JRC Scientific and Technical Reports

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In support of COM(2006)508 "Development of agri-environmental indicators for monitoring the integration of environmental concerns into the Common Agricultural Policy"

Maria Luisa Paracchini and Claudia Capitani

EUR 25114 EN - 2011

JRC
EUROPEAN COMMISSION

Institute for Environment and Sustainability

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Institute for Environment and Sustainability

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JRC 68008

EUR 25114 EN
ISBN 978-92-79-22396-9 (PDF)
ISBN 978-92-79-22395-2 (print)
ISSN 1831-9424 (online)
ISSN 1018-5593 (print)

doi:10.2788/26827

Luxembourg: Publications Office of the European Union, 2011

Printed in Italy

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Acknowledgements

The authors wish to acknowledge Dr.Silvia Calvo Iglesias for starting the conceptual development of the indicator, and the experts who, with their input, contributed to set the basis for the ideas developed in this report:

Eric Willems, European Commission DG Agriculture, Belgium

Johan Selenius, European Commission, EUROSTAT, Luxembourg

Bas Pedroli, ALTERRA, Netherlands

Thomas Wrbka, University of Vienna, Austria

Wenche Dramstad, Norwegian Forest and Landscape Institute, Norway

Katharina Pavlicková, University Comenius, Slovak Republic

Felix Herzog, ART Agroscope Reckenholz-Tänikon, Switzerland

Christian Lauk, Institute for Social Ecology, Austria

Jean-Michel Terres, European Commission, Joint Research Centre, Italy

INTRODUCTION

1.1 Policy frame

In the year 2000 the European Landscape Convention was adopted, came into force in 2004, and has been since then open for signature by member states of the Council of Europe and for accession by the European Community and European non-member states. This is the first international act adopted by an international body with the aim of promoting protection, management and planning of the European landscape (Prof.G.F.Cartei, University of Florence, personal communication). In the legislative frame of the European Union (EU), though, there is no specific legislation concerning management and preservation of landscapes, which is under the responsibility of Member States, including the ratification of the European Landscape Convention. EU policies, though, deeply affect landscapes, and monitoring activities are necessary to assess the impact of such policies on landscapes and on the environment in general. This is particularly true in the frame of the Common Agricultural Policy (CAP), agricultural activities, in fact, affect 47% of the EU-27 surface and such share increases to 78% if forestry is included. Therefore decisions taken in the frame of the CAP are likely to impact on a consistent part of the EU surface, and landscape has acquired a relevant role in the discussions on the public goods provided by agriculture in the frame of the debate on the post-2013 CAP. Such provision is recognised and supported in recent legislation such as COM(2010) 672 final "The CAP towards 2020: meeting the food, natural resources and territorial challenges of the future", where landscape maintenance is listed as one of the strategic aims of the post-2013 CAP, and COM(2011) 627 final/2 "on support for rural development by the European Agricultural Fund for Rural Development (EAFRD)" where landscapes are identified as a component of the six Union priorities for rural development. In the programming period 2007-2012 the Community Strategic Guidelines for Rural Development state that resources devoted to axis 2 should contribute to the "preservation and development of high nature value farming and forestry systems and traditional agricultural landscapes" (Council Decision 2006/144/EC).

Following the process started at the European Council at Cardiff in June 1998, that invited all relevant formations of the Council to establish their own strategies for giving effect to environmental integration and sustainable development within their respective policy areas, the European Commission has issued three Communications to the Council and the European Parliament which focus on the identification and set up of a framework of agrienvironmental indicators for monitoring the integration of environmental concerns into the common agricultural policy. The first, COM (2000) 20 final "Indicators for the Integration of Environmental Concerns into the Common Agricultural Policy" sets the frame for the identification of the indicators, the second, COM (2001) 144 final "Statistical Information needed for Indicators to monitor the Integration of Environmental concerns into the Common Agricultural Policy" proposes a set of 35 indicators (the so-called IRENA framework "Indicator Reporting on the Integration of Environmental Concerns into Agricultural Policy"), sets the work plan for the identification of data needs and launches the pilot study for their calculation, the third, COM (2006) 508 "Development of agri-environmental indicators for monitoring the integration of environmental concerns into the common agricultural policy", revises the results, sets the final indicator frame and launches the final phase to the full operationalisation of the monitoring framework.

According to this latest Communication the framework is now composed by 28 indicators, among which n.28 is defined as "Landscape state and diversity". It groups the formerly IRENA indicators n.32 "Landscape State" and n.35 "Impact on Landscape Diversity". The IRENA indicator n.32 "Landscape State" was calculated for twelve selected study areas representing seven of the agricultural landscape types identified in Europe by Meeus (1990). The aim of this indicator was mainly to show the variety and value of landscapes across Europe. To calculate the indicator four parameters were used: percentage of agricultural crop types in total land area extracted from the Farm Structure Survey (FSS), number of agricultural classes and patch density based on Corine Land Cover (CLC) data, and the number of linear features obtained from LUCAS survey. The indicator n.35 "Impact on landscape diversity", presented the evolution of the parameters used for the calculation of the indicator n.32 Landscape State, noting that the evolution of linear features was only presented for Sweden and UK (EEA, 2006).

The Communication also classifies the indicators according to their level of development, which, for the landscape indicator is "in need of substantial improvements in order to become fully operational". Among the services of the European Commission involved in the development of the indicators, the Joint Research Centre was responsible of the methodological development of n.28 "Landscape state and diversity". The progress done in this frame is the object of this report.

1.2 An indicator to monitor landscape: conceptual frame

The context for the methodological development of the landscape indicator starts with the landscape concept itself. For this purpose the two most widely accepted definitions of landscape, used by UNESCO and the Council of Europe are taken into account. In the frame of the World Heritage Convention, UNESCO (1997) has defined three categories of cultural landscapes in the World Heritage list. In this context, cultural landscape "*represents the combined work of nature and human being, illustrating the evolution of human society and settlement over time, under the constraints and opportunities offered by the biophysical setting, socioeconomic and cultural forces*". With a wider scope, referring to all landscapes, the European Landscape Convention (Council of Europe, 2000) defines landscape as "*an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors*". Landscape is also identified as an essential component of people's surroundings, an expression of the diversity of their shared cultural and natural heritage, and a foundation of their identity.

In both cases, there is an acknowledgment of the multiple aspects to be addressed in the study of landscape:

- ecological aspects (landscape as a result of natural factors, natural heritage).
- perception-aesthetics (landscape as perceived by people, as the framework of everyday's life),
- cultural aspects (landscape as the result of the interaction between human being and the surrounding environment, a foundation of human identity)
- its dynamic character, as in both cases it is mentioned that landscape evolves through time.

Within the policy framework previously mentioned, the development of a landscape indicator for the agri-environment involves the identification of parameters that provide a measure of the landscape character including the four aspects above mentioned, and in particular addressing how farming activity has shaped landscapes and the influence of policy in the farming activity and subsequently in the landscape. Previous work carried out within IRENA operation has shown the difficulties of describing the state and change in landscape character and assessing its significance at the European level and in relation to the agrienvironment. From this experience, the further development of the landscape indicator should take into account as well the following issues (Paracchini and Calvo Iglesias, 2007):

<u>Which parameters are needed to address the state and change of landscape character in agrarian landscapes?</u> Parameters selected need to be scientifically sound and at the same time easy to communicate to policy makers and the society.

<u>Which data would be used/generated to calculate these parameters?</u> Data should be available at the European level in a harmonized way. Main sources that fulfil this criteria are e.g. Corine Land Cover, LUCAS Area Frame Survey, Farm Structure Survey, Farm Accountancy Data Network.

<u>In which context should these parameters be interpreted?</u> In the IRENA operation a general classification of landscapes done by Meeus (1990) was used for selecting cases studies and interpreting the results. However, no meaningful differences between landscapes were found using this approach. Increasing the sample may help in assessing differences. In the present study a comprehensive assessment covering the whole of the EU was sought.

<u>What is the link between the landscape indicator and other indicators for the agrienvironment?</u> Or, furthermore, could other agrienvironmental indicators help to describe the state and change in landscape character? The set of agrienvironmental Indicators presently retained for the integration of environmental concerns into agriculture includes among others indicators related to biodiversity, farming practices and trends in farming activity (see Annex I).

In synthesis, there are clear constraints in the definition of the indicator: it must be calculated on the basis of available data or on information that can be made available in the short term, at the EU level, based on a harmonised methodology. The indicator will be applied for monitoring purposes so the need for updates must be taken into consideration. Furthermore, the indicator should try to describe as comprehensively as possible the rural landscape, but as part of an indicator framework it should not be redundant with other indicators.

2 Toward an indicator for the rural-agrarian landscape

2.1 Definition of the indicator

The landscape addressed by the indicator is the one targeted by the CAP, here identified broadly as rural-agrarian landscape. Its mere extension is intended as the soil surfaces where the agricultural activities (cultivations, grazing etc.) take place, plus the areas of natural/semi-natural vegetation functional to the agricultural management (hedges, field margins, ditches etc.), rural buildings and structural elements (dry walls, terraces etc.). As a wider concept the rural-agrarian landscape is a cultural landscape composed by spatial units characterised by the interrelation of different but identifiable components such as natural conditions/farming traditions/farming systems/cultural heritage, and the people who manage the landscape (the farmers). The concept is schematised in Figure 1.

Figure 1- Schematic definition of the rural agrarian landscape and its relation with the total landscape.

The rural-agrarian landscape is a subset both of the total landscape and the rural landscape; the latter contains also other types of built-up areas and infrastructures, involving other activities not directly linked to agriculture.

The identified landscape concept can be schematised on the assumption that landscape is structured in different components or layers, and can be described / summarised in four main aspects which represent (Paracchini and Calvo Iglesias, 2007):

1. the natural potential of the land, which is given by soils, climate, topography, potential vegetation etc.

2. the physical structure, intended as land cover and its spatial organisation as a product of land management (organisation of different land cover types, plot size, fragmentation, diversity etc.)

3. the influence exerted by society on the agrarian landscape through agricultural activities, and the way such influence is organised (farm practices, farming systems, biomass production etc.)

4. the social perception on the landscape, as the society perceives, values and assesses landscape quality; the society plans, manages, and uses the landscape for productive or non productive purposes.

These aspects are very different among them; therefore it is unlikely that one indicator can synthesise them all. The implementation of the indicator is therefore carried out through a set of sub-indicators (or components), addressing specifically each of the aspects listed above:

Component 1 (aspects 1 and 3): It can be assumed that the natural potential of the landscape is invariant, therefore rather than proposing a composite sub-indicator referring to these invariant factors an indicator can be selected providing an estimate of how much the actual agricultural ecosystems are distant from a potential natural one (this is a relative assessment therefore the change of the natural potential due to climate change is not relevant in this context). An existing indicator that describes well this aspect is the hemeroby index. The hemeroby provides a measure of the anthropogenic influence on landscapes and habitats (Sukopp, 1976; Wrbka et al., 2004; Fu et al., 2006). Hemeroby increases with the increase of the human influence; gradients of human influence are assessed using a scale, in which the lowest values (ahemerob) correspond to “natural” or non disturbed landscapes and habitats such as bogs and the highest values (metahemerob) are given to totally disturbed or “artificial” landscapes and habitats such as artificial surfaces (Steinhardt et al. 1999). In the application on the rural-agrarian landscape the index expresses how much the pressure from agricultural management practices moves the state of the landscape away from the natural one.

Component 2 (aspect 2): The physical structure has been widely addressed in literature when analysing landscape composition and spatial pattern (McGarigal et al., 2002). In this specific case two aspects are particularly relevant: the internal structure and configuration of the rural-agrarian landscape, and the structure of such landscape in reference to the overall landscape matrix.

Component 3 (aspect 4): The implementation of an indicator targeting the appreciation of the rural-agrarian landscape at European level has been explored as a proxy of the interest/perception that society has for the rural-agrarian landscape. This involves the assumption that such interest can be demonstrated with the regulations on landscape protection and with the use and enjoyment that society makes of this type of landscape.

These three components complement each other in the description of the rural-agrarian landscape, but should not be merged in one single indicator, because the result would be difficult to disentangle, and that would need anyway the access to the underlying components in order to be understood.

The JRC proposal is therefore that the final indicator is structured in three components, addressing the three points mentioned above and namely: the degree of naturalness, structure and societal awareness of rural landscape.

3 Component 1 – Degree of naturalness

3.1 Concept

The natural potential of the agricultural land is addressed through the hemeroby concept. This is a measure of the degree of artificiality, i.e. the modification of the ecosystem from the potential natural condition due to human activities, and in this case it is seen as a measure of the “agricultural footprint” on the environment in terms of modification from the original (or potential) natural state.

The indicator is calculated not only for the rural-agrarian landscape, but an effort was made to provide the complete picture for all land cover types, so that the relation of agricultural practices in comparison to other transformations of land cover becomes more evident.

The hemeroby concept was developed in the 1950s in ecology by Jalas (Jalas, 1955), only later on it was extended to the whole geosphere (Blume and Sukopp, 1976). According to Sukopp (1976) the degree of hemeroby is "*an integrative measure of the impacts of all human interventions on ecosystems, whether they are intended or not. The degree of hemeroby is the result of the impact on a particular area and the organisms which inhabit it*", it increases with growing human influence (Steinhardt et al., 1999).

Based on the assumption that human interference with natural ecosystems basically leads to disturbance and is therefore altering the species composition from climax to earlier successional stages, the hemerobiotic state is assessed by estimating the magnitude of this deviation from the climax, described by the potential natural vegetation (Wbrka et al., 2004).

Data on hemeroby are given on an ordinal scale ranging from level 1 ('ahemerob'; i.e. no human impact) to level 7 ('metahemerob'; i.e. sealed soil, where the originally prevalent biocenosis is destroyed). Table 1 presents the original hemeroby classification.

Tab. 1 – Degree of hemeroby according to Blume and Sukopp (1976) and corresponding human impact of ecosystems (modified after Steinhardt et al., 1999; Zebisch et al., 2004)

Hemeroby value	Hemeroby level	Degree of naturalness	Example	Processes/Human impact
1	Ahemerobe	Natural	Bogs, tundra	No disturbance
2	Oligohemerobe	Close to natural	Forest with species typical for the site, semi-natural grasslands	Limited removal of wood, pastoralism, minor changes in matter circles, imissions through air and water
3	Mesohemerobe	Semi-natural	Forest with species atypical for the site, extensive grasslands	Clearing and occasional ploughing, extensive grazing, rare and small doses of fertiliser
4	β-euhemerobe	Relatively far from natural	Intensive grassland, extensive arable land	Use of fertilisers and biocides melioration, ditch drainage
5	α-euhemerobe	Far from natural	Intensive arable land	Deep plowing, planting, major changes in matter circle, drainage, heavy use of fertilizers and biocides
6	Polyhemerobe	Strange to natural	City green, golf courses, pits	Strong changes in biocenosis, covering of the biotope with external material
7	Metahemerobe	Artificial	Streets, buildings	Sealed surface, biocenosis destroyed

In more recent years the index was related to landscape and land cover types (Wrbka et al., 2004), and intended as a surrogate for land use intensity and a sustainability measure index for agricultural landscapes (Zechmeister and Moser, 2001; Fu et al., 2006).

For the application of the hemeroby concept to the landscape indicator, and on the basis of available data, the hemeroby scale has been revised in order to allocate with more detail broad categories of agricultural land uses (Table 2). The latter, in fact, are associated to hemeroby levels 2 to 5, and especially grasslands and arable land have a considerable overlap in level 4. The proposed revision splits levels 4 and 5 in two parts, so that grasslands can be associated to levels 2 to 4b (Aubrecht et al. 2001), ranging from "close to natural" for light management like transhumance to "relatively far from natural" when they are heavily managed and therefore composed by very few species; arable land is associated to levels 4a to 5b ("far from natural"), ranging from extensive cultivations (i.e. in the Mediterranean) to cereal monocultures. In any case grasslands do not exceed level 4b, and arable land level 5b.

Since the degree of hemeroby is the result of the impact on a particular area the value is associated to the reference area (cell) of a land cover map.

Tab. 2 – Degree of hemeroby – revised table

Hemeroby value	Hemeroby level	Degree of naturalness	Example	Processes/Human impact
1	Ahemerobe	Natural	Bogs, tundra, forest untouched by man or currently protected	No disturbance
2	Oligohemerobe	Close to natural	Forest with species typical for the site and diverse; semi-natural grasslands	Limited removal of wood, pastoralism, minor changes in matter circles, imissions through air and water
3	Mesohemerobe	Semi-natural	Forest with low species diversity and increasing presence of atypical species; extensive grasslands	Moderate modification of forest composition, clearing and occasional ploughing, extensive grazing, rare and small doses of fertiliser
4a	β-euhemerobe	Relatively far from natural	Forest dominated by species atypical for the site or with high presence of alien species[1]; annual crops associated with permanent crops (extensive), agro-forestry	Great modification of forest natural composition; use of fertilisers and biocides melioration, ditch drainage
4b			Intensive grassland, extensive arable land, olive groves with permanent vegetation cover	
5a	α-euhemerobe	Far from natural	Forest dominated by alien species; intensive arable land (short rotations), intensive vineyards	Substitution of natural with alien vegetation; deep plowing, planting, major changes in matter circle, drainage, heavy use

[1] A distinction is made between species whose distribution range is expanded beside the natural potential trough human activity either within the original geographical region (e.g. *Picea abies*), named "species atypical for the site", or outside, named alien species (e.g.: *Eucalyptus* spp.).

Hemeroby value	Hemeroby level	Degree of naturalness	Example	Processes/Human impact
5b			Cereal monocultures, rice fields and irrigated crops (intensive)	of fertilizers and biocides
6	Polyhemerobe	Strange to natural	City green, golf courses, pits	Strong changes in biocenosis, covering of the biotope with external material
7	Metahemerobe	Artificial	Streets, buildings	Sealed surface, biocenosis destroyed

3.2 Data

The data available for calculating the indicator are:

- the CORINE Land Cover 2000 raster dataset at 100 m resolution (CLC2000; JRC-EEA, 2005), using the third level of land cover classification;
- the dataset of mineral and organic N input and Livestock Unit density extracted from the HSMU[2] (Homogenous soil mapping units) module of CAPRI model (Britz and Witzke, 2008);
- the raster datasets of tree species coverage in Europe at 1 km^2 resolution, extracted from the AFOLU (Agriculture, Forestry and Other Land Uses) database (Köble, R. and Seufert, G., 2001);
- the Map of the Natural vegetation of Europe (Bohn, U. and Neuhäusl, R., 2000) at 1:2.500.000 scale, which displays the potential distribution of the dominant natural plant communities consistent with the current climatic and edaphic conditions;
- hemerobe state of land cover classes obtained from literature.

3.3 Methodology

The definition of the indicator for the different land cover classes was mainly based on literature review. Hemeroby classes are generally described qualitatively and through the human activities which have an impact on the ecosystem (Steinhard et al., 1999; Zechmeister, and Moser, 2001; Zebisch M. et al., 2004; Miklós et al., 2006; Reif and Walentowski, 2008; Rüdisser et al., 2012). In a few studies a direct match between CORINE land cover classes and hemeroby index was presented (Schleupner and Schneider, 2008; Csorba, 2009).

On the basis of a literature review, a value of hemeroby from 1 (ahemerobe) to 7 (metahemerobe) was assigned to CLC classes. Water bodies were not considered.

For agriculture, natural grassland and forest classes, the hemeroby classification was further improved starting from the definition found in literature, in order to take into account the intensity of land management. As a consequence, for each class a range of hemeroby values was identified (Table 3) corresponding to low-, medium- and high- intensity of management.

[2] the HSMUs represent homogeneous clusters of 1 km^2 pixels, identified on the basis of: Farm Structure Survey regions (NUTS 2 or 3, depending on the Member State, EUROSTAT 2003), land cover (CLC2000), soil mapping units (European Soil Database V2.0, European Commission, 2004) and slope according to the classification 0 degree, 1 degree, 2-3 degrees, 4-7 degrees and 8 or more degrees (CCM DEM 250, 2004).

Table 3– Hemeroby values for CLC classes. For agricultural land and forest the possible value range is given. (*)Exceptions: in case of alien species the value can be elevated to 5a, or in case of natural forest inside protected areas the value can be decreased to 1.

CLC code	HEMEROBY (expanded)	class
111	7	Continuous urban fabric
112	7	Discontinuous urban fabric
121	7	Industrial or commercial units
122	7	Road and rail networks and associated land
123	7	Port areas
124	7	Airports
131	6	Mineral extraction sites
132	6	Dump sites
133	6	Construction sites
141	6	Green urban areas
142	6	Sport and leisure facilities
211	4b-5a-5b	Non-irrigated arable land
212	4b-5a-5b	Permanently irrigated land
213	4b-5a-5b	Rice fields
221	4a-4b-5a	Vineyards
222	4a-4b-5a	Fruit trees and berry plantations
223	4a-4b-5a	Olive groves
231	3-4a-4b	Pastures
241	4a-4b-5a	Annual crops associated with permanent crops
242	4a-4b-5a	Complex cultivation patterns
243	4a-4b-5a	Land principally occupied by agriculture, with significant areas of natural vegetation
244	3-4a-4b	Agro-forestry areas
311	2-3-4a*	Broad-leaved forest
312	2-3-4a*	Coniferous forest
313	2-3-4a*	Mixed forest
321	2-3-4a	Natural grasslands
322	2	Moors and heathland
323	2	Sclerophyllous vegetation
324	2	Transitional woodland-shrub
331	2	Beaches, dunes, sands
332	1	Bare rocks
333	2	Sparsely vegetated areas
334	5a	Burnt areas
335	1	Glaciers and perpetual snow
411	2	Inland marshes
412	2	Peat bogs
421	2	Salt marshes
422	5a	Salines
423	1	Intertidal flats

Some assumptions had to be taken when assigning the hemeroby levels to the classes, keeping in mind that CLC provides a map of land cover and not of land use, therefore natural grasslands and sparsely vegetated areas can be grazed and especially for natural grasslands it is difficult to map with a reasonable degree of accuracy the sites where they are not grazed and should be assigned to level 1. Permanent crops are assigned to levels ranging from 4a to 5a because the soil is ploughed for their planting, but then the level depends from their management type: if they are associated with a permanent grassland cover they correspond to level 4a, to annual crops to level 4b, if the understory vegetation is regularly removed (like in intensive vineyards) to level 5a.

The intensity of management therefore plays a crucial role in the assignment of the hemeroby levels to the classes. It was estimated through the concentration of nitrogen input and livestock density, obtained from the HSMU dataset, as indicated in Table 4. Thresholds for the three degrees of intensity were established according to literature and expert opinion (Klimek et al., 2008; Kleijn et al. 2009). Since the distinction between class 3 and class 4 is substantial, because the first refers to a degree of naturalness "semi-natural" and the second to a "relatively far from natural", the threshold of 30 kg N/ha was selected, which is the one after which the majority of species is lost (Billeter et al. 2008; Kleijn et al., 2009). A second threshold was set at 150 kg/ha, in order to define highly intensive management. The thresholds set for livestock try to average values that in reality have a higher variability across the European environments; taking into consideration that extensive grazing livestock density can range from 0.1 LU/ha for the South Mediterranean environments to 0.7 in the Atlantic areas, a value of 0.5 LU/ha was selected as lower threshold, and 1.2 LU/ha as higher threshold dividing mid- from high-input. In a 1 km^2-cell grid layer, for every cell the degree of management intensity was calculated from both the nitrogen concentration and the livestock density. Then, the highest degree reached by at least one of the two parameters was assigned to the cells.

Table 4– Definition of the intensity of management degree according to Nitrogen input and Livestock density classes.

	Low input	Mid input	High input
N input (kg/ha)	>0-30	>30-150	>150
Livestock density (LU/ha)	>0-0.5	<0.5-1.2	>1.2

Forests are generally associated to oligohemerobe (2) and mesohemerobe (3) classes, but depending on the intensity of management hemeroby values can range from 1, for forest untouched by men, to 5a, for "artificial" forest of planted tree species not native to that site (Reif and Walentowski, 2008). We assumed then the range 2 to 4a as the "standard" hemerobe condition for forest, and we modified this range according to the management intensity.

Detailed data on the intensity of forest management are not available at European scale, therefore the information on spatial distribution and percentage of coverage of tree species from the AFOLU database was used as a proxy for the degree of naturalness and diversity of forest. In fact, it was assumed that the more the human management is intense the more the distribution of species is different from natural condition and the forest composition is homogeneous. Alien species plantations (e.g.: *Eucalyptus* sp., *Tsuga* sp.) represent extreme cases, and they can be assimilated to artificial areas.

Among the species represented in AFOLU database, we took into account the 26 most represented tree species (i.e. their total coverage reaching at least 1% of total forest or the maximum pixel coverage reaching 100%) and 9 alien species.

The following criteria were then applied for assigning hemeroby values to each species over its range of distribution:

- current spatial distribution compared to the map of potential natural vegetation: if the current distribution matched the potential one, the range 2-3 was assigned, otherwise a range 3-4a was applied;
- forest heterogeneity: within the range defined as explained above, hemeroby values were linearly related to the share of the species in forest cover for each 1 km^2 pixel, so that higher hemeroby values correspond to greater dominance of a single species;
- presence of alien species: alien species were accounted for in one category, and a range of 3-5a was applied, linearly related to the cover share;

Then, the maximum value out of the 27 information layers was assigned to each 1 km^2 pixel. According to this rule, within each pixel the hemeroby value is mostly influenced by the most represented species. In fact, the higher the share of one single species or of alien species or of species not distributed according to their current potentiality within each pixel, the more the maximum hemeroby value is high. The resulting rank was decreased of 1 point for the forests inside protected areas, on the assumption that in those areas the impact of current management could be low or absent, although the effect of the past management could still influence the degree of naturalness.

As both the HSMU and the AFOLU dataset have 1 km^2 resolution, the results obtained from these layers were resampled at 100 m resolution to match the resolution of the overall map.

Finally the CLC layer was reclassified according to the hemeroby information layers for all land cover classes (Figure 2).

In order to validate the results Annex II presents a detailed analysis of data and indices that can be related to the hemeroby.

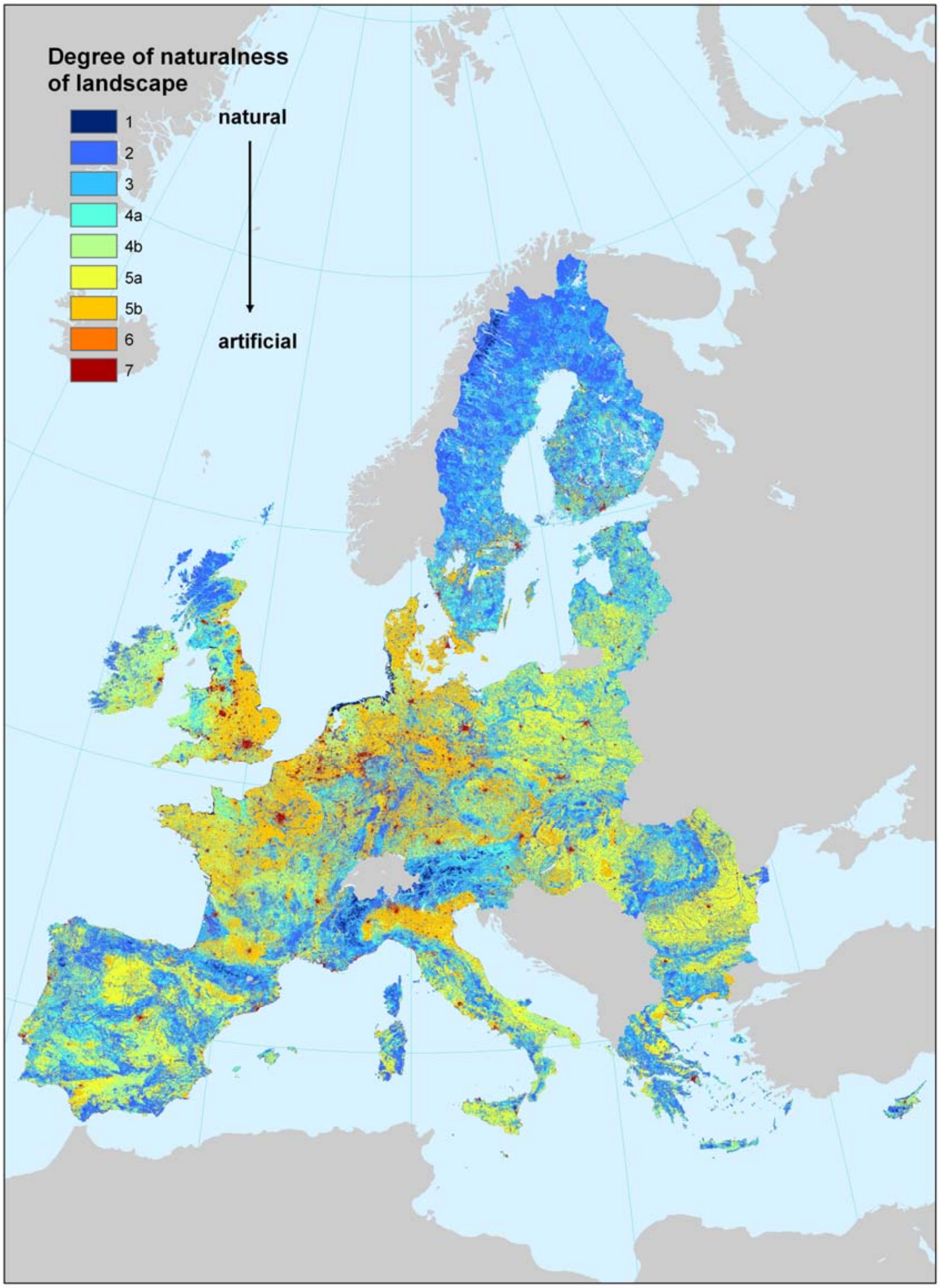


Figure 2-Hemeroby classification of European landscape based on the CORINE land cover raster layer (100 m resolution).

The final result shows areas where intensive crop production is located, and on the other hand where the impact of human activities on the degree of naturalness is lower. At this regard it should be noted that the degree of naturalness is related to land use intensity but there are slight differences between the two concepts, for example grasslands have hemeroby values lower than arable land (except in the case of sport facilities and golf courses) because cropland includes always a mechanical action on the soil, which brings the system further away from the natural state.

Table 5 shows the distribution of hemeroby levels within and among CLC classes, Figures 3 and 4 the distribution of values in agricultural land and forest, and within agricultural classes.

Table 5. Distribution of hemeroby levels

	Hemeroby levels (% within the CLC class)					
CLC CLASS	2	3	4a	4b	5a	5b
Agro-forestry areas		11.04	76.23	12.78		
Annual crops associated with perm			14.94	70.95	14.11	
Complex cultivation patterns			7.00	57.64	35.36	
Fruit trees and berry plantations			12.32	69.89	17.80	
Land principally occupied by agri			10.17	68.94	20.88	
Natural grasslands	12.59	71.71	15.69			
Non-irrigated arable land				4.05	55.19	40.75
Olive groves			8.63	87.95	3.43	
Pastures		4.64	42.99	52.37		
Permanently irrigated land				5.77	51.29	42.94
Rice fields				2.69	24.64	72.66
Vineyards			8.56	77.04	14.40	
% on total of all classes	0.68	4.78	11.44	28.47	34.16	20.47

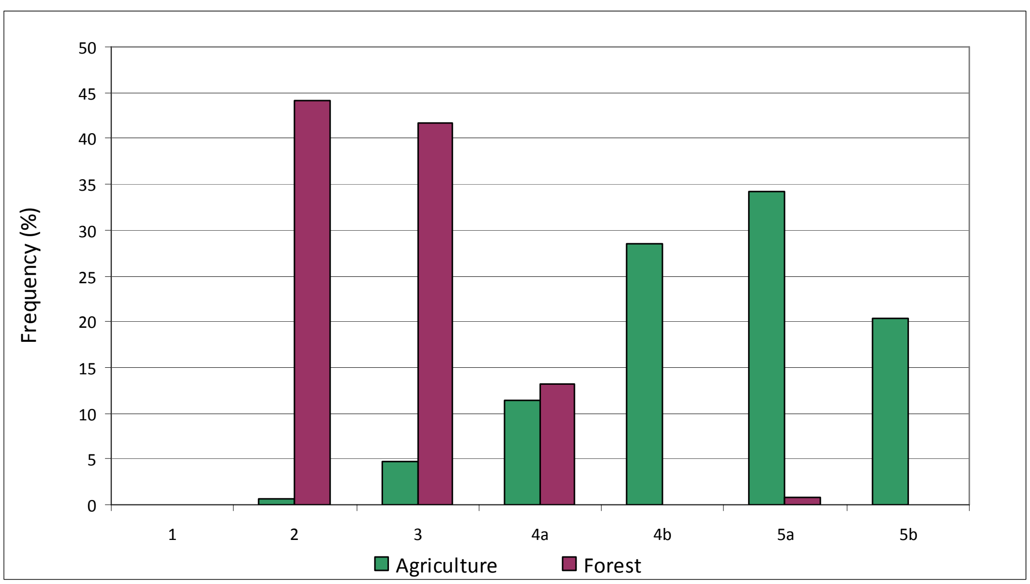


Figure 3. Distribution of hemeroby levels in agricultural land and forests

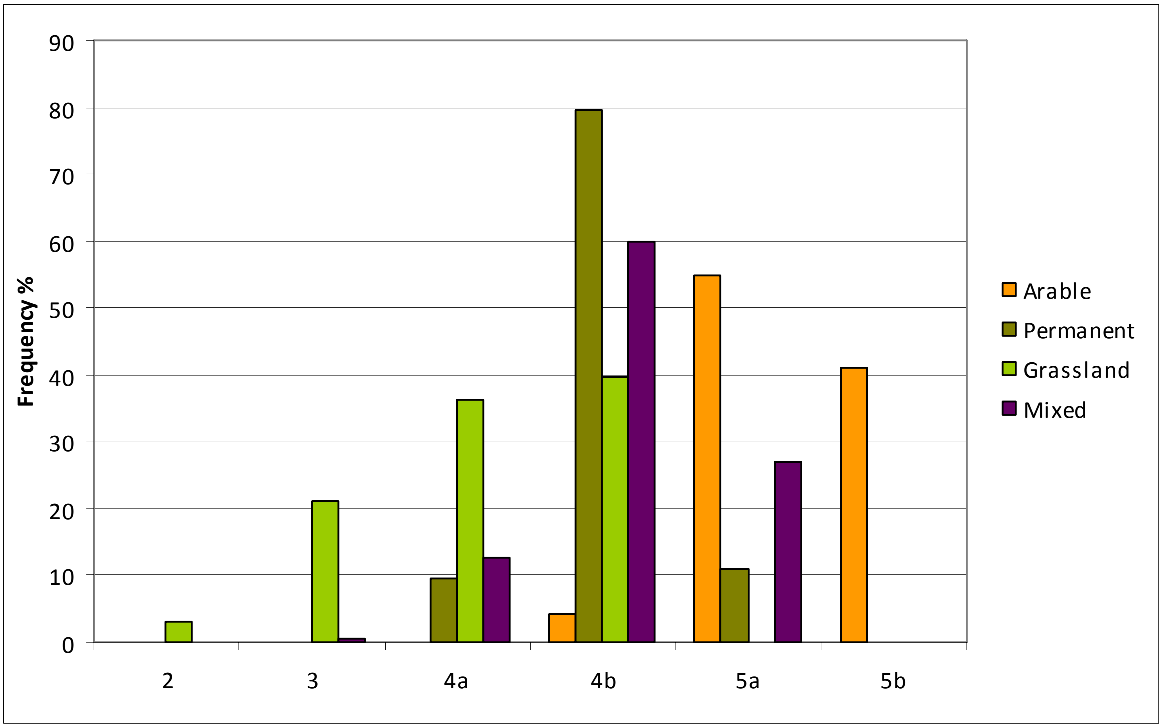


Figure 4. Distribution of hemeroby levels within agricultural classes

4 Component 2 – Physical structure

4.1 Concept

An indicator on physical structure describes the spatial organisation of different land cover types, plot size, fragmentation, diversity etc. as a product of (mostly agricultural) land management.

