on breeding farms, the other half from the presence of permanent grassland, with bonus points for humid grasslands and grassland-related AEM.

| | | |
|---|---|---|
| Indicator score (out of 10) = | | |
| | 5 points for | : Extensive breeding farms practices indicator |
| + | 3 points for | : Permanent grasslands (ha) / UAA (ha) |
| + | 1 point for | : Zones with high % of humid grasslands in UAA |
| + | 1 point for | : Bonus for zones with several grassland-related AEM |

Results for the Walloon Region are:
- 4.22 points - mean of the community scores
- 4.21 points - mean of the community score weighted with UAA

Map 23: Indicator on extensivity of practices



The lowest scores (0-2) correspond to areas characterised by intensive agricultural crops: hesbaye with cereals and sugar beet, the west of Hainaut. Best scores (above 6 out of 10) correspond to Lorraine, Fagne and Famenne, north of Ardenne.

### c) Indicator group: "Landscape elements"

This group combines the following sub-indicators:

a. Length of hedges
b. Length of wood edges
c. Plot size
d. Number of isolated trees
e. Number of ponds

The sub-indicators are weighted into a final "landscape elements value" indicator.

Development of indicators and maps

**- Lengths of hedges**

Hedge length is estimated through the agri-environmental measures database. The present database contains only the contracts initiated in 2005 but can give an estimation of the lengths of hedges in the different communities. GIREA is currently working on previous data, regrouping the contracts established between 2000 and 2004.

The score is calculated at the present community level (less precise than ancient community level), because data is not complete (only 2005 AEM database and not a complete inventory). For each community, the base score is calculated as:

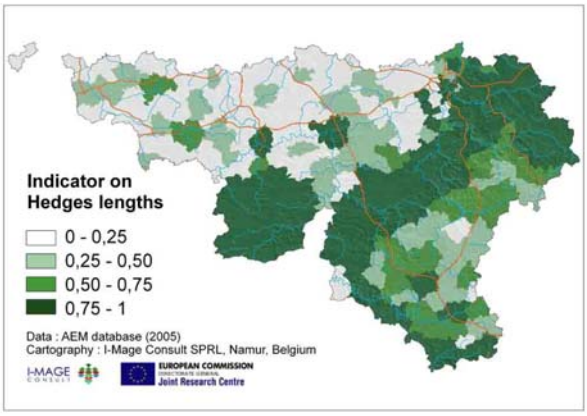
| |
|---|
| Length of hedges (m) / UAA (ha) |

The base score is modified to obtain a range of 0 to 1 for the indicator. Communities where the length of hedges per ha of UAA reaches at least 30 (371 out of 1,471 ancient communities) receive the full bonus, as shown in Fig. 24.

Figure 24: Score calculation for hedges subindicator

| Lengths of hedges (m) / UAA (ha) | Hedges subindicator value (1 max) |
|---|---|
| 0 to 30 | (Lengths of hedges (m) / UAA (ha)) / 30 |
| Above 30 | 1 |

Map 25: Hedges subindicator




A limitation of the method is that the contribution of hedges to biodiversity depends on their type of maintenance. For instance, the low hedges in the Pays de Herve area (north eastern part of the dark green zone, specialised in milk production) do not present a very high interest in terms of biodiversity conservation.

- **Length of wood edges**

The national land use plan provides an estimation of the wood edge length per ancient community.

For each ancient community, the base score is:

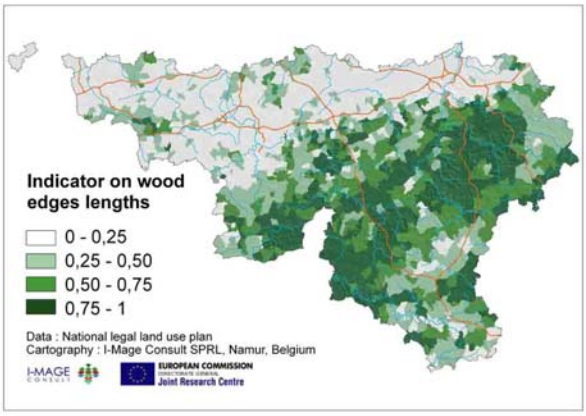
| |
|---|
| Length of wood edges (m) / UAA (ha) |

The base score is then modified to get a range of 0 to 1 for the indicator. Communities where the length of edges per hectare of UAA reaches at least 70 (145 out of 1,471 ancient communities) receive the full bonus, as shown in Fig. 26.

Figure 26: Score calculation for wood edges sub indicator

| Lengths of edges (m) / UAA (ha) | Edges subindicator value (1 max) |
|---|---|
| 0 to 70 | (Lengths of wood edges (m) / UAA (ha)) / 70 |
| Above 70 | 1 |

Map 27: Wood edges subindicator




A limitation of this method is that it does not take into account the forest composition (broad leaved / conifer / mixed) which significantly affects the potential biodiversity level of the edges. Moreover, the biodiversity level is generally considered as quite low in the absence of field margins.

In the search of precise data on edges (also other important landscape elements like hedges) the National Geographic Institute was contacted. Detailed database was under development but was not available at the time of the study.

**- Plot size**

A smaller field size is considered as more favourable for biodiversity. The average plot size may therefore serve as an indicator for the designation of potential HNV farmlands.

The indicator is based on the agricultural plots database (SIGEC 2005). In this geographic database, limits between crops are sometimes virtual: two contiguous crops in the database can be a single crop in reality. To solve this problem, all contiguous plots sharing the same crop were merged into a single one before calculation of the indicator.

Points were attributed for plots depending on their crop type and area:

Figure 28: Points attributed to plots

| Crops and temporary grasslands | |
|---|---|
| **Plot area (ha)** | **Points** |
| 0.0 – 0.5 | 5 |
| 0.5 – 1.0 | 4 |
| 1.0 – 1.5 | 3 |
| 1.5 – 2.0 | 2 |
| 2.0 – 2.5 | 1 |
| Above 2.5 | 0 |
| **Permanent grasslands** | |
| **Plot area (ha)** | **Points** |
| All areas | 5 |

To avoid penalising permanent grasslands, they receive 5 points independently of their size.

Each ancient community received a base score calculated as:

| |
|---|
| Sum of plots points / UAA |

It is important to relate the sum of points to the UAA, for several reasons:

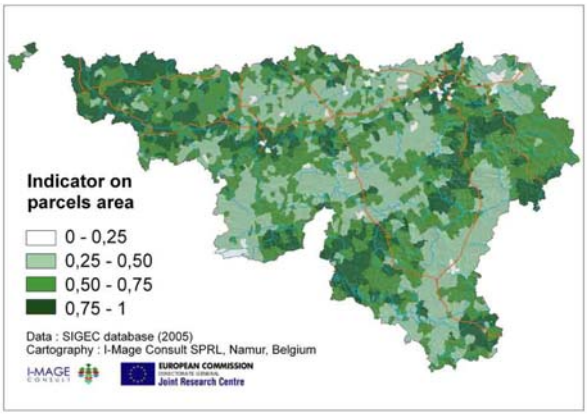
1. Crops and temporary grassland with area above the 2.5 ha threshold were taken into account as their area contributes to increase the denominator of the base score calculation.
2. Differences between large and small plots of permanent grassland were taken into account. Compared to smaller plots, there are fewer larger plots to cover the same area thus larger plots contribute to a lesser extent to the score.

The base score was then modified to get a range of 0 to 1 for the indicator. Communities where the base score reached at least 1.4 (162 out of 1,471 ancient communities) received the full bonus, as shown in Fig. 29.

Figure 29: Score calculation for plot area subindicator

| Sum of plots points/UAA(ha) | Plot area subindicator value (1 max) |
|---|---|
| 0 to 1.4 | (Sum of plot points / UAA(ha)) / 1.4 |
| Above 1.4 | 1 |

Map 30: Plot area subindicator




- **Number of isolated trees**

The number of isolated trees was estimated through agri-environmental measures database (2005). The score was calculated at the present community level (less precise than ancient community level) because data is not complete (only 2005 AEM database and not a complete inventory).

For each community, the base score was calculated as:

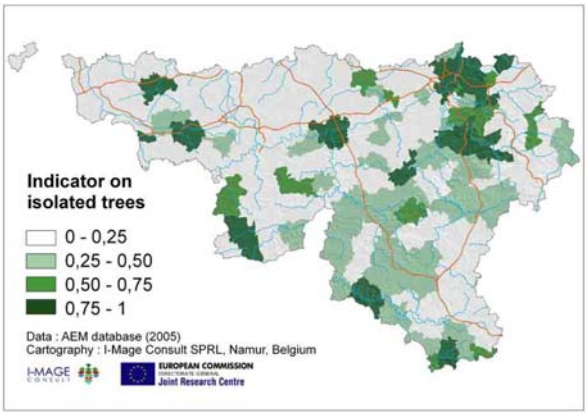
| |
|---|
| Number of isolated trees / UAA (ha) |

The base score was modified to obtain a range of 0 to 1 for the indicator. Communities where the number of isolated trees per hectare of UAA is above 1 (148 out of 1,471 ancient communities) received the full bonus, as shown in Fig. 31.

Figure 31: Score for isolated trees subindicator

| Isolated trees / UAA (ha) | Isolated trees subindicator value (1 max) |
|---|---|
| 0 to 1 | Number of isolated trees / UAA (ha) |
| Above 1 | 1 |

Map 32: Isolated trees indicator




The main limitation of this indicator is that it refers to the existence of isolated trees inventoried through the AEM database which is not complete.

