The EU societal awareness of landscape indicator: a review of its meaning, utility and performance across different scales

Article

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Title: **The EU societal awareness of landscape indicator: a review of its meaning, utility and performance across different scales.**

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Research Highlights:

- Including social values in EU agri-environment landscape indicators
- Introducing and testing the concept of 'societal awareness' as a measurable criteria
- Assessing the meaning, utility and performance of the landscape awareness indicator
- Identification of indicator weaknesses at regional level and proposed solutions
- Useful step to capturing societal interaction with landscape at a range of scales

Abstract

There is increasing recognition that agricultural landscapes meet multiple societal needs and demands beyond provision of economic and environmental goods and services. Accordingly, there have been significant calls for the inclusion of societal, amenity and cultural values in agri-environmental landscape indicators to assist policy makers in monitoring the wider impacts of land-based policies. However, capturing the amenity and cultural values that rural agrarian areas

provide, by use of such indicators, presents significant challenges. The EU social awareness of landscape indicator represents a new class of generalized social indicator using a top-down methodology to capture the social dimensions of landscape without reference to the specific structural and cultural characteristics of individual landscapes. This paper reviews this indicator in the context of existing agri-environmental indicators and their differing design concepts. Using a stakeholder consultation approach in five case study regions, the potential and limitations of the indicator are evaluated, with a particular focus on its perceived meaning, utility and performance in the context of different user groups and at different geographical scales. This analysis supplements previous EU-wide assessments, through regional scale assessment of the limitations and potentialities of the indicator and the need for further data collection. The evaluation finds that the perceived meaning of the indicator does not vary with scale, but in common with all mapped indicators, the usefulness of the indicator, to different user groups, does change with scale of presentation. This indicator is viewed as most useful when presented at the scale of governance at which end users operate. The relevance of the different sub-components of the indicator are also found to vary across regions.

1. Introduction

Human activities have shaped the rural environment to such an extent that that the notion of the 'anthropocene', as a new geological epoch, has been proposed to describe the period since widespread agricultural management began (Crutzen and Stoermer, 2000). The multiple ways in which humans interact with rural agrarian landscapes makes landscapes multifunctional, providing a number of ecosystem services (MEA, 2005) to society, such as provisioning (e.g. food) and regulating (e.g. pollution control) services (Potschin and Haines-Young, 2006, Primdahl and Swaffield, 2010), but also a variety of cultural services, such as rural settlement, cultural heritage, and amenity (Bromley, 2000; Wascher, 2000; Beletti *et al*., 2002; Yrjölä and Kola, 2004). In recognition of the cultural services that rural agrarian landscapes provide, these landscapes are now being defined both as physical structures managed for agriculture and forestry and as cultural entities characterised by systems of land use and cultural practices. The functional components of the physical landscape (woodlands, hedges, field margins, ditches, etc.) as well as rural buildings and other structural elements (dry walls, terraces, etc.) are now understood to reflect the evolution of farming and forestry in a specific physical and socio-economic setting. Similarly, the cultural attributes of a landscape are a product of centuries of interaction between natural conditions, farming traditions and cultural heritage (Paracchini et al., 2012).

Policies, in conjunction with economic forces, acting upon the social/cultural and the natural/man-made capital of a society, impact human activity and therefore have a marked impact on human wellbeing (Primdahl and Swaffield, 2010). Policies targeted at the rural space and related economic activities, such as the Common Agricultural policy (CAP) and environmental legislation, directly affect the provision of ecosystem services from rural agrarian landscapes, by driving changes to the management of these landscapes. Therefore, multi-dimensional indicators of the states and rates of change in agrarian landscapes are of particular interest to policy makers, as these are windows into the wider performance of these policy instruments.

To support policy monitoring and impact assessment, considerable research effort has been devoted in the past to mapping the physical components of European landscapes (Mücher *et al*., 2010; van Eupen *et al*., 2012; Wascher, 2005; Warnock and Griffiths, in press). In the EU this has resulted in maps identifying meaningful ecological units, based on differences in elevation, soils, geology and land cover, which provide broad environmental strata as a spatial framework to, or example, assist with indicator reporting and environmental sampling. A good example of this type of approach is the development in the UK of the Countryside Survey (Bunce *et al*. 1995), which provides a system of strata for monitoring environmental indicators at national scales, based on a rigorous sampling framework.