The theme has been widely addressed in literature when analysing landscape composition and spatial pattern. Many metrics have been proposed to characterise the landscape, however, literature also warns about their inappropriate use. In fact, issues related to spatial characteristics (scale) and thematic resolution could influence significantly the obtained results (Herzog and Lausch, 2001; Li and Wu, 2004; Bailey et al. 2007). On the basis of literature review three landscape structural characteristics were identified as relevant for the final indicator: composition, grain and diversity. The possibility of calculating them at the EU scale using appropriate indicators was explored, in order to provide one final indicator.

The current exercise aims at proposing an index that can communicate in an easy and understandable way how the rural-agrarian landscape is structured, therefore more complex indices like fractal dimension, Shannon, interspersion/juxtaposition etc. were discarded. The selection of the indices was linked to the idea that rather than through a composite indicator, landscape structure could be described through a frame in which both the internal structure of rural landscape per se, and the interaction of rural landscape with the contiguous landscape are represented. Such a solution is suited for an assessment to be performed at continental scale. In practice, a binary representation of landscape is analysed, consisting in two classes: agricultural and non-agricultural, with the assumption that what is classified in CLC under the agricultural classes is inherently mapping the rural-agrarian landscape in the wide sense. This includes CLC classes of heterogeneous agriculture such as "Land principally occupied by agriculture, with significant areas of natural vegetation". In this specific case agricultural land occupies between 25% and 75% of the total surface of the classified unit, but areas of natural vegetation do not exceed the minimum mappable area (CORINE Land cover - Part 2: Nomenclature, CEC 1994). It is then assumed that the overall landscape context refers to a rural-agrarian landscape type, rather than to a predominant semi-natural or natural landscape type. In the specific case of the application for the landscape indicator CLC mapping requirements clearly pose limitations to the possibility of detecting fragmentation at a higher level of detail. The other heterogeneous classes (Annual crops associated with permanent crops, Complex cultivation patterns and Agro-forestry areas) do not share the same problem, because in that case agricultural land is dominant. Figure 5 shows examples of the landscape addressed by the indicator.

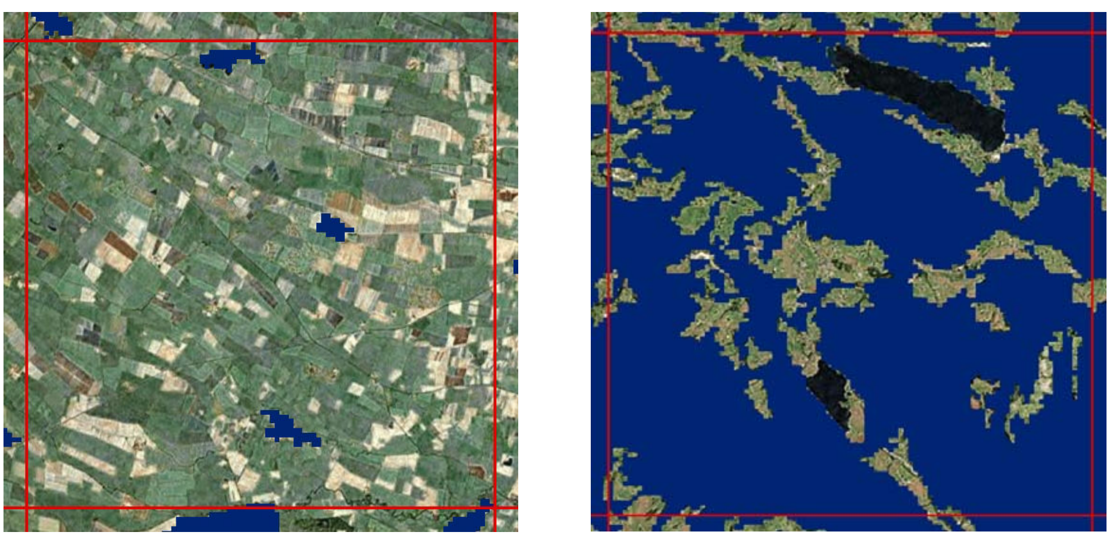


Figure 5. Examples of high dominance (left) and low-dominance (right) of the rural-agrarian landscape in the reference areal unit (10 km x 10 km). Non-agricultural areas are masked in blue, except water.

Given the constraints of available data, a few indices were identified which could provide information on the structure of the rural-agrarian landscape. Annex III describes the analyses carried out to get to the final selection of indices, consisting in the Largest Patch Index as a measure of agricultural landscape dominance and fragmentation in the matrix of non-agricultural background (McGarigal et al., 2002)., and the number of crop categories, which has been identified as a measure of agricultural landscape diversity. In Annex III a comparison between the number of crop categories provided by different data sources is presented, showing possibilities and limits of the exercise. Other indices are reported as well that are not retained in the final indicator, but provide further information on landscape structure. The metrics of landscape physical structure are usually calculated on a reference areal unit, which represents the landscape object of the study. In this case the indicator has to be calculated at continental level, and the reference areal unit that has been identified for its calculation is a 10 km x 10 km cell. This decision is arbitrary, but tries to address two relevant issues linked to data structure and landscape analysis: Corine Land Cover has a minimum mappable unit of 25 ha, therefore a unit large enough must be identified in order to obtain meaningful results, secondly, the reference unit refers in this case to an area that an average EU citizen can recognise as the object of daily surroundings. At 10 km grain, the EU27 is therefore split in about 47.000 cells, on the basis of a 10x10 km grid designed according to Inspire standard for reference grids (http://inspire.jrc.ec.europa.eu/documents/Data_Specifications/INSPIRE_Specification_GGS_v3.0.1.pdf).

A third dimension in the proposed frame should take into consideration either parcel size and/or the presence of linear elements in the landscape. Concerning parcel size, there is currently no information on parcel size available at the EU level, therefore this variable cannot be taken into account. Nevertheless, data on parcel size are collected on the whole of the Utilised Agricultural Area in the frame of the Land Parcel Identification System (LPIS) and have been made available to JRC for a EU NUTS2 region (Regione Lombardia). A comparison of information provided by LPIS data and other sources is presented in Annex III. In the case of linear elements, the possibility of using LUCAS transect data available in the 2009 survey has been explored, and is reported as well in Annex III. The size of the reference unit (100 sqkm) is not sufficiently large to contain a representative number of sampling points, also considering that only the rural landscape is analysed in this study, therefore this option has not been retained. LUCAS data, on the other hand, provide useful results if analysed on the total landscape and on a larger reference unit (i.e. NUTS2) as shown by Eurostat's study "Diversified landscape structure in the EU Member States" available at http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-11-021/EN/KS-SF-11-021-EN.PDF.

4.2 Data

The data available for calculating the indicator are:

- the CORINE Land Cover 2000 raster dataset at 0.1 km^2 resolution (CLC2000; JRC-EEA, 2005), using the third level of land cover classification;

- the dataset of crop share extracted from the HSMU (Homogenous soil mapping units) module of CAPRI model (Britz and Witzke, 2008), including 30 crop activities.

4.3 Methodology

The Largest Patch Index (LPI) quantifies the percentage of the identified landscape area comprised by the largest patch, and is therefore a simple measure of dominance (Fragstats metrics available at http://www.umass.edu/landeco/research/fragstats/documents/Metrics/Metrics%20TOC.htm). It is calculated as follows:

$$(1) \quad LPI = \frac{\max(a_{ij})}{A} * 100$$

a_{ij} = area (m^2) of patch ij (jth patch of the ith class)

A = total landscape area (m^2)

Unit of measure: percent

CORINE Land Cover 2000 dataset provides a good representation of agricultural areas in the matrix of natural vegetation and urbanised areas. The dataset was used for calculating the overall degree of dominance/fragmentation of rural-agrarian landscape by means of the Largest Patch Index (LPI).

The LPI was calculated for a 10x10 km cell grid covering the EU27. The CLC2000 raster dataset was split into 10x10 km raster squares, and then reclassified into two categories: "Agriculture", including agricultural classes and natural grasslands, and "background", including artificial areas, natural vegetation and water. LPI was then calculated for each 100 km^2 raster square using Fragstat 3.3. LPI ranges from 0 to 100 and is expressed as percentage. Following the above described protocol, LPI measures the extension of the largest agricultural patch in each cell, and thus the dominance and fragmentation of agricultural landscapes. Results are shown in Figure 6.

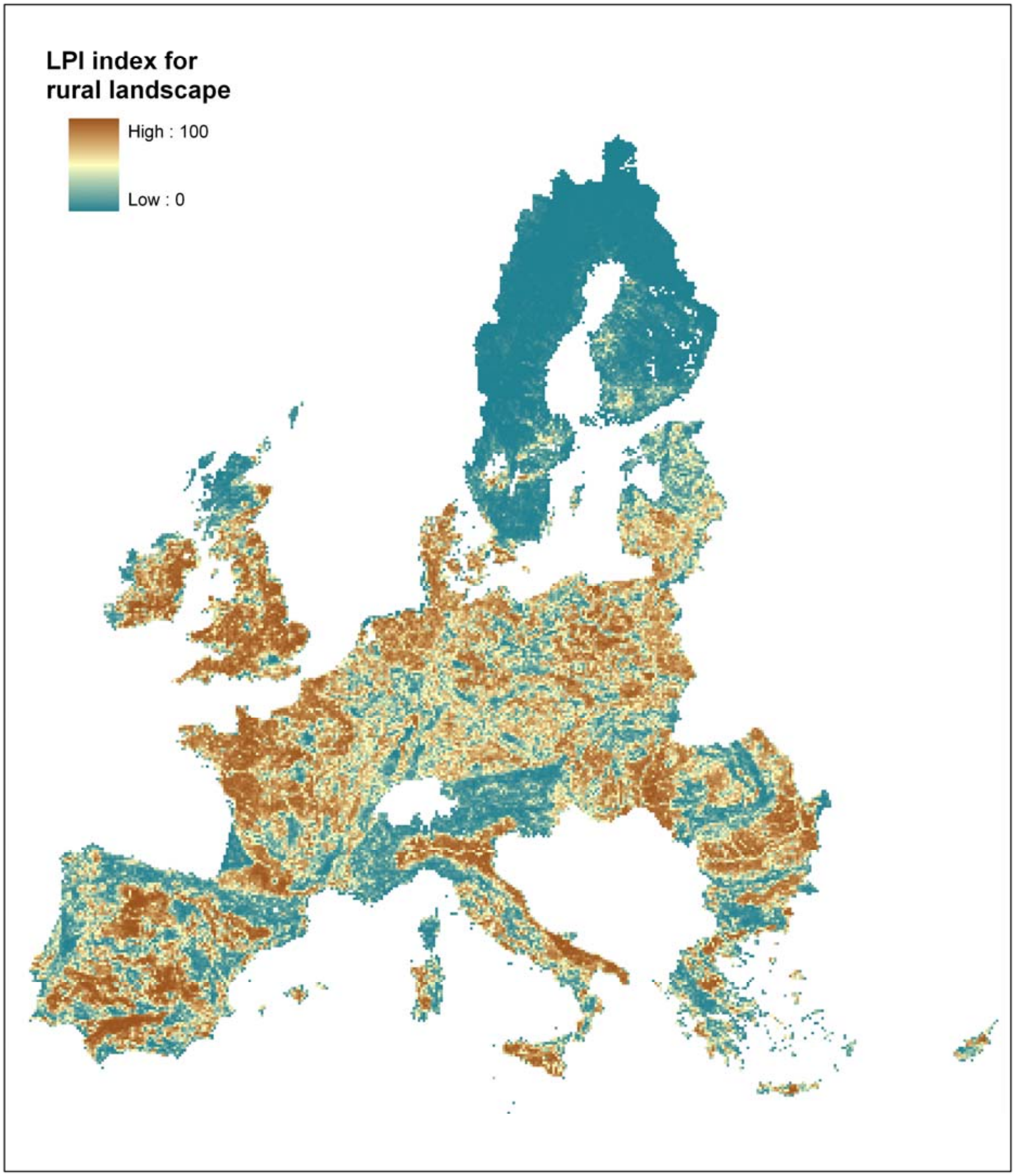


Figure 6. Largest Patch Index (%) of agricultural land calculated on CORINE2000 data

However, CLC2000 classification system does not give any information on the internal structure of rural-agrarian landscape due to crop diversity. The data on crop shares made available in the HSMU module of

CAPRI model, instead, allow an estimate of the share of 30 different crops at 1 km^2 cell resolution for the EU, and can be used to calculate crop diversity.

Likewise LPI, the number of crop categories was calculated for a 10x10 km cell grid covering the EU27. The CAPRI model allocates crops and estimates their share of UAA in the homogeneous soil mapping units (HSMUs), consistently with statistics at NUTS2 level[3]; the allocation is based on the LUCAS survey (http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/LUCAS_%E2%80%94_a_multi-purpose_land_use_survey). The 30 crop activities modelled in CAPRI were aggregated into 18 categories (Table 4): cereals, mais, paddy rice, rape, sunflower, legumes, textile fibres, other industrial crops, nurseries, flowers, vegetables, root crops, tobacco, fruits, citrus fruits, olives, grapes, grasslands. The categories were defined according to their significance from a landscape perspective (i.e. maize and rice are cereals, but there are substantial differences between the type of landscape they produce with respect to other cereals, the same applies to sunflower and rape among oilseeds). The information at HSMU level was aggregated at 10 kmx10 km grid resolution, assuming that crops available in each HSMU could be uniformly distributed within its area. Figure 7 shows the resulting map. The allocation of crop shares maintains unchanged NUTS2 totals (i.e. if the surface of a crop is added up within a NUTS2, the result matches FSS statistics). This causes "border effects" evident in some regions.

Table 4- Correspondence table between the 30 crop activities modelled in CAPRI and the 18 categories used in this study.

CAPRI CROPS	CATEGORIES	CAPRI CROPS	CATEGORIES
Soft wheat	Cereal	Apple	Fruits
Durum wheat	Cereal	Other fruits	Fruits
Rye and meslin	Cereal	Citrus fruit	Citrus fruits
Barley	Cereal	Olives for oil	Olive
Oats	Cereal	Table olives	Olive
Other cereals	Cereal	Table grapes	Grapes
Maize	Corn	Table wine	Grapes
Fodder Maize	Corn	Other fodder on arable land	Grass
Paddy rice	Paddy rice	Grass extensive	Grass
Rape	Rape	Grass intensive	Grass
Sunflower	Sunflower	Non food production on set-aside	Grass
Soya	Legumes	Fallow land	Grass
Pulses	Legumes	Set aside idling	Grass
Other oilseed	Text		
Flax and hemp	Text		
Other industrial crops	Other industrial crops		
Nursery	Nursery		
Flowers	Flowers		
Other marketable crops	Vegetables		
Potatoes	Vegetables		
Tomatoes	Vegetables		
Other vegetables	Vegetables		
Sugar beet	Root crops		
Fodder root crops	Root crops		
Tobacco	Tobacco		

[3] Nomenclature d'Unités Territoriales Statistiques, EC 2003

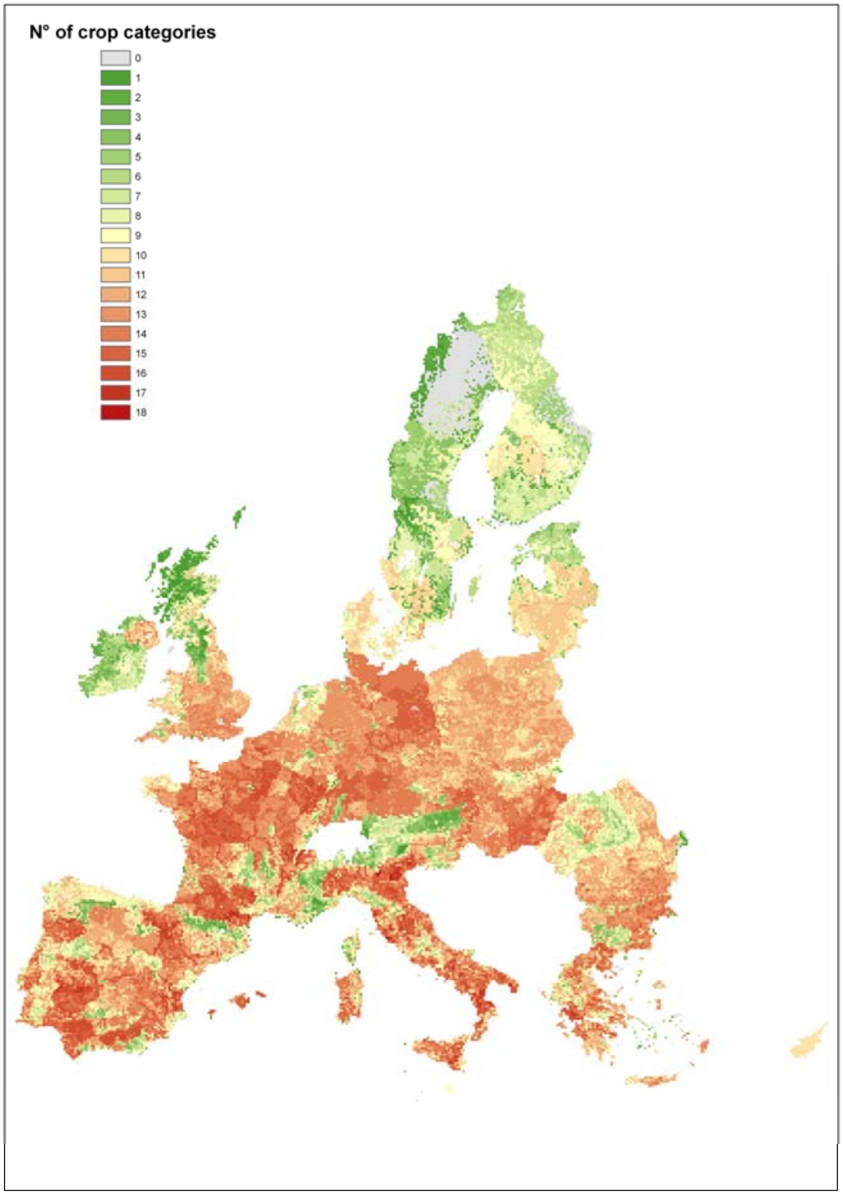


Figure 7. Number of crop categories relevant for landscape diversity

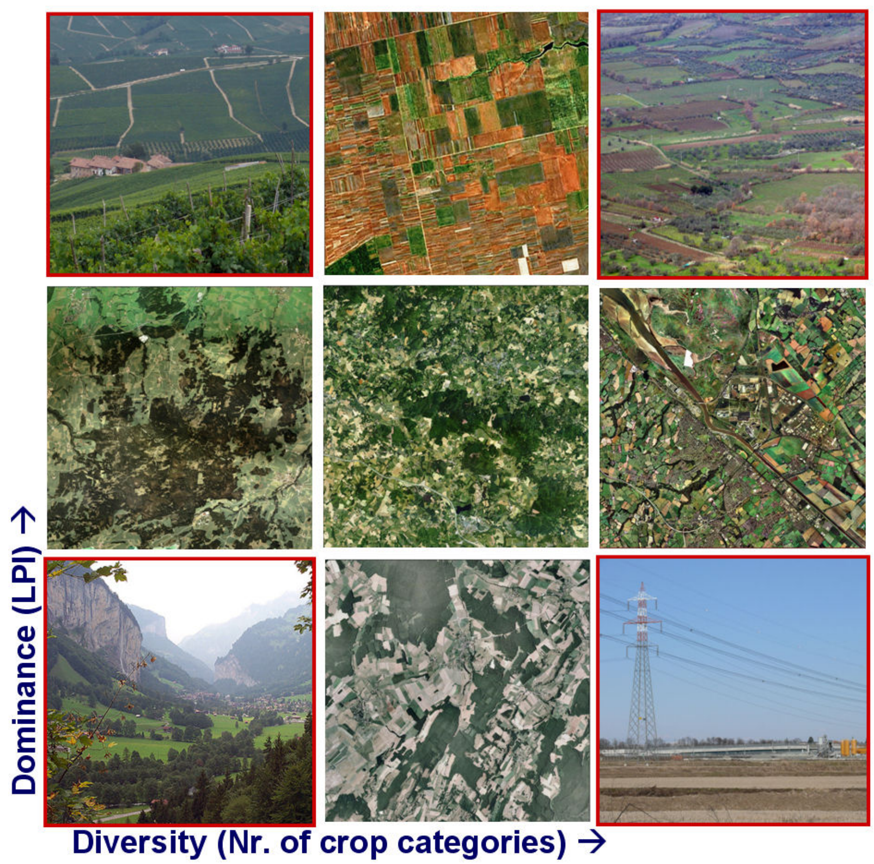
A bi-dimensional scheme was created in order to identify a limited number of structural classes that include a cross-combination of the two identified indices, can be of immediate understanding and easily monitored. The scheme is illustrated in Figure 8 a-b.

1-6 crop categories 67% < LPI< 100% Monoculture (e.g. rice fields, wine areas)	7-12 crop categories 67% < LPI < 100%	13-18 crop categories 67% < LPI < 100% Heterogeneous agricultural land
1-6 crop categories 34% < LPI < 66 %	7-12 crop categories 34% < LPI < 66 %	13-18 crop categories 34% < LPI < 66 %
1-6 crop categories 0% < LPI < 33 % Homogeneous scattered areas (e.g. Alpine pastures)	7-12 crop categories 0% < LPI < 33 %	12-18 crop categories 0% < LPI < 33 % Heterogeneous scattered areas (e.g. urban fringe)

Dominance/Fragmentation (LPI) →

Diversity (nr. of crops) →

a)



b)

Figure 8 - Diagram of the Dominance/Fragmentation and Diversity class cross-combinations (a) and examples of corresponding landscapes from in situ and satellite images (b).

Such a scheme allows the identification of the main types of rural-agrarian landscape in terms of structure. A low diversity and low dominance characterise in fact i.e. the alpine pastures in a forested context; a high dominance and low diversity clearly represents areas with a homogeneous landscape type (wine regions, rice fields, rough grazings etc.); high dominance and high diversity is a landscape where agriculture dominates but that is also characterised by a high internal variability of crops; high diversity and low dominance is typical i.e. of the urban fringe, where agricultural fields are scattered among other land uses and include many different cultivation types (Figure 9).

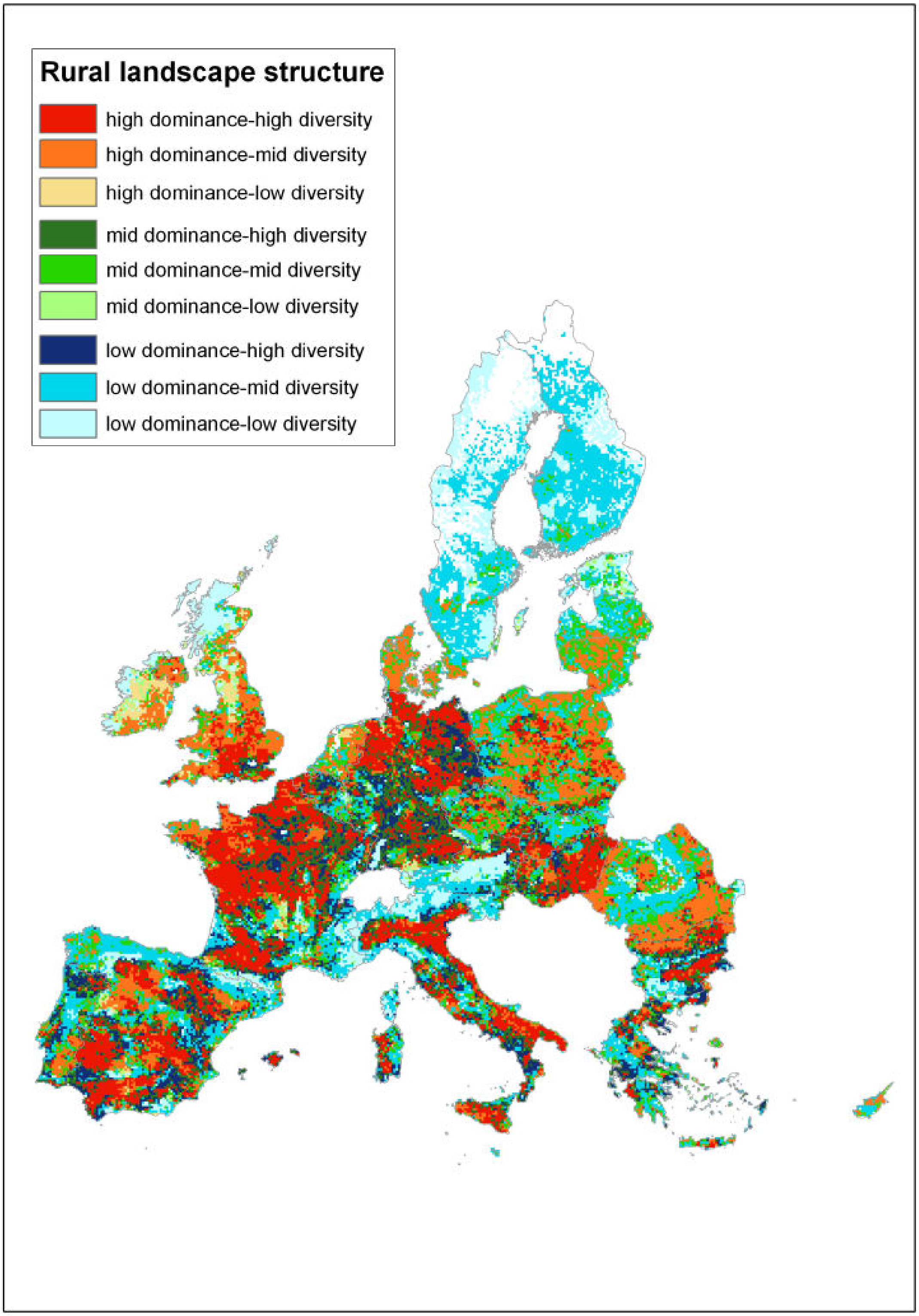


Figure 9. The indicator component on landscape structure resulting from the scheme in Figure 7

Though the index is relatively simple, it well depicts areas where agriculture is dominant, where it is fragmented, and where it is more or less homogeneous, showing the main trends at EU level.

It is worth stressing, though, the difference occurring when using the LPI and not i.e. the UAA as reference for the indicator. Figure 10 shows an example of this: the 10 km x 10 km square is classified as “low dominance/high diversity”. “Low dominance” means that the largest patch of agricultural landscape is smaller than 3333 ha, but that there may be other landscape patches smaller than 1/3 of the surface of the square. In this case agricultural land in terms of UAA covers a surface larger than 33% of the square (57%), but it is fragmented by other landscape types (i.e. natural, artificial). It is also worth noting that we consider in this exercise macro-fragmentation and not micro-fragmentation, because the data detail does not allow analysing the latter, but also because through the LPI we do not consider fragmentation within the rural-agrarian landscape, but fragmentation of a given landscape type (using land cover as a proxy) among other landscape types, therefore the reference unit must be large enough to represent a landscape. For this reason the decrease of dominance of the rural-agrarian landscape is considered to be starting at 1/3 of the reference unit (corresponding to a relatively large surface): because it is not a single patch that is taken into consideration, but a whole landscape type. Of course the geometry of the reference unit (a square) artificially produces patches by cutting out larger patches that are contained in neighbouring squares. The fact, though, that the geometry of CORINE in the updates remains constant unless a real change happens, will not produce artificial changes in the final result, given that the reference grid remains the same.

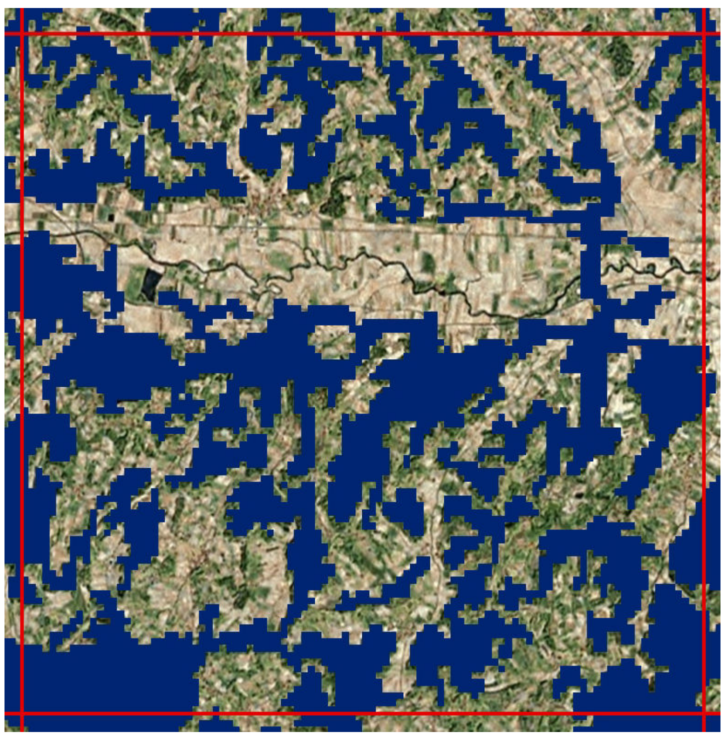


Figure 10 – An example of an area where the agricultural surface exceeds 50% but where fragmentation of the rural-agrarian landscape in the total landscape is high

The LPI was selected instead of the UAA because, besides dominance, is a proxy for fragmentation. The share of the UAA in a cell may explain dominance, but not fragmentation. The two indices are anyway correlated and the use of UAA remains an option, as shown in Appendix III, where the difference between the two indices is explained in more detail.

5 Component 3 – Societal awareness of rural-agrarian landscape

5.1 Concept

It is not possible, in the context of a EU wide assessment, to address the relation society → landscape through valuation methods at local level (surveys, enquiries etc.), therefore the interest that society has for the rural-agrarian landscape is modelled with the assumption that it can be indirectly demonstrated through the use of proxies. The idea is that collective actions produce measurable outcomes, and that if there are a sufficient number of variables measuring different aspects of the interaction of society with landscape, then the overall link can be represented through a composite indicator, which measures how society reacts to values broadly attached to the landscape, respectively through public or private initiatives (Paracchini et al., 2010; Paracchini et al. 2011). A sufficient basket of basic indicators is then needed to reflect the variability of behaviours and traditions across Europe; it is not necessary, in fact, that regions score high in all indicators (this is likely to happen in the highlights of societal appreciation for the rural-agrarian landscape), but it is sufficient that at least one indicator is capturing the main expression of such appreciation in a region.

The components of the composite indicator have been identified on the basis of existing data, and try to cover complementary themes that describe the way society interacts with the rural-agrarian landscape. Such three ways are:

- society protects valuable landscapes that are considered as a common resource;
- it uses and enjoys the natural capital providing a recreational service;
- it consumes the products of the landscape and provides a market for such products sufficiently steady to guarantee the subsistence of the market itself, of the community providing the product and therefore, indirectly, of the associated landscape (Gauttier 2006).

The link indicator-landscape in the first two components is straightforward. Protected areas provide public benefits, in terms of i.e. offering possibilities for outdoor recreation, nature and wildlife protection, safeguard of landscape beauty, therefore they can be used as proxy for the interest that society demonstrates for landscapes or habitat types. Consequently, the presence of protected areas in the rural-agrarian landscape has been identified as a component of social awareness of such specific landscape.

Tourism is clearly a sign of enjoyment of/interest for the landscape type identified as the goal of the visit. Of course there are caveats to be taken into account when trying to identify which parameter should be used in the indicator composition, and these are explained in 5.3.

The third component, concerning quality products linked to specific landscape types has been identified since it surrogates multiple interests: the one of society for good food, the one of the local community who wants its products to be recognised, the one of farmers who need to earn a living from their activity but who, in this case, get a recognition for the added value of their products. Such recognition is demonstrated both by the specific interest of the consumers, and the fact that the market of the product (often one single product) provides an income. The link to landscape is not straightforward in all cases, as explained in 5.3, but in the cases when this exists, then quality products can be regarded at the same time as products of a landscape, and custodians of that landscape (Mattiacci and Zampi, 2004). In fact, without a specific landscape and related management practices products lose their specific character (Vandecandelaire et al, 2009; Arfini et al, 2010). This applies to food and wine. A nice example of the link product-landscape is shown by the label in Figure 11.

Figure 11. Label of PDO wine (courtesy of CasalFarneto winery)

This is a label of a wine produced in central Italy, the design reminds of the hills where it is produced, and the caption reads "*Casalfarneto is located in the heart of Marche region, in a land rich in history and natural beauty, characterised by medieval towns, gentle hills and century-old oaks, from which the name and the logo of the farm derives*". This is just one out of many examples that can be found in the market of local products. Quality products have very often representations of the landscape where they are produced on the label, but the link with those landscapes can be much stricter: in many cases products cannot exist without related landscapes (i.e. honey produced in Spanish Dehesas, cheese and butter in Alpine pastures, olive oil from traditional olive groves in the Mediterranean, quality wines in wine regions etc.), in this sense the product is the "custodian" of the landscape (e.g. http://ec.europa.eu/agriculture/capreform/wine/potential/index_en.htm#vineyard).

Furthermore, the production of quality food has been reinforced by the EC Quality Package, which puts in place for the first time a comprehensive policy on certification schemes, value-adding terms for agricultural product qualities, and product standards, covering the different facets of quality, from the compliance with minimum standards to the production of highly specific products (http://ec.europa.eu/agriculture/quality/policy/quality-package-2010/index_en.htm).

5.2 Data

Data available to calculate proxies for the three identified components are:

- protected area dataset derived from: a) Natura 2000 vector dataset (EEA); b) European nationally designated areas vector dataset (EAA); c) IUCN category V - World Protected Areas; and d) World Heritage Unesco sites related to agricultural landscape;

- the Farm Structure Survey (FSS) declarations for "Tourism as other gainful activity". The data refer to all activities in tourism, accommodation services, showing the holding to tourists or other groups, sport and recreation activities etc. where either land, buildings or other resources of the holding are used. This is currently the most complete dataset on tourism specifically occurring in rural areas. Data are not complete or missing for the following regions: Eastern and South Western Scotland, Highlands and Islands in the United Kingdom and Île de France in France;

- The Farm Accountancy Data Network (FADN) for what concerns the field "receipts of tourism, including returns from board and lodging, campsites, cottages, riding facilities, hunting and fishing and excluding value of products produced on the holding used for catering";

- the DOOR database of the products under the EU labelling system for PDO (Protected Denomination of Origin) and PGI (Protected Geographical Indication) (EC, DG Agriculture, http://ec.europa.eu/agriculture/quality/door/); although, wines are now included in the PDO/PGI labelling scheme, this dataset does not contain information on wine yet;

- the E-Bacchus database of European wines (EC, DG Agriculture, http://ec.europa.eu/agriculture/markets/wine/e-bacchus/);

- the inventory of wine produced under the VQPRD scheme (Vin de Qualité Produit dans des Régions Déterminées) , corresponding to the PDO/PGI scheme (EC, DG Agriculture, http://ec.europa.eu/agriculture/markets/wine/prod/inventaire.pdf)

5.3 Methodology

Protected areas: The first component of the composite indicator is the share of agricultural area in protected and valuable sites, specifically Natura 2000 sites, European nationally designated areas, World Heritage Unesco sites related to agricultural landscape, and category V - World Protected Areas. Many sites were included in more than one dataset, and so a unique database was built in order to avoid redundancy. Agricultural areas were extracted by CLC 2000 taking into account all agricultural classes and the class "Natural grassland".
The index represents the share of the agricultural area within the protected sites, calculated on the basis of CORINE2000 land cover map and aggregated to NUTS2 regions.