**- Number of ponds**

The number of ponds was estimated through agri-environmental measures database (2005).
The score was calculated at the present community level (less precise than ancient community level), because data is not complete (only 2005 AEM database and not a complete inventory).
For each community, the base score was calculated as:

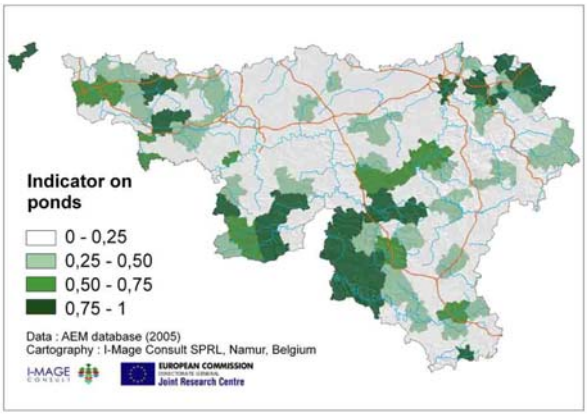
| |
|---|
| Number of ponds / UAA (ha) |

The base score was modified to obtain a range of 0 to 1 for the indicator. Communities where the number of ponds per hectare of UAA was above 0.02 (106 out of 1,471 ancient communities) received the full bonus, as shown in Fig. 33.

Figure 33: Score calculation for ponds subindicator

| Ponds / UAA (ha) | Ponds subindicator value (1 max) |
|---|---|
| 0 to 0.02 | (Number of ponds / UAA (ha))/0.02 |
| Above 0.02 | 1 |

Map 34: Ponds subindicator




The main limitation of this indicator is that it refers to the existence of ponds inventoried through the AEM database which is not complete.

<u>Weighting of sub-indicators in the final “landscape elements value” indicator</u>

The “landscape elements” indicator was calculated from the weighted subindicators:

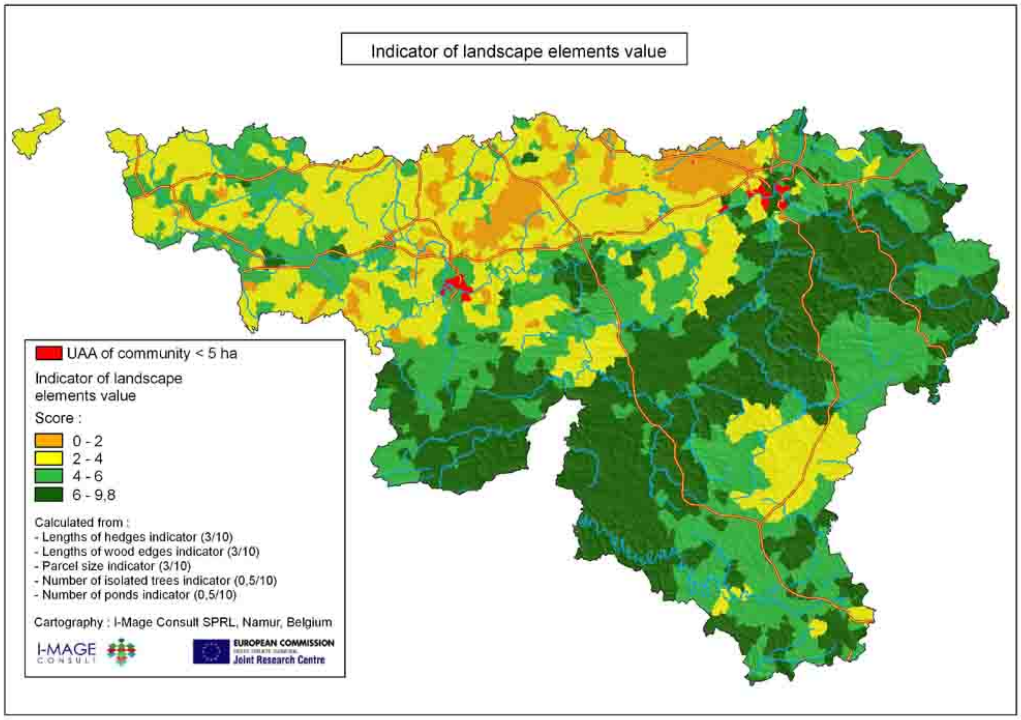
- Length of hedges
- Length of wood edges
- Plot size
- Number of isolated trees
- Number of ponds

Maximum score is 10. After discussions with biodiversity experts of Solagro and GIREA, it was decided to give most of the points (9) to hedges, edges and plot size indicators. Zones with a high number of isolated trees and ponds can get a bonus (1 point maximum).
The indicator value is:

| | | |
|---|---|---|
| Score (out of 10) = | | |
| | 3 points for | : Length of hedges subindicator |
| + | 3 points for | : Length of wood edges subindicator |
| + | 3 points for | : Plot size subindicator |
| + | 0.5 point for | : Number of isolated trees subindicator |
| + | 0.5 point for | : Number of ponds subindicator |

Results for the Walloon Region are:
- 4.65 points - mean of the community scores
- 4.47 points - mean of the community score weighted with UAA

Map 35: Landscape elements value indicator




Best scores are mostly grouped in the area stretching from southwest Ardenne to northern Ardenne, through Fagne et Famenne.

## 2.6.3 Results and mapping of the farming systems in HNV farmland

With the aid of the maps produced, discussions were held with biodiversity experts to give weights to the three groups of indicators. The indicators were then merged into the final HNV farm systems score. It was finally decided to give the same weight to each group of indicators.

The HNV score is:

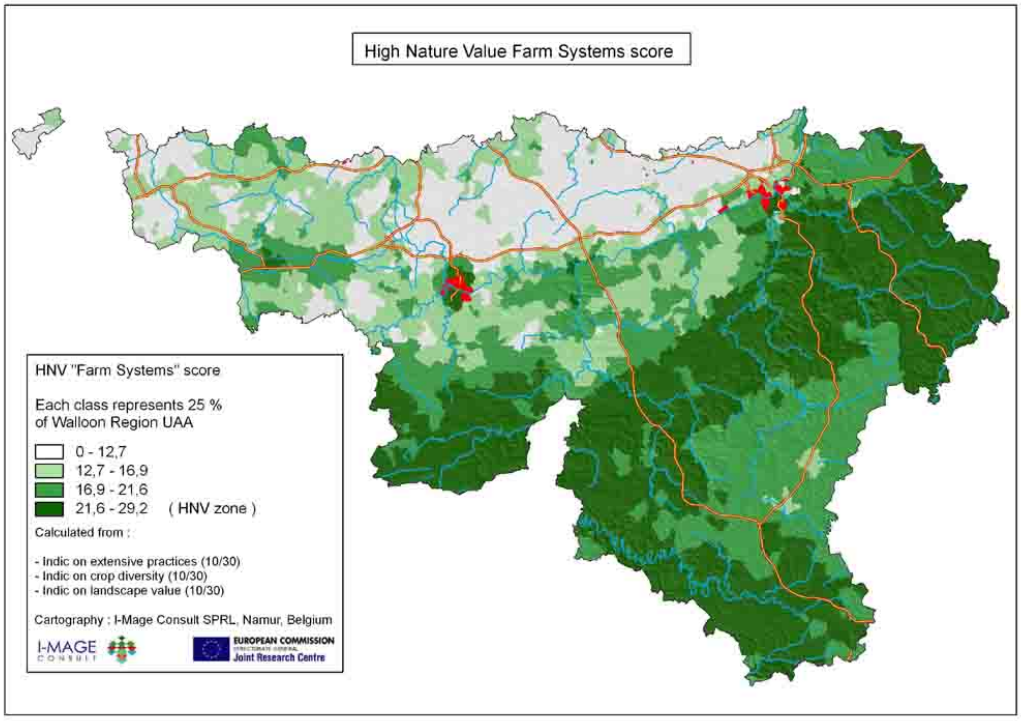
Score (out of 30) =
10 points for : Crop diversity indicator
+ 10 points for : Extensive practices indicator
+ 10 points for : Landscape elements indicator

The first HNV map was produced on the basis of the 25 % UAA with the best score, which means communities with a HNV score higher than 21.6 points. The HNV farmland area includes 388 ancient communities out of the 1,471.

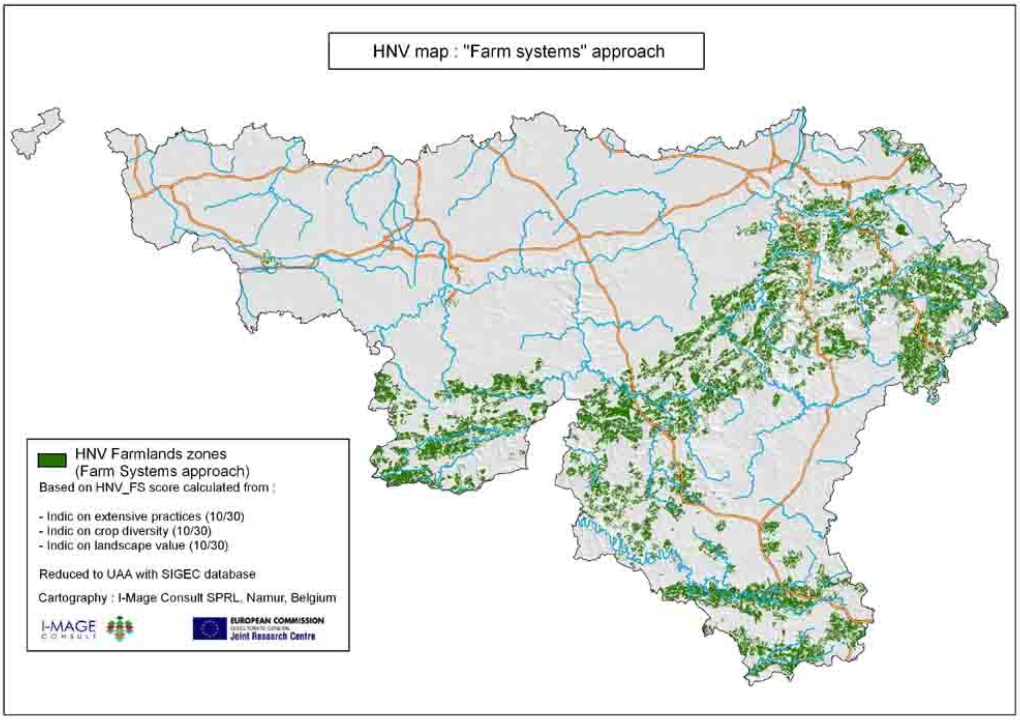
Figure 36: Distribution of communities and UAA depending on the HNV score

| HNV_FS score | UAA (ha) | UAA (%) | Cumulated UAA (%) | Number of communities | Communities (%) |
|---|---|---|---|---|---|
| 28-30 | 543 | 0.1 | 0.1 | 3 | 0.2 |
| 26-28 | 22,056 | 2.9 | 2.9 | 51 | 3.5 |
| 24-26 | 66,648 | 8.7 | 11.6 | 131 | 8.9 |
| 22-24 | 95,059 | 12.4 | 24.0 | 182 | 12.4 |
| 20-22 | 77,256 | 10.1 | 34.1 | 148 | 10.1 |
| 18-20 | 63,678 | 8.3 | 42.4 | 117 | 8.0 |
| 16-18 | 94,356 | 12.3 | 54.7 | 166 | 11.3 |
| 14-16 | 73,937 | 9.6 | 64.3 | 166 | 11.3 |
| 12-14 | 125,639 | 16.4 | 80.7 | 226 | 15.4 |
| 10-12 | 97,797 | 12.8 | 93.5 | 170 | 11.6 |
| 8-10 | 44,642 | 5.8 | 99.3 | 85 | 5.8 |
| 6-8 | 5,326 | 0.7 | 100.0 | 12 | 0.8 |
| 4-6 | 51 | 0.0 | 100.0 | 1 | 0.1 |
| 2-4 | 0 | 0.0 | 100.0 | 0 | 0.0 |
| 0-2 | 0 | 0.0 | 100.0 | 13 | 0.9 |
| **Total** | **766,987** | **100** | | **1,471** | |

Map 37: HNV farming systems communities score map



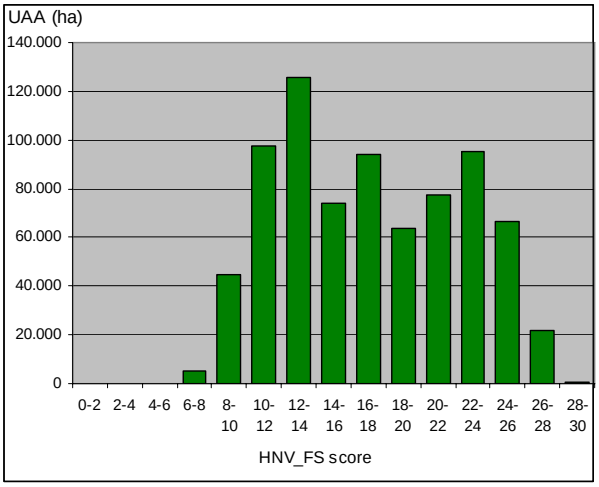
Map 38: HNV Farmland based on farm systems approach (25% of UAA)




Map 38 shows the agricultural land within the HNV zone defined by the farm system approach.

Figure 39 (left): Distribution of HNV score in UAA

Figure 40 (right): Distribution of HNV score in communities



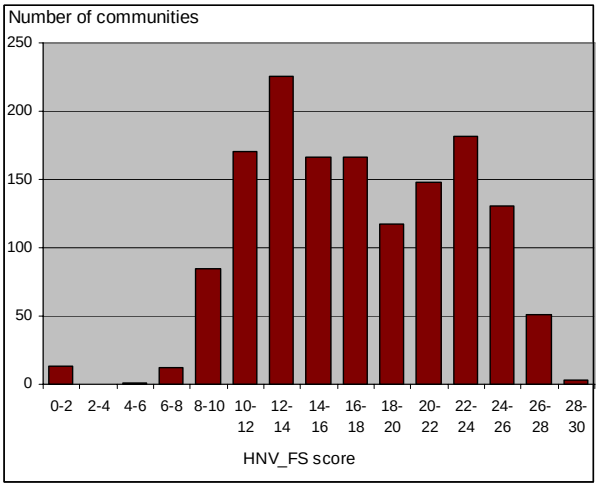
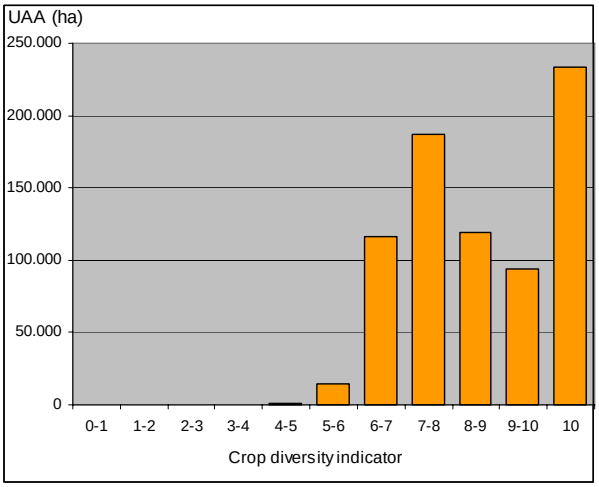




Figure 41 (left): Distribution of crop diversity score in UAA

Figure 42 (right): Distribution of extensive practices score in UAA



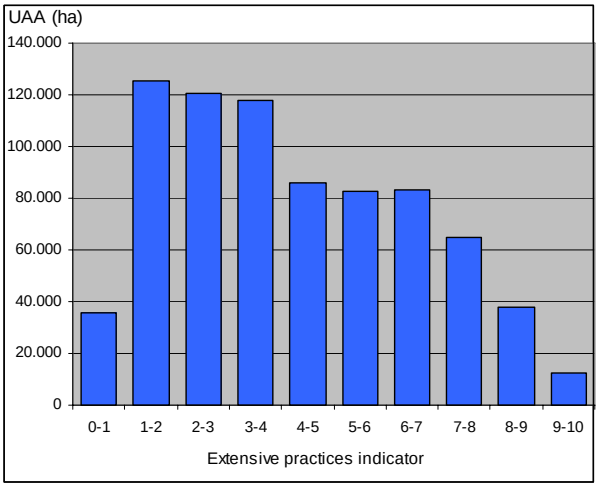
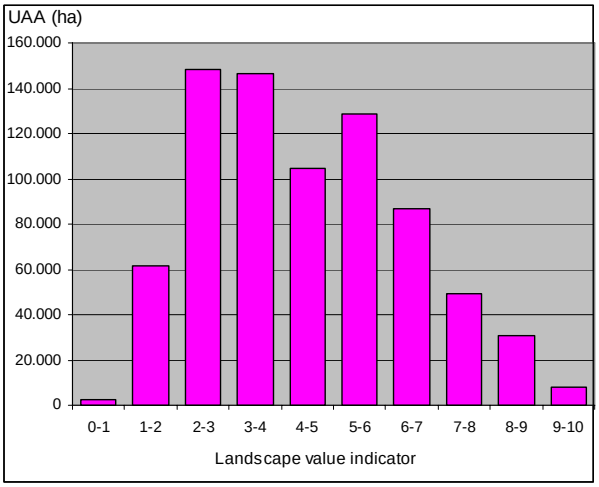



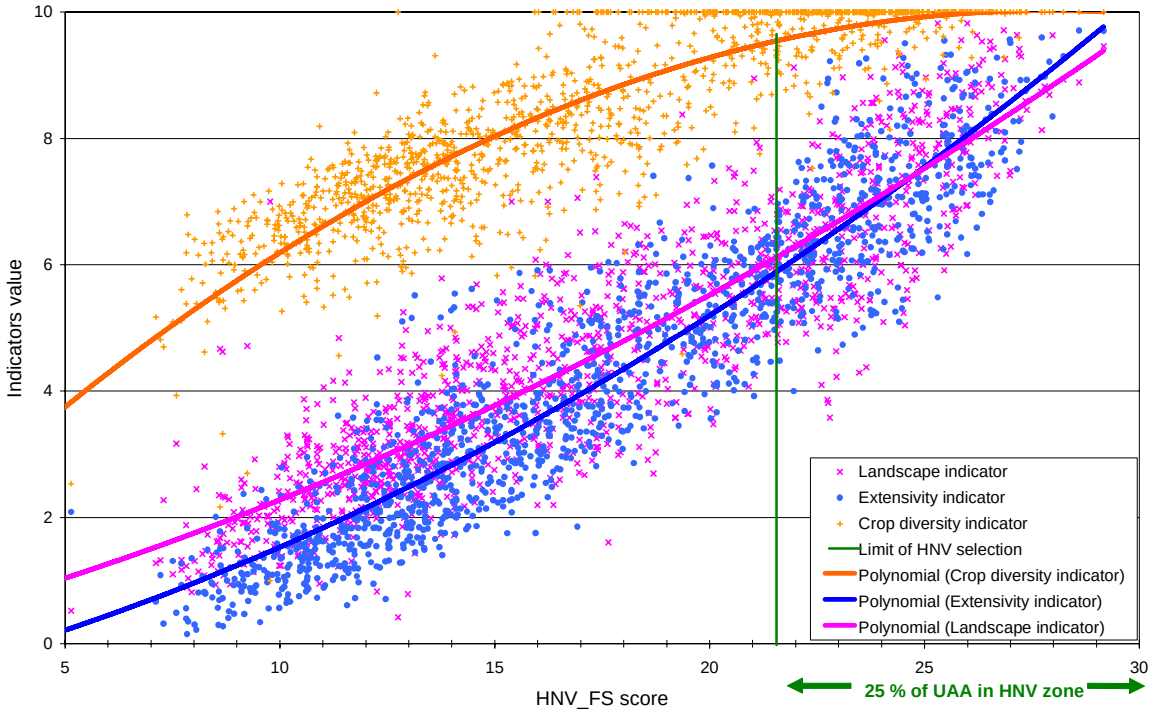

Figure 43: Distribution of landscape value score in UAA




Figures show that crop diversity score is high for a large number of communities. There are no very low scores; the indicator could have been more selective in its method of calculation.

Only a small part of the agricultural land gets a good score for the indicators “landscape elements” and “extensive practices”.

Figure 44: Evolution of the 3 indicators with the HNV score




Crop diversity patterns follow a decreasing curve. The indicator does not evolve much once the threshold of 25% for HNV delimitation is reached. In the HNV zone, crop diversity minimum value is 7.5 and maximum is 10.