The surface of CLC agricultural classes has been identified as the reference surface for standardisation of this component. This choice was driven by the fact that the subject of the analysis in the final indicator is the rural-agrarian landscape and the index should put in evidence such areas and not the overall landscape. Through such a standardisation, more weight is given the analysed landscape type, and small patches of valuable landscape are put in evidence in the scoring system particularly when the rural-agrarian landscape is not dominant in the region (i.e. if all agricultural areas of a region containing a small share of agricultural land were protected, these would get the maximum score even if they are not the dominant landscape type).

The procedure to build composite indicators requires that the various components are made adimensional, so that they can be summed up in the final indicator avoiding the error of adding variables with different units of measure. This occurs by rescaling the original values to a reference scale. In this case the reference scale is the 0-10 scale (Figure 12a), where the upper (10) and lower (0) limits correspond to the upper and lower limits of data distribution. The applied equation is the following:

(1) $I_{rescaled} = (I_{norm} – I_{min}) / (I_{max} – I_{min}) * 10$

Where:

$I_{rescaled}$ is the result of the rescaling and final value of the index

I_{norm} is the result of the normalisation on the UAA (in the case of quality products this is the sum of the two components on food and wine)

I_{min} is the minimum value of the population of I_{norm} calculated at NUTS2 level

I_{max} is the maximum value of the population of I_{norm} calculated at NUTS2 level

The decision to always refer to the minima and maxima of data populations in the rescaling procedure could be questioned, given that in some cases data distribution shows higher frequencies in the lower range of the scale. None of the values, though, could be fully considered an outlier, so no threshold for rescaling was set in order to ease the replication of the procedure when new data become available.

Tourism: a thorough analysis of availability of data on tourism has shown that there are no homogeneous data available on tourism in rural-agrarian settings at the EU level. Information exists, though, on farm activities related to tourism, in both the EU farm surveys FSS and FADN. Such variables are the number of holdings having Tourism as "Other gainful activity", by NUTS2 regions in the FSS, and " receipts of tourism, including returns from board and lodging, campsites, cottages, riding facilities, hunting and fishing and excluding value of products produced on the holding used for catering" in the FADN. FADN data are provided as the weighted average value, calculated from the sample of surveyed farms, of total receipts from. Such data do not represent all tourism in rural areas, but are considered relevant since they represent tourism specifically linked to farm multifunctionality, and as such can be indicators of change in farm management. FSS data were available for the years 2000, 2003 and 2005, and as the data were not statistically different among the years, the last available date was chosen in every country. In FADN data were generally available for the years from 2000 to 2008. However, data were not available homogeneously for all FADN regions and years, therefore one reference year could not be identified and the mean value of the index over the available years was calculated for each region. As the index is the average value per farm, it was not normalised on a reference surface, as in the case of the other components.

FADN regions do not coincide with the reference areal unit identified for this study (NUTS2), therefore NUTS regions were spatially overlapped to FADN regions, in order to assign the index associated to the FADN region to the corresponding NUTS2 region (i.e. if a FADN region is composed by two NUTS2 regions, both of the latter will receive the corresponding index derived by FADN because it is not possible to re-allocate the value within the regions).

FSS data have been standardised to the UAA, and then both indices (FADN and FSS) have been rescaled in the range 0-10 according to equation (1).The two indices provide complementary information on rural tourism, so the final index for each region was calculated as their average value. The final result was rescaled once more to the 0-10 range by applying equation (1), in order to match the characteristics of the other two components of the indicator, both rescaled on the same range (Figure 12b). For few regions only one index was available, which was then taken into account in the final score.

FSS data are missing for the following regions: Eastern and South Western Scotland, Highlands and Islands in the United Kingdom and Île de France in France). FADN data are not available/fully reliable for Spain, Romania and Bulgaria.

Quality products: The EU schemes known as PDO (protected designation of origin) and PGI (protected geographical indication), which promote and protect names of quality agricultural products and foodstuffs (http://ec.europa.eu/agriculture/quality/schemes/index_en.htm) have been identified as a harmonised source of information for quality food.

The registers contain names of agricultural products and foodstuffs, the names and scheme logos can only be used to describe authentic product corresponding to the specification laid down. In this way, the EU schemes identify and protect the names of quality agricultural products and foods. The PDO is used for products with a strong link to the defined geographical area where they are produced; a PGI denotes a products linked to a geographical area where at least one production step has taken place (EC, MEMO/11/84 http://ec.europa.eu/agriculture/quality/schemes/index_en.htm).

For what concerns wine it has been assumed that there is a strict link between Quality Wines and the quality of the landscape where these are produced (Mattiacci and Zampi, 2004). The surface of quality wines under the VQPRD scheme per Nuts2 region has been accounted for in the indicator.

The two indices (for food and wine) were calculated separately and then aggregated. This is necessary since they are expressed in different units of measure.

Since not all products under PDO/PGI schemes have a specific link with landscape a screening was done on the basis of the following criteria:

1. the product itself creates a specific landscape (i.e. vineyards, olive groves, etc.);

2. the production area is characterised by a particular landscape (i.e. montados, bocages, alpine meadows, maquis, etc.);
3. the production is explicitly related to the preservation of the landscape's characteristics;
4. the production is the result of a traditional management of rural landscape.

Selected products are reported in Annex IV, together with an analysis of trends in registrations.

Data on the number of VQPRD wines were only available at Member State level from E-Bacchus database. Alternatively, for Nuts2 regions data on the production surface (ha) were used, derived by the "Inventory of quality wines produced in specified regions". The two components (food and wine) were then standardised on the UAA, rescaled in the range 0-10 by means of equation (1) and summed. The result had to be rescaled once more to the 0-10 range in order to match the range of variation of the other two components (Figures 12c and 12d).

UAA at NUTS2 level has been identified as the reference surface for standardisation of this component. This choice was driven by the fact that the subject of the analysis in the final indicator is the rural-agrarian landscape and the UAA provides a good proxy (though underestimated) for its regional extension. Furthermore data are regularly collected and published by EUROSTAT. Such values are considered a proxy because they do not include common lands and other components of the rural-agrarian landscape such as hedges, patches of forest or semi-natural vegetation etc.

Composite indicator:

The three indices were summed up to the final indicator which ranges potentially from 0 to 30 (Figure 12e)., and in the current exercise reaches a maximum value of 20. The reasons why the regions score high can be very different: some have a high rate of protected agricultural area (e.g. Rhein regions and Baden-Wuttemberg), some have a high number of certified products (e.g. Provence-Alpes-Côtes d'Azur in France, Norte in Portugal), some have a high number of farms declaring relevant revenue from tourism activities (e.g.Toscana, Tirol and Salzburg). On the other hand it can also happen that some regions (e.g. Burgenland in Austria) have a high score because they reach medium results in all indicators. The Swedish region Övre Norrland scores high because its agricultural land is contained in protected areas and the value of the indicator is normalised on the UAA, therefore small areas may get high values (meaning that society is aware of their value according to the identified criteria). Clearly the indicator would greatly benefit of data on the production surfaces of quality products, rather than number of labels. This would express the real value of the landscape in the frame of the indicator, and would not penalise areas where one product is available from a very large surface.

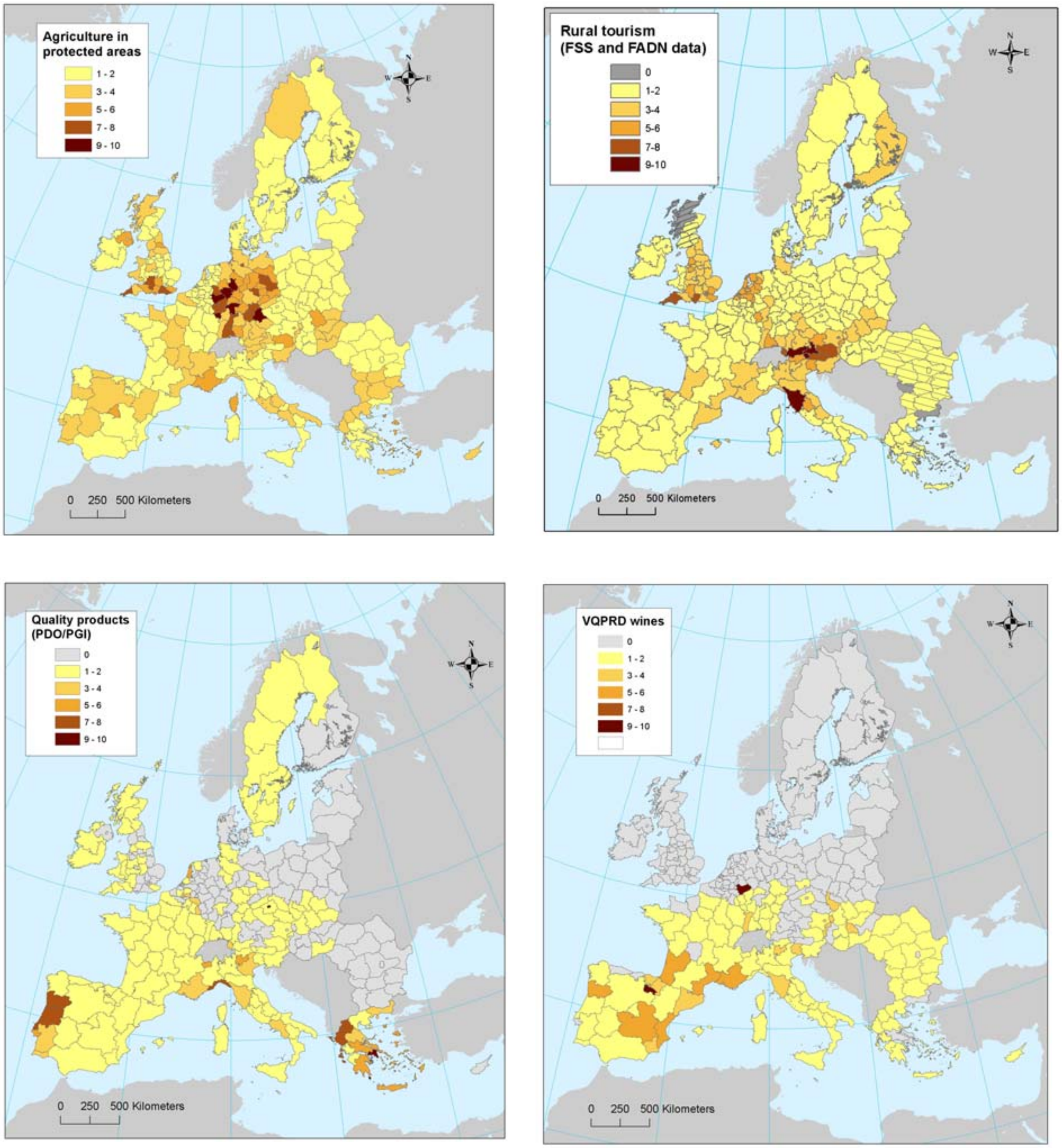


Figure 12a (upper left). Rural-agrarian landscape in protected sites index (standardised and rescaled)

Figure 12b (upper right). Rural tourism index (rescaled). Shadings indicate regions where FSS or FADN data are not available.

Figure 12c (lower left). Quality products – food (standardised and rescaled)

Figure 12d (lower right). Quality wines (standardised and rescaled).

In order to ease readability the figures share the same legend, though this does not make the internal variation of values evident, which are in some cases distributed with higher frequencies in the first two classes.

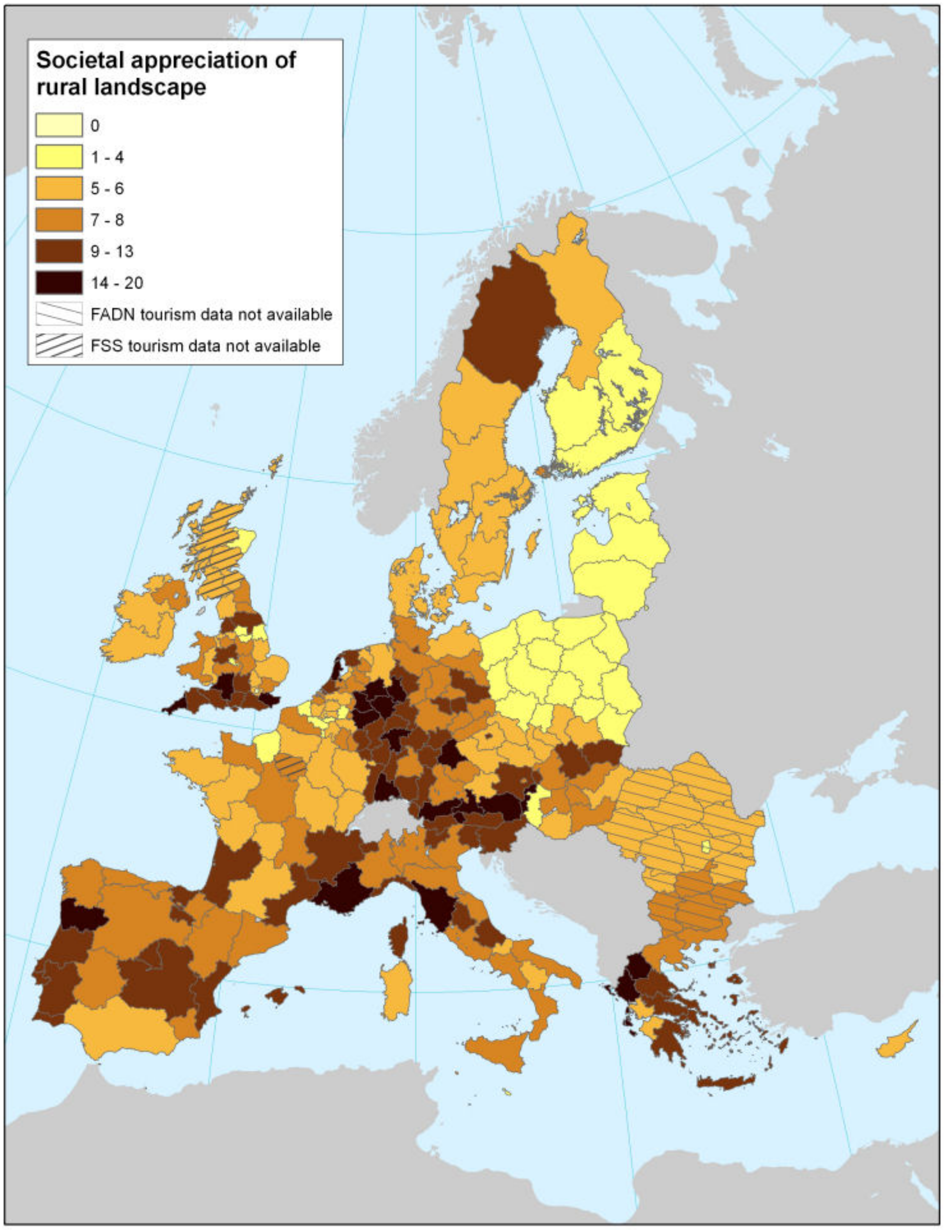


Figure 12e. Distribution of societal appreciation of the rural landscape per NUTS2 region in Europe, as calculated according to a combined proxy indicator, including, per reference area, total protected agricultural area, farm units with income derived from tourism, and quality products with a link to landscape management

The index in Figure 12e represents a first attempt to address the issue of the interaction of societal groups with the rural-agrarian landscape. This solution has been explored because a component including the link between landscape and its users is necessary at this stage, since in the end citizens are the recipients of EU policies, but EU-wide surveys targeted to appreciation of the rural landscape are not existing and unlikely to be carried out in the near future. Therefore a top-down approach (via indicators and proxies), rather than a bottom-up approach (via surveys) is adopted.

The approach is novel and still in need of further developments, and at this stage several questions may arise from the conceptual frame put in place to derive the indicator. These cannot be addresses in full in the present report, but a thorough analysis of the conceptual frame and methodological development is presented in the complementing EUR report "Measuring societal awareness of the rural-agrarian landscape: indicators and scale issues" (Paracchini et al, 2012) which addresses in detail assumptions, data, scaling issues. Results show that this is a way worth pursuing. The method is in fact suited to be applied at different scales, once the boundary conditions are made clear and relevant components are identified.

6 Conclusions

The conclusions on the indicator presented in this report can be drawn on the basis of the results achieved and the methodology presented.
From the point of view of the description of the EU rural agrarian landscape, results show that it is possible to synthetise the dominance-diversity pattern among Member States (Figure 13), the frequencies of distribution of hemeroby values in the rural-agrarian landscape (Figure 14) and the contribution of each of the three components to the total societal awareness indicator (Figure 15).
Results show that:
- the rural-agrarian landscape is the most diffuse typology among European landscapes, covering half of the EU surface;
- the rural-agrarian landscape is dominating the overall landscape in 34% of the European territory, and is showing a low degree of fragmentation, being mainly structured in large-medium patches (size>3300ha). Moreover, in terms of diversity 37% of the landscape is highly diverse and only 14% is characterised by low diversity;
- agriculture is the land use that mostly contributes to changes in the degree of naturalness of the European landscape (57% of the rural-agrarian landscape is far from natural conditions);
- social awareness of the rural landscape, measured according to the surface of protected agricultural areas (for ecological and/or scenic values), farm tourism and number of quality products linked to landscape, is medium to high in 111 NUTS2 Regions, and medium to low in 149 NUTS2 Regions .

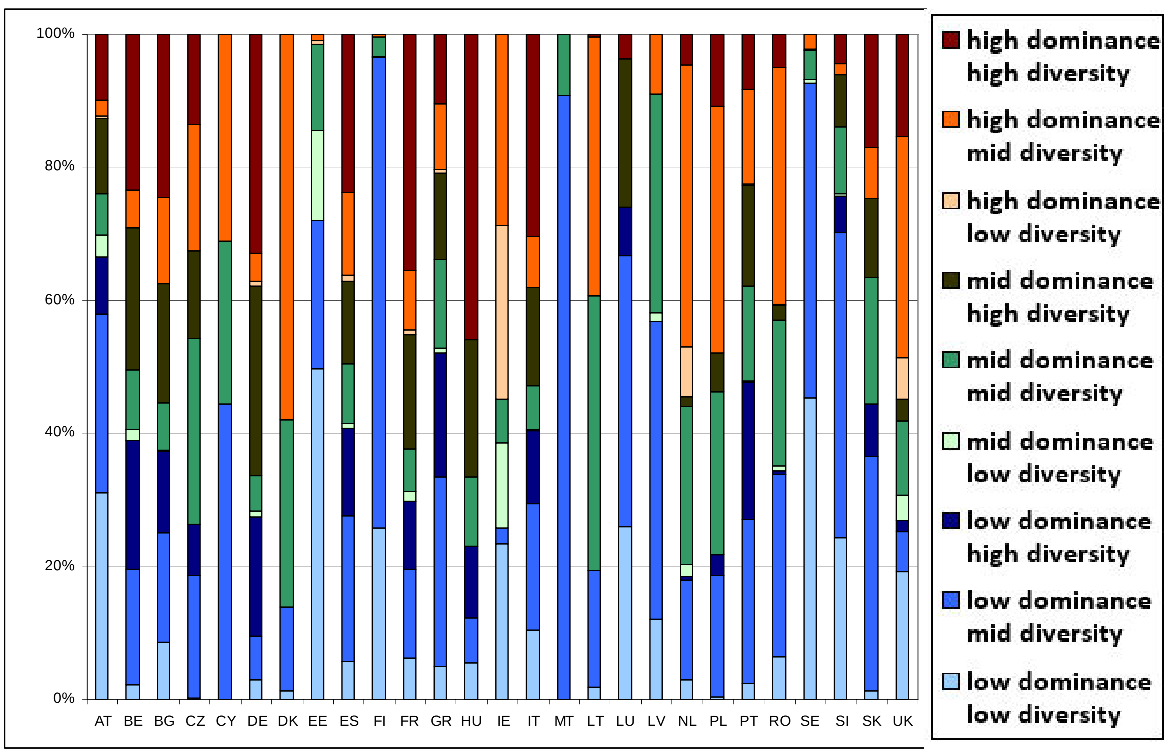


Figure 13. Structure of the rural-agrarian landscape in MS, according to the degree of dominance of agricultural land use and its diversity in terms of number of crops

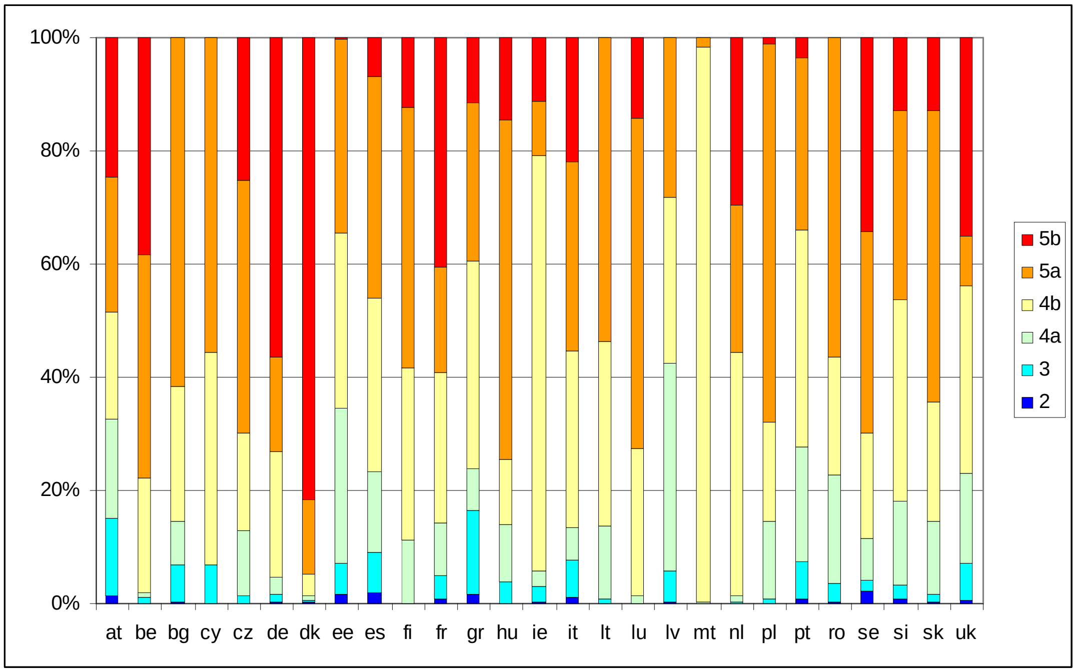


Figure 14. Frequencies of hemeroby classes in rural-agrarian landscape in EU Member States (disaggregated CAPRI data not available for Malta and Cyprus, average values for agricultural classes have been applied)

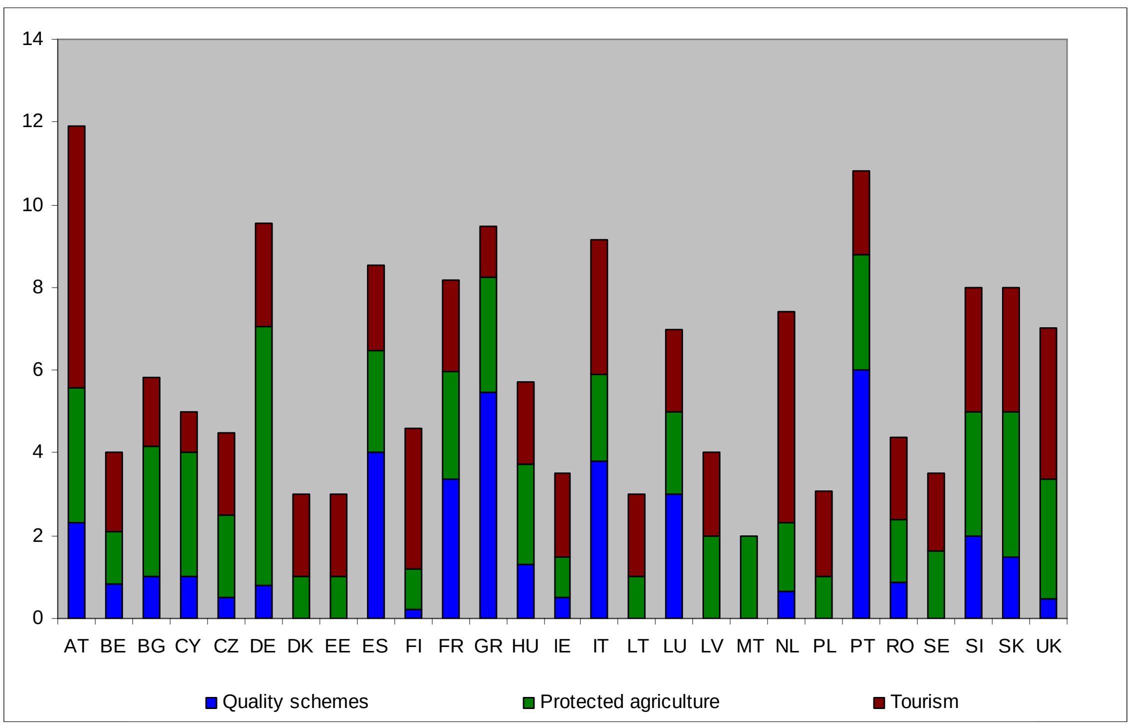


Figure 15. Contribution of the three components to the total social awareness indicator (average value by country)

In order to show how dynamic such components can be, the number of quality products selected for the indicator was calculated for 1996 - 2005 and 2006 – 2009 time periods. In the final indicator such numbers are normalised by UAA and then rescaled, therefore differences are levelled proportionally to the minimum and maximum number of products per UAA hectares in all NUTS2 regions (Figure 16). Currently Eastern Countries are characterised by low scores, this does not mean that their landscapes do not have high aesthetic qualities, but rather that having entered the EU in 2004 their tradition concerning i.e. EU quality schemes still has to consolidate. In this sense there is much room for improvement, trends are positive as shown in Appendix IV.

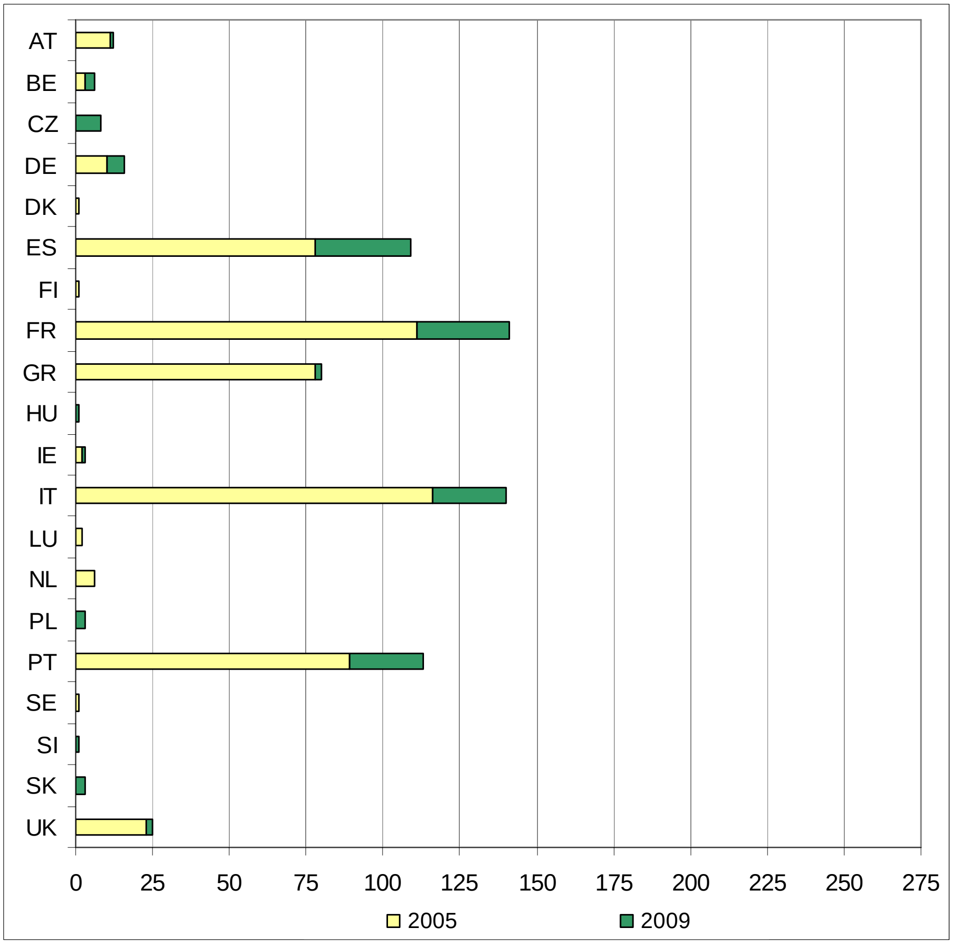


Figure 16. Temporal variation in the number of products under PDO/PGI schemes linked to landscape management per Member State.

Results obtained so far show that identified components can be calculated on the basis of data available at EU level. Obviously a certain degree of approximation has to be taken into consideration, so as the awareness that there are relevant landscape characteristics that cannot be represented in the final indicators, like parcel size or the presence of linear elements, either because the data are not publicly available (e.g. as in the case of IACS data), or because EU surveys do not provide information applicable on a small unit of reference (i.e. for linear elements). In other cases proxies must be used, for example for tourism, or in the case of quality products that are accounted for using the number of labels and not the corresponding hectares (which would constitute a direct reference to the size of landscapes where production takes place). In this sense the current exercise can also be interpreted as the possibility of highlighting the lack of appropriate data to the statistical offices (both at Member State and EU level).

The hemeroby classification represents the first attempt to produce a map of naturalness for the whole of the EU. Results clearly show that agriculture is by far the human activity that impacts the most on landscapes, changing the natural state to different ecosystems. This is not necessarily harmful for the environment (see the High Nature Value farmland concept), and the resulting map, used in a monitoring framework, allows the identification of areas where overall management pressure (not deriving from agricultural practices only) is increasing or decreasing. Whether this is beneficial or potentially harmful can only be assessed with an integrated analysis of the other indicators in the agrienvironmental framework.

The indicator component on structure is –overall- the most consolidated, given the amount of existing literature on landscape structure/fragmentation. The way the two basic indices are composed, though, represents a new attempt to characterise the rural landscape.

The component on societal awareness of the rural landscape is the most novel one. It is provided through a relevant methodological effort to address the issue of landscape valuation at the EU level (Paracchini et al., 2010; Paracchini et al., 2011 and 2012). Since there is no relevant bibliography to support the analysis of results, it is important to understand, from a conceptual point of view, what is really measured in the results. Firstly, it must be underlined that these should not be regarded to as expressing individual preferences. They rather express a synthesis of the actions that society as a whole takes when it deals with the rural-agrarian landscape. The index therefore illustrates the awareness that society has of the rural-agrarian landscape, because such awareness causes feedback (protecting, visiting, enjoying, buying). Results show the level of interest that society has for the rural landscape, regardless of the intrinsic value of the landscape itself. The index therefore does not represent a judgement, and as such it must not be read associating the concept of "good" to high scores and "bad" to low scores, it is just an analysis of the awareness that society has of the rural landscape measured according to a set of indicators that does not increase or diminish the intrinsic value of the landscape itself.

Lastly, it is should be noted that though the indicator on landscape state and diversity is built on the basis of a self-standing methodology, its optimal use consists in reading the information it provides in the context of the frame of which it is part and in a monitoring routine. When periodically calculated, the indicator can highlight hotspots of changes in the rural-agrarian landscape, and by building storylines based on the information provided by the present and other agrienvironmental indicators listed in the COM(2006)508 landscape dynamics can be fully assessed.

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Annex I - Framework of Agrienvironmental Indicators – COM(2006)508

Domain/ sub domain	Indicator
RESPONSES Public Policy	1.Agrienvironmental commitments 2.Agricultural areas under Natura 2000
RESPONSES Technology skills	3.Farmers' training levels and use of environmental advisory services
RESPONSES Market signals and attitudes	4.Area under organic farming
DRIVING FORCES Input use	5.Mineral fertiliser consumption 6.Consumption of pesticides 7. Irrigation 8. Energy use
DRIVING FORCES Land use	9.Land use change 10.Cropping/ livestock patterns 11.Farm management practices
DRIVING FORCES Trends	12. Intensification/ extensification 13. Specialisation 14.Risk of land abandonment
PRESSURES Pollution	15.Gross nitrogen balance 16.Risk of pollution by phosphorus 17. Pesticide risk 18.Ammonia emissions 19. Greenhouse gas emissions
PRESSURES Resource depletion	20.Water abstraction 21. Soil erosion 22.Genetic diversity
PRESSURES Benefits	23.High Nature Value Farmland 24. Production of renewable energy
STATE/IMPACT Biodiversity and habitats	25.Population trends of farmland birds
STATE/IMPACT Natural resources	26. Soil quality 27. Water quality
STATE /IMPACT landscape	28.Landscape – State and diversity

Annex II - Hemeroby Index validation

There are two ways to assess the accuracy of the hemeroby layer: by considering the accuracy of the input data used to build the layer, and by using external data as reference, such as indicators related to naturalness, in particular indicators of water quality, landscape complexity and wild species abundance. Both options are presented here below.

Input data

CORINE Land Cover 2000: CLC2000 data covering 18 countries of Europe (3.4 million km2) were validated by means of LUCAS survey [4]. Two kinds of method were applied:

• automatic comparison of CLC2000 codes and LUCAS LU and LC codes from more than 100000 SSUs. The percentage of agreement was 4.8 ± 0.6 %.

• reinterpretation of Image2000 data from more than 8200 LUCAS PSUs based on ground photographs and LUCAS LU and LC codes. The percentage of agreement was 87.0 ± 0.8 %. (European Environment Agency. The thematic accuracy of CLC 2000 , Assessment using LUCAS, 2006 — 85 pp.).

AFOLU : To assess the accuracy, the map results for the species were compared with the national forest statistics. The percentage of the "differently classified forest area" was calculated for each country. The values range between 6% for the Czech Republic and 41% for the UK. On a European level the "differently classified forest area", calculated as a forest area weighted average of the individual country values, amounts to 13.4%.

HSMU: Disaggregation of data at HSMU level is consistent with statistics for Nuts II. Therefore accuracy of the process was tested reaggregating data from HSMU at Nuts III and comparing the results with statistics at Nuts III where these are available. The share of misclassified crops at Nuts III varied widely among European regions, ranging from 1.7 to 33 % (Britz and Witzke 2008).

Hemeroby index and eutrophication index

The Nitrates Directive (91/676/EC) aims to reduce water pollution by nitrate from agricultural sources and to prevent such pollution occurring in the future. The Directive requires Member States to identify polluted waters and apply Action Programme measures (see Annex III) throughout their whole territory or within designated Nitrate Vulnerable Zones (NVZs). In order to designate and revise NVZs, a water monitoring programme must be established and repeated every four years. The eutrophic state of surface freshwaters, estuaries and coastal waters needs to be reviewed and reported every four years (Article 6). Inherently, eutrophication is considered as a process wherein enrichment of aquatic systems by nutrients, usually phosphorus and nitrogen compounds, causes an imbalance between the processes of algal production and consumption. Therefore, it is assumed that eutrophication necessarily involves the observation of adverse ecological changes in relation to the anthropogenic nutrient enrichment and that it can apply to waters from anywhere within the trophic spectrum.

Data collected from Member States are merged and harmonized in a unique dataset at JRC-IES, therefore data on the eutrophic state are available for 7610 sampling points in Europe.

In order to compare eutrophication and hemeroby indices, we converted the qualitative eutrophic state definition into numerical ranks from 1 to 5, as reported in table II.1. Although we could not expect a linear correlation between the eutrophication and the hemeroby index, we expected that the more the action of human activities has produced changes from pristine condition in the landscape, the more the eutrophication process could be marked.