Evolution of extensive practices and landscape elements indicators follow similar increasing curves. In the HNV zone, their value is variable. In HNV zone:

- minimum score for extensive practices is 4 and maximum is 9.7
- minimum score for landscape value is 3.6 and maximum is 9.8

Figure 45:Distribution of the share of three indicators in the final HNV score (means are weighted with UAA)

| HNV_FS score | UAA (ha) | Average crop diversity score | Average extensive practices score | Average landscape score | Part of crop diversity in the HNV_FS score (%) | Part of extensive practices in the HNV_FS score (%) | Part of landscape in the HNV_FS score (%) |
|---|---|---|---|---|---|---|---|
| 28-30 | 543 | 10.0 | 9.4 | 9.0 | 35.3 | 33.1 | 31.7 |
| 26-28 | 22,056 | 10.0 | 8.3 | 8.4 | 37.5 | 31.0 | 31.5 |
| 24-26 | 66,648 | 9.9 | 7.7 | 7.3 | 39.8 | 30.9 | 29.3 |
| 22-24 | 95,059 | 9.9 | 6.9 | 6.3 | 42.9 | 29.8 | 27.3 |
| 20-22 | 77,256 | 9.7 | 5.6 | 5.6 | 46.3 | 26.8 | 26.9 |
| 18-20 | 63,678 | 9.2 | 4.9 | 5.1 | 48.0 | 25.5 | 26.4 |
| 16-18 | 94,356 | 8.9 | 3.9 | 4.2 | 52.2 | 23.0 | 24.8 |
| 14-16 | 73,937 | 7.9 | 3.2 | 3.8 | 52.8 | 21.5 | 25.7 |
| 12-14 | 125,639 | 7.5 | 2.5 | 3.1 | 57.4 | 18.9 | 23.6 |
| 10-12 | 97,797 | 6.9 | 1.7 | 2.5 | 62.4 | 15.2 | 22.3 |
| 8-10 | 44,642 | 6.3 | 1.1 | 1.8 | 68.8 | 11.6 | 19.6 |
| 6-8 | 5,326 | 5.8 | 0.7 | 1.2 | 75.1 | 8.9 | 16.0 |
| 4-6 | 51 | 2.5 | 2.1 | 0.5 | 49.3 | 40.6 | 10.2 |
| 2-4 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 0-2 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **All scores** | **766,987** | **8.5** | **4.2** | **4.5** | **49.4** | **24.5** | **26.0** |
| In HNV | 191,748 | 9.9 | 7.3 | 6.9 | 41.1 | 30.3 | 28.6 |
| Out HNV | 575,239 | 8.0 | 3.2 | 3.7 | 53.9 | 21.4 | 24.7 |

Figure 46: Distribution of the share of three indicators in the final HNV score (Graph)

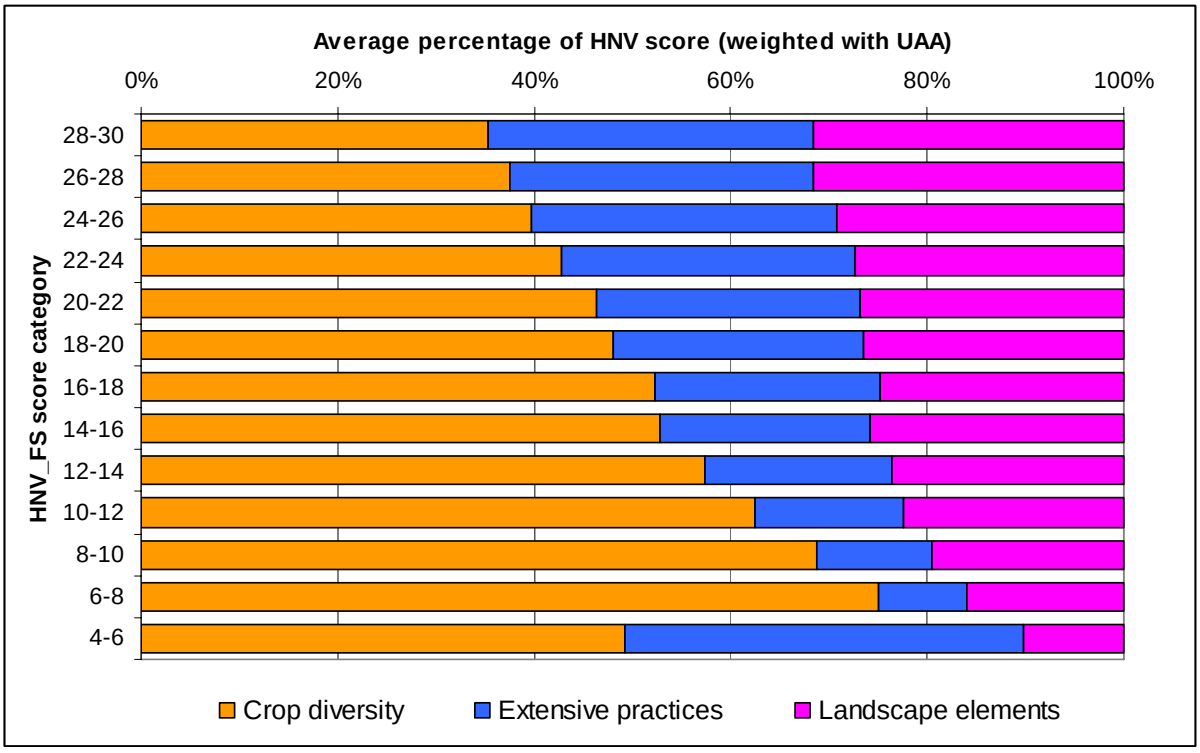


Fig. 45 and 46 show the evolution of the three indicators with the HNV score, in terms of mean value and share in the final score. Mean values are weighted with UAA of the communities.

For communities with a low HNV score (6 to 8), crop diversity is providing most of the points (75% for 5.8 points average), with landscape coming second (16% for 1.2 points average). Extensive practices scores are very low (0.7 average) and contribute to only 9% of the score.

The higher the HNV score value, the more balanced is the distribution of the three indicators influence. Between the 6-8 category and the 28-30 category, influence of crop diversity decreases continuously (40% loss of its share in the final score). The influence of landscape elements grows (16% gain of its share in the final score) and influence of extensive practices grows even faster (24% gain).

For communities in the HNV zone (score higher than 21.6), distribution of share of all three indicators in the final score is quite balanced: 41% comes from crop diversity, 30% comes from extensive practices, and 29% comes from landscape elements value.

## 2.7 Comparison of results of farm system and natural zones approaches

The natural zones approach is based on verified biodiversity value of a particular area. It can help to validate the farm system approach which aims to identify zones where agriculture is more favourable to biodiversity.

Figure 47: Comparison of natural zones and farm system approaches

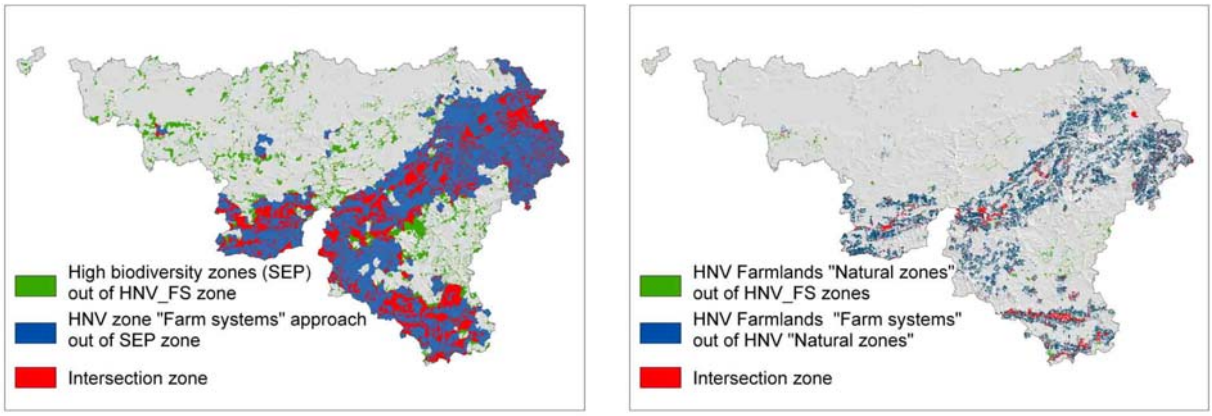



Figure 48: Part of SEP zones in the HNV "Farm system" zone

| | Total (ha) | UAA (ha) | % of UAA |
|---|---|---|---|
| SEP zones | 298,696 | 43,527 | **14.6** |
| SEP zones in HNV_FS zone | 187,116 | 27,341 | **14.6** |
| **Part of SEP as HNV_FS zone (%)** | **62.6** | **62.8** | |

- SEP zones : biodiversity layer used in the "natural zones" approach"
- HNV zones : communities with HNV farm system score above 21.6 (25 % of UAA)

63% of SEP zones are located in the HNV zone. This percentage does not change when considering agricultural land only. The percentage of SEP land under agricultural management is the same within and outside the HNV zone.

Figure 49: Part of HNV "Farm system" zones in SEP zone

| | Total (ha) | UAA (ha) | % of UAA |
|---|---|---|---|
| HNV_FS zone | 644,508 | 191,748 | **29.8** |
| SEP zones in HNV_FS zone | 187,116 | 27,341 | **14.6** |
| **Part of HNV_FS zone as SEP (%)** | **29.0** | **14.3** | |

| | Total (ha) | UAA (ha) | % of UAA |
|---|---|---|---|
| Land out of HNV_FS zone | 1,046,207 | 575,239 | **55.0** |
| SEP zones out of HNV_FS zone | 111,580 | 16,186 | **14.5** |
| **Part of non HNV_FS land as SEP (%)** | **10.7** | **2.8** | |

In the HNV zone, 29% of the land was identified as SEP zones. It is almost 3 times the matching percentage out of HNV zone (10.7%).

Moreover, in the HNV zone, 14.3% of the UAA correspond to SEP. It is 5 times the matching percentage outside the HNV zone (2.8%).

Figure 50: Comparison of agricultural land use distribution for natural zones and farm system approaches

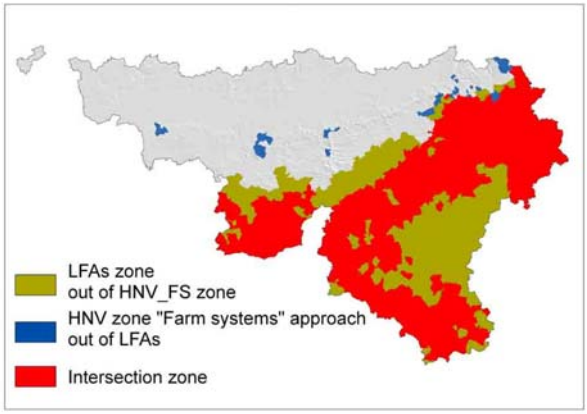
| Agriculture land use | In HNV "Farm systems" zone (ha) | HNV "Natural zones" Area (ha) | % of HNV "Farm systems" zone | % of HNV "Natural zones" | Part in HNV "Farm systems" zones | Part in HNV "Natural zones" |
|---|---|---|---|---|---|---|
| Permanent grasslands | 136,056 | 32,708 | 71.0 | 75.1 | 44.1 | 10.6 |
| Temporary grasslands | 25,812 | 5,293 | 13.5 | 12.2 | 38.9 | 8.0 |
| Fodder crops | 12,649 | 1,534 | 6.6 | 3.5 | 21.0 | 2.5 |
| Cereal crops (wheat, maize, barley...) | 10,937 | 1,916 | 5.7 | 4.4 | 6.2 | 1.1 |
| Oats, triticale, rye, sorghum, other cereals | 2,665 | 332 | 1.4 | 0.8 | 33.3 | 4.1 |
| Industr. crops (sugar beet, rape seed, soja. | 1,321 | 553 | 0.7 | 1.3 | 1.5 | 0.6 |
| Graminaceous (+ mixed with legumin.) | 817 | 358 | 0.4 | 0.8 | 6.8 | 3.0 |
| Headlands with grass | 540 | 323 | 0.3 | 0.7 | 9.0 | 5.4 |
| Potatoes, dry vegetables | 402 | 210 | 0.2 | 0.5 | 1.2 | 0.6 |
| Other | 549 | 303 | 0.3 | 0.7 | 5.8 | 3.2 |
| **Total** | **191,748** | **43,527** | | | **25** | **5.7** |

Permanent (70-75%) and temporary (12-13%) grassland is represented in similar proportions in both approaches.

There is about twice the proportion of fodder crops in the HNV zone (6.6%) compared to the natural zones approach (2.5%). The same occurs for the category oats, triticale, rye, sorghum…

## 2.8 Comparison of results of farm system approach and LFAs

Map 51: Comparison of HNV_FS zones and LFAs




There is a strong relation between the HNV farm systems zone and the Less Favoured Areas zones in the Walloon Region.

Indeed, 97.6% of the UAA in the HNV zone is also located in the LFAs. Agricultural land in the HNV zone represents 56.4% of the UAA of LFAs.

Figure 52: Comparison of HNV zone and LFAs

| | Total (ha) | UAA (ha) |
|---|---|---|
| LFAs zone | 937,651 | 331,705 |
| LFAs zones in HNV_FS zone | 623,850 | 187,233 |
| **Part of LFAs as HNV_FS zone (%)** | **66.5** | **56.4** |

| | Total (ha) | UAA (ha) |
|---|---|---|
| HNV_FS zone | 644,508 | 191,748 |
| LFAs zones in HNV_FS zone | 623,850 | 187,233 |
| **Part of HNV_FS land as LFA (%)** | **96.8** | **97.6** |

## 2.9 Description of the HNV farming systems in the Walloon Region[7]

### 2.9.1 Analysis of the characteristics of the farming systems in HNV zone (per agro-geographic zone)

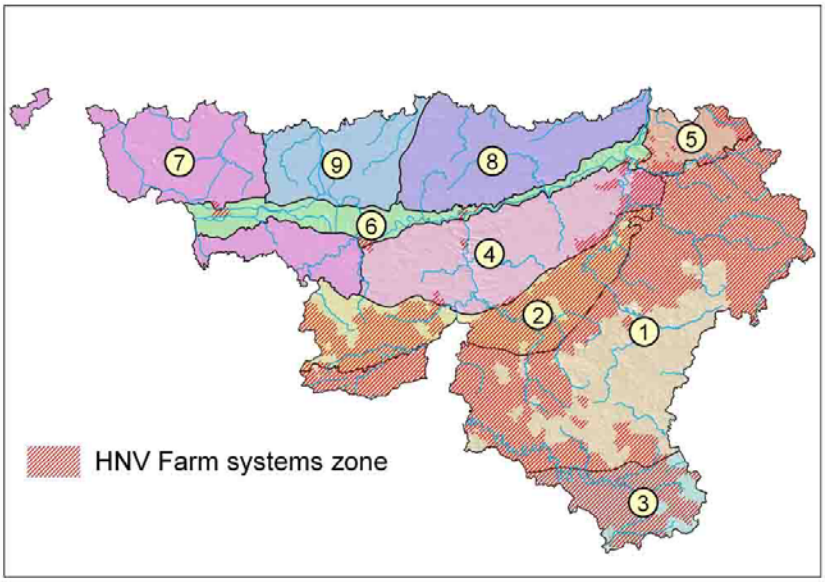
The Walloon Region can be divided into 9 agro-geographic zones, defined by the morphological characteristics of the rural landscapes:

Figure 53: Proportion of HNV zones in the UAA of the agro-geographic regions

| | Agro-geographic zone | Total UAA (ha) | UAA in HNV zone (ha) | UAA out of HNV zone (ha) | % of UAA in HNV | % of HNV UAA |
|---|---|---|---|---|---|---|
| 1 | Ardenne | 161,081 | 86,661 | 74,419 | 53.8 | 45.2 |
| 2 | Fagne et Famenne | 78,338 | 59,444 | 18,894 | 75.9 | 31.0 |
| 3 | Lorraine | 35,086 | 28,348 | 6,738 | 80.8 | 14.8 |
| 4 | Condroz | 113,867 | 9,387 | 104,480 | 8.2 | 4.9 |
| 5 | Pays de Herve | 27,994 | 6,912 | 21,082 | 24.7 | 3.6 |
| 6 | Sillon Sambre et Meuse | 23,077 | 878 | 22,199 | 3.8 | 0.5 |
| 7 | Plateau limoneux hennuyer | 137,650 | 119 | 137,531 | 0.1 | 0.1 |
| 8 | Hesbaye | 123,181 | 0 | 123,181 | 0.0 | 0.0 |
| 9 | Plateau limoneux brabançon | 66,715 | 0 | 66,715 | 0.0 | 0.0 |
| | **Total** | **766,987** | **191,748** | **575,239** | **25.0** | **24** |

91 % of the HNV farm systems zone is located in Ardenne, Fagne and Famenne while Lorraine. Condroz and Pays de Herve share 8.5 % of HNV UAA. Map 54 shows how the HNV zone is distributed in these regions.

Map 54: Agro-geographic regions




[7] Sources on farming types in WR : « Etat de l'environnement wallon 2000 », MRW. « Plan d'environnement pour le développement durable en Région wallonne » 1995, MRW. « Evaluation des impacts de la PAC et de l'agenda 2000 sur le développement de la zone rurale » 2000, MRW.

- Regions with a low percentage of the HNV zone are :

- Sillon Sambre et Meuse (n°6) :

It is not a typical agro-geographic region but more a transitional zone defined by rivers (from west to east): Haine, Sambre and Meuse;

- Plateaux limoneux hennuyers et brabançons (n°7 and 9) :

25% of the farms are oriented towards cereals. 20% are oriented towards a mix of cereals and cattle other than for milk production. Mixed types of big cereal/milk production are also present, as well as farms specializing in cattle for milk/breeding/meat.

- Hesbaye (n°8):

It is almost entirely the domain of intensive agriculture: mainly cereals and sugar beet. Animal production is present, principally as cattle for fattening kept in shed.
The following section examines the characteristics of farming in the agro-geographic zones where a significant proportion of the UAA matches the HNV zone: Ardenne, Fagne and Famenne, Lorraine, Condroz and Pays de Herve.

## Ardenne

45 % of the HNV zone UAA is located in Ardenne. However it represents only about half the UAA of Ardenne. Map 54 shows that the north-eastern and south-western zones of Ardenne contain most of the HNV zone in this region.
The soils in the region are formed from sandstone and schist and are shallow. 90% of the UAA is covered with grass with permanent grassland accounting for 65% of the UAA.
Half of the agricultural holdings are oriented towards cattle breeding, with calves raised with cows. 25 % of the farms combine cattle breeding and/or milk and/or fattening.
With regard to the rural landscape, Ardenne can be divided into two zones: the central and north-eastern zones.
The relief of the north-eastern part is very uneven. The wooded area is important and is associated with strong slopes. Permanent grassland occupies more than 80% of the UAA. Grassland is found in farms specializing in cattle for milk production but in a more extensive way than in the Pays de Herve.

Photo 1: Grassland with Festuca and Geranium sylvaticum in northern Ardenne (source: GIREA)

Central Ardenne differs from the northeast region as it has larger farms and a more diversified use of the land. Traditional subsistence agriculture has been progressively replaced with cattle grazing systems. Pastures occupy the majority of agricultural land and are often associated with fodder crops.
With about half the UAA of Ardenne in the HNV zone (in northeast and southwest), it is interesting to compare the agricultural land use distribution within and outside the HNV zone.