[4] The thematic accuracy of Corine land cover 2000. EEA Technical report No 7/2006. Assessment using LUCAS (land use/cover area frame statistical survey)

While applying this method one should take into consideration that we are comparing processes that occurred at different time and in different time periods. Furthermore, eutrophication is a process that mainly concern water, while in the hemeroby assessment we consider the degree of disturbance of other natural elements, i.e.: soil, animals, vegetation.

Table II.1- Definition and ranking of eutrophication index and comparison with hemeroby index.

Eutrophic state	Ranks	Hemeroby	Index
Ultra-oligotrophic	1	Metahemerobe	7
Oligotrophic	2	Polyhemerobe	6
Mesotrophic	3	α-euhemerobe	5a, 5b
Eutrophic	4	β-euhemerobe	4a, 4b
Hypertrophic	5	Mesohemerobe	3
		Oligohemerobe	2
		Ahemerobe	1

Assigning water quality values to single areas is a complex issue, since they can refer to surfaces of different size. Therefore for comparing the observed data with the hemeroby index obtained in this study, we used the following approach. We created a buffer area around each water quality survey point, then we calculated the median values for the hemeroby index in the buffer areas and finally we calculated the correlation between the hemeroby values and the eutrophic ranks in the buffer areas. We applied this method both for 1km- and 5km-radium buffer areas.

RESULTS

The described method was applied to the hemeroby index first for the rural landscape only and then for the entire landscape. The analysis was carried on at European scale, using all the available survey points.

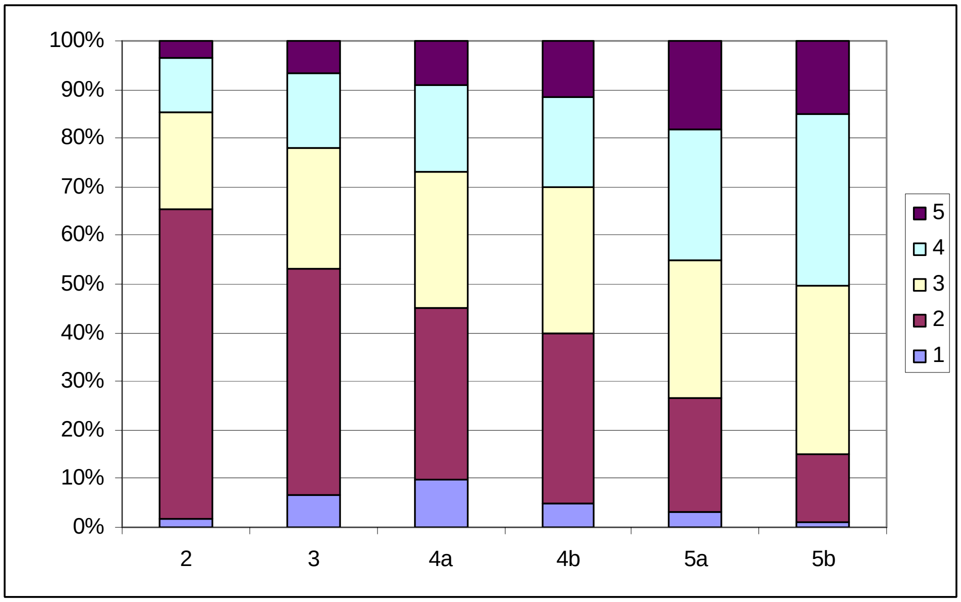
Similar results were obtained using either 1 km or 5 km buffer areas for the calculation of the hemeroby median values.

Analyzing the rural landscape only, we observed that low values of eutrophication index are more frequent for low values of hemeroby index and vice versa (Figures II.1a, II.2a).

In the analysis of the entire landscape a different trend was observed. In this case, also urban areas are taken into account, which have the highest values of hemeroby (6 and 7). However, in these classes the trend of the distribution of values for the eutrophication index is inverted and is more similar to the condition of mid-intensity management (Figures II.1b, II.2b).

Buffer 1 km

a)



b)

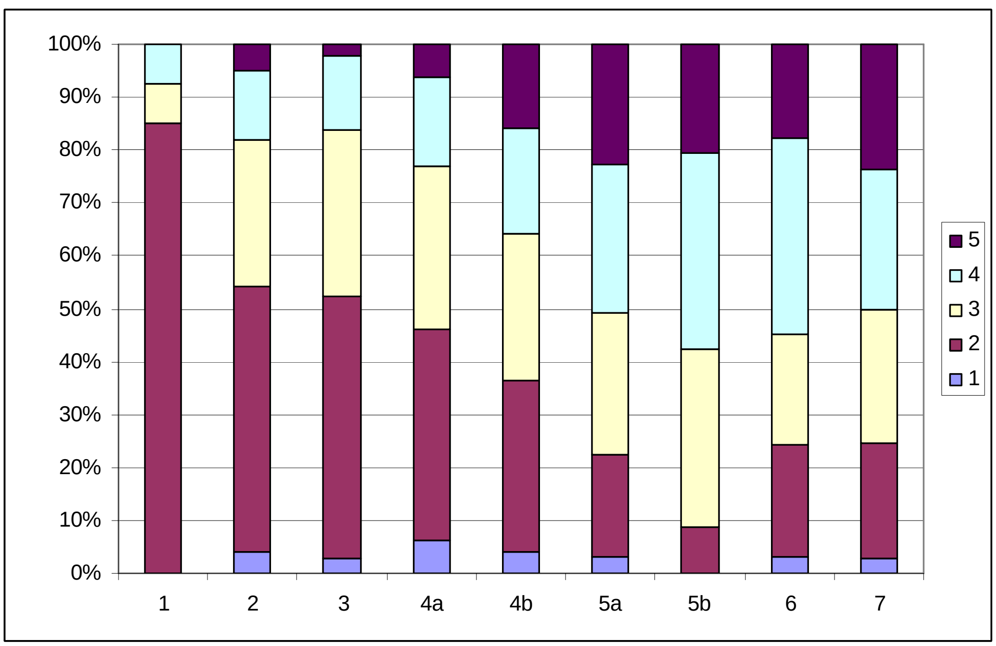
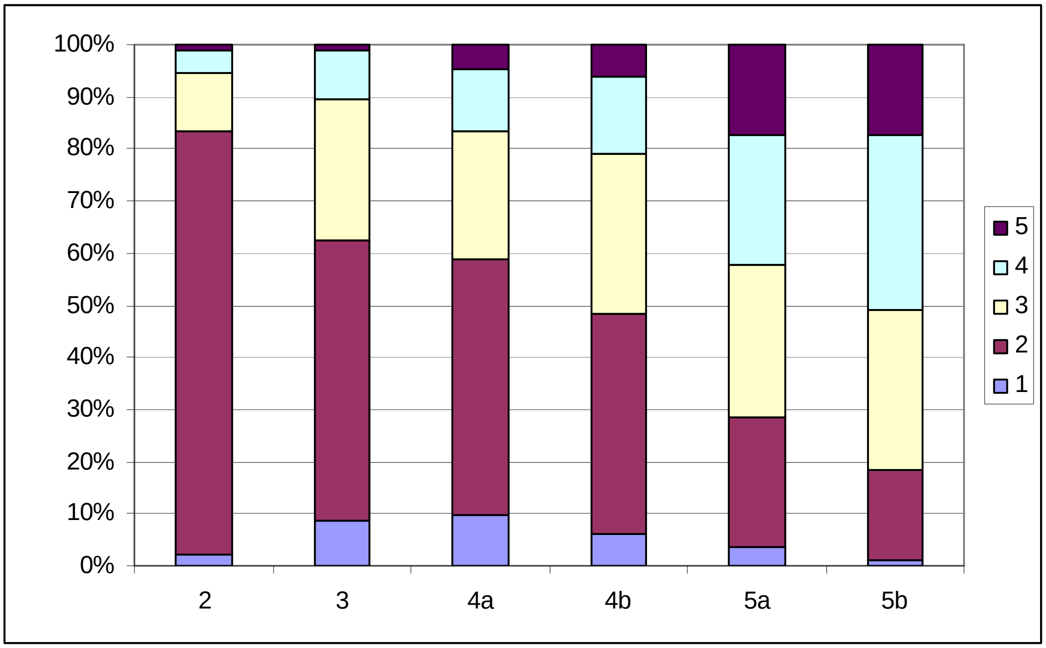


Figure II.1- Distribution of eutrophication index values in the hemeroby classes: a) hemeroby calculated only for agricultural land cover classes, b) hemeroby calculated for the entire landscape.

Buffer 5 km

a)



b)

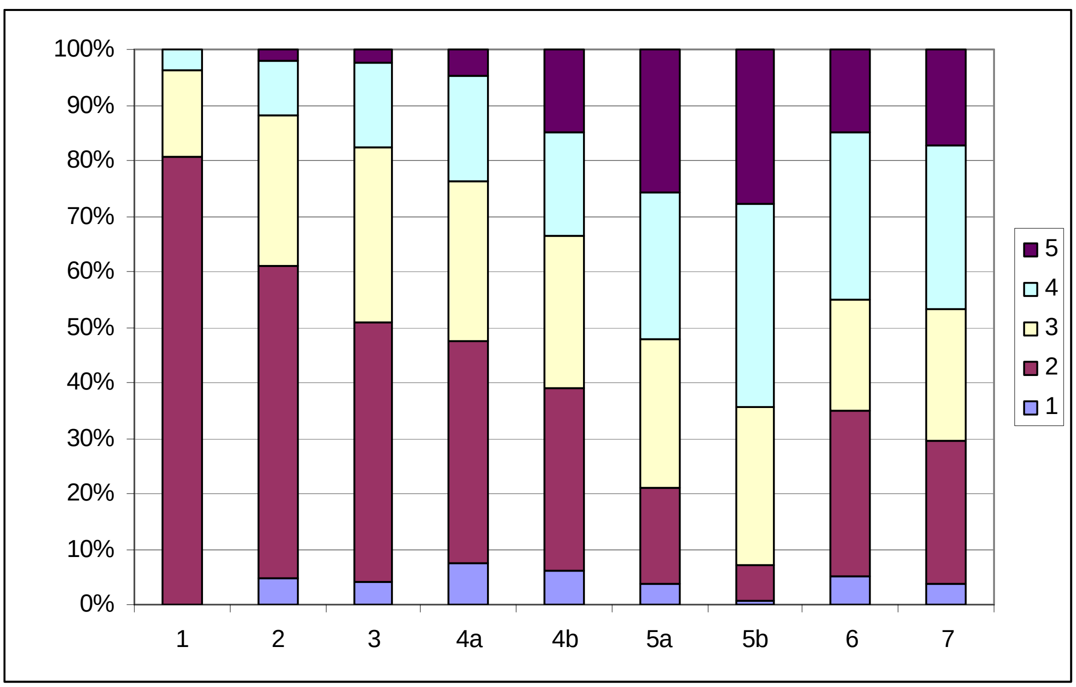


Figure II.2- Distribution of eutrophication index values in the hemeroby classes: a) hemeroby calculated only for agricultural land cover classes, b) hemeroby calculated for the entire landscape.

Hemeroby and landscape metrics

Various studies suggest that the rate of landscape transformation is a function of land-use intensity (Alard and Poudevigne, 1999; Hietala-Koivu, 1999; Mander et al., 1999; Odum and Turner, 1989), and that the geometric complexity of a landscape in particular decreases with increasing land-use intensity accompanied by a decrease of habitat heterogeneity and an increase of production units

(Wrbka et al. 2004). Agricultural land generally shows regular patterns caused by modern cultivation methods (Krummel et al., 1987; Moser et al., 2002). At the European scale, single landscape metrics react differently depending on land cover (Renetzeder et al., .2010). Wrbka et al. (1998) showed that for several Austrian cultural landscapes there is a significant influence of the hemerobiotic state on the shape of landscape elements, expressed by the area weighted mean shape index (McGarigal and Marks, 1995).

FRAGSTATS (McGarigal and Marks, 1995) computes several metrics that quantify landscape configuration in terms of the complexity of patch shape. Most of these shape metrics are based on perimeter-area relationships. However, the simple perimeter-area ratio index varies with patch size, i.e. two patches with the same shape but different size have a different index value. Shape index (SHAPE) corrects for the size problem of the simple perimeter-area ratio index by adjusting for a square standard. Another basic type of shape index based on perimeter-area relationships is the fractal dimension index. Fractal dimension index (FRAC) reflects shape complexity across a range of spatial scales.

The two metrics are calculated according to the following formula, and their values increase as the shape of the patches becomes more irregular and convoluted:

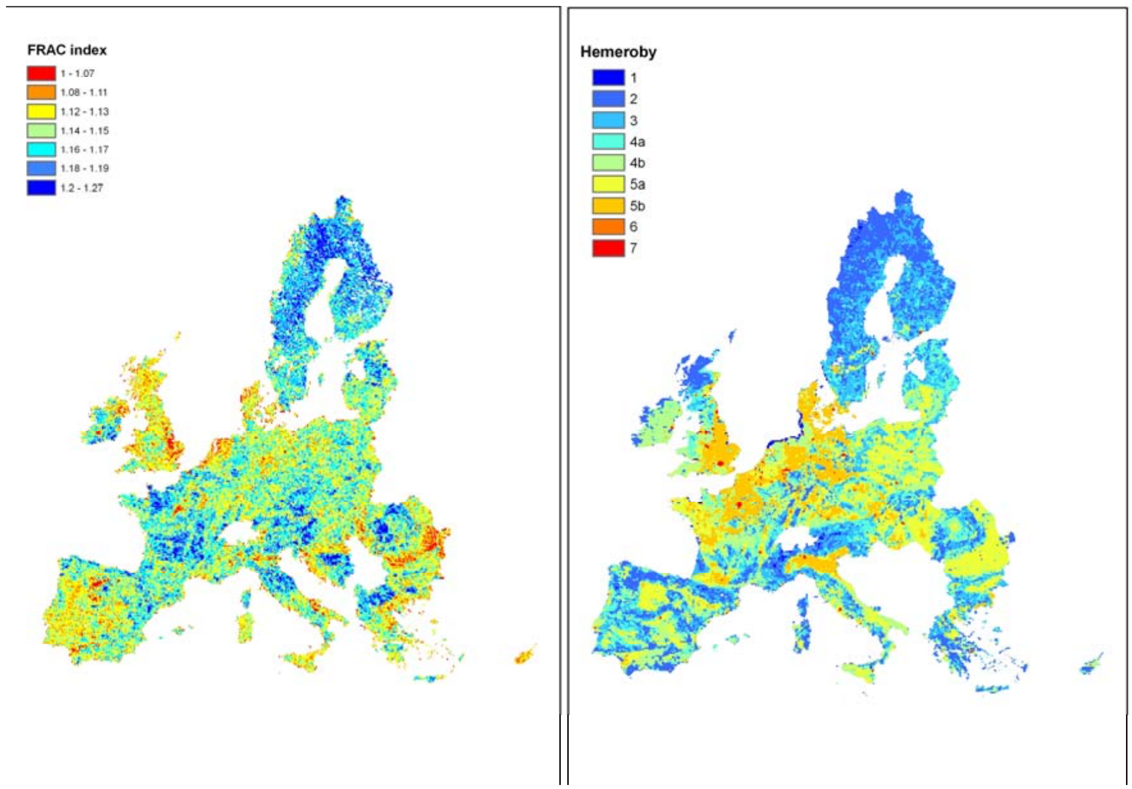
SHAPE = $\frac{p_{ij}}{\min p_{ij}}$, where *p* = perimeter and SHAPE >= 1 without limits

FRAC = $\frac{2\ln(0.25 p_{ij})}{\ln a_{ij}}$, where *p* = perimeter , *a* = area and 1 <= FRAC <= 2

Using a 10x10 km reference cell grid, we calculated the Area weighted Mean (_AM) of the two indices for the entire landscape from Corine Land Cover raster dataset. Low values of the SHAPE_AM and FRAC_AM indices reflect landscape simplification, and then they should correspond to high hemeroby values.

In order to compare the landscape metrics with the hemeroby index, the latter was aggregated to a 10x10 km cell grid, using both median and mean as aggregation statistics. In Figures II.3 a,b the resulting maps for the landscape metrics and the aggregated (through median) hemeroby index are compared.

a)



b)

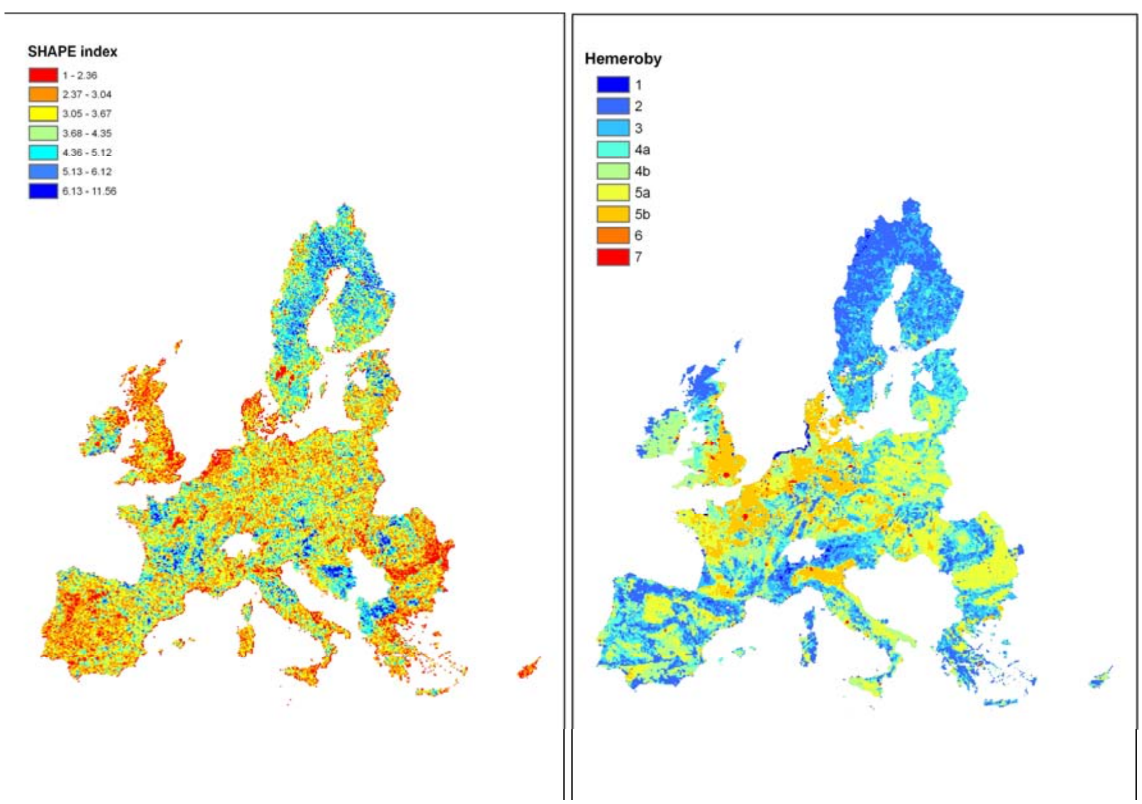


Figure II.3 - Comparison between the hemeroby index and a) the Fractal dimension index (Correlation Index = 0.02) and b) the Shape index (Correlation Index = -0.16.).

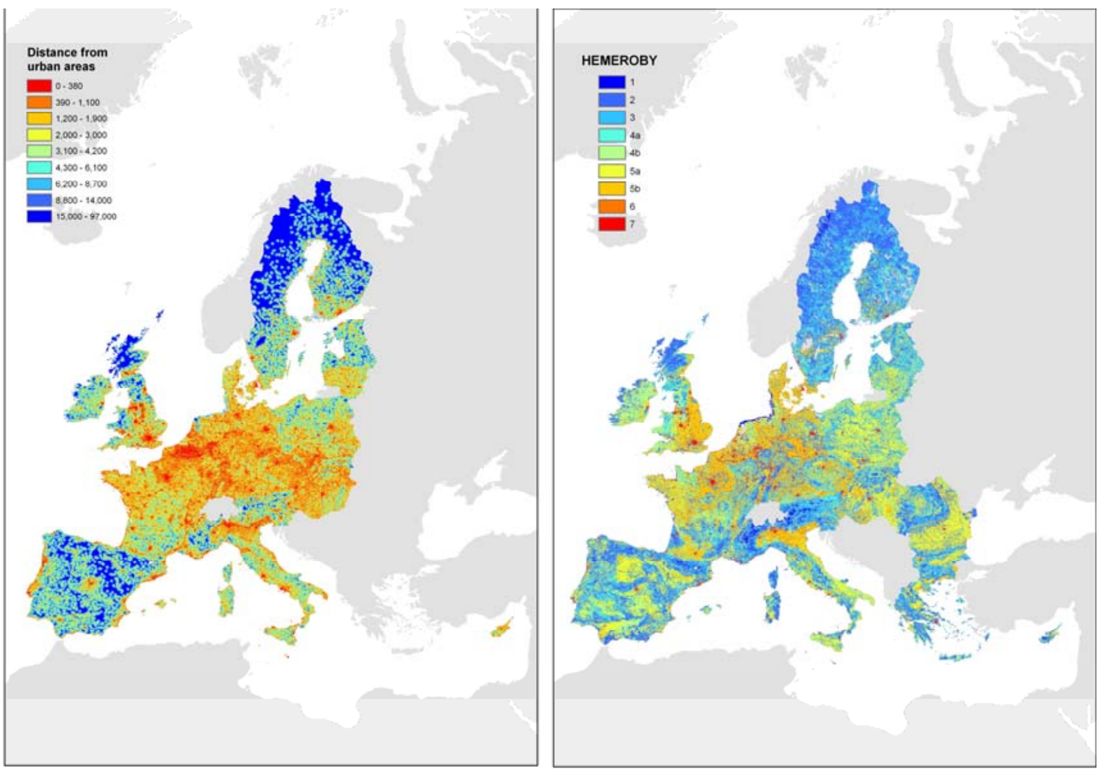
We did not find any significant correlation between the two landscape metrics and the hemeroby index in Europe. The result was confirmed also limiting the analysis to both the rural and the forest landscape alone.

The calculated landscape metrics tend to have low values compared to their potential range. This could be due to the fact that the human footprint on environment in Europe is so widespread to have shaped also semi-natural and natural areas. In conclusion, at least at the scale of this study it seems that landscape metrics can not be used to differentiate the degree of landscape naturalness.

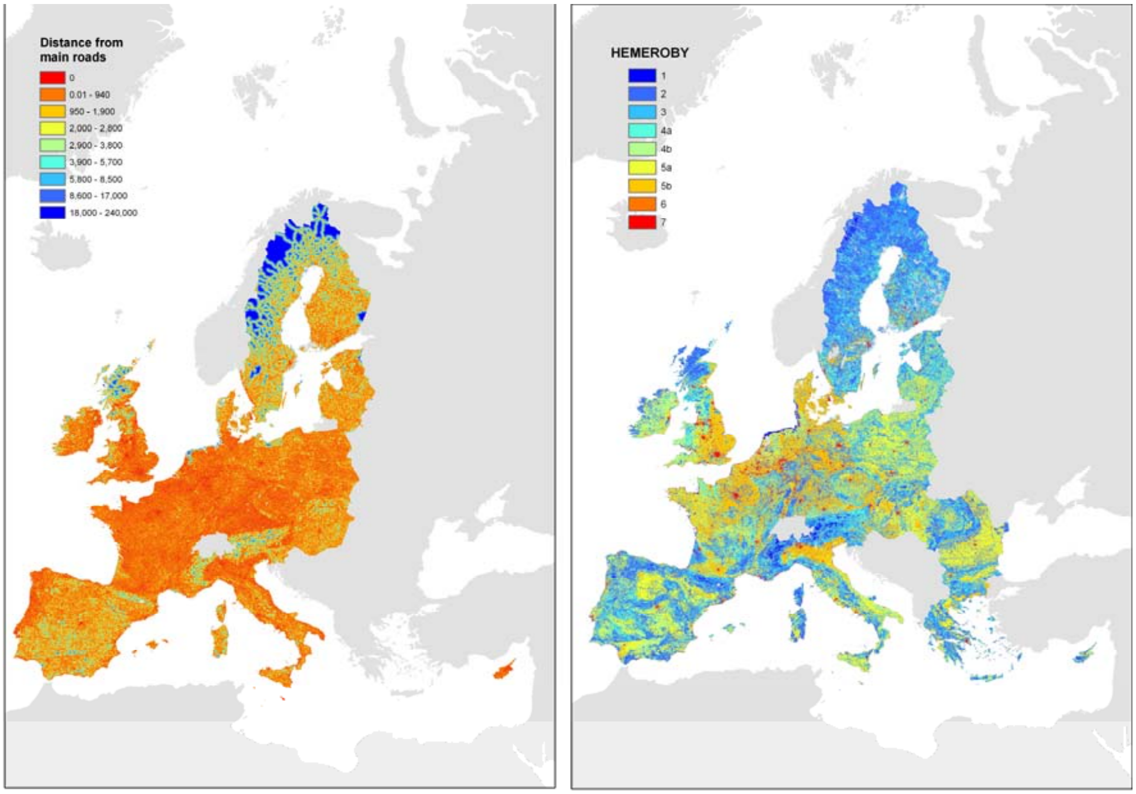
Hemeroby and anthropic pressure indices

The Hemeroby index was compared to three indices that are deemed to be related to the human influence on landscape (Sanderson et al. 2002): the distance from urban areas, the distance from main roads and the population density (Figure II.4).

a)



b)



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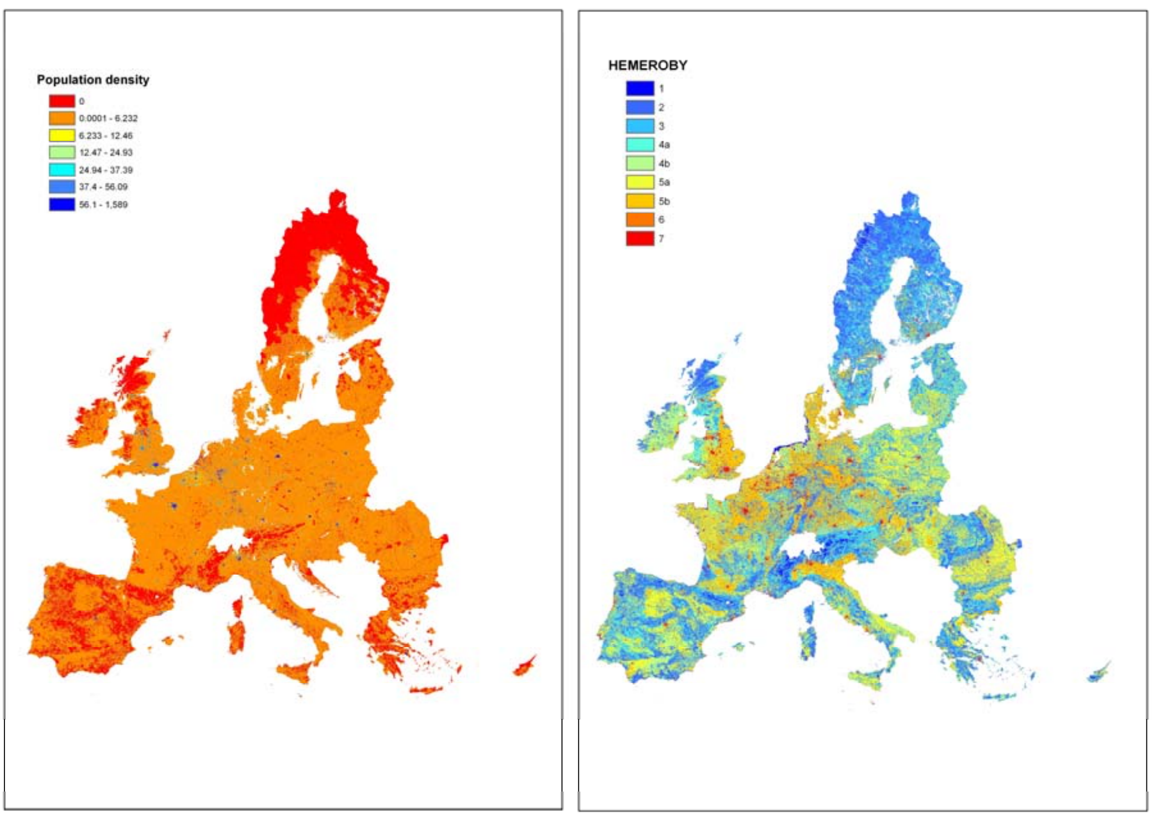

Figure II.4 - Comparison between the hemeroby index and anthropic pressure indices a) distance from urban areas b) distance from roads and c) population density. In the maps the anthropic pressure indices were classified according to quantile distribution.

The first of the two indices was calculated as Euclidean distance from urban areas extracted from the Corine Land Cover dataset.

The second index was calculated as Euclidean distance from streets extracted from the street dataset of TeleAtlas (http://licensing.tomtom.com/index.htm), taking into consideration the categories corresponding to the main roads at European scale: 0, 1, 2, 3, 4, 5.
Finally, we used a population density layer at 0.1 km of resolution for 2001 (Gallego et al. 2001), derived from the downscaling of demographic statistics at municipality scale, according to the land cover classification of Corine dataset (2000) and LUCAS survey (2001).
We found a slight inverse correlation of the hemeroby index to the distance from urban areas (Correlation Index = - 0.35), the population density (Correlation Index = - 0.32), and to the distance from main roads (Correlation Index = - 0.24).

Hemeroby and Mean Species Abundance (MSA)

The mean species abundance (MSA) is an indicator of naturalness or biodiversity intactness (Alkemade et al., 2009).
GLOBIO3 model (http://www.globio.info/) calculates the MSA of original species, relative to their abundance in pristine or primary vegetation, which are assumed to be not disturbed by human activities for a prolonged period. An area with an MSA of 100% means a biodiversity that is similar to the natural situation. An MSA of 0% means a completely destructed ecosystem, with no original species remaining. GLOBIO3 is built on a set of equations linking environmental drivers and biodiversity impact (cause–effect relationships). Cause–effect relationships are derived from available literature using meta-analyses. The variable taken in to account as drivers are: land use change, climate change, atmospheric N deposition, Biotic exchange, atmospheric CO_2 deposition, fragmentation, infrastructure, harvesting, human population density, energy use. The land cover layer used to calculate the indicator is the Global Land Cover 2000 (GLC2000) map, the resulting MSA layer has a resolution of 1 km (Figure II.5).

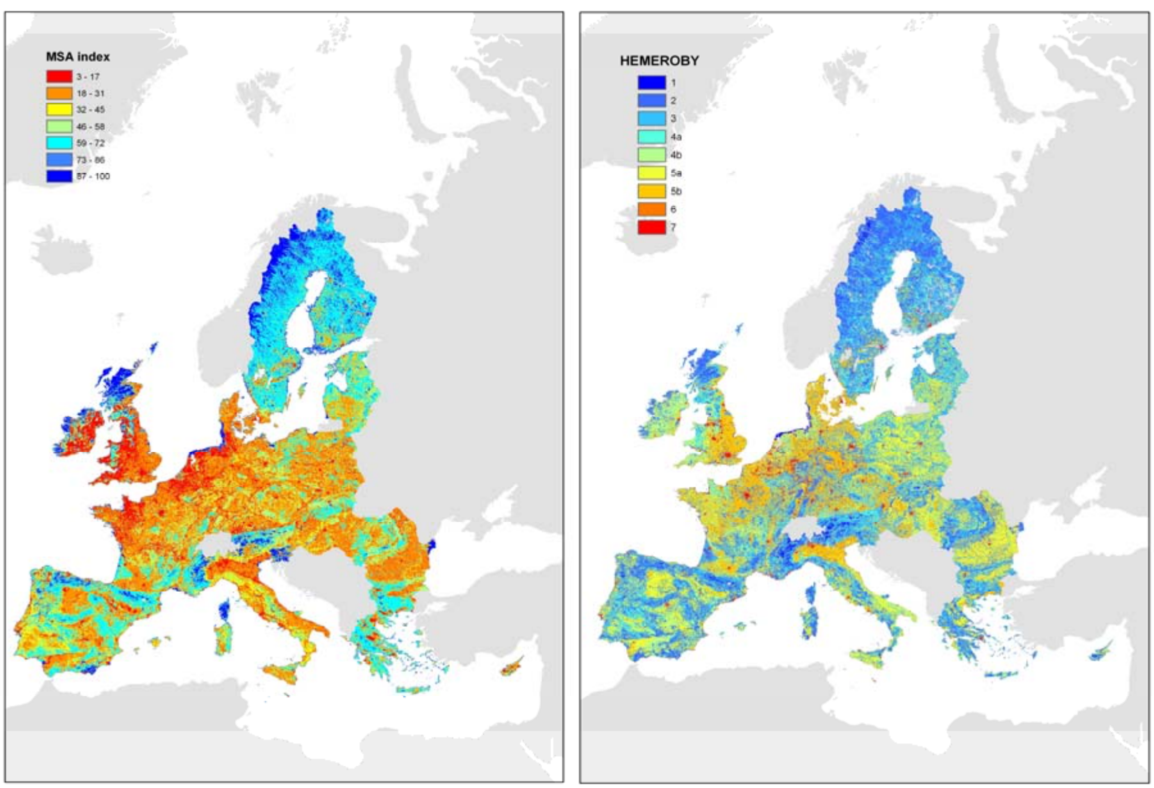

Figure II.5 - Comparison of the spatial pattern between the hemeroby index and the Mean Species Abundance index in Europe 27.

The correlation index between the hemeroby and the MSA raster layers is -0.63.

Analysis of results

Though there seems not to be a direct correlation between the eutrophic state and the hemeroby state if analysed at the point level, the situation changes if the analysis is performed at landscape level. Here a clear trend is detected, that shows a decrease in the oligotrophic state as the hemeroby values increase. The exception of urban areas may be due to water treatment plants. Such results on one hand are surely due to the fact that water quality is more linked to the intensity of land use than to the hemeroby state, on the other indicate the level of validity of the indicator, which should not be used below the landscape level. At this regard, results at NUTS2/NUTS3 level seem to be more reliable.

The indicators of landscape structure are not correlated to the hemeroby state. This may show that in Europe and at the level of detail provided by CORINE land cover changes in landscape due to human influence do not lead to an overall simplification or introduction of recognizable patterns in the landscape that can be related to the degree of naturalness.

Indicators of anthropic pressure show higher degrees of inverse correlation than structural landscape indicators, but these are not as strong as results obtained in the MSA analysis. The latter shows that an inverse correlation exists with the hemeroby index. This is for sure depending to some extent from the fact that the MSA index is calculated following a similar approach to the hemeroby index, but the result acquires particular validity since the MSA map is based on different input datasets, and that the MSA conceptually is closer to the hemeroby than the other analysed indices.

Overall, results show that the index has a good potential and is sufficiently well structured to show differences in the degree of naturalness among EU regions, or landscape units; in order to be used at a more detailed scale it should be improved on the basis of additional datasets linked to changes in vegetation (composition/management).