Figure 55: Distribution of crops in Ardenne in the HNV and non-HNV zones

| Agriculture land use | Total UAA (ha) | UAA in HNV (ha) | UAA out of HNV (ha) | % of HNV UAA | % of non HNV UAA | % of Ardennes UAA |
|---|---|---|---|---|---|---|
| Permanent grasslands | 104,649 | 66,178 | 38,471 | 76.4 | 51.7 | 65.0 |
| Temporary grasslands | 40,191 | 13,373 | 26,818 | 15.4 | 36.0 | 25.0 |
| Fodder crops | 7,268 | 3,451 | 3,817 | 4.0 | 5.1 | 4.5 |
| Cereal crops (wheat, maize, barley...) | 4,806 | 2,012 | 2,794 | 2.3 | 3.8 | 3.0 |
| Oats, triticale, rye, sorghum | 3,056 | 1,078 | 1,978 | 1.2 | 2.7 | 1.9 |
| Industrial crops (sugar beet, rape seed, soja...) | 127 | 116 | 11 | 0.1 | 0.0 | 0.1 |
| Graminaceous (also mixed with leguminous) | 206 | 140 | 66 | 0.2 | 0.1 | 0.1 |
| Headlands with grass | 92 | 56 | 36 | 0.1 | 0.0 | 0.1 |
| Potatoes, dry vegetables | 505 | 108 | 397 | 0.1 | 0.5 | 0.3 |
| Other | 180 | 150 | 31 | 0.2 | 0.0 | 0.1 |
| **Total** | **161,081** | **86,661** | **74,419** | | | |

The total grassland (temporary plus permanent) share in the UAA is only slightly higher within the HNV zone than outside the HNV zone. However, there is a much higher percentage of UAA dedicated to permanent grassland in the HNV zone than outside the HNV zone (difference of 15%).

## Fagne et Famenne

31% of the HNV zone UAA is located in Fagne et Famenne. It represents about 75% of the UAA of this region.

Fagne et Famenne is the transitional zone between Condroz and Ardenne. Soil is variable in nature and quality.

With regard to the rural landscape, Fagne et Famenne can be divided into two zones: the western (Fagne) and the eastern (Famenne).

Photo 2: Lowland hay meadows in Famenne (photo:S.Rouxhet)

Grassland occupies 80% of UAA in Fagne. The rest is principally occupied by cereals and green fodder. 1/3 of the farms are oriented towards milk production. Other farms are mixed cattle farms.

In Famenne, most farms specialize in cattle breeding, followed by milk production and cattle fattening. Other farms are characterised by a mix of cattle production activities.

Figure 56: Distribution of crops in Fagne-Famenne in the HNV and non-HNV zones

| Agriculture land use | Total UAA (ha) | UAA in HNV (ha) | UAA out of HNV (ha) | % of HNV UAA | % of non HNV UAA | % of Fagne Famenne UAA |
|---|---|---|---|---|---|---|
| Permanent grasslands | 49,856 | 39,620 | 10,236 | 66.7 | 54.2 | 63.6 |
| Temporary grasslands | 6,548 | 5,680 | 868 | 9.6 | 4.6 | 8.4 |
| Fodder crops | 7,689 | 5,513 | 2,176 | 9.3 | 11.5 | 9.8 |
| Cereal crops (wheat, maize, barley...) | 9,669 | 5,965 | 3,704 | 10.0 | 19.6 | 12.3 |
| Oats, triticale, rye, sorghum | 941 | 682 | 260 | 1.1 | 1.4 | 1.2 |
| Industrial crops (sugar beet, rape seed, soja...) | 1,743 | 842 | 900 | 1.4 | 4.8 | 2.2 |
| Graminaceous (also mixed with leguminous) | 592 | 360 | 232 | 0.6 | 1.2 | 0.8 |
| Headlands with grass | 577 | 384 | 193 | 0.6 | 1.0 | 0.7 |
| Potatoes, dry vegetables | 372 | 140 | 232 | 0.2 | 1.2 | 0.5 |
| Other | 351 | 257 | 94 | 0.4 | 0.5 | 0.4 |
| **Total** | **78,338** | **59,444** | **18,894** | | | |

Main differences in agricultural land use between HNV and non-HNV zones are:

- a higher percentage of UAA dedicated to pastures in the HNV zone (difference of 17.5%);
- the share of UAA dedicated to cereal crops in the HNV zone is half of that share outside HNV zone (difference of 9.6 %);
- the share of UAA dedicated to industrial crops is 3.5 times lower in the HNV zone (difference of 3.4 %).

## Lorraine

14.8% of the HNV zone UAA is located in the Belgian Lorraine. It represents about 81% of the UAA of this region.
The region includes the last traditional rural villages in the Walloon Region. Half of the farms specialize in cattle breeding. ¼ of the farms engage in a mix of cattle-based production activities.

Figure 57: Distribution of crops in Lorraine in the HNV and non-HNV zones

| Agriculture land use | Total UAA (ha) | UAA in HNV (ha) | UAA out of HNV (ha) | % of HNV UAA | % of non HNV UAA | % of Lorraine UAA |
|---|---|---|---|---|---|---|
| Permanent grasslands | 19,275 | 16,709 | 2,566 | 58.9 | 38.1 | 54.9 |
| Temporary grasslands | 7,658 | 6,102 | 1,556 | 21.5 | 23.1 | 21.8 |
| Fodder crops | 3,493 | 2,314 | 1,179 | 8.2 | 17.5 | 10.0 |
| Cereal crops (wheat, maize, barley...) | 2,859 | 1,917 | 942 | 6.8 | 14.0 | 8.1 |
| Oats, triticale, rye, sorghum | 972 | 738 | 234 | 2.6 | 3.5 | 2.8 |
| Industrial crops (sugar beet, rape seed, soja...) | 319 | 189 | 131 | 0.7 | 1.9 | 0.9 |
| Graminaceous (also mixed with leguminous) | 197 | 142 | 55 | 0.5 | 0.8 | 0.6 |
| Headlands with grass | 55 | 38 | 17 | 0.1 | 0.3 | 0.2 |
| Potatoes, dry vegetables | 131 | 112 | 19 | 0.4 | 0.3 | 0.4 |
| Other | 125 | 86 | 39 | 0.3 | 0.6 | 0.4 |
| **Total** | **35,086** | **28,348** | **6,738** | | | |

The main difference in agricultural land use between HNV and non-HNV zones is:

- a higher percentage of UAA dedicated to permanent grasslands in the HNV zone (difference of 20.8 %) and, as a corollary, lower percentage of UAA dedicated to other crops.

Photo 3 (left): Whinchat (photo AVES)

Photo 4 (right): Red-backed shrike (photo DGRNE)

## Condroz

4.9% of the HNV zone UAA is located in Condroz and represents 8.2% of the UAA of this region. Soil is in general fertile and agricultural activities are oriented towards animal husbandry, principally cattle. The most important land uses are permanent grassland (39% of UAA), cereal crops (30%), and industrial crops (11%).
Most of the HNV zones in Condroz are located at the eastern extremity of the region, next to Famenne and northern Ardenne.

Figure 58: Distribution of crops in Condroz in the HNV and non-HNV zones

| Agriculture land use | Total UAA (ha) | UAA in HNV (ha) | UAA out of HNV (ha) | % of HNV UAA | % of non HNV UAA | % of Condroz UAA |
|---|---|---|---|---|---|---|
| Permanent grasslands | 44,592 | 6,713 | 37,880 | 71.5 | 36.3 | 39.2 |
| Temporary grasslands | 4,351 | 431 | 3,920 | 4.6 | 3.8 | 3.8 |
| Fodder crops | 9,222 | 824 | 8,398 | 8.8 | 8.0 | 8.1 |
| Cereal crops (wheat, maize, barley...) | 34,551 | 914 | 33,637 | 9.7 | 32.2 | 30.3 |
| Oats, triticale, rye, sorghum | 1,330 | 149 | 1,181 | 1.6 | 1.1 | 1.2 |
| Industrial crops (sugar beet, rape seed, soja...) | 12,376 | 158 | 12,218 | 1.7 | 11.7 | 10.9 |
| Graminaceous (also mixed with leguminous) | 2,349 | 72 | 2,278 | 0.8 | 2.2 | 2.1 |
| Headlands with grass | 1,839 | 46 | 1,793 | 0.5 | 1.7 | 1.6 |
| Potatoes, dry vegetables | 2,330 | 33 | 2,297 | 0.4 | 2.2 | 2.0 |
| Other | 926 | 47 | 879 | 0.5 | 0.8 | 0.8 |
| **Total** | **113,867** | **9,387** | **104,480** | | | |

The main differences in agricultural land use between HNV and non-HNV zones are:

- the share of UAA dedicated to permanent grassland is twice as high in the HNV zone as outside it (difference of 22.5%);
- the share of UAA dedicated to cereal crops is three times lower in the HNV zone (difference of 35.2%);
- the share of UAA dedicated to industrial crops is seven times lower in the HNV zone (difference of 10%);

## Pays de Herve

3.6% of the HNV zone UAA is located in the Pays de Herve. It represents 24.7% the UAA of this region. The region is specialized in intensive milk production. Permanent pastures cover 81.6% of the UAA.

Figure 59: Distribution of crops in Pays de Herve in the HNV and non-HNV zones

| Agriculture land use | Total UAA (ha) | UAA in HNV (ha) | UAA out of HNV (ha) | % of HNV UAA | % of non HNV UAA | % of Pays de Herve UAA |
|---|---|---|---|---|---|---|
| Permanent grasslands | 22,855 | 6,212 | 16,643 | 89.9 | 78.9 | 81.6 |
| Temporary grasslands | 1,307 | 186 | 1,120 | 2.7 | 5.3 | 4.7 |
| Fodder crops | 2,354 | 385 | 1,969 | 5.6 | 9.3 | 8.4 |
| Cereal crops (wheat, maize, barley...) | 753 | 39 | 714 | 0.6 | 3.4 | 2.7 |
| Oats, triticale, rye, sorghum | 78 | 4 | 74 | 0.1 | 0.3 | 0.3 |
| Industrial crops (sugar beet, rape seed, soja...) | 189 | 10 | 179 | 0.1 | 0.8 | 0.7 |
| Graminaceous (also mixed with leguminous) | 99 | 66 | 33 | 1.0 | 0.2 | 0.4 |
| Headlands with grass | 33 | 5 | 28 | 0.1 | 0.1 | 0.1 |
| Potatoes, dry vegetables | 88 | 3 | 86 | 0.0 | 0.4 | 0.3 |
| Other | 239 | 2 | 237 | 0.0 | 1.1 | 0.9 |
| **Total** | **27,994** | **6,912** | **21,082** | | | |

The main difference in agricultural land use between HNV and non-HNV zones is:

- a percentage of UAA dedicated to permanent grasslands more is important in the HNV zone (difference of 11%) and, as a corollary, a lower percentage of UAA is dedicated to other crops.

### 2.9.2 The impact of the indicators on the HNV score in the agro-geographic regions

Figure 60 compares the impact of the three indicators on the HNV score within and outside the HNV zone of the different regions.

Figure 60: Impact of indicators on the HNV score in agro-geographic regions

| | Agro-geographic zone | Average Landscape score | Average Extensivity score | Average Crop div. score | Average HNV score | Part of Landscape in HNV score (%) | Part of Extensivity in HNV score (%) | Part of Crop div. in HNV score (%) |
|---|---|---|---|---|---|---|---|---|
| 1 | Ardennes | 7.0 | 7.3 | 10.0 | 24.2 | 28.7 | 30.2 | 41.1 |
| 2 | Fagne et Famenne | 7.3 | 7.2 | 9.8 | 24.3 | 30.1 | 29.6 | 40.4 |
| 3 | Lorraine | 5.7 | 8.0 | 9.9 | 23.5 | 24.1 | 34.0 | 41.8 |
| 4 | Condroz | 7.3 | 6.4 | 9.9 | 23.6 | 30.8 | 27.3 | 42.0 |
| 5 | Pays de Herve | 6.5 | 6.3 | 10.0 | 22.8 | 28.6 | 27.6 | 43.8 |
| | **All HNV zones** | **6.9** | **7.3** | **9.9** | **24.1** | **28.6** | **30.3** | **41.1** |
| | **Walloon region** | **4.5** | **4.2** | **8.5** | **17.2** | **26.0** | **24.5** | **49.4** |

**Some remarks:**

The crop diversity indicator does not discriminate between regions in the HNV zone but does, however, discriminate between HNV and non-HNV zones.
In Ardenne and Fagne et Famenne, the 3 subindicators influence the HNV score in about the same proportions.
Lorraine's HNV zones are characterized by low landscape score (5.7 on average), counterbalanced by high extensivity score (8 on average).
Condroz and Pays de Herve obtain the lowest mean scores for extensivity of practices.

## 2.9.3 Synthetic description of farm systems in the HNV zones

Identified HNV farm system zone can be divided into several coherent parts on the basis of:

- The map of agricultural activities within communities[8];
- The analysis of the farming system characteristics in the HNV zones of the different agro-geographic regions (3.9.1);
- Scores of the 3 groups of indicators and also of the subindicators.

Map 61: HNV farm systems zones

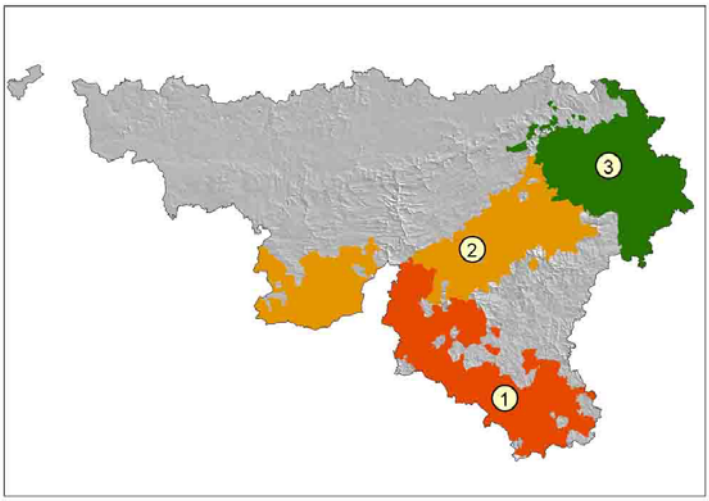



Figure 62: Synthetic description of HNV farm systems

| N° | HNV areas | Dominant farming system type |
|---|---|---|
| 1 | 80% of Lorraine, south-west of Ardenne | - Grazing livestock system; specialist cattle rearing ;<br>- Average LU/ha < 2.0;<br>- About 60% of UAA as permanent grasslands. |
| 2 | 75% of Fagne et Famenne, an area of Ardenne near Fagne et Famenne | - Grazing livestock system; milk and meat production;<br>- Average LU/ha < 2.0<br>- About 70% of UAA as permanent grasslands |
| 3 | Northern Ardenne, most north-eastern part of Condroz, south and east of Pays de Herve | - Grazing livestock system. Specialist dairy cattle.<br>- Average LU/ha < 2.0<br>- Above 80% of UAA as permanent grassland |

Definition of the HNV farmland (Andersen, 2004) distinguishes the following HNV types:

**Type 1**: Farmland with a high proportion of semi-natural vegetation;
**Type 2**: Farmland dominated by low intensity agriculture or a mosaic of semi-natural and cultivated land and small-scale features;
**Type 3**: Farmland supporting rare species or a high proportion of European or World populations.

The HNV farming systems described for the Walloon Region in general represent type 2 HNV farmland. They are defined by extensive farming practices and landscape elements. Certainly the extensivity of agriculture in these regions is relative and is not comparable

[8] Source : Etat de l'environnement en Wallonie, 1993, CSWAAA

to some very extensive systems in other regions of Europe (extensive grazing of grassland and heath vegetation in Ireland for example).

# 3 Czech case study

## 3.1 Introduction

### 3.1.1 Objectives

The Czech case study focuses on the identification of data sets and data sources and evaluation of their usefulness for HNV farmland identification on the basis of national data.

Through the collaboration with the Agronomy University of Gembloux (Prof. Burny), contacts were established with the Faculty of Agricultural Economics and Management of Prague. Mr Tomsik helped I-Mage Consult with data identification for the Czech Republic focusing on data availability, completeness and accuracy.

### 3.1.2 Agriculture in the Czech Republic

The total agricultural area of the Czech Republic is 4.3 million ha, of which 3.1 million ha is arable land. About a half of the total agricultural area is located on less favourable land and about an eighth is located in conservation areas (protected water resources, landscapes and nature).

Agricultural production represents 5% of the Gross Domestic Product while the processing industry accounts for 7%. The Czech agriculture is concentrated on traditional crops of the temperate zone with predominating cereals, mainly wheat and barley.

Animal production is focused primarily on raising cattle for milk and meat production and on pig and poultry breeding.

The economic transformation after 1989 resulted in significant changes in the land tenure. At the end of 2000, about 85% of the total area was privately owned and further privatization of the state land is under way. Today, 98% of farmland is privately managed. During the transformation period new forms of ownership emerged from the former co-operatives and state farms. Farmland is now distributed as follows:

- corporate farms - 40% of the agricultural area;
- co-operatives - 34%;
- individual private farms - 24%;
- state enterprises - 2%.

## 3.2 Data sets

Possible useful data sets for HNV Farmland mapping:

Figure 63: Datasets in the Czech Republic

| Name | Administrative level and scale | Year or Update frequence | Description | Institution |
|---|---|---|---|---|
| Land Parcel Information System (LPIS) | 10,000<br><br>98% of UAA | 1999-2006<br><br>permanent update | Agricultural plots identification system. Derived from aerial photos. LPIS was made for farmers who want to apply to gain access to AEM. Farmlands of state or army are thus not taken into acount. | Data source: Ministry of Agriculture<br>Data maker (until 2005): Ekotoxa company<br>Data maker (since 2005): Sitewell company |
| Agri-environmental measures (AEM) | 10,000<br><br>In LPIS | 1999-2006<br><br>Every year | AEM contracts are made for 5 years and are comprised in the LPIS database. 3 types of contracts exist:<br>- Basic management (for everyone);<br>- Extensive measures (only in protected areas);<br>- Special measures : humid grasslands or bird areas. | Ministry of the Environment, Dept. Of Financial tools in Nature and Landscape protection |
| Declaration for subsidies | Farm level | Every year | Declaration for subsidies : areas of culture types (grassland, arable lands…), livestock (number of heads per categories of species and age)… | State Agricultural Intervention Fund (SZIF) |
| Farm structure survey | sampling of +- 40.000 farms | Every year | The sample includes both corporate and registered individual farms. The survey do not include questions related to the diversification of enterprises and incomes | Central statistics office (CZSO) |
| Agriculture census | Farm level, sampling of farms (75 % UAA) | Every 5 years | Farmers declaration of precise crop data, animal husbandry, fertilizers use… | Central statistics office (CZSO) |
| Natura 2000 | probably around 10.000 | - | Special Protected Areas (SPA), proposed Sites of Community Importance (comprises animal, plant, habitat and moss layers) | Agency for Nature Conservation (AOPK) |
| Biotopes map | probably around 10.000 | 2000-2005 probable update every 12 | Includes all zones of ecological interest. Contains all Natura 2000 zones but also high biologic interest zones outside Natura 2000, because it takes into account Habitat and Bird directives but also species or biotopes of national interest. | |
| Large scale Protected areas (LPA) | probably around 10.000 | - | Zones with total protection status. Comprise 4 large national parks and Protected Landscape Areas. For LPA there is a classification from most valuable regarding ecology/biodiversity to least valuable zones. | |
| Small scale Protected areas (SPA) | probably around 10.000 | - | Zones with total protection status. Historical data (1930s). Principally natural reserves. Do not necessarily contain high biodiversity. | |
| Integrated Land Use Planning (ILUP) | probably around 10.000 | In preparation 5% complete | Preparation of a digital rural development map to preserve biodiversity, protect soils and rivers. This EU - Interreg project includes mapping of edges, hedges, isolated trees, riverbanks and roads. | Data maker: Ekotoxa company |
| Soil map | 1: 500<br><br>All Czech Republic | - | Soil map was used (with other data) to make the so-called "Bonifying Soil Ecologic Units" map (by research institute for soil and water conservation). Provides farmers by Internet with info on good practices: fertilization, crop types… | Research Institute for Improving and protecting Soil (VUMOP) |

### 3.2.1 Biodiversity data

First observation is the high quality and availability of biodiversity data. Along with the Natura 2000 and protected zones, a biotopes map is available. This geographical layer combines all zones presenting an ecological interest in the Czech Republic. It contains all Natura 2000 zones but also high biological interest zones outside Natura 2000 because it takes into account not only Habitat and Bird directives but also species or biotopes of national interest. 600 persons worked for 6 summers to produce the maps.