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Annex III - Analysing the physical structure of rural landscape: alternative and complementary indices

Landscape structure: dominance

A large number of metrics and indices have been developed to characterize landscape composition and configuration based on categorical map patterns (McGarigal and Marks 1995; McGarigal et al. 2002). In some studies an effort to select a smaller set of not redundant and meaningful metrics was done through statistics, as tree-classification method, principal component and factor analysis, Spearman's Correlation (Riiters et al. 1995, Cain et al. 1997, Herzog et al. 2001, Lausch and Herzog 2003, Yang and Liu 2005, Hahs and McDonnell 2006.)
Considering the overall complexity of the Landscape state and diversity indicator, we tried to identify an index of the physical structure taking into consideration simplicity and repeatability of the calculation process, clarity of the conceptual definition and meaningfulness of the results.
Following findings from previous studies, we first focused on a set of landscape metrics which could take into account both the abundance of the target landscape and its relationship (fragmentation, interspersion) with the complementary matrix. These metrics were calculated from the Corine Land Cover raster dataset (100m resolution) for every cell of a 10 km x 10 km grid covering EU27, designed according to Inspire standard for reference grids (http://inspire.jrc.ec.europa.eu/documents/Data_Specifications/INSPIRE_Specification_GGS_v3.0.1.pdf).
Using the software Fragstat (McGarigal and Marks, 1995), we calculated Largest Patch (LPI), Number of Patches (NP), Mean Patch Size (MPS) and the Area weighted Mean Patch Size (AW_MPS) indices for the entire rural landscape, merging all agricultural classes and natural grassland in one class, and classifying the other classes as background.
Finally, the degree of rural landscape fragmentation due to urbanization was investigated through the Edge Density (ED) index, calculated after merging agricultural classes and natural grassland in one class, and artificial classes in a second class.

The Largest patch index equals the percent of the landscape that the largest patch comprises:

LPI = $\frac{\max(a_{ij})}{A} * 100$;

where $\mathbf{a}_{ij}$ = area of patch ij and **A** = total landscape area; the range is 0 < LPI ≤ 100.

The Number of Patches equals the number of patches in the landscape and its range is NP ≥ 1 without limits.

The Mean Patch Size is the average size of the patches in the landscape, and its range is MPS ≥ 0 without limits.

Finally, Edge density is the ratio between the total edge in the landscape and the landscape area, therefore ED ≥ 0, without limits.

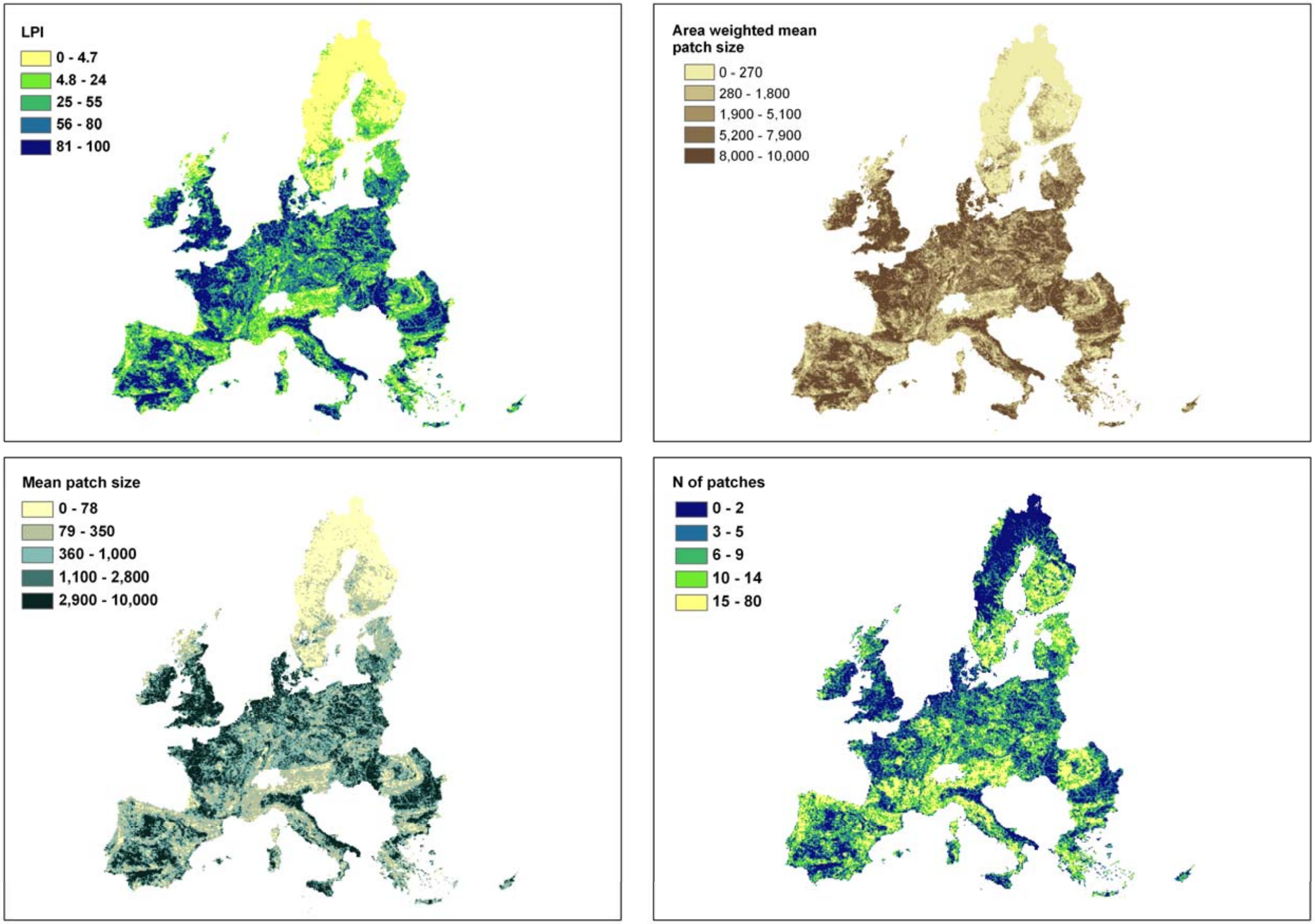


Figure III.1 - Comparison among LPI, MPS, AWMPS and NP indices for European Rural Landscape

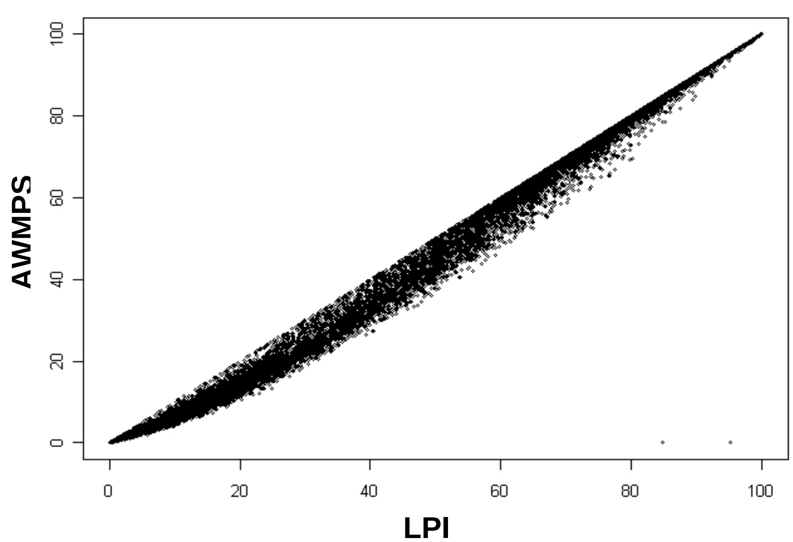
Using the 10X10 cell as the reference unit introduces a bias in the results because the patches are "artificially" cut by the grid boundaries. However, given the dimension of the cells, we assumed that this had little effect on the overall pattern of the landscape included in the cell. The effect is also more negligible for the indices which include in the formula the total patch area, as the LPI and the AWMPS.

In Figure III.1, the spatial pattern of LPI, MPS, AWMPS and NP indices are compared. Symbolizing the thematic maps so to maintain the correspondence among the index meanings (i.e.: the more the landscape is dominated by agricultural landscape, the more the colour is dark), we can observe that they generally have a consistent pattern throughout Europe. Evident exceptions are Sweden and the north of Finland. The LPI and AWMPS indices are strongly correlated (Figure III.2a, Correlation Index = 0.99). This correspondence seems related to the fact that in most of the cells there are few patches, with more than 46% of the cells with NP <= 5.
However, LPI is conceptually more straightforward than AWMPS, therefore it should be preferred in the context of this study.

The LPI is inversely correlated to NP index (Figure III.2b, Correlation Index = 0.47). Only when the LPI is very low also NP is low, meaning that the largest patch size is not only depending on fragmentation but also on the actual extent of the rural area within the cell, as for example in Sweden. On the contrary, when the rural landscape is dominant it tends not to be fragmented.

LPI represents both abundance and fragmentation of rural landscape. Since it proved to be quite well correlated to the total UAA per unit (Figure III.2b, Correlation Index = 0.88), it can be used for representing also *dominance* of the rural landscape in Europe.

a)



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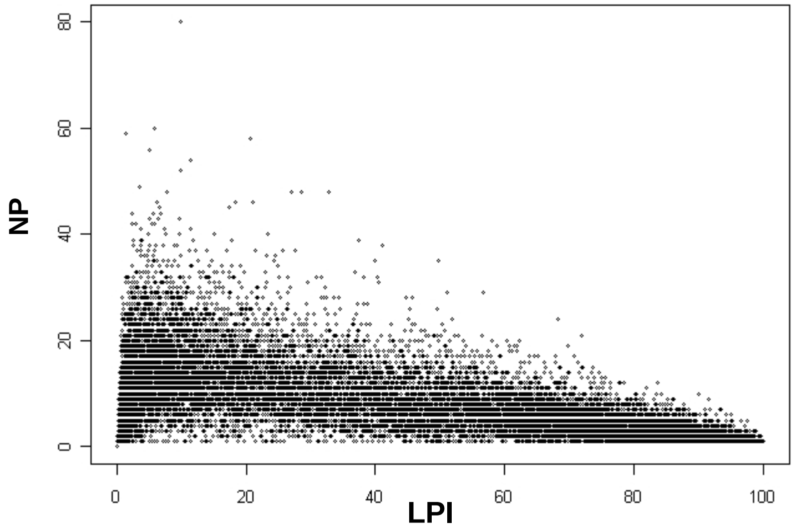


c)

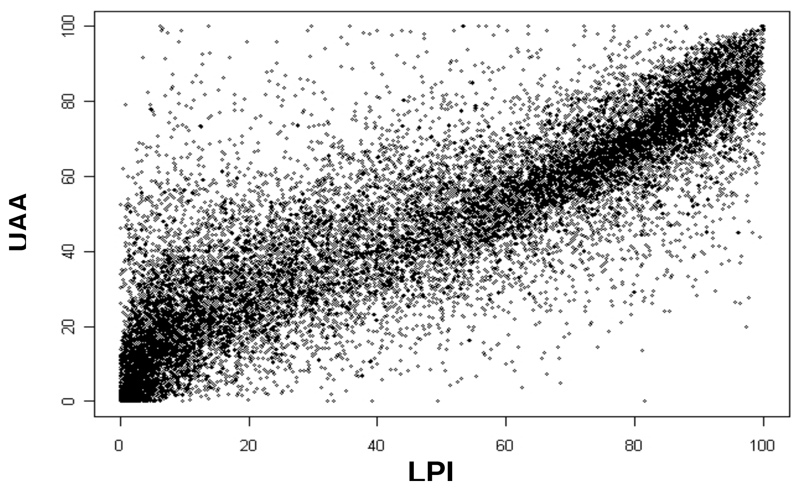


Figure III.2 – Correlation between LPI and AWMPS (a), NP (b) and UAA (c) indices for rural landscape in Europe.

Furthermore, we calculated edge density as an index of fragmentation of rural landscape due to artificial areas. Edge density proved not related to LPI (Figure III.3, Correlation Index = 0.31).

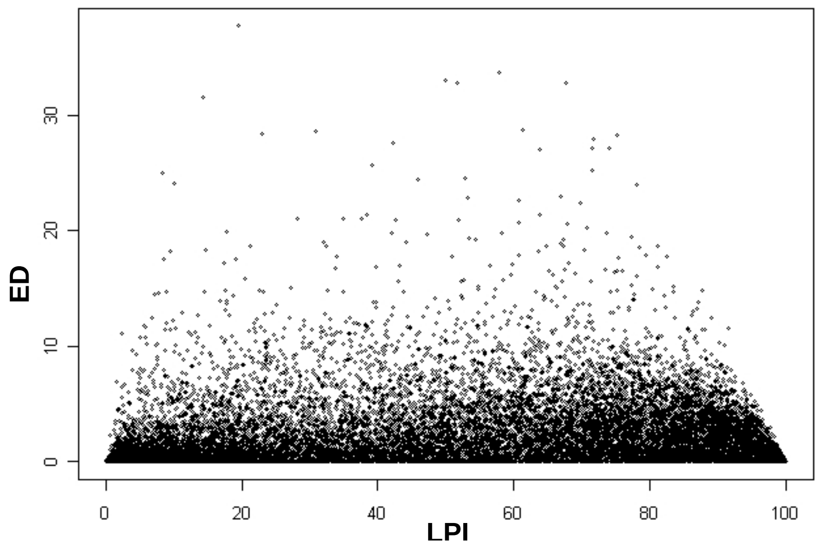


Figure III..3 – Correlation between LPI and Edge Density index for European Rural Landscape.

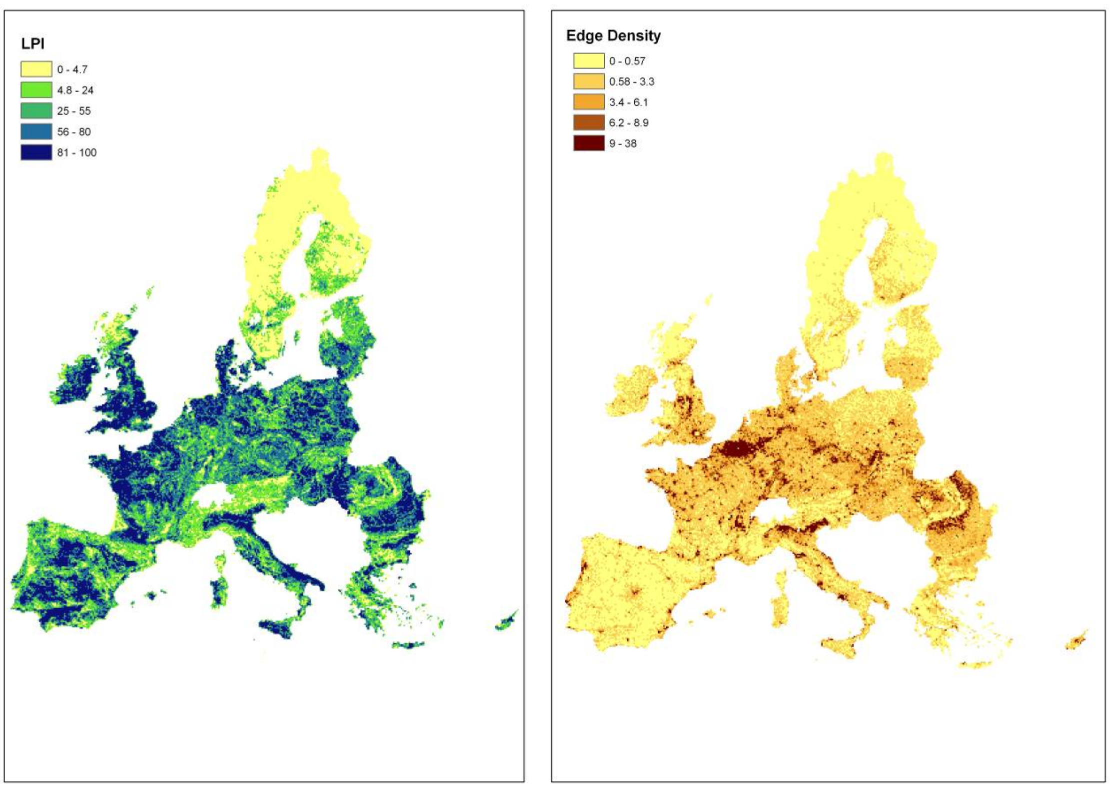


Figure III..4 – Comparison between LPI and Edge Density index for rural landscape in Europe.

In the figure below, some patches with the highest values of ED index are shown, and values for LPI and ED are reported for comparison.

The pattern of artificial areas spread into agricultural areas looks quite different, and this could correspond to different stages of the urbanization process. LPI values have higher change dynamics that ED values, ranging from a) to c).

The two indices, then, seem to correspond to different aspects of the fragmentation process, with LPI being more efficient in describing the loss of connection among rural patches than the spreading of urban fringes (Figure III.5).

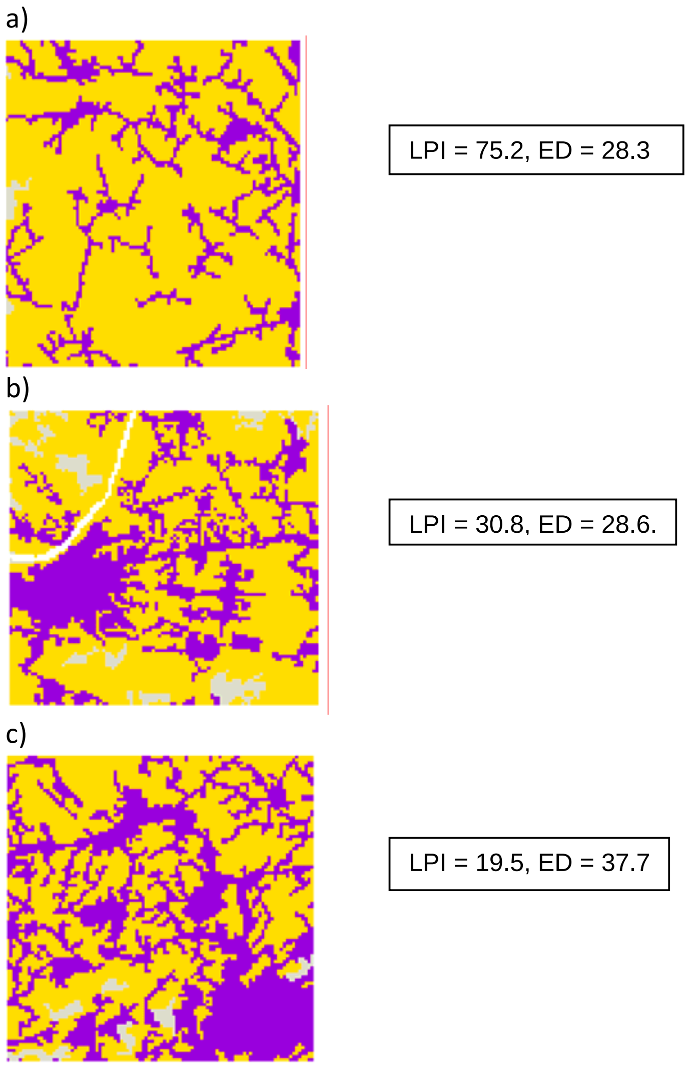
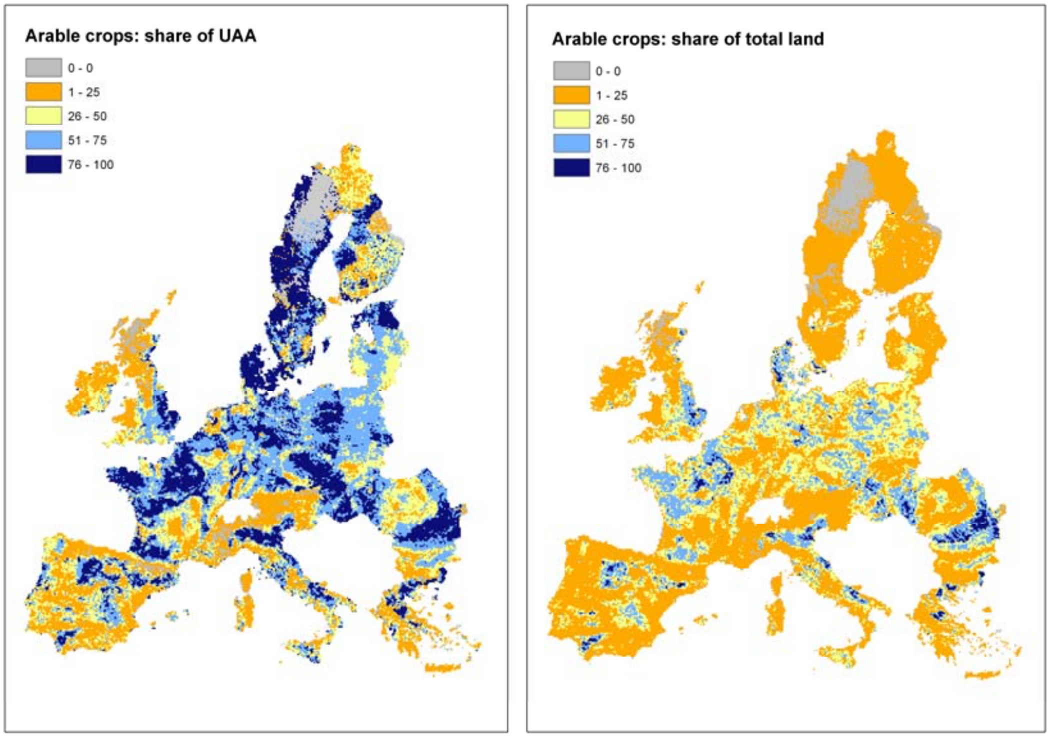


Figure III.5 - Example of urban sprawling in cells from the 10x10 km grid: rural areas in yellow, urban areas in violet, natural areas in grey.

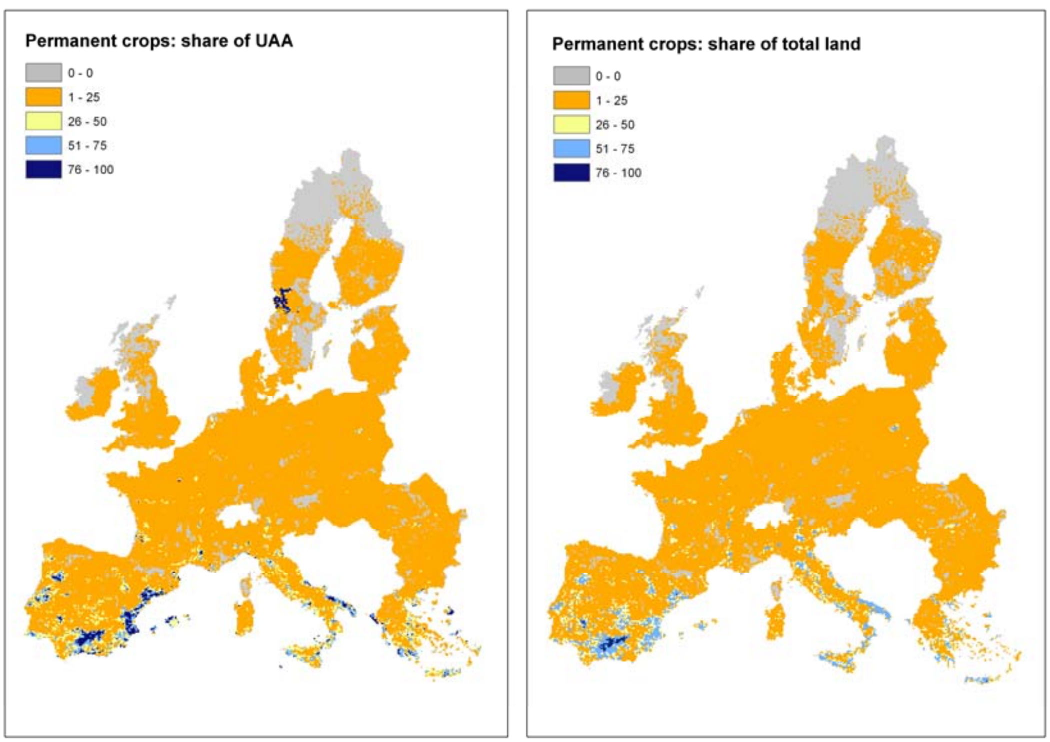
Landscape structure: diversity

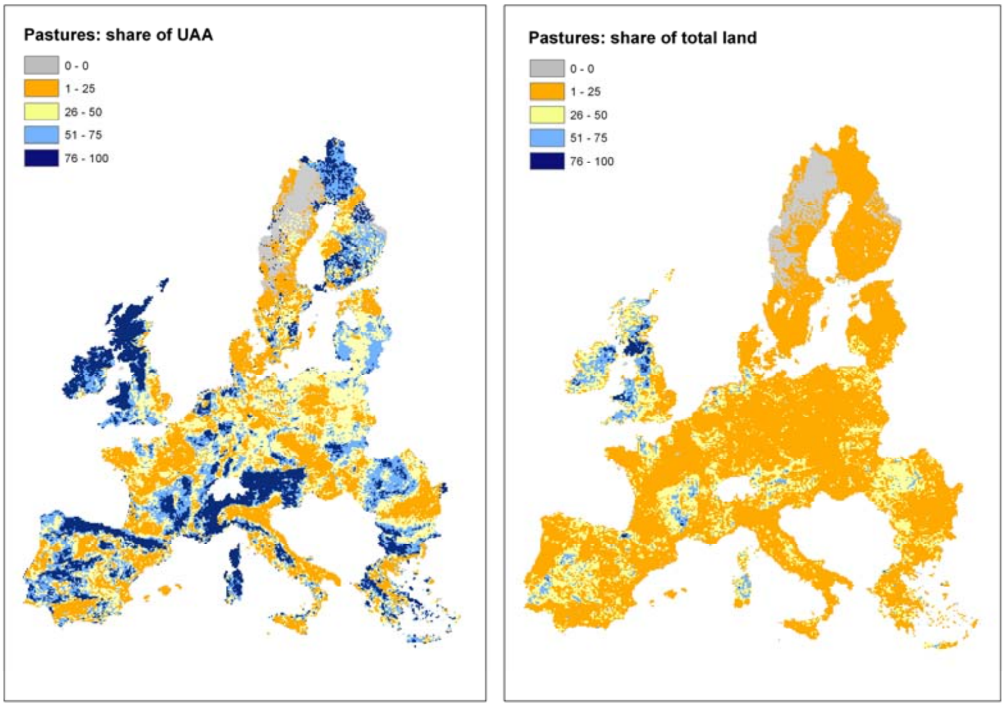
To investigate the general pattern of diversity of rural landscape, we used the HSMU dataset derived from the Dynaspat module of CAPRI model. We grouped the 30 crop activities modeled in the HSMU dataset into three main agricultural land uses: arable lands, permanent crops and pastures. Then we calculated the share of these land uses in the 10x10 km reference cell grid, both as percentage of total area and as percentage of the UAA (Figure III.6).

a)


Arable crops: share of UAA
0 - 0
1 - 25
26 - 50
51 - 75
76 - 100
Arable crops: share of total land
0 - 0
1 - 25
26 - 50
51 - 75
76 - 100

b)


Permanent crops: share of UAA
0 - 0
1 - 25
26 - 50
51 - 75
76 - 100
Permanent crops: share of total land
0 - 0
1 - 25
26 - 50
51 - 75
76 - 100



c)

Figure III.6 – Spatial distribution of arable land (a), pastures (b) and permanent crops (c), according to the Dynaspat module of CAPRI model.

Finally, we characterized the landscape on the basis of the percentage of the different land use categories, according to the classification in Table III.2.

Table III.2 – Classification of landscape in reference to the land use categories: arable crops, permanent crops, pastures and not agricultural areas.

	Not agricultural areas	Agricultural areas	Arable lands	Permanent crops	Pastures
Prevalent not agriculture	> 75%	<= 25%	na	na	na
Prevalent agriculture (mixed)	<= 25%	> 75%	< 50%	< 50%	< 50%
Prevalent arable	<= 25%	> 75%	>= 50%	< 25%	< 25%
Prevalent permanent	<= 25%	> 75%	< 25%	>= 50%	< 25%
Prevalent pastures	<= 25%	> 75%	< 25%	< 25%	>= 50%

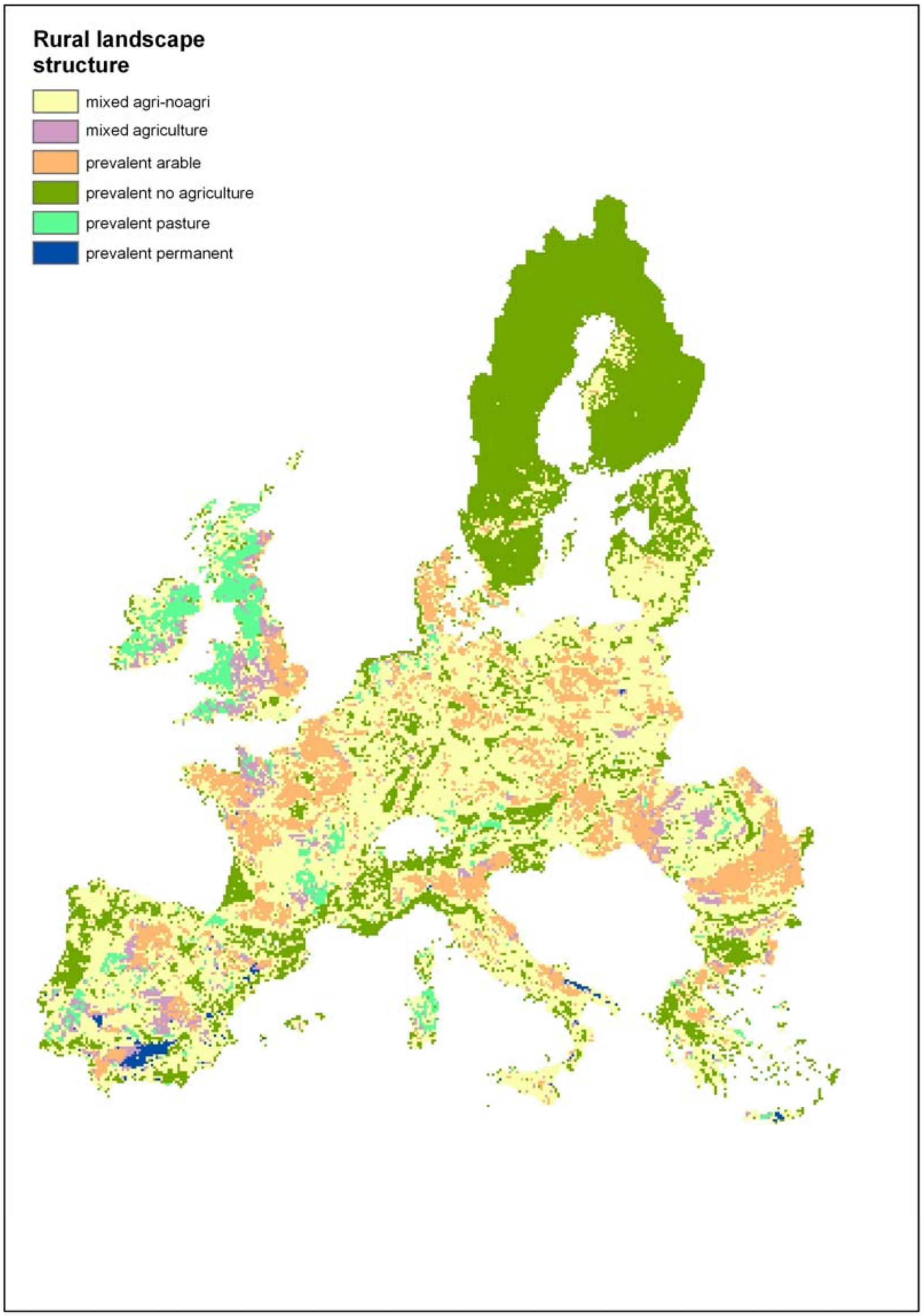


Figure III.7 – Composition of rural landscape and distribution of both agricultural and not-agricultural land.

Landscape structure: pattern validation

CLC resolution and classification system is probably not sufficient to represent the complexity of the rural landscape structure. Information on parcels and linear elements would be more appropriate to describe both fragmentation and crop diversity, therefore we present hereafter a few examples of possible implementation on the basis of data that would bring an added value to this component of the indicator if widely available.The

Integrated Administration and Control System is the main administration tool for managing of farmers' applications, and the Land Parcel Identification System (LPIS) is a main tool to manage and control area based subsidies. The LPIS database contains data on parcel geometry which can offer good possibilities to assess parcel size and therefore the structure of the rural-agrarian landscape across Europe. Such data are in most cases not public, therefore a study could be carried out on two regions for which the use of parcel geometry (from cadastral and Îlots [5] datasets respectively) was granted: Lombardia Region[6] in Italy and France, and we compared the results achieved from the different data sources. The aim of the comparison was to evaluate on one hand to what extent the indices used at European scale are able to characterize the landscape structure, and on the other hand whether available data alternative to LPIS could be used. At the finer scale, we chose the mean patch size index to represent both fragmentation and diversity of landscape.

For Lombardia region, we analysed the dataset of LPIS cadastral parcels. The parcel spatial layer was intersected with the 10x10 km grid used in the computation for EU27, and the mean parcel size was calculated for each grid cell. Mean parcel size was relatively comparable with LPI and number of crop categories in the Po river plan, which is mainly arable land (Figure III.8). Different figures were obtained instead for the northern part of the region, where agriculture is mainly represented by grassland. Besides the difference due to methodology, this result is also the consequence of land cover classification in CORINE compared to the parcel dataset.

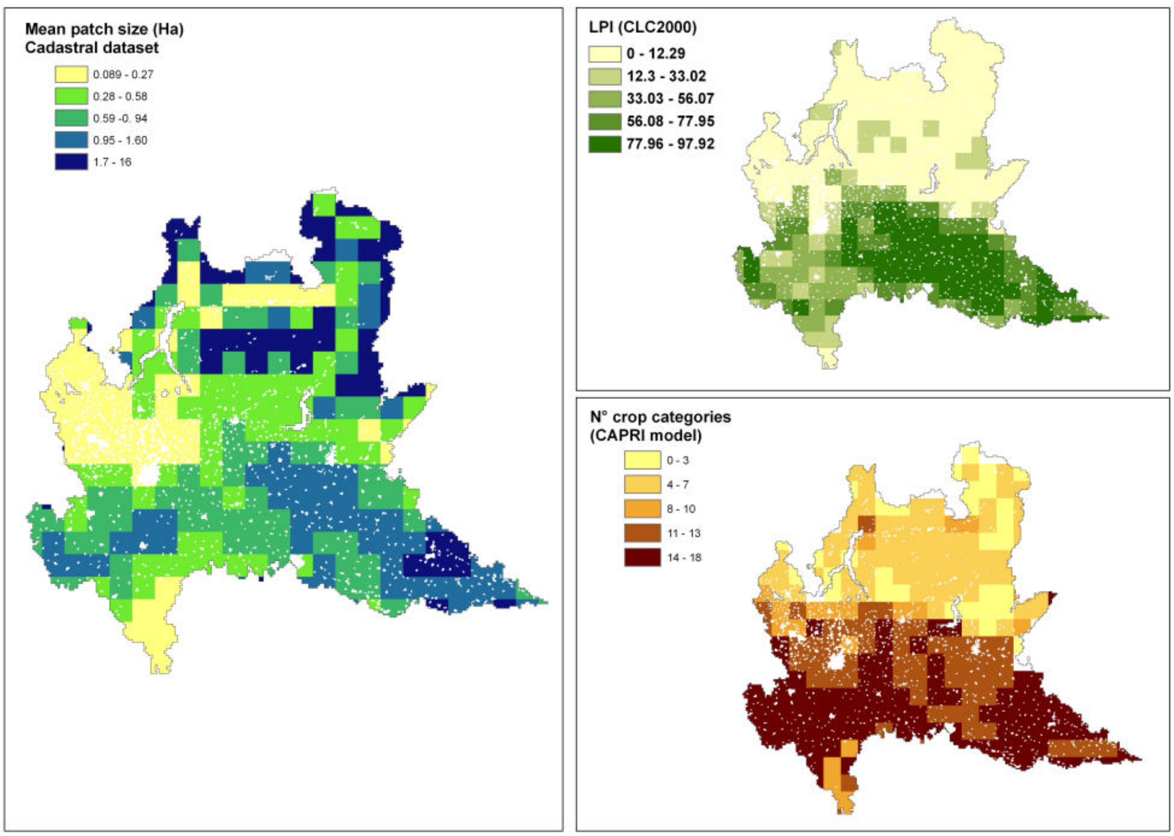


Figure III.8- Comparison among Mean Patch Size index calculated from cadastral parcel dataset, the Mean Patch Size and the Largest patch index calculated from CORINE land cover map (only for agriculture and natural grassland patches) and the crop diversity index calculated from HSMU-CAPRI model, for Lombardia region.

[5] Continuous portions of land which is farmed by only one farmer with several crops of the same or different land use type.

[6] Regione Lombardia – Ersaf – Sistemi informative geografici pr il sistema rurale.

In Figure III.9, the agricultural areas and natural grasslands extracted from the CLC raster dataset, in green, are overlapping the fodder areas extracted from the cadastral dataset, in yellow. It is evident that there is not a complete matching of the two datasets, and some fodder areas (visible yellow areas) were not classified as agriculture or natural grassland in the CLC dataset, but mostly as sparsely vegetated areas. As a consequence, the presence of large fodder parcels in the north of the region is not represented by the LPI index calculate from CLC.

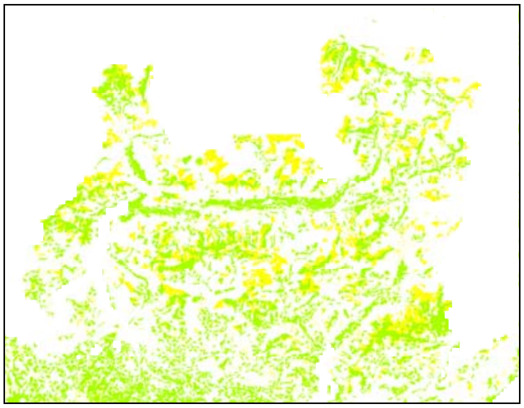


Figure III.9- Overlapping of CLC agricultural areas and natural grassland (green) in CLC dataset and the fodder areas in the cadastral parcel dataset (yellow).

For France, we analysed the dataset of Îlots calculating the average size for Nuts3 regions (Figure III.10). The Îlots mean size is related to land ownership, and it didn't result to have any significant relationship with landscape structure. Therefore, a direct comparison of the three indices is not meaningful.

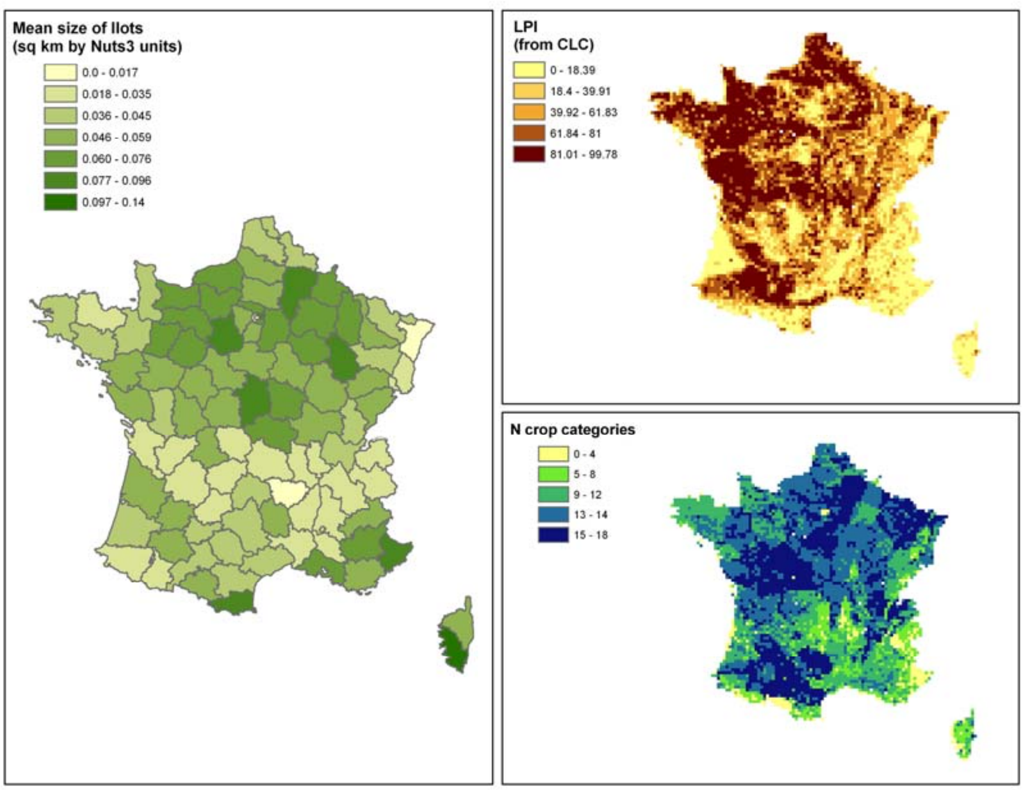


Figure III.10- Comparison among the Mean patch size index calculated from Îlots dataset, the Largest patch index calculated from CORINE land cover map and the crop diversity index calculated from HSMU-CAPRI model, for France.

Results show that the information on parcel size is not necessarily related to dominance of agriculture in the landscape, and to crop diversity, therefore it would add relevant information to landscape characterisation.

LUCAS survey and the use of linear elements to characterize the physical structure of landscape

LUCAS stands for "Land Use and Cover Area frame Survey". The aim of the LUCAS survey is to gather harmonised data on land use/cover and their changes over time.
LUCAS is an in-situ survey area frame survey, which means that the data is gathered through direct observations by the surveyors on the ground. Land cover data can also be obtained by photo interpreting satellite images or orthophotos as is done in the Corine Land Cover. Based on the experience gained during the pilot phase (2000–07), initially involving 13 to 15 EU Member States (the first survey was held in 2001), a new LUCAS survey was carried out in 2009. It is the largest LUCAS survey ever carried out, with 25 EU countries involved (Cyprus and Malta are not included because of their size) and 234709 survey points to be visited by the surveyors in the years 2008 and 2009. The points were selected from a standard 2 km grid including in total around 1 million points all over the EU. The selection of points was done on the basis of stratification information. Linear transect surveys were associated to the point survey.

Further details on the survey can be found in LUCAS technical documentation (http://epp.eurostat.ec.europa.eu/portal/page/portal/LUCAS/methodology).

We analysed LUCAS survey's dataset for 2009 to evaluate the additional/alternative information provided by these data in describing rural landscape structure. We, therefore, assessed:

1) Crop diversity, from the point data;
2) Density of linear elements related to the rural landscape, from the transect data.

Crop diversity

In LUCAS dataset 101536 survey points were classified in the agricultural land cover categories[7].

The crop classes reported in LUCAS dataset were aggregated into 18 categories (Table III.3) which can be considered homogeneous from a landscape perspective, following the same procedure as for the CAPRI dataset (see Table 4 in main text).

Table III.3 – Correspondence between crop classes identified in LUCAS nomenclature and landscape categories

Landscape Category	Crop classes in LUCAS nomenclature
Cereal	Common wheat
Cereal	Durum wheat
Cereal	Barley
Cereal	Rye
Cereal	Oats
Cereal	Triticale
Cereal	Other cereals*
Citrus fruits	Oranges
Citrus fruits	Other citrus fruit*
Corn	Maize
Flowers	Floriculture and ornamental plants

[7] http://epp.eurostat.ec.europa.eu/portal/page/portal/LUCAS/documents/Nomenclature_LUCAS2009_C_3.pdf

Landscape Category	Crop classes in LUCAS nomenclature
Fruits	Strawberries
Fruits	Apple fruit
Fruits	Pear fruit
Fruits	Cherry fruit
Fruits	Nuts trees
Fruits	Other fruit trees and berries*
Grapes	Vineyards
Grass	Mixed cereals for fodder
Grass	Temporary grassland
Grass	Grassland with sparse tree/shrub cover
Grass	Grassland without tree/shrub cover
Legumes	Soya
Legumes	Dry pulses
Legumes	Lucerne
Legumes	Other legumes and mixture for fodder*
Nurseries	Nurseries
Olive	Olive groves
Other industrial crops	Greenhouses
Other industrial crops	Cotton
Other industrial crops	Other non permanent industrial crops*
Other industrial crops	Permanent industrial crops*
Rape and turnip seeds	Rape and turnip seeds
Rice	Rice
Root crops	Sugar beet
Root crops	Other root crops*
Sunflower	Sunflower
Text	Other fiber and oleaginous crops*
Tobacco	Tobacco
Vegetables	Potatoes
Vegetables	Tomatoes
Vegetables	Other fresh vegetables*
Vegetables	Clovers

The reference resolution for this exercise is the 10 km x 10 km cell grid for EU27 designed according to the Inspire Directive, therefore the point information was aggregated at this scale by counting the number of different crop categories surveyed by cell. The number of LUCAS points associated to a cell is not sufficient to draw statistically valid conclusions on the presence of crops. The analysis was anyway carried out in order to gain a different view angle on the information provided by CAPRI disaggregated data.

Only the cells including at least 5 survey points (i.e.: 1 point / 20 km^2) [8] were considered, therefore excluding 16% of grid cells.

[8] Each point has a weight which represents somehow the number of km^2 that each point represents. The mean weight for the agricultural survey points is 16.2

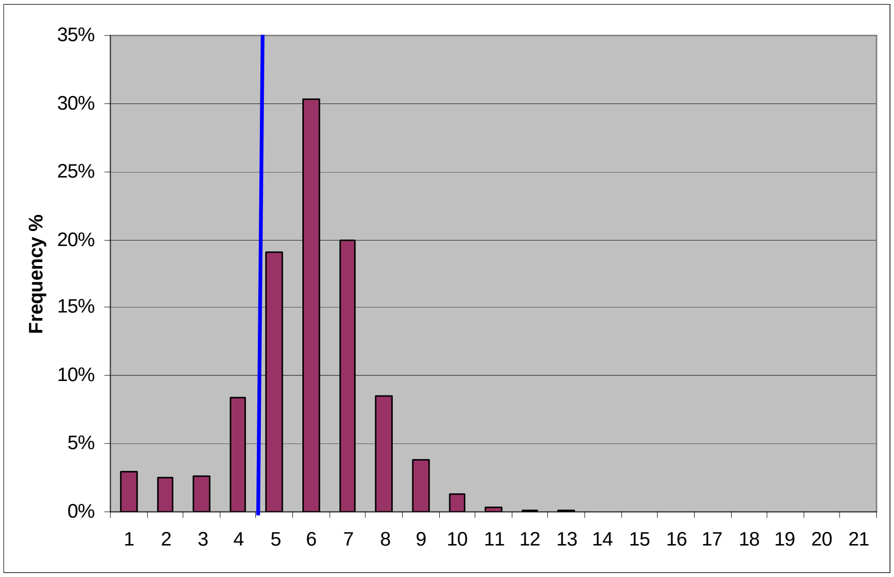


Figure III.11– Frequency of occurrence of the number of survey points included in every 10x10 km grid cell.

The highest values of crop diversity were found in the Italian Po river plan and in Andalusia (III.12).

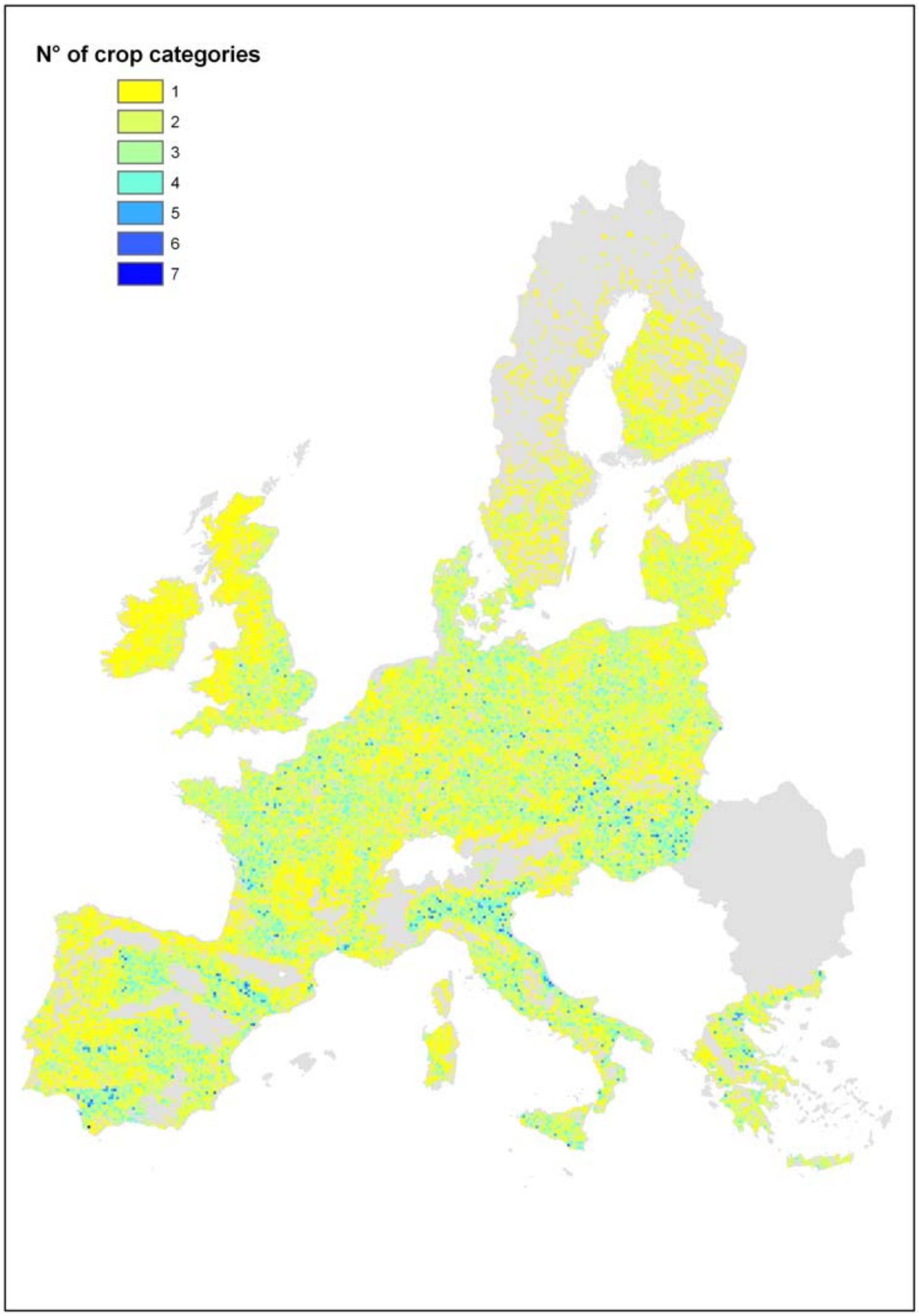


Figure III.12– Number of crop categories from LUCAS survey 2009.

Comparing the results from LUCAS survey with those from Capri dataset (Figure III.13) we observed interesting differences.

First, the number of crop categories found in the 10 km^2 cells varies from 0 to 6 generally, reaching 7 in one cell only, whereas using Capri dataset we could find up to a maximum of 18 categories per cell. This difference is explained by the fact that LUCAS is an area frame survey, therefore it does not count every crop in a region, but the crops where the sampling points are located, while the statistical data disaggregation from Nuts II to HSMU resolution performed in CAPRI tends to distribute the crops in a NUTS2 region in a more homogeneous way. Reality lies in between. In the current study CAPRI data have been selected for two main reasons: they contain the information on all crops cultivated in a region (while it is evident that LUCAS underestimates such number, also because the sample captures the situation of a moment in time); estimates are based on the official Eurostat statistics available at NUTS2.

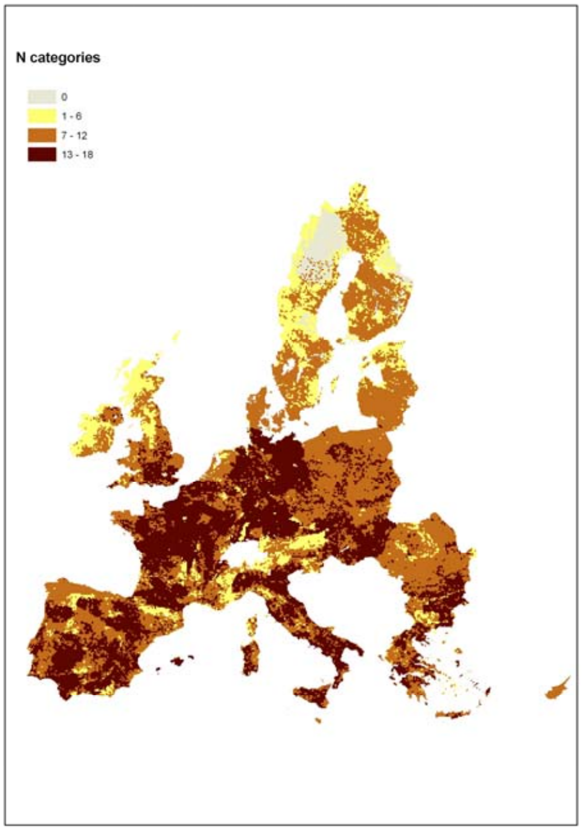


Figure III.13– Number of categories derived from Capri dataset, classified in three main classes.

Moreover, looking at the distributions of values, we found that in LUCAS data the low values (corresponding to low diversity) are much more frequent than the others, while in Capri dataset we found the opposite trend (Figure III.14 and Figure III.15).

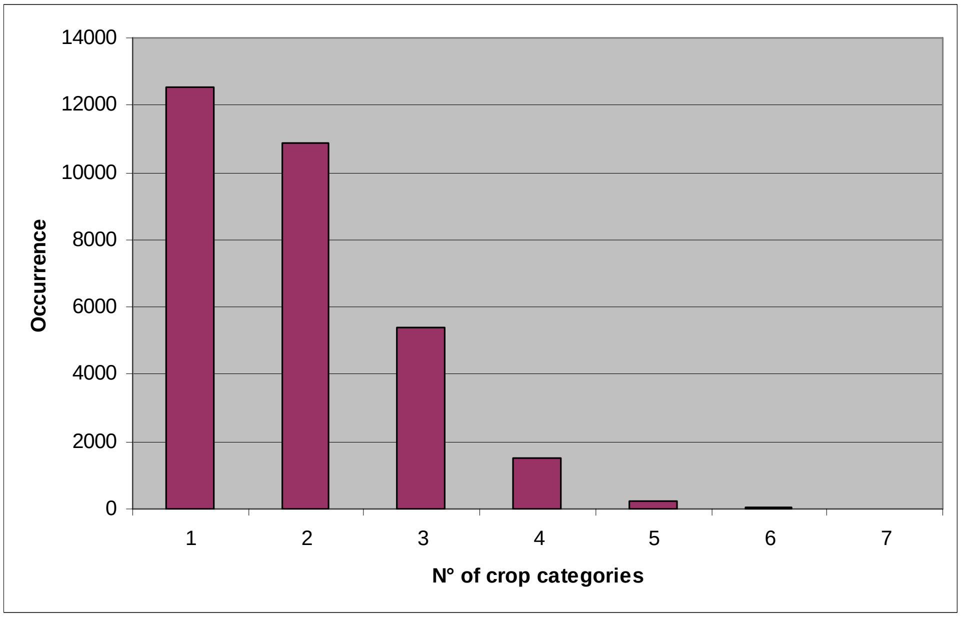


Figure III.14– Distribution of the occurrences of different number of categories in the 10x10 km cells, from LUCAS dataset.

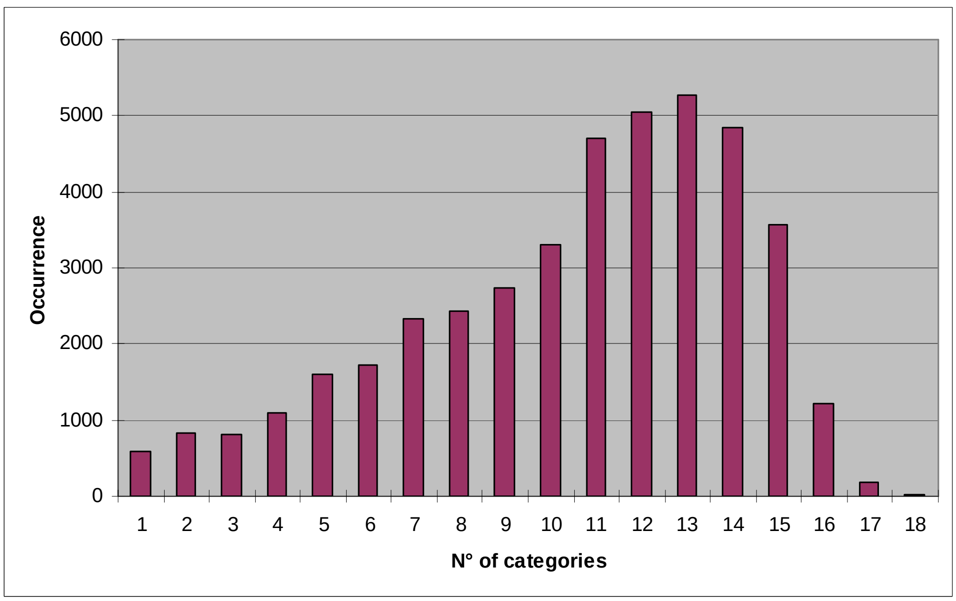


Figure III.15– Distribution of the occurrences of different number of categories in the 10x10 km cells, from Capri dataset.

Finally, we assessed the feasibility of using LUCAS data for calculating the integrated "dominance/diversity" index of rural landscape structure, by combining the number of crop categories from LUCAS dataset and the Corine Land Cover layer (2006, EEA) for calculating the LPI (Figure III.16).

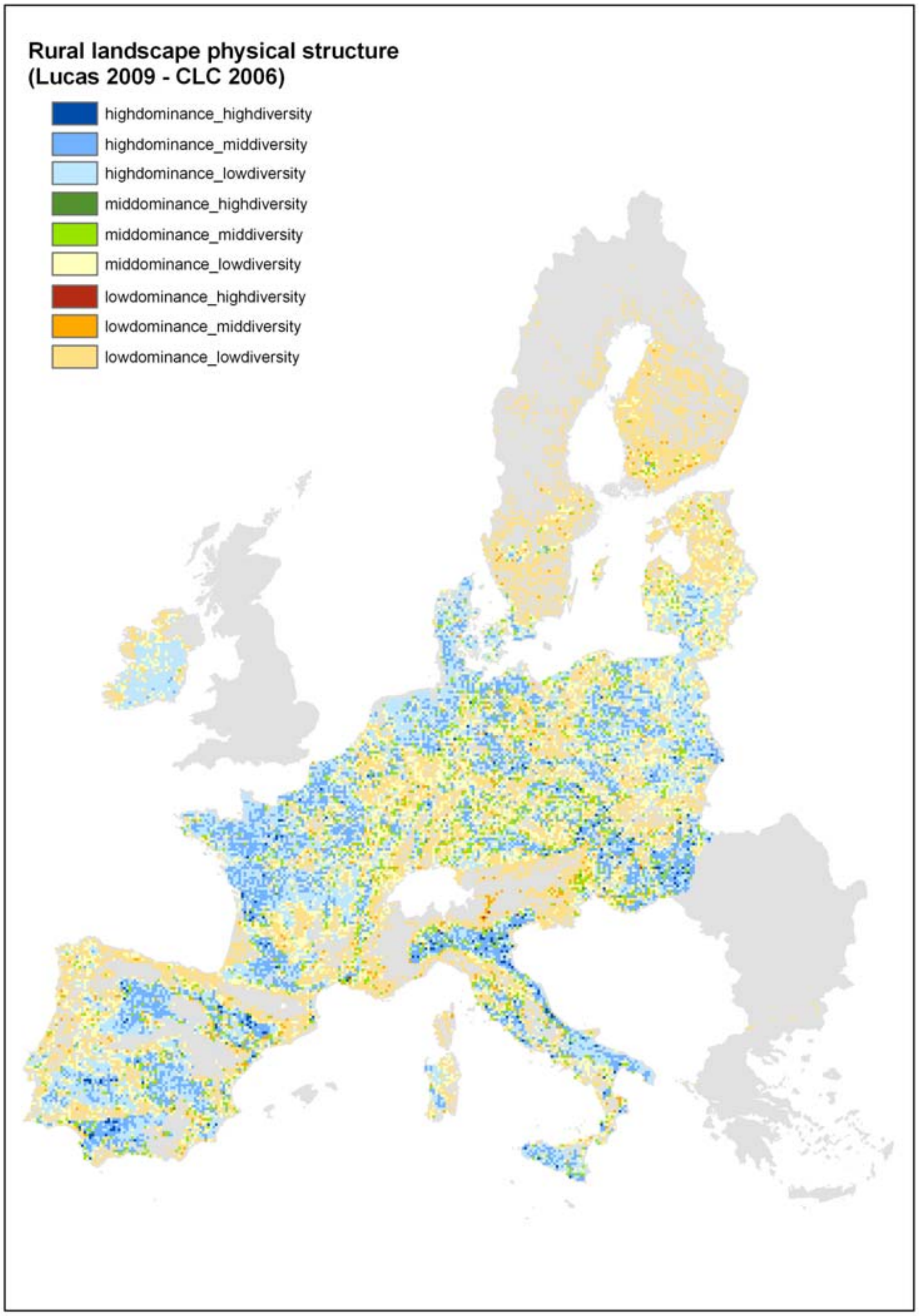


Figure III.16 – Combined index of physical structure for European rural landscape, calculated from LUCAS dataset 2009 and CLC2006.

Though not usable for the statistical constraints mentioned above, the general pattern is quite similar to that obtained using Capri dataset and CLC2000 (see Figure 9 in the main text).

Linear elements

Linear elements were detected during transect surveys. The transect is a 250 m straight line to the East direction from the survey point.

The transect surveys were carried out for 216405 points out of the total, but we selected only the points included in agricultural areas (from Corine Land Cover, class 2 "agriculture" and class 321 "natural grassland"), for a total of 120116 points. Consequently, some points whose land cover does not belong to the agricultural classes according to LUCAS nomenclature, but are located close to agricultural areas were selected as well. This is justified by the fact that the transect can traverse a different land cover category than the one where the point is located.

The following linear elements related to agriculture were taken into account:

- Grass margins < 3 m
- Avenue trees
- Conifer hedges < 3 m
- Bush/tree hedges/coppices, visibly managed (e.g. pollarded) < 3 m
- Dry stone walls
- Ditches, channels < 3 m.

The number of linear elements of interest along each transect was calculated and then the results were upscaled to the 10 kmx10 km cell reference grid. For each cell, then, the mean number of linear elements among the survey transects included in the cell was calculated.
Likewise for calculating the number of crop categories, we took into account only the cells including at least 5 survey points (i.e.: 1 point / 20 km2) and excluding thus 63 % of the cells (Figure III.17).

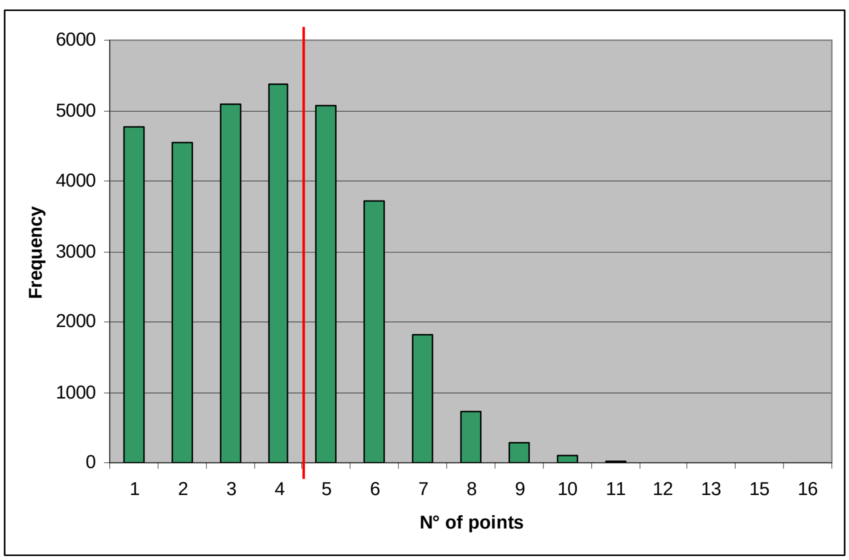


Figure III.17 – Frequency of the number of survey points included in each 10x10 km cell.

In Figure III.18 the mean total number of linear elements associated with agriculture is shown. The absolute values of the index can not be considered an actual measure of the linear elements density. However the spatial distribution pattern looks meaningful.

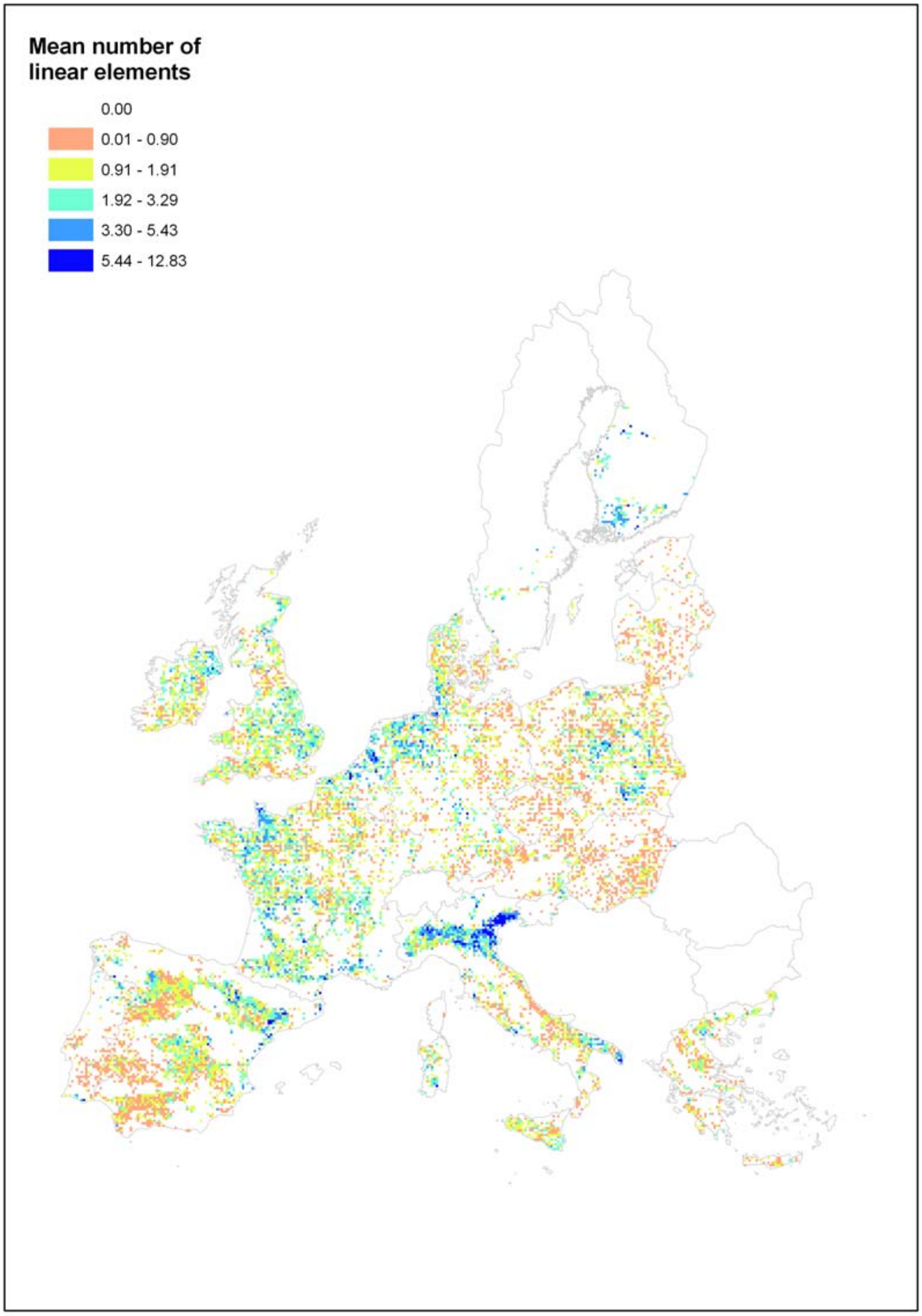


Figure III.18 – Spatial distribution of linear elements, mean number value calculated by 10x10 km cells.

Conclusions:

- The general pattern of the index of physical structure of rural landscape obtained by using the LUCAS dataset is quite similar to that obtained from the Capri dataset, but given the limited number of points in each 10 km x 10 km cell, representativeness of LUCAS data at this scale is not sufficient.
- The results obtained for linear elements give an overall distribution pattern which is consistent with the known configuration. Nonetheless, there are shortcomings for the use of the information on linear elements to describe the landscape structure:
  1) though the total number of surveyed points in LUCAS project is huge, due to the upscaling process the final layer has many gaps and it is not possible to cover the whole EU27 reference grid
  2) the transect length is 250m, therefore it is very difficult to generalize the results at the scale of this exercise (the grid cell is 100 km^2). In any case results are related to micro-fragmentation.

For more information please see EUROSTAT web page on "Landscape structure indicators from LUCAS":
http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Landscape_structure_indicators_from_LUCAS

Annex IV – Selected PDO/PGI products

Assessment of the societal appreciation for rural landscape was achieved through proxies, including the production of foodstuffs and drinks under the European quality certification schemes.

- **Quality certification scheme definitions:**
  - **PDO**- covers agricultural products and foodstuffs which are produced, processed and prepared in a given geographical area using recognised know-how.
  - **PGI**- covers agricultural products and foodstuffs closely linked to the geographical area. At least one of the stages of production, processing or preparation takes place in the area.
- **Main steps in policy regulation**:
  - **14 July 1992**: Adoption of the first European legislation on geographical indications and protected designation of origin for agricultural product and foodstuffs (**Council Regulation (EEC) No 2082/92)**
  - **12 June 1996**: Regulation on the registration of geographical indications and designations of origin **(Commission Regulation (EC) No 1107/96)**
  - **20 March 2006**: Adoption by the Council of the EU of a new Regulation on geographical indications and designations of origin (**Council Regulation (EC) No 510/2006)**
  - **1 August 2009*:*** Application of the new PDO/PGI policy in wine as defined in **Regulation (EU) 479/2008**
- **Temporal reference for the index:** Product registered up to 2005

- **Statistics**:
  - 1056 products registered between 1996 and 2011.
  - 671 products registered in 15 EU Member States up to 2005, out of which 532 products selected according to our criteria (Table IV.1).
  - Italy has the highest number of selected products, followed by France, Portugal, Greece and Spain (Figure IV.1).