### 3.2.2 Agricultural Land Use data

Concerning agricultural land use information the national Land Plot Information System (LPIS) provides information on agricultural plots:

- Status of protection;
- Sensitive areas with regard to nitrates;
- Type of agricultural land use (arable land, temporary grassland, permanent grassland (declared as grassland for 5 years), vineyard, orchard…);
- AEM contracts for each measure;
- Organic farming area ;
- Bird areas in Natura 2000.

Agricultural parcels were plotted using aerial photos and were further verified with farmers. LPIS was created with the objective of facilitating access to AEMs for farmers. State or army-owned farmland is thus not taken into account. As a result, LPIS covers approximately 98 % of total UAA (4 280 000 ha). According to the Ministry of Agriculture, the coverage accounts for 97 % of agricultural land. Most of farms of less than 5 ha are probably not included in LPIS.

### 3.2.3 Farm structure data

In the Czech Republic, due to the large farm size, it could prove difficult to obtain statistical data more accurate than the 14 regions level (possibly at the level of 74 districts). There is indeed a lot of large farms (>10 000 ha) which means that a community could include only one or a few farms, causing data secrecy problems.

The farm structure survey and agricultural census carried out by the Central Statistics Office (CZSO) provide incomplete data based on a sample of farms. Another data source could be the yearly farmer declarations to the State Agricultural Intervention Fund (SZIF).

However, a full-scale agricultural census data will be available in the future. Indeed, with the inclusion of the Czech Republic in the EU, the Farm Structure Survey will have to follow the same protocol as for other Member States:

- a basic survey (full scope Agricultural Census - AC) every 10 years;
- several intermediate surveys on a sample basis.

### 3.2.4 Landscape features data

Data on landscape features are currently being collected in the frame of a European Commission INTERREG project ILUP and (ILUP – The Integrated Land Use Planning). The objective of the project is to construct:

- A digital rural development map (DMVK), including edges, hedges, isolated trees, riverbands and roads.
- A plan for changes in land use to help preserve biodiversity, protect soils and rivers.
- A map of ecological stability (derived from DMVK) showing value of landscape.

Until now, 5% of the Czech Republic land has been processed. Future completion of the project is uncertain. If finished, this project would produce a good data set for estimation of the landscape nature value.

## 3.3 Applicability of the Walloon Region 'farm system approach' for HNV Farmland identification in the Czech Republic

Statistical data is still incomplete and insufficient to build a methodology similar to the Walloon Region farm system approach.

Figure 64: Possibilities to adapt the WR farm systems approach for the Czech Republic[9]

| Indicator in the WR "Farm systems" approach | Possibility of equivalence in Czech case | Data in CZ |
|---|---|---|
| Crop diversity | Yes when full FSS complete | Farm structure survey data exists as sampling of farms<br>Complete FSS will be achieved as CZ has entered EU |
| Livestock units / ha of fodder crops and grasslands | Yes when full FSS complete | With complete FSS |
| Organic Nitrogen pressure | No | No |
| % of permanent grasslands in UAA | Yes | LPIS (agricultural plots |
| % of humid permanent grasslands in UAA | Yes | Pedologic map crossed with LPIS (agricultural plots) |
| Total areas of grassland-related AEM contracts / UAA | Yes | LPIS (agricultural plots) |
| Lengths of hedges | No | ILUP in construction |
| Lengths of wood edges | No | ILUP in construction |
| Plot size | To a certain extent with LPIS. Elements are blocks of crops more than plots. | |
| Number of isolated trees | No | ILUP in construction |
| Number of ponds | No | ILUP in construction |

Conversely, biodiversity and habitat data are abundant and are certainly the best data sets for HNV identification in the Czech Republic.

[9] This table reflects the results of a short investigation on data availability in the Czech Republic. It is possible that other data exists although not identified in the data list.

Figure 65: Possibilities to adapt the WR natural zones approach for the Czech Republic

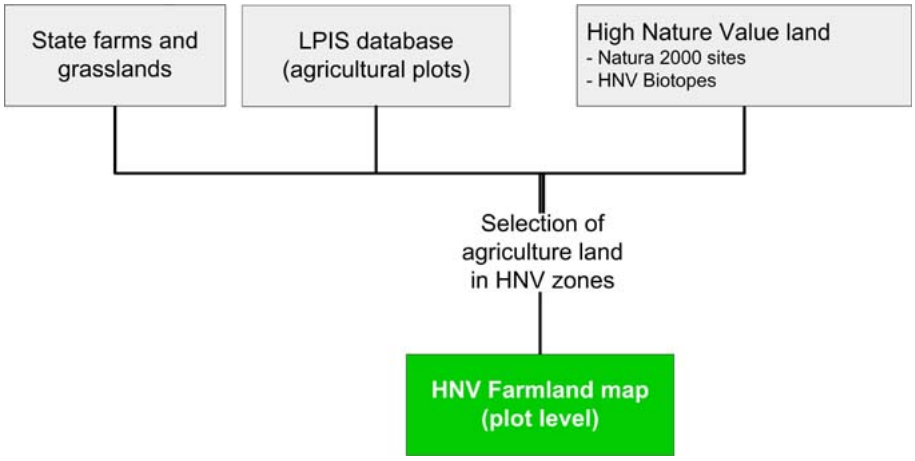
| Data in the WR "Natural zones" approach | Possibility of equivalence in Czech case | Data in CZ |
|---|---|---|
| SEP zones (HNV zones layer) | Yes | Biotopes map (HNV zones layer) |
| SIGEC database (agricultural plots) - All UAA | Yes | LPIS (agricultural plots) - 97 % of UAA |
| Particular species | Yes | Animal and plants species maps |

A combination of Natura2000, Biotopes map, and LPIS database should form a proper basis for HNV Farmland identification.

In the 3% of UAA not included in LPIS, the biotopes layer should allow to select high nature value zones in biotopes related to farmland e.g. high nature value grassland.

Number of farms not in LPIS will probably decrease, as farmers need to apply to LPIS to gain access to subsidies. LPIS should evolve to cover all UAA in the country, including state farms.

Figure 66: HNV identification method in the Czech Republic



# 4 Conclusions and recommendations for future work

The Farm System Approach, combined with data from national surveys, provides a relevant methodology to identify, characterise (with regard to surface, type of production, grazing management, agricultural land use) and locate High Nature Farmland areas in the Walloon Region.

The strength of the Farm System Approach methodology is the possibility of producing a map at the NUTS 5 level with an accurate description of the farm systems. The methodology can be improved by crosschecking the results with regional experts and getting feedback on the thresholds and the weighting of the indicators.

The weaknesses of the Farm System Approach methodology are mainly due to the way agricultural practices are modelled. The lack of comprehensive and reliable data on landscape elements and grassland management hampers further validation of HNV farmland identification results. A development of additional relevant surveys is therefore recommended.

Further validation of HNV farmland identification results can be done by cross checking the results with other data sets

- agricultural CORINE Land Cover categories
- AEM linked to grassland management and biodiversity
- indicators of biodiversity and water quality (crayfish, river mussels, quality of ground water and rivers)
- data on non-urban areas with very low percentage of UAA (less than 10%)

Concerning permanent crops, especially vineyards, specific indicators (terraces, organic farming, soil cover) have to be found and tested to assess the possibility of including those land uses in HNV farmland areas.

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Abstract
The concept of High Nature Value (HNV) farmland has been evolving over the last fifteen years in Europe. In the European Union this has been closely linked to the aim of integrating environmental concerns in the Common Agricultural Policy. The idea that nature values, environmental qualities, even cultural heritage are linked to or dependent on farming, also underlies and supports the concept of a multifunctional 'European model of farming which provides benefits beyond food production.
The objective of this study is to better identify and characterise HNV farmland at national level (the Walloon Region in Belgium) with a Farm System Approach based on FSS statistical data and specific national surveys, taking into account the whole farm with the total agricultural area and its characteristics.
The methodology is built on two different approaches: the natural zones approach and the farm system approach. The natural zones approach uses spatial data to define agricultural zones with a verified high biodiversity interest, based on a reference biodiversity layer for the Walloon Region (WR) called the principal ecological structure (SEP). The farm system approach analyses the farm structure and farming practices on the basis of data available in the WR agricultural database. In the first step relevant variables have been selected to calculate the HNV indicators for the farm system approach at NUTS 5 level: 1) crop diversity and grassland presence, 2) extensive practices, and 3) landscape elements. In the second step the three indicators were combined to calculate the HNV score. In the third step the areas delimited through the farm system approach were overlaid with a map resulting form the natural zones approach. In the last step HNV farmland was analysed with regard to prevailing trends in farming practices and production types with the aim of identification of farming systems which might be associated with HNV farmland occurrence in the WR in Belgium.
The analysis of spatial distribution of HNV farmland delimited in the study shows that 91% of the HNV farm system zone identified in the study is located in Ardenne, Fagne and Fammenne. The dominant farming system types are grazing livestock system specialised in milk or meat production, depending on the region. The average livestock density is less than 2.0 LU/ha. Over 60% of UAA is used as permanent grassland.
The strength of the Farm System Approach methodology is the possibility of producing a map at the NUTS 5 level with an accurate description of the farm systems. The methodology can be improved by crosschecking the results with regional experts and getting feedback on the thresholds and the weighting of the indicators.

The weaknesses of the Farm System Approach methodology are mainly due to the way agricultural practices are modelled. The lack of comprehensive and reliable data on landscape elements and grassland management hampers further validation of HNV farmland identification results. A development of additional relevant surveys is therefore recommended.
An attempt at assessing the applicability of the FSA for HNV farmland identification was undertaken for the Czech Republic. Statistical data on farming practices are still incomplete and insufficient to build the methodology similar to the Walloon Region FSA. Conversely, biodiversity and habitat data are abundant and of high quality and currently are the best datasets for HNV farmland identification in the Czech Republic.

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