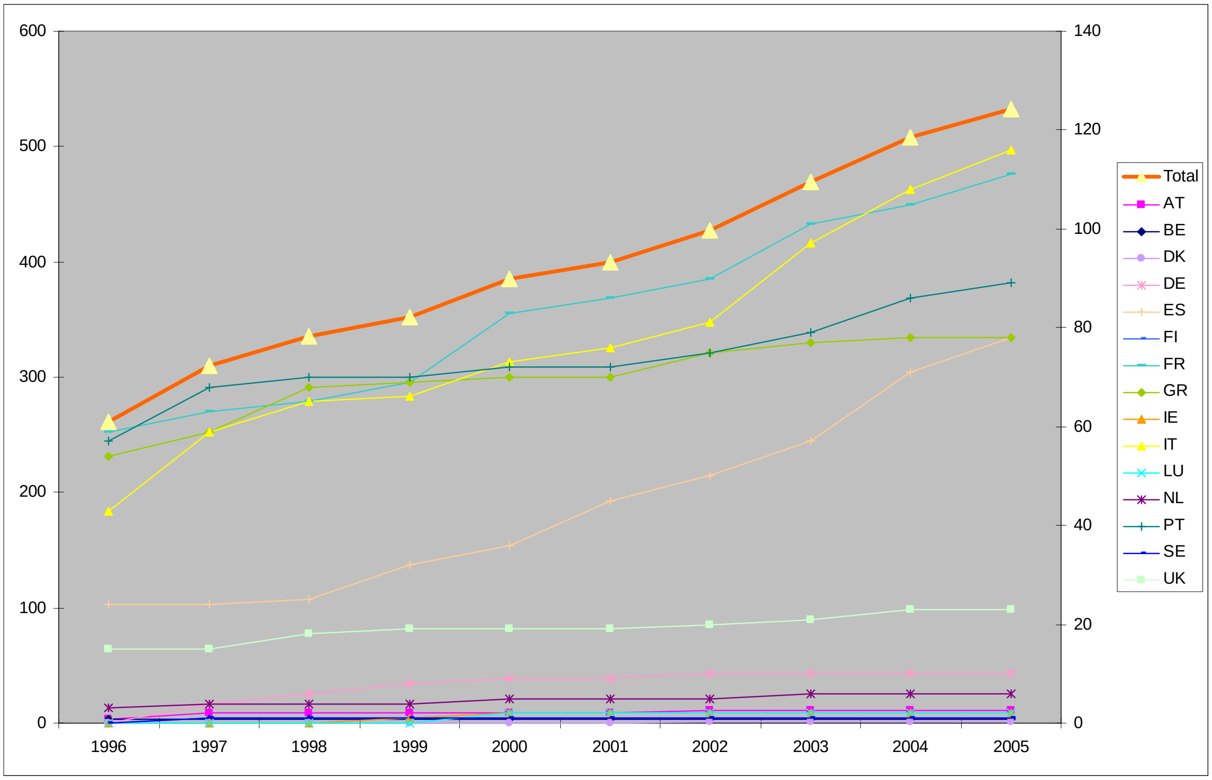


Figure IV.1 – Cumulative distribution of the number of selected PDO/PGI products registered during the period 1996-2005, for each Member State and in total.

For EU15 Member States the number of registered products regularly increased throughout the 1996-2009 period (Figure IV.2), and in 2006 the registrations started to increase at higher rate.

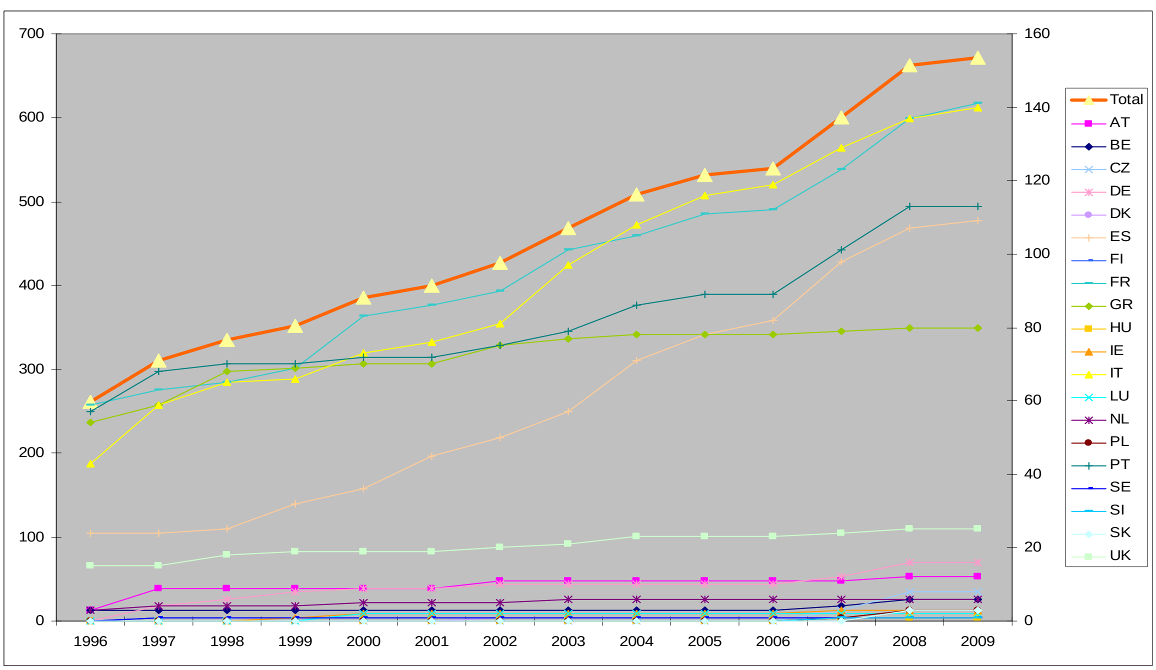


Figure IV.2 - Cumulative number of selected PDO/PGI products registered during the period 1996-2009, for each Member State

The Countries with the highest number of registrations in the period 1996-2005 (Italy, France, Spain, Greece) kept on registering new products in the following period (Figure IV.3).
The differences among Countries are most likely due to two reasons:
- environmental and climatic conditions, related to latitude and altitude: the largest amount of quality products are produced in the Southern and Mediterranean regions;
- food tradition, which beside physical conditions is also affected by culture, religion, domination history, location in respect to centres of trade and cultural exchanges[9].

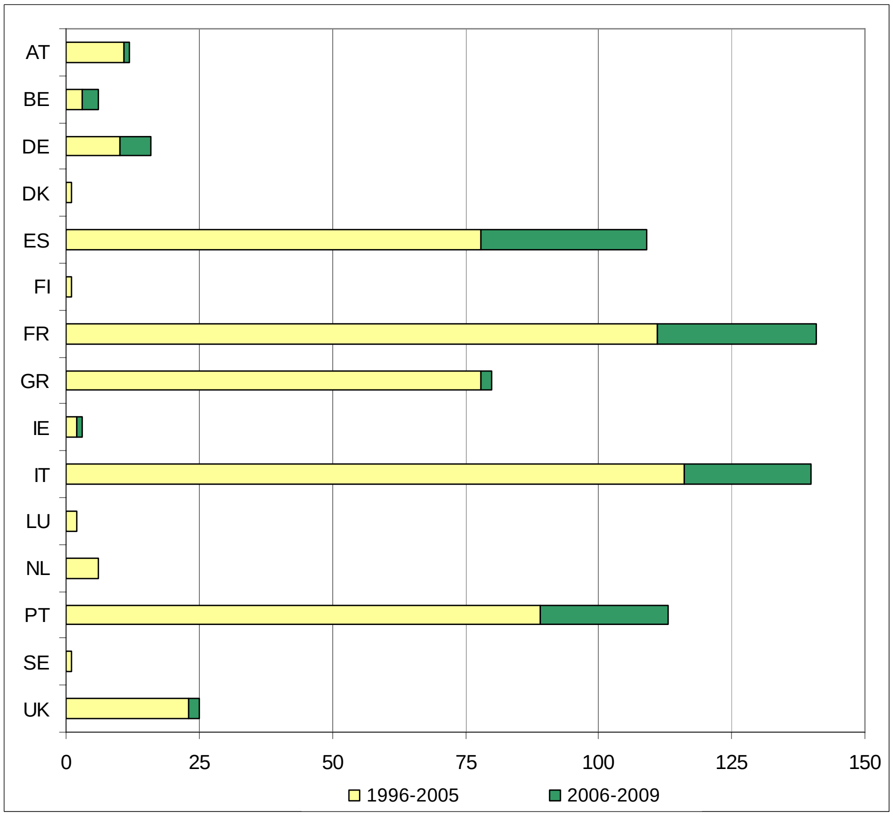


Figure IV.3 - Number of selected PDO/PGI products registered during the two periods 1996-2005 and 2006-2009, for the EU15 Member States.

Although the Regulation allowed third Countries to apply for registration of their products since 1992, in the new Member States the registration process started only after they entered the EU (Figure IV.4).

[9] Synthesis report No 6: Traditional Foods in Europe Dr. Elisabeth Weichselbaum and Bridget Benelam British Nutrition Foundation, Dr. Helena Soares Costa National Institute of Health (INSA), Portugal

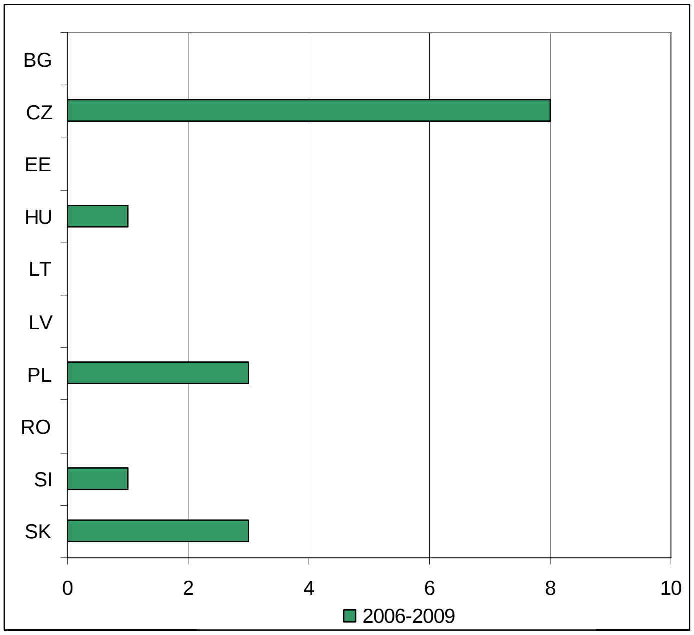


Figure IV.4 - Number of selected PDO/PGI products registered during the period 2006-2009, for the EU10 Member States.

Figures IV.1-4 represent only selected products related to rural landscape, however the observed tendency is consistent with that of the whole list of denominations (Figure IV.5).

Table IV.1 lists the PDO/PGI products registered up to 2005 selected for the calculation of the indicator.

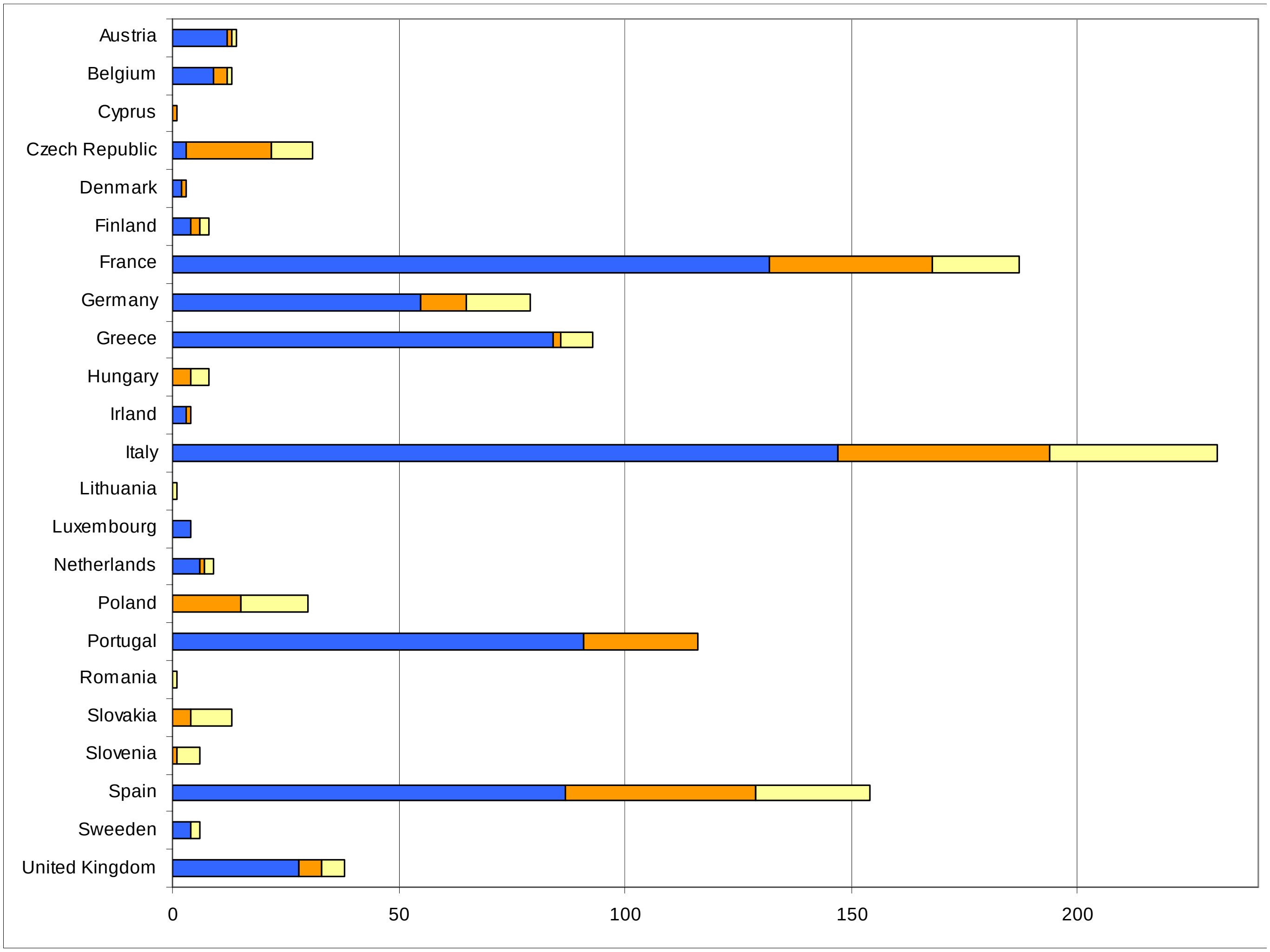


Figure IV.5 - Number of PDO/PGI products registered up to 2005, 2009, and 2011, for the EU27 Member States.

Table IV.1 - List of PDO/PGI products registered up to 2005 selected for the calculation of the indicator.

Denomination	Label	Product type	Product subtype	Year
Austria				
Gailtaler Almkäse	PDO	Dairy	Cheeses	1997
Gailtaler Speck	PGI	Meat Based	Pork	2002
Marchfeldspargel	PGI	Fruit, Vegetables and cereals	Vegetable	2002
Steirisches Kürbiskernöl	PGI	Fruit, Vegetables and cereals	Vegetable	1996
Tiroler Almkäse / Tiroler Alpkäse	PDO	Dairy	Cheeses	1997
Tiroler Bergkäse	PDO	Dairy	Cheeses	1997
Tiroler Graukäse	PDO	Dairy	Cheeses	1996
Vorarlberger Alpkäse	PDO	Dairy	Cheeses	1997
Vorarlberger Bergkäse	PDO	Dairy	Cheeses	1997
Wachauer Marille	PDO	Fruit, Vegetables and cereals	Fruit	1996
Waldviertler Graumohn	PDO	Fruit, Vegetables and cereals	Grains	1997

Denomination	Label	Product type	Product subtype	Year
Belgium				
Beurre d'Ardenne	PDO	Oils & Fats	Butter	1996
Fromage de Herve	PDO	Dairy	Cheeses	1996
Jambon d'Ardenne	PGI	Fresh Meat	Pork	1996
DE				
Allgäuer Bergkäse	PDO	Dairy	Cheeses	1997
Allgäuer Emmentaler	PDO	Dairy	Cheeses	1997
Altenburger Ziegenkäse	PDO	Dairy	Cheeses	1997
Diepholzer Moorschnucke	PGI	Fresh Meat	Lamb/mutton	1998
Lüneburger Heidschnucke	PGI	Fresh Meat	Lamb/mutton	1998
Oberpfälzer Karpfen	PGI	Fresh fish, molluscs, crustaceans and other prod	fresh water fish	2002
Odenwälder Frühstückskäse	PDO	Dairy	Cheeses	1997
Schwarzwaldforelle	PGI	Fresh fish, molluscs, crustaceans and other prod	fresh water fish	2000
Spreewälder Gurken	PGI	Fruit, Vegetables and cereals	Vegetable	1999
Spreewälder Meerrettich	PGI	Fruit, Vegetables and cereals	Vegetable	1999
Denmark				
Lammefjordsgulerod	PGI	Fruit, Vegetables and cereals	Vegetable	2002
Finland				
Lapin Puikula	PGI	Fruit, Vegetables and cereals	Vegetable	1997
France				
Abondance	PDO	Dairy	Cheeses	1996
Agneau de l'Aveyron	PGI	Fresh Meat	Lamb/mutton	1996
Agneau de Pauillac	PGI	Fresh Meat	Lamb/mutton	2004
Agneau du Bourbonnais	PGI	Fresh Meat	Lamb/mutton	1996
Agneau du Limousin	PGI	Fresh Meat	Lamb/mutton	2000
Agneau du Quercy	PGI	Fresh Meat	Lamb/mutton	1996
Ail rose de Lautrec	PGI	Fruit, vegetables and cereals	Garlic	1996
Asperge des Sables des Landes	PGI	Fruit, Vegetables and cereals	Vegetable	2005
Beaufort	PDO	Dairy	Cheeses	2003
Beurre Charentes-Poitou -Beurre des Charentes - Beurre des Deux-Sèvres	PDO	Oils & Fats	Butter	1996
Beurre d'Isigny	PDO	Oils & Fats	Butter	1996
Bleu d'Auvergne	PDO	Dairy	Cheeses	1996
Bleu des Causses	PDO	Dairy	Cheeses	1996
Bleu du Vercors - Sassenage	PDO	Dairy	Cheeses	2001
Boeuf Charolais du Bourbonnais	PGI	Fresh Meat	Beef	1996
Boeuf de Chalosse	PGI	Fresh Meat	Beef	1996
Boeuf du Maine	PGI	Fresh Meat	Beef	1996
Brie de Meaux	PDO	Dairy	Cheeses	1996
Brie de Melun	PDO	Dairy	Cheeses	1996
Brocciu Corse ou brocciu	PDO	Dairy	Cheeses	2003
Camembert de Normandie	PDO	Dairy	Cheeses	1996
Canard à foie gras du Sud-Ouest	PGI	Fresh Meat/Meat based	Poultry	2000

Denomination	Label	Product type	Product subtype	Year
Cantal ou fourme de Cantal ou cantalet	PDO	Dairy	Cheeses	1996
Chabichou du Poitou	PDO	Dairy	Cheeses	1996
Chasselas de Moissac	PDO	Fruit, Vegetables and cereals	Fruit	1996
Chevrotin	PDO	Dairy	Cheeses	2005
Cidre de Bretagne ou Cidre Breton	PGI	Other drinks and spring water	Cider	2000
Cidre de Normandie ou cidre normand	PGI	Other drinks and spring water	Cider	2000
Coco de Paimpol	PDO	Fruit, Vegetables and cereals	Vegetable	1999
Comté	PDO	Dairy	Cheeses	2003
Cornouaille	PDO	Other drinks and spring water	Cider	2000
Crème d'Isigny	PDO	Other products of animal origin	Fresh cream	1996
Crottin de Chavignol ou Chavignol	PDO	Dairy	Cheeses	1996
Dinde de Bresse	PDO	Fresh Meat	Beef	2003
Domfront	PDO	Other drinks and spring water	Cider	2004
Emmental français est-central	PGI	Dairy	Cheeses	1996
Emmental français est-central	PDO	Dairy	Cheeses	1996
Foin de Crau	PDO	Non-food	Hay	2000
Fourme d'Ambert ou fourme de Montbrison	PDO	Dairy	Cheeses	1996
Fraise du Périgord	PGI	Fruit, Vegetables and cereals	Fruit	2004
Haricot tarbais	PGI	Fruit, Vegetables and cereals	Vegetable	2000
Huile d'olive d'Aix-en-Provence	PDO	Oils & Fats	Oil	2002
Huile d'olive de Haute-Provence	PDO	Oils & Fats	Oil	2001
Huile d'olive de la Vallée des Baux-de-Provence	PDO	Oils & Fats	Oil	2000
Huile essentielle de lavande de Haute-Provence	PDO	Non-food	Essential Oil	2003
Langres	PDO	Dairy	Cheeses	1996
Lentille verte du Puy	PDO	Fruit, Vegetables and cereals	Vegetable	2000
Lentilles vertes du Berry	PGI	Fruit, Vegetables and cereals	Vegetable	1998
Livarot	PDO	Dairy	Cheeses	1996
Maroilles ou Marolles	PDO	Dairy	Cheeses	1996
Melon du Haut-Poitou	PGI	Fruit, Vegetables and cereals	Fruit	1998
Miel d'Alsace	PGI	Other products of animal origin	Honey	2005
Miel de Corse - Mele de Corsica	PDO	Other products of animal origin	Honey	2000
Miel de Provence	PGI	Other products of animal origin	Honey	2005
Miel de Sapin des Vosges	PDO	Other products of animal origin	Honey	2005
Mirabelles de Lorraine	PGI	Fruit, Vegetables and cereals	Fruit	1996

Denomination	Label	Product type	Product subtype	Year
Mont d'or ou vacherin du Haut-Doubs	PDO	Dairy	Cheeses	2003
Munster ou Munster-Géromé	PDO	Dairy	Cheeses	1996
Muscat du Ventoux	PDO	Fruit, Vegetables and cereals	Fruit	1999
Neufchâtel	PDO	Dairy	Cheeses	1996
Noix de Grenoble	PDO	Fruit, Vegetables and cereals	Nut	2003
Olive de Nice	PDO	Olives	Olives	2005
Olives cassées de la vallée des Baux-de-Provence	PDO	Olives	Olives	1999
Olives noires de la vallée des Baux-de-Provence	PDO	Olives	Olives	1999
Ossau-Iraty	PDO	Dairy	Cheeses	2003
Pays d'Auge/Pays d'Auge-Cambremer	PDO	Other drinks and spring water	Cider	2000
Pélardon	PDO	Dairy	Cheeses	2001
Piment d'Espelette - Piment d'Espelette-Ezpletako Biperra	PDO	Fruit, Vegetables and cereals	Vegetable	2002
Poireaux de Créances	PDO	Fruit, Vegetables and cereals	Vegetable	1996
Pomme de terre de l'Île de Ré	PGI	Fruit, Vegetables and cereals	Vegetable	2000
Pomme de Terre de Merville	PGI	Fruit, Vegetables and cereals	Vegetable	1996
Pommes et poires de Savoie	PGI	Fruit, Vegetables and cereals	Fruit	1996
Pont-l'Evêque	PDO	Dairy	Cheeses	1996
Porc de la Sarthe	PGI	Fresh Meat	Pork	1997
Porc de Normandie	PGI	Fresh Meat	Pork	1997
Porc de Vendée	PGI	Fresh Meat	Pork	1997
Porc du Limousin	PGI	Fresh Meat	Pork	1997
Pruneaux d'Agen - Pruneaux d'Agen mi-cuits	PGI	Fruit, Vegetables and cereals	Fruit	2002
Reblochon ou reblochon de Savoie	PDO	Dairy	Cheeses	2003
Riz de Camargue	PGI	Fruit, Vegetables and cereals	Grain	2000
Sainte-Maure de Touraine	PDO	Dairy	Cheeses	2003
Saint-Nectaire	PDO	Dairy	Cheeses	1996
Salers	PDO	Dairy	Cheeses	2003
Selles-sur-Cher	PDO	Dairy	Cheeses	1996
Taureau de Camargue	PDO	Fresh Meat	Beef	2002
Tomme de Savoie	PGI	Dairy	Cheeses	1996
Tomme des Pyrénées	PGI	Dairy	Cheeses	1996
Valençay	PDO	Dairy	Cheeses	2004
Veau du Limousin	PGI	Fresh Meat	Beef	1996
Volaille d'Ancenis	PGI	Fresh Meat	Poultry	1996
Volaille de Bresse	PDO	Fresh Meat	Poultry	2000
Volaille de Gascogne	PGI	Fresh Meat	Poultry	1996
Volaille de Houdan	PGI	Fresh Meat	Poultry	1996
Volaille de Janzé	PGI	Fresh Meat	Poultry	1996
Volailles d'Auvergne	PGI	Fresh Meat	Poultry	1996
Volailles de Bourgogne	PGI	Fresh Meat	Poultry	1996
Volailles de Bretagne	PGI	Fresh Meat	Poultry	1996
Volailles de Challans	PGI	Fresh Meat	Poultry	1996

Denomination	Label	Product type	Product subtype	Year
Volailles de Cholet	PGI	Fresh Meat	Poultry	1996
Volailles de la Drôme	PGI	Fresh Meat	Poultry	1996
Volailles de Licques	PGI	Fresh Meat	Poultry	1996
Volailles de Normandie	PGI	Fresh Meat	Poultry	1996
Volailles de Vendée	PGI	Fresh Meat	Poultry	1996
Volailles des Landes	PGI	Fresh Meat	Poultry	1996
Volailles du Béarn	PGI	Fresh Meat	Poultry	1996
Volailles du Charolais	PGI	Fresh Meat	Poultry	1996
Volailles du Forez	PGI	Fresh Meat	Poultry	1996
Volailles du Gers	PGI	Fresh Meat	Poultry	1996
Volailles du Maine	PGI	Fresh Meat	Poultry	1996
Volailles du plateau de Langres	PGI	Fresh Meat	Poultry	1996
Volailles du Val de Sèvre	PGI	Fresh Meat	Poultry	1996
Volailles du Velay	PGI	Fresh Meat	Poultry	1996
Greece				
Agios Mathaios Kerkyras	PDO	Oils & Fats	Oil	2004
Aktinidio Pierias	PDO	Fruit, Vegetables and cereals	Fruit	2002
Aktinidio Sperchiou	PDO	Fruit, Vegetables and cereals	Fruit	1996
Anevato	PDO	Dairy	Cheeses	1996
Apokoronas Hanion Kritis	PDO	Oils & Fats	Oil	1996
Archanes Iraklio Kritis	PDO	Oils & Fats	Oil	1996
Batzos	PDO	Dairy	Cheeses	1996
Corinthiaki Stafida Vostitsa	PDO	Fruit, Vegetables and cereals	Fruit	1998
Elia Kalamatas	PDO	Olives	Olives	1996
Exeretiko partheno eleol	PDO	Oils & Fats	Oil	2002
Fasolia Gigantes Elefantes Kato Nevrokopiou	PGI	Fruit, Vegetables and cereals	Vegetable	1998
Fasolia Gigantes Elefantes Prespon Florinas	PGI	Fruit, Vegetables and cereals	Vegetable	1998
Fasolia Gigantes-Elefantes Kastorias	PGI	Fruit, Vegetables and cereals	Vegetable	2003
Fasolia Koina Mesosperma Kato Nevrokopiou	PGI	Fruit, Vegetables and cereals	Vegetable	1998
Fasolia Plake Megalosperma Prespon Florinas	PGI	Fruit, Vegetables and cereals	Vegetable	1998
Feta	PDO	Dairy	Cheeses	2002
Finiki Lakonias	PDO	Oils & Fats	Oil	2003
Fistiki Aeginas	PDO	Fruit, Vegetables and cereals	Nut	1996
Fistiki Megaron	PDO	Fruit, Vegetables and cereals	Nut	1996
Formaella Arachovas Parnassou	PDO	Dairy	Cheeses	1996
Galotyri	PDO	Dairy	Cheeses	1996
Graviera Agrafon	PDO	Dairy	Cheeses	1996
Graviera Kritis	PDO	Dairy	Cheeses	1996
Graviera Naxou	PDO	Dairy	Cheeses	1996
Hania Kritis	PGI	Oils & Fats	Oil	1996
Kalamata	PDO	Oils & Fats	Oil	1997

Denomination	Label	Product type	Product subtype	Year
Kalathaki Limnou	PDO	Dairy	Cheeses	1996
Kasseri	PDO	Dairy	Cheeses	2000
Katiki Domokou	PDO	Dairy	Cheeses	1996
Kefalograviera	PDO	Dairy	Cheeses	1996
Kefalonia	PGI	Oils & Fats	Oil	1996
Kelifoto fistiki Phtiotidas	PDO	Fruit, Vegetables and cereals	Nut	1996
Kerasia Tragana Rodochoriou	PDO	Fruit, Vegetables and cereals	Fruit	1997
Kolymvari Hanion Kritis	PDO	Oils & Fats	Oil	1997
Konservolia Amfissis	PDO	Olives	Olives	1996
Konservolia Artas	PDO	Olives	Olives	1996
Konservolia Atalantis	PDO	Olives	Olives	1996
Konservolia Piliou Volou	PDO	Olives	Olives	1997
Konservolia Rovion	PDO	Olives	Olives	1996
Konservolia Stilidas	PDO	Olives	Olives	1996
Kopanisti	PDO	Dairy	Cheeses	1996
Kranidi Argolidas	PDO	Oils & Fats	Oil	1996
Krokees Lakonias	PDO	Oils & Fats	Oil	1996
Krokos Kozanis	PDO	Non-food	Saffron	1999
Kumquat Kerkyras	PGI	Fruit, Vegetables and cereals	Fruit	1996
Ladotyri Mytilinis	PDO	Dairy	Cheeses	1996
Lakonia	PGI	Oils & Fats	Oil	1996
Lesbos	PGI	Oils & Fats	Oil	1996
Lygourgio Asklipiou	PDO	Oils & Fats	Oil	1996
Manouri	PDO	Dairy	Cheeses	1996
Metsovone	PDO	Dairy	Cheeses	1996
Mila Delicious Pilafa Tripolos	PDO	Fruit, Vegetables and cereals	Fruit	1997
Mila Zagora Piliou	PDO	Fruit, Vegetables and cereals	Fruit	1996
Milo Kastorias	PGI	Fruit, Vegetables and cereals	Fruit	2002
Olympia	PGI	Oils & Fats	Oil	1996
Patata kato nevrokopiou	PGI	Fruit, Vegetables and cereals	Vegetable	2002
Petrina Lakonias	PDO	Oils & Fats	Oil	1996
Peza Iraklio Kritis	PDO	Oils & Fats	Oil	1996
Pichtogalo Chanion	PDO	Dairy	Cheeses	1996
Portokalia Maleme Hanion Kritis	PDO	Fruit, Vegetables and cereals	Fruit	1996
Preveza	PGI	Oils & Fats	Oil	1996
Rhodos	PGI	Oils & Fats	Oil	1996
Rodakina Naoussas	PDO	Fruit, Vegetables and cereals	Fruit	1998
Samos	PGI	Oils & Fats	Oil	1998
San Michali	PDO	Dairy	Cheeses	1996
Sfela	PDO	Dairy	Cheeses	1996
Sitia Lasithi Kritis	PGI	Oils & Fats	Oil	1998
Syka Vravronas Markopoulou Mesogion	PGI	Fruit, Vegetables and cereals	Fruit	1996
Thassos	PGI	Oils & Fats	Oil	1996
Trumba Quios	PDO	Olives	Olives	1996
Trumba Thasu	PDO	Olives	Olives	1996
Trumba-Ambadai Rethimno Crète	PDO	Olives	Olives	1996

Denomination	Label	Product type	Product subtype	Year
Tsakoniki Melintzana Leonidiou	PDO	Fruit, Vegetables and cereals	Vegetable	1996
Viannos Iraklio Kritis	PGI	Oils & Fats	Oil	1996
Vorios Mylopotamos Rethymnis Kritis	PGI	Oils & Fats	Oil	1996
Xera Syka Kymis	PDO	Fruit, Vegetables and cereals	Fruit	1996
Xynomyzithra Kritis	PDO	Dairy	Cheeses	1996
Zakynthos	PGI	Oils & Fats	Oil	1998
Ireland				
Imokilly Regato	PDO	Dairy	Cheeses	1999
Timoleague Brown Pudding	PGI	Meat Based	Pork	2000
Italy				
Aceto balsamico tradizionale di Modena	PDO	Non-food	Vinegar	2000
Aceto balsamico tradizionale di Reggio Emilia	PDO	Non-food	Vinegar	2000
Alto Crotonese	PDO	Oils & Fats	Oil	2003
Aprutino Pescarese	PDO	Oils & Fats	Oil	1996
Arancia Rossa di Sicilia	PGI	Fruit, Vegetables and cereals	Fruit	1996
Asparago bianco di Cimadolmo	PGI	Fruit, Vegetables and cereals	Vegetable	2002
Asparago verde di Altedo	PGI	Fruit, Vegetables and cereals	Vegetable	2003
Basilico Genovese	PDO	Fruit, Vegetables and cereals	Vegetable	2005
Bergamotto di Reggio Calabria	PDO	Non-food	Essential Oil	2001
Bitto	PDO	Dairy	Cheeses	1996
Bra	PDO	Dairy	Cheeses	1996
Brisighella	PDO	Oils & Fats	Oil	1996
Bruzio	PDO	Oils & Fats	Oil	1997
Caciocavallo Silano	PDO	Dairy	Cheeses	2003
Canestrato Pugliese	PDO	Dairy	Cheeses	1996
Canino	PDO	Oils & Fats	Oil	1996
Cappero di Pantelleria	PGI	Fruit, Vegetables and cereals	Vegetable	1996
Carciofo di Paestum	PGI	Fruit, Vegetables and cereals	Vegetable	2004
Carciofo Romanesco del Lazio	PGI	Fruit, Vegetables and cereals	Vegetable	2002
Cartoceto	PDO	Oils & Fats	Oil	2004
Casciotta d'Urbino	PDO	Dairy	Cheeses	1996
Castagna del Monte Amiata	PGI	Fruit, Vegetables and cereals	Nut	2000
Castagna di Montella	PGI	Fruit, Vegetables and cereals	Nut	1996
Castelmagno	PDO	Dairy	Cheeses	1996
Chianti Classico	PDO	Oils & Fats	Oil	2000
Cilento	PDO	Oils & Fats	Oil	1997
Ciliegia di Marostica	PGI	Fruit, Vegetables and cereals	Fruit	2002
Clementine del Golfo di Taranto	PGI	Fruit, Vegetables and cereals	Fruit	2003
Clementine di Calabria	PGI	Fruit, Vegetables and cereals	Fruit	1997
Collina di Brindisi	PDO	Oils & Fats	Oil	1996
Colline di Romagna	PDO	Oils & Fats	Oil	2003
Colline Salernitane	PDO	Oils & Fats	Oil	1997
Colline Teatine	PDO	Oils & Fats	Oil	1997

Denomination	Label	Product type	Product subtype	Year
Dauno	PDO	Oils & Fats	Oil	1997
Fagiolo di Lamon della Vallata Bellunese	PGI	Fruit, Vegetables and cereals	Vegetable	1996
Fagiolo di Sarconi	PGI	Fruit, Vegetables and cereals	Vegetable	1996
Fagiolo di Sorana	PGI	Fruit, Vegetables and cereals	Vegetable	2002
Farina di Neccio della Garfagnana	PDO	Fruit, Vegetables and cereals	Grain	2004
Farro della Garfagnana	PGI	Fruit, Vegetables and cereals	Grain	1996
Ficodindia dell'Etna	PDO	Fruit, Vegetables and cereals	Fruit	2003
Fiore Sardo	PDO	Dairy	Cheeses	1996
Fontina	PDO	Dairy	Cheeses	1996
Formai de Mut Dell'alta Valle Brembana	PDO	Dairy	Cheeses	1996
Fungo di Borgotaro	PDO	Fruit, Vegetables and cereals	Fungus	1996
Garda	PDO	Oils & Fats	Oil	1997
Gorgonzola	PDO	Dairy	Cheeses	1996
Grana Padano	PDO	Dairy	Cheeses	1996
Kiwi Latina	PGI	Fruit, Vegetables and cereals	Fruit	2004
La Bella della Daunia	PDO	Olives	Olives	2000
Laghi Lombardi	PDO	Oils & Fats	Oil	1997
Lametia	PDO	Oils & Fats	Oil	1999
Lenticchia di Castelluccio di Norcia	PGI	Fruit, Vegetables and cereals	Vegetable	1997
Limone Costa d'Amalfi	PGI	Fruit, Vegetables and cereals	Fruit	2001
Limone di Sorrento	PGI	Fruit, Vegetables and cereals	Fruit	2000
Lucca	PDO	Oils & Fats	Oil	2004
Marrone del Mugello	PGI	Fruit, Vegetables and cereals	Nut	1996
Marrone di Castel del Rio	PGI	Fruit, Vegetables and cereals	Nut	1996
Marrone di San Zeno	PDO	Fruit, Vegetables and cereals	Nut	2003
Mela Alto Adige or Südtiroler Apfel	PGI	Fruit, Vegetables and cereals	Fruit	2005
Mela Val di Non	PDO	Fruit, Vegetables and cereals	Fruit	2003
Miele della Lunigiana	PGI	Other products of animal origin	Honey	2004
Molise	PDO	Oils & Fats	Oil	2003
Montasio	PDO	Dairy	Cheeses	1996
Monte Etna	PDO	Oils & Fats	Oil	2003
Monte Veronese	PDO	Dairy	Cheeses	1996
Monti Iblei	PDO	Oils & Fats	Oil	2003
Murazzano	PDO	Dairy	Cheeses	1996
Nocciola del Piemonte	PGI	Fruit, Vegetables and cereals	Nut	2004
Nocellara del Belice	PDO	Olives	Olives	1998
Oliva Ascolana del Piceno	PDO	Olives	Olives	2005
Parmigiano Reggiano	PDO	Dairy	Cheeses	1996
Pecorino Sardo	PDO	Dairy	Cheeses	1996
Pecorino Siciliano	PDO	Dairy	Cheeses	1996
Pecorino Toscano	PDO	Dairy	Cheeses	1996
Penisola Sorrentina	PDO	Oils & Fats	Oil	1997
Peperone di Senise	PGI	Fruit, Vegetables and cereals	Vegetable	1996
Pera dell'Emilia Romagna	PGI	Fruit, Vegetables and cereals	Fruit	1998

Denomination	Label	Product type	Product subtype	Year
Pera mantovana	PGI	Fruit, Vegetables and cereals	Fruit	1998
Pesca e nettarina di Romagna	PGI	Fruit, Vegetables and cereals	Fruit	1998
Pomodoro di Pachino	PGI	Fruit, Vegetables and cereals	Vegetable	2003
Pomodoro S. Marzano dell'Agro Sarnese-Nocerino	PGI	Fruit, Vegetables and cereals	Vegetable	1996
Pomodoro S. Marzano dell'Agro Sarnese-Nocerino	PDO	Fruit, Vegetables and cereals	Vegetable	1996
Pretuziano delle Colline Teramane	PDO	Oils & Fats	Oil	2003
Provolone Valpadana	PDO	Dairy	Cheeses	1996
Quartirolo Lombardo	PDO	Dairy	Cheeses	1996
Ragusano	PDO	Dairy	Cheeses	1996
Raschera	PDO	Dairy	Cheeses	1996
Ricotta Romana	PDO	Dairy	Cheeses	2005
Riso Nano Vialone Veronese	PGI	Fruit, Vegetables and cereals	Grain	1996
Riviera Ligure	PDO	Oils & Fats	Oil	1997
Robiola di Roccaverano	PDO	Dairy	Cheeses	1996
Sabina	PDO	Oils & Fats	Oil	1996
Salame d'oca di Mortara	PGI	Meat Based	Poultry	2004
Scalogno di Romagna	PGI	Fruit, Vegetables and cereals	Vegetable	1997
Sopressa Vicentina	PDO	Meat Based	Pork	2003
Spressa delle Giudicarie	PDO	Dairy	Cheeses	2003
Taleggio	PDO	Dairy	Cheeses	1996
Tergeste	PDO	Oils & Fats	Oil	2004
Terra di Bari	PDO	Oils & Fats	Oil	1997
Terra d'Otranto	PDO	Oils & Fats	Oil	1998
Terre di Siena	PDO	Oils & Fats	Oil	2000
Terre Tarantine	PDO	Oils & Fats	Oil	2004
Toma Piemontese	PDO	Dairy	Cheeses	1996
Toscano	PDO	Oils & Fats	Oil	1998
Tuscia	PDO	Oils & Fats	Oil	2005
Umbria	PDO	Oils & Fats	Oil	1997
Uva da tavola di Canicattì	PGI	Fruit, Vegetables and cereals	Fruit	1997
Uva da tavola di Mazzarrone	PGI	Fruit, Vegetables and cereals	Fruit	2003
Val di Mazara	PDO	Oils & Fats	Oil	2001
Valdemone	PDO	Oils & Fats	Oil	2005
Valle d'Aosta Fromadzo	PDO	Dairy	Cheeses	1996
Valle del Belice	PDO	Oils & Fats	Oil	2004
Valli Trapanesi	PDO	Oils & Fats	Oil	1997
Valtellina Casera	PGI	Dairy	Cheeses	1996
Veneto Valpolicella, Veneto Euganei e Berici, Veneto del Grappa	PDO	Oils & Fats	Oil	2002
Zafferano del' Aquila	PDO	Non-food	Saffron	2005
Zafferano di San Gimignano	PDO	Non-food	Saffron	2005
Luxemburg				
Beurre rose de la marque nationale	PDO	Oils & Fats	Butter	2000

Denomination	Label	Product type	Product subtype	Year
grand duché de Luxembourg				
Miel luxembourgeois de marque nationale	PDO	Other products of animal origin	Honey	2000
Netherland				
Boeren-Leidse met sleutels	PDO	Dairy	Cheeses	1997
Kanterkaas, Kanternagelkaas, Kanterkomijnekaas	PDO	Dairy	Cheeses	2000
Noord-Hollandse Edammer	PDO	Dairy	Cheeses	1996
Noord-Hollandse Gouda	PDO	Dairy	Cheeses	1996
Opperdoezer Ronde	PGI	Fruit, Vegetables and cereals	Vegetable	1996
Westlandse druif	PGI	Fruit, Vegetables and cereals	Fruit	2003
Portugal				
Ameixa d'Elvas	PDO	Fruit, Vegetables and cereals	Fruit	1996
Amêndoa Douro	PDO	Fruit, Vegetables and cereals	Nut	1996
Anona da Madeira	PDO	Fruit, Vegetables and cereals	Fruit	2000
Azeite de Moura	PDO	Oils & Fats	Oil	1996
Azeite de Trás-os-Montes	PDO	Oils & Fats	Oil	1996
Azeite do Ribatejo	PDO	Oils & Fats	Oil	1996
Azeites da Beira Interior (Azeite da Beira Alta, Azeite da Beira Baixa)	PDO	Oils & Fats	Oil	1996
Azeites do Norte Alentejano	PDO	Oils & Fats	Oil	2005
Azeitona de conserva Negrinha de Freixo	PDO	Olives	Olives	1996
Borrego da Beira	PGI	Fresh Meat	Lamb/mutton	1996
Borrego de Montemor-O-Novo	PGI	Fresh Meat	Lamb/mutton	1996
Borrego do Baixo Alentejo	PGI	Fresh Meat	Lamb/mutton	1997
Borrego do Nordeste Alentejano	PGI	Fresh Meat	Lamb/mutton	2003
Borrego Serra da Estrela	PDO	Fresh Meat	Lamb/mutton	1996
Borrego Terrincho	PDO	Fresh Meat	Lamb/mutton	1996
Cabrito da Beira	PGI	Fresh Meat	Goat	1996
Cabrito da Gralheira	PGI	Fresh Meat	Goat	1996
Cabrito das Terras Altas do Minho	PGI	Fresh Meat	Goat	1996
Cabrito de Barroso	PGI	Fresh Meat	Goat	1996
Cabrito Transmontano	PDO	Fresh Meat	Goat	1996
Cacholeira Branca de Portalegre	PGI	Meat Based	Pork	1997
Carne Arouquesa	PDO	Fresh Meat	Beef	1996
Carne Barrosã	PDO	Fresh Meat	Beef	1996
Carne Cachena da Peneda	PDO	Fresh Meat	Beef	2002
Carne da Charneca	PDO	Fresh Meat	Beef	2002
Carne de Bovino Cruzado dos Lameiros do Barroso	PGI	Fresh Meat	Beef	2002
Carne de Porco Alentejano	PDO	Fresh Meat	Pork	2003
Carne dos Açores	PGI	Fresh Meat	Beef	2003
Carne Marinhoa	PDO	Fresh Meat	Beef	1996
Carne Maronesa	PDO	Fresh Meat	Beef	1996
Carne Mertolenga	PDO	Fresh Meat	Beef	1996

Denomination	Label	Product type	Product subtype	Year
Carne Mirandesa	PDO	Fresh Meat	Beef	1996
Castanha da Terra Fria	PDO	Fruit, Vegetables and cereals	Nut	1996
Castanha de Marvão - Portalegre	PDO	Fruit, Vegetables and cereals	Nut	1996
Castanha de Padrela	PDO	Fruit, Vegetables and cereals	Nut	1996
Castanha dos Soutos da Lapa	PDO	Fruit, Vegetables and cereals	Nut	1996
Cereja da Cova da Beira	PGI	Fruit, Vegetables and cereals	Fruit	1996
Cereja de São Julião - Portalegre	PDO	Fruit, Vegetables and cereals	Fruit	1996
Chouriço de Carne de Estremoz e Borba	PGI	Meat Based	Pork	2004
Chouriço de Portalegre	PGI	Meat Based	Pork	1997
Chouriço Grosso de Estremoz e Borba	PGI	Meat Based	Pork	2004
Chouriço Mouro de Portalegre	PGI	Meat Based	Pork	1997
Citrinos do Algarve	PGI	Fruit, Vegetables and cereals	Fruit	1996
Cordeiro Bragançano	PDO	Fresh Meat	Lamb/mutton	1996
Farinheira de Estremoz e Borba	PGI	Meat Based	Pork	2004
Farinheira de Portalegre	PGI	Meat Based	Pork	1997
Linguiça de Portalegre	PGI	Meat Based	Pork	1997
Lombo Branco de Portalegre	PGI	Meat Based	Pork	1997
Lombo Enguitado de Portalegre	PGI	Meat Based	Pork	1997
Maçã Bravo de Esmolfe	PDO	Fruit, Vegetables and cereals	Fruit	1996
Maçã da Beira Alta	PGI	Fruit, Vegetables and cereals	Fruit	1996
Maçã da Cova da Beira	PGI	Fruit, Vegetables and cereals	Fruit	1996
Maçã de Alcobaça	PGI	Fruit, Vegetables and cereals	Fruit	1996
Maçã de Portalegre	PGI	Fruit, Vegetables and cereals	Fruit	1996
Maracuja dos Açores/S. Miguel	PDO	Fruit, Vegetables and cereals	Fruit	1996
Mel da Serra da Lousã	PDO	Other products of animal origin	Honey	1996
Mel da Serra de Monchique	PDO	Other products of animal origin	Honey	1996
Mel da Terra Quente	PDO	Other products of animal origin	Honey	1996
Mel das Terras Altas do Minho	PDO	Other products of animal origin	Honey	1996
Mel de Barroso	PDO	Other products of animal origin	Honey	2005
Mel do Alentejo	PDO	Other products of animal origin	Honey	1996
Mel do Parque de Montezinho	PDO	Other products of animal origin	Honey	1996
Mel do Ribatejo Norte (Serra D'aire,Albufeira de Castelo de Bode, Bairro,	PDO	Other products of animal origin	Honey	1996
Mel dos Açores	PDO	Other products of animal origin	Honey	1996
Morcela de Assar de Portalegre	PGI	Meat Based	Pork	1997
Morcela de Cozer de Portalegre	PGI	Meat Based	Pork	1997
Morcela de Estremoz e Borba	PGI	Meat Based	Pork	2004

Denomination	Label	Product type	Product subtype	Year
Paia de Estremoz e Borba	PGI	Meat Based	Pork	2004
Paia de Lombo de Estremoz e Borba	PGI	Meat Based	Pork	2004
Paia de Toucinho de Estremoz e Borba	PGI	Meat Based	Pork	2004
Painho de Portalegre	PGI	Meat Based	Pork	1997
Pêra Rocha do Oeste	PDO	Fruit, Vegetables and cereals	Fruit	2003
Pêssego da Cova da Beira	PGI	Fruit, Vegetables and cereals	Fruit	1996
Presunto de Barrancos	PDO	Meat Based	Pork	1996
Presunto de Barroso	PGI	Meat Based	Pork	1996
Queijo de Azeitão	PDO	Dairy	Cheeses	1996
Queijo de Cabra Transmontano	PDO	Dairy	Cheeses	1996
Queijo de Évora	PDO	Dairy	Cheeses	1996
Queijo de Nisa	PDO	Dairy	Cheeses	1996
Queijo do Pico	PDO	Dairy	Cheeses	1998
Queijo mestiço de Tolosa	PGI	Dairy	Cheeses	2000
Queijo Rabaçal	PDO	Dairy	Cheeses	1996
Queijo São Jorge	PDO	Dairy	Cheeses	1996
Queijo Serpa	PDO	Dairy	Cheeses	1996
Queijo Terrincho	PDO	Dairy	Cheeses	1996
Queijos da Beira Baixa (Queijo de Castelo Branco, Queijo Amarelo da Beira	PDO	Dairy	Cheeses	1996
Requeijão Serra da Estrela	PDO	Other products of animal origin	Dairy	2005
Salpicão de Vinhais	PGI	Meat Based	Pork	1998
Vitela de Lafões	PGI	Fresh Meat	Beef	1996
Spain				
Aceite de Mallorca / Aceite mallorquín / Oli de Mallorca / Oli mallorquí	PDO	Oils & Fats	Oil	2004
Aceite de Terra ou Oli de Terra Alta	PDO	Oils & Fats	Oil	2005
Aceite del Bajo Aragón	PDO	Oils & Fats	Oil	2001
Alcachofa de Benicarló o Carxofa de Benicarló	PGI	Fruit, Vegetables and cereals	Vegetable	2003
Alcachofa de Tudela	PGI	Fruit, Vegetables and cereals	Vegetable	2001
Arroz de Valencia - Arròs de València	PGI	Fruit, Vegetables and cereals	Grain	2001
Avellana de Reus	PDO	Fruit, Vegetables and cereals	Nut	1999
Azafrán de La Mancha	PDO	Non-food	Saffron	2004
Berenjena de Almagro	PGI	Fruit, Vegetables and cereals	Vegetable	1996
Botillo del Bierzo	PGI	Meat Based	Pork	2001
Cabrales	PDO	Dairy	Cheeses	1996
Calasparra	PDO	Fruit, Vegetables and cereals	Grain	1996
Calçot de Valls	PGI	Fruit, Vegetables and cereals	Vegetable	2002
Carne de Ávila	PGI	Fresh Meat	Beef	1996
Carne de Cantabria	PGI	Fresh Meat	Beef	2004
Carne de la Sierra de Guadarrama	PGI	Fresh Meat	Beef	2004
Carne de Morucha de Salamanca	PGI	Fresh Meat	Beef	1996
Carne de Vacuno del País Vasco o	PGI	Fresh Meat	Beef	2004

Denomination	Label	Product type	Product subtype	Year
Euskal Okela				
Cecina de León	PGI	Meat Based	Pork	1996
Cerezas de la Montaña de Alicante	PGI	Fruit, Vegetables and cereals	Fruit	1996
Chufa de Valencia	PDO	Fruit, Vegetables and cereals	Nut	1999
Cítricos Valencianos - Cítrics Valencians	PGI	Fruit, Vegetables and cereals	Fruit	2003
Clementinas de las Tierras del Ebro o Clementines de les Terres de l'Ebre	PGI	Fruit, Vegetables and cereals	Fruit	2003
Cordero Manchego	PGI	Fresh Meat	Lamb/mutton	1999
Dehesa de Extremadura	PDO	Meat Based	Pork	1996
Espárrago de Huétor-Tájar	PGI	Fruit, Vegetables and cereals	Vegetable	2000
Espárrago de Navarra	PGI	Fruit, Vegetables and cereals	Vegetable	2004
Faba Asturiana	PGI	Fruit, Vegetables and cereals	Vegetable	1996
Guijuelo	PDO	Meat Based	Pork	1996
Idiazábal	PDO	Dairy	Cheeses	1999
Jamón de Huelva	PDO	Meat Based	Pork	1998
Jijona	PGI	Baked goods	Nougat	1996
Judias de El Barco de Avila	PGI	Fruit, Vegetables and cereals	Vegetable	1996
Kaki Ribera del Xuquer	PGI	Fruit, Vegetables and cereals	Fruit	2002
Lacón Gallego	PGI	Meat Based	Pork	2001
Lechazo de Castilla y León	PGI	Fresh Meat	Lamb/mutton	1999
Les Garrigues	PDO	Oils & Fats	Oil	2004
Mahón	PDO	Dairy	Cheeses	2001
Mantequilla de l'Alt Urgell y la Cerdanya o Mantega de l'Alt Urgell i la	PDO	Oils & Fats	Butter	2003
Manzana de Girona o Poma de Girona	PDO	Fruit, Vegetables and cereals	Fruit	2003
Manzana Reineta del Bierzo	PDO	Fruit, Vegetables and cereals	Fruit	2001
Melocotón de Calanda	PDO	Fruit, Vegetables and cereals	Vegetable	2000
Miel de Granada	PDO	Other products of animal origin	Honey	2005
Miel de La Alcarria	PDO	Other products of animal origin	Honey	1996
Montes de Toledo	PDO	Oils & Fats	Oil	2000
Nísperos Callosa d'En Sarriá	PDO	Fruit, Vegetables and cereals	Fruit	1996
Pera de Jumilla	PDO	Fruit, Vegetables and cereals	Fruit	2005
Peras de Rincón de Soto	PDO	Fruit, Vegetables and cereals	Fruit	2004
Picón Bejes-Tresviso	PDO	Dairy	Cheeses	1996
Pimentón de Murcia	PDO	Fruit, Vegetables and cereals	Vegetable	2004
Pimiento Riojano	PGI	Fruit, Vegetables and cereals	Vegetable	2004
Pimientos del Piquillo de Lodosa	PGI	Fruit, Vegetables and cereals	Vegetable	1996
Priego de Córdoba	PDO	Oils & Fats	Oil	1999
Queso de La Serena	PDO	Dairy	Cheeses	1996
Queso de l'Alt Urgell y la Cerdanya	PDO	Dairy	Cheeses	2000
Queso de Murcia	PDO	Dairy	Cheeses	2002
Queso de Murcia al vino	PDO	Dairy	Cheeses	2002
Queso de Valdeón	PDO	Dairy	Cheeses	2004

Denomination	Label	Product type	Product subtype	Year
Queso Ibores	PDO	Dairy	Cheeses	2005
Queso Majorero	PDO	Dairy	Cheeses	1999
Queso Palmero o Queso de la Palma	PDO	Dairy	Cheeses	2002
Queso Tetilla	PDO	Dairy	Cheeses	1996
Queso Zamorano	PDO	Dairy	Cheeses	1996
Quesucos de Liébana	PDO	Dairy	Cheeses	1996
Roncal	PDO	Dairy	Cheeses	2003
Salchichón de Vic - Llonganissa de Vic	PGI	Meat Based	Pork	2001
Sidra de Asturias or Sidra d'Asturies	PDO	Other drinks and spring water	Cider	2005
Sierra de Cádiz	PDO	Oils & Fats	Oil	2005
Sierra de Cazorla	PDO	Oils & Fats	Oil	2001
Sierra de Segura	PDO	Oils & Fats	Oil	1996
Siurana	PDO	Oils & Fats	Oil	2005
Ternera Asturiana	PGI	Fresh Meat	Veal	2004
Ternera de Extremadura	PGI	Fresh Meat	Veal	2004
Ternera de Navarra/Nafarroaka Aratxea	PGI	Fresh Meat	Veal	2004
Ternera Gallega	PGI	Fresh Meat	Veal	1996
Torta del Casar	PDO	Dairy	Cheeses	2003
Turrón de Alicante	PGI	Baked goods	Nougat	1996
Uva de mesa embolsada "Vinalopó"	PDO	Fruit, Vegetables and cereals	Fruit	1996
Sweden				
Svecia	PGI	Dairy	Cheeses	1997
United Kingdom				
Beacon Fell traditional Lancashire cheese	PDO	Dairy	Cheeses	1996
Bonchester cheese	PDO	Dairy	Cheeses	1996
Buxton blue	PDO	Dairy	Cheeses	1996
Cornish Clotted Cream	PDO	Other products of animal origin	Dairy	1998
Dorset Blue Cheese	PDO	Dairy	Cheeses	1998
Dovedale cheese	PDO	Dairy	Cheeses	1996
Exmoor Blue Cheese	PGI	Dairy	Cheeses	1999
Gloucestershire cider/perry	PGI	Other drinks and spring water	Cider	1996
Herefordshire cider/perry	PGI	Other drinks and spring water	Cider	1996
Kentish ale and Kentish strong ale	PGI	Beer	Ale	1996
Orkney Beef	PDO	Fresh Meat	Beef	1996
Orkney Lamb	PDO	Fresh Meat	Lamb/mutton	1996
Scotch Beef	PGI	Fresh Meat	Beef	2004
Scotch Lamb	PGI	Fresh Meat	Lamb/mutton	2004
Shetland Lamb	PDO	Fresh Meat	Lamb/mutton	1996
Single Gloucester	PDO	Dairy	Cheeses	1996

Denomination	Label	Product type	Product subtype	Year
Swaledale cheese, Swaledale ewes' cheese	PDO	Dairy	Cheeses	1996
Teviotdale cheese	PGI	Dairy	Cheeses	1998
Welsh Beef	PGI	Fresh Meat	Beef	2002
Welsh Lamb	PGI	Fresh Meat	Lamb/mutton	2003
West Country farmhouse Cheddar cheese	PDO	Dairy	Cheeses	1996
White Stilton cheese, Blue Stilton cheese	PDO	Dairy	Cheeses	1996
Worcestershire cider/perry	PGI	Other drinks and spring water	Cider	1996

Additional data were collected for the period 2006-2009 (Table 2).

Table 2 - List of selected PDO/PGI products registered in Europe from 01/01/2006 and 30/11/2009

Denomination	Label	Product type	Product subtype	Year
Austria				
Steirischer stern	PGI	Fruit, Vegetables and cereals	Vegetable	2008
Belgium				
Brussels grondwitloof	PGI	Fruit, Vegetables and cereals	Vegetable	2008
Geraardsbergse mattentaart	PGI	Baked goods	Pastry	2007
Vlaams-Brabantse tafeldruif	PGI	Fruit, Vegetables and cereals	Fruit	2008
Czech Republic				
Ceski kmín	PDO	Non-food	spices	2008
Chamomilla Bohemica	PDO	Non-food	spices	2008
Chodské pivo	PGI	Beer	Beer	2008
Nosovické kysané zelí	PGI	Fruit, Vegetables and cereals	Vegetable	2008
Pohořelický kapr	PGI	Fresh fish, molluscs, crustaceans and other prod	Seafood	2007
Třeboňský kapr	PGI	Fresh fish, molluscs, crustaceans and other prod	Seafood	2007
Vsestarská cibule	PDO	Fruit, Vegetables and cereals	Vegetable	2008
Zatecki chmel	PDO	Fruit, Vegetables and cereals	Vegetable	2007
Germany				
Bayerischer Meerrettich	PGI	Fruit, Vegetables and cereals	Vegetable	2007
Feldsalat von der Insel Reichenau	PGI	Fruit, Vegetables and cereals	Vegetable	2008
Gurken von der Insel Reichenau	PGI	Fruit, Vegetables and cereals	Vegetable	2008
Holsteiner Karpfen	PGI	Fresh fish, molluscs, crustaceans and other prod	fresh water fish	2007

Salate von der Insel Reichenau	PGI	Fruit, Vegetables and cereals	Vegetable	2008
Tomaten von der Insel Reichenau	PGI	Fruit, Vegetables and cereals	Vegetable	2008
France				
Agneau de Lozère	PGI	Fresh Meat	Lamb/mutton	2008
Agneau de Sisteron	PGI	Fresh Meat	Lamb/mutton	2007
Ail blanc de Lomagne	PGI	Fruit, Vegetables and cereals	Garlic	2008
Ail de la Drôme	PGI	Fruit, vegetables and cereals	Garlic	2008
Banon	PDO	Dairy	Cheeses	2007
Barèges-Gavarnie	PDO	Fresh Meat	Lamb/mutton	2008
Bleu du Haut-Jura, de Gex, de Septmoncel	PDO	Dairy	Cheeses	2008
Boeuf de Bazas	PGI	Fresh Meat	Beef	2008
Chaource	PDO	Dairy	Cheeses	2009
Clémentine de Corse	PGI	Fruit, Vegetables and cereals	Fruit	2007
Epoisses de Bourgogne	PDO	Dairy	Cheeses	2008
Huile d'olive De Corse or Huile d'olive de Corse - Oliu di Corsica	PDO	Oils & Fats	Oil	2007
Huile d'olive de Nice	PDO	Oils & Fats	Oil	2006
Huile d'olive de Nîmes	PDO	Oils & Fats	Oil	2007
Huile d'olive de Nyons	PDO	Oils & Fats	Oil	2007
Laguiole	PDO	Dairy	Cheeses	2008
Lingot du Nord	PGI	Fruit, Vegetables and cereals	Vegetable	2008
Melon du Quercy	PGI	Fruit, Vegetables and cereals	Fruit	2007
Morbier	PDO	Dairy	Cheeses	2009
Noix du Périgord	PDO	Fruit, Vegetables and cereals	Nut	2007
Oeufs de Loué	PGI	Other products of animal origin	eggs	2008
Oignon doux des Cévennes	PDO	Fruit, Vegetables and cereals	Vegetable	2008
Olives noires de Nyons	PDO	Olives	Olives	2007
Picodon de l'Ardèche ou picodon de la Drôme	PDO	Dairy	Cheeses	2009
Pomme du Limousin	PDO	Fruit, Vegetables and cereals	Fruit	2007
Pouligny-Saint-Pierre	PDO	Dairy	Cheeses	2009
Rocamadour	PDO	Dairy	Cheeses	2008
Roquefort	PDO	Dairy	Cheeses	2008
Tome des Bauges	PDO	Dairy	Cheeses	2007
Veau de l' Aveyron et du Ségala	PGI	Fresh Meat	Beef	2008
Greece				
Exeretiko partheno eleolado Thrapsano	PDO			2007
Stafida Zakynthou	PDO	Fruit, Vegetables and cereals	Fruit	2008
Hungary				
Szegedi szalámi or Szegedi téliszalámi	PGI	Meat Based	Pork	2007
Ireland				
Connemara Hill Lamb or Uain Sléibhe Chonamara	PGI	Fresh Meat	Lamb/mutton	2007
Italy				

Arancia del Gargano	PDO	Fruit, Vegetables and cereals	Fruit	2007
Asiago	PDO	Dairy	Cheeses	2007
Asparago Bianco di Bassano	PGI	Fruit, Vegetables and cereals	Vegetable	2007
Carota dell'Altopiano del Fucino	PGI	Fruit, Vegetables and cereals	Vegetable	2007
Casatella Trevigiana	PDO	Dairy	Cheeses	2008
Castagna Cuneo	PDO	Fruit, Vegetables and cereals	Nut	2007
Cipolla Rossa di Tropea Calabria	PDO	Fruit, Vegetables and cereals	Vegetable	2008
Cipollotto Nocerino	PDO	Fruit, Vegetables and cereals	Vegetable	2008
Fico bianco del Cilento	PDO	Fruit, Vegetables and cereals	Fruit	2006
Limone Femminello del Gargano	PGI	Fruit, Vegetables and cereals	Fruit	2007
Marrone di Roccadaspide	PGI	Fruit, Vegetables and cereals	Nut	2008
Melannurca Campana	PGI	Fruit, Vegetables and cereals	Fruit	2006
Mozzarella di Bufala Campana	PDO	Dairy	Cheeses	2008
Nocciola di Giffoni	PGI	Fruit, Vegetables and cereals	Nut	2006
Pane di Matera	PDO	Baked goods	Bread	2008
Pecorino di Filiano	PDO	Dairy	Cheeses	2007
Pecorino Romano	PDO	Dairy	Cheeses	2009
Radicchio di Chioggia	PGI	Fruit, Vegetables and cereals	Vegetable	2008
Radicchio di Verona	PGI	Fruit, Vegetables and cereals	Vegetable	2009
Riso di Baraggia Biellese e Vercellese	PDO	Fruit, Vegetables and cereals	Grain	2007
Sardegna	PDO	Oils & Fats	Oil	2007
Stelvio or Stilfser	PDO	Dairy	Cheeses	2007
Tinca Gobba Dorata del Pianalto di Poirino	PDO	Fresh fish, molluscs, crustaceans and other prod	fresh water fish	2008
Zafferano di Sardegna	PGI	Non-food	Saffron	2009
Poland				
Bryndza Podhalańska	PDO	Dairy	Cheeses	2007
Miód wrzosowy z Borów Dolno?l?skich?	PGI	Other products of animal origin	Honey	2008
Oscypek	PDO	Dairy	Cheeses	2008
Portugal				
Alheira de Barroso - Montalegre	PGI	Meat Based	Pork	2007
Alheira de Vinhais	PGI	Meat Based	Pork	2008
Arroz Carolino Lezírias Ribatejanas	PGI	Fruit, Vegetables and cereals	Rice	2008
Azeite do Alentejo interior	PDO	Oils & Fats	Oil	2007
Azeitonas de Conserva de Elvas e Campo Maior	PDO	Olives	Olives	2007
Batata de Trás-os-Montes	PGI	Fruit, Vegetables and cereals	Vegetable	2007
Butelo de Vinhais or Bucho de Vinhais or Chouriço de Ossos de Vinhais	PGI	Meat Based	Pork	2008
Carnalentejana	PDO	Fresh Meat	Beef	2008
Carne de Bísaro Transmontano or Carne de Porco Transmontano	PDO	Fresh Meat	Pork	2007
Chouriça de carne de Barroso - Montalegre	PGI	Meat Based	Pork	2007
Chouriça de Carne de Vinhais or	PGI	Meat Based	Pork	2008

Linguiça de Vinhais				
Chouriça Doce de Vinhais	PGI	Meat Based	Pork	2008
Chouriço azedo de Vinhais ; Azedo de Vinhais ; Chouriço de Pão de Vinhais	PGI	Meat Based	Pork	2008
Chouriço de Abóbora de Barroso - Montalegre	PGI	Meat Based	Pork	2007
Cordeiro de Barroso, Anho de Barroso or Cordeiro de leite de Barroso	PGI	Fresh Meat	Lamb/mutton	2007
Linguíça do Baixo Alentejo or Chouriço de carne do Baixo Alentejo	PGI	Meat Based	Pork	2007
Paio de Beja	PGI	Meat Based	Pork	2007
Presunto de Camp Maior e Elvas ; Paleta de Campo Maior e Elvas	PGI	Meat Based	Pork	2008
Presunto de Santana da Serra ; Paleta de Santana da Serra	PGI	Meat Based	Pork	2008
Presunto de Vinhais or Presunto Bísaro de Vinhais	PGI	Meat Based	Pork	2008
Presunto do Alentejo ; Paleta do Alentejo	PDO	Meat Based	Pork	2008
Queijo Serra da Estrela	PDO	Dairy	Cheeses	2008
Salpicão de Barroso - Montalegre	PGI	Meat Based	Pork	2007
Sangueira de Barroso - Montalegre	PGI	Meat Based	Pork	2007
Ekstradeviško oljčno olje Slovenske Istre	PDO	Oils & Fats	Oil	2007
Spain				
Aceite de Alcarria	PDO	Oils & Fats	Oil	2009
Aceite de La Rioja	PDO	Oils & Fats	Oil	2006
Aceite del Baix Ebre-Montsià	PDO	Oils & Fats	Oil	2008
Aceite Monterrubio	PDO	Oils & Fats	Oil	2007
Afuega'l Pitu	PDO	Dairy	Cheeses	2008
Antequera	PDO	Oils & Fats	Oil	2006
Arroz del Delta del Ebro	PGI	Fruit, Vegetables and cereals	Grain	2008
Baena	PDO	Oils & Fats	Oil	2007
Cebreiro	PDO	Dairy	Cheeses	2008
Cereza del Jerte	PDO	Fruit, Vegetables and cereals	Fruit	2007
Coliflor de Calahorra	PGI	Fruit, Vegetables and cereals	Vegetable	2007
Cordero de Navarra or Nafarroako Arkumea	PGI	Fresh Meat	Lamb/mutton	2008
Gamoneu or Gamonedo	PDO	Dairy	Cheeses	2008
Garbanzo de Fuentesaúco	PGI	Fruit, Vegetables and cereals	Vegetable	2007
Gata-Hurdes	PDO	Oils & Fats	Oil	2007
Lenteja de La Armuña	PGI	Fruit, Vegetables and cereals	Vegetable	2008
Lenteja Pardina de Tierra de Campos	PGI	Fruit, Vegetables and cereals	Vegetable	2007
Mantequilla de Soria	PDO	Oils & Fats	Butter	2007
Miel de Galicia or Mel de Galicia	PDO	Other products of animal origin	Honey	2007
Montes de Granada	PDO	Oils & Fats	Oil	2006
Pataca de Galicia or Patata de Galicia	PGI	Fruit, Vegetables and cereals	Vegetable	2007

Patatas de Prades or Patates de Prades	PGI	Fruit, Vegetables and cereals	Vegetable	2007
Pimentón de la Vera	PDO	Fruit, Vegetables and cereals	Vegetable	2007
Pimiento Asado del Bierzo	PGI	Fruit, Vegetables and cereals	Vegetable	2006
Poniente de Granada	PDO	Oils & Fats	Oil	2007
Queso de Cantabria	PDO	Dairy	Cheeses	2007
Queso Manchego	PDO	Dairy	Cheeses	2009
Queso Nata de Cantabria	PDO	Dairy	Cheeses	2007
San Simón da Costa	PDO	Dairy	Cheeses	2008
Sierra Mágina	PDO	Oils & Fats	Oil	2007
Ternasco de Aragón	PGI	Fresh Meat	Lamb/mutton	2008
Slovakia				
Slovenská bryndza	PDO	Dairy	Cheeses	2008
Slovenská parenica	PGI	Dairy	Cheeses	2008
Slovenský ostiepok	PGI	Dairy	Cheeses	2008
United Kingdom				
Isle of Man Manx Loaghtan Lamb	PDO	Fresh Meat	Lamb/mutton	2008
Staffordshire Cheese	PDO	Dairy	Cheeses	2007

European Commission

EUR 25114 EN– Joint Research Centre – Institute for Environment and Sustainability
Title: Implementation of e EU-wide indicator for the rural-agrarian landscape
Authors: Maria Luisa Paracchini and Claudia Capitani
Luxembourg: Publications Office of the European Union
2011 – 89 pp. – 29.7 x 21 cm
EUR – Scientific and Technical Research series – ISSN 1831-9424 (online), ISSN 1018-5593 (print)

ISBN 978-92-79-22396-9 (PDF)
ISBN 978-92-79-22395-2 (print)

doi: 10.2788/26827

Abstract
The report explains the conceptual and methodological development of the agrienvironmental indicator on landscape state and diversity, calculated in support of COM(2006)508 “Development of agri-environmental indicators for monitoring the integration of environmental concerns into the common agricultural policy”. The indicator is based on three components: the degree of naturalness of the rural-agrarian landscape, intended as the influence exerted by society on the agrarian landscape with its agricultural activities and modifications of the original natural state introduced by farming practices; the physical structure, intended as land cover and its spatial organisation as a product of land management (organisation of different land cover types, fragmentation, diversity etc.); the societal awareness of the rural-agrarian landscape, as the society perceives, values and assesses landscape quality, and uses the landscape for productive or non productive purposes.

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LB-NA-25114-EN-N

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Publications Office

ISBN 978-92-79-22396-9