However, few reliable frameworks are currently available by which to assess the ways in which farming practices interact with landscapes to generate non-market, or non-commodity (MEA-Scope, 2003), cultural ecosystem services (Pinto Correia and Carvalho-Ribeiro, 2012). Consequently, there has been more limited development of indicators encompassing the social dimensions of rural agrarian landscapes (Cassatela and Peano, 2011b; Ode *et al*., 2008; Tveit *et al*., 2006). The European Landscape Convention (ELC, 2000) echoes others in describing this lack of a well-developed conceptual framework and limited policy tools as problematic given increasing awareness of the importance of accommodating multiple societal, amenity and cultural values in the management of landscapes (Haberl *et al*., 2004; Pinto-Correia and Breman, 2009; Pinto-Correia *et al*., 2006; Sassatelli, 2010; Stephenson, 2007, 2008; Swanwick, 2009). This paper, by testing the indicator for 'societal awareness of landscapes' developed by Paracchini *et al*. (this issue) at multiple scales of governance (i.e. regional and EU), provides an in-depth view on the potentialities for a top-down approach to the construction such social indicators of landscape.

2 The current state of development of landscape social indicators

Commenting on the state of development of social indicators of landscape Cassatella and Peano (2011) point out that while a considerable number of social indicators exist, "*the number of indicators found in the literature is a sign of the diversity of use and the experimental phase the subject is currently going through, rather than a sign of rich content*". While the corpus of existing social indicators is thus highly fragmented, due in part to this diversity of uses, a broad classification is possible on the basis of the criteria upon which public preferences for, or valuations of, landscapes are made, i.e. the *functional* value and the *aesthetic* value of landscapes.

Preferences for particular landscapes are sometimes expressed in terms of the uses to which landscapes can be put. So, for example, a landscape with land uses providing game-cover would have a 'functional value' to groups interested in hunting. Studies in the fields of landscape ecology and ecological economics have shown that different functional values can be attributed to the same landscapes according to the preferences of different user groups, such as tourists, farmers, hunters etc. (Ribe, 1989, 2002; Sheppard *et al*., 2001; Tahvanainen *et al*., 2001; Roovers *et al*., 2002; Rogge *et al*., 2007; Surova and Pinto-Correia, 2008; Sevenant, 2010; Carvalho-Ribeiro and Lovett 2011; Rogge et al., 2011). More recently, several EU research projects have contributed developments to the landscape function approach based on the ecosystem service framework (see for example, SENSOR: Helming et al., 2007; ELCAI: Perez-Soba and Wascher, 2005; Euroscape 2020: Wascher and Pedroli, 2008).

Preferences based on aesthetic values, on the other hand, are closely associated with the process of *perception* (Tahvanainen et al,. 2001), where these perceptions are rooted in cognitive processes, involving observation and analysis in the present, based on past knowledge and experience, to create coherent visual concepts that are attributable to, and identify, landscapes. Numerous landscape concepts have been identified, including, stewardship, coherence, disturbance, historicity, visual scale, imageability, diversity, naturalness and ephemera, etc. (Antrop, 2000; Ode et al., 2008, 2009, 2010, 2011, 2013; Fry et al., 2009). The role of human perception in defining landscapes has been recognised in the European Landscape Convention (ELC, 2000), which defines landscape as "*an area perceived by people, whose character is the result of the action and interaction of natural and/or human factors*" (CoE, 2000). By their very nature, these perception-based values are multi-dimensional and localised, i.e. specific to particular groups and places and therefore the indicators which capture them are usually constructed using 'bottom-up' approaches, i.e. derived from data collected from local surveys addressing the preferences of publics related to particular rural agrarian landscapes (Carvalho-Ribeiro and Lovett, 2011; Hersperger and Burgi, 2009; Howley *et al*., 2012;

Nijnik *et al*., 2009; Palang *et al*., 2011; Rogge *et al*., 2011; Sayadi *et al*., 2009; Surova and Pinto-Correia, 2008; Van Eetvelde and Antrop, 2009). It has also been noted that both function and perception based values are not permanent, but context-related, such that individuals can switch between them according to circumstances, i.e. based on whether they are adopting a user/consumer or a citizens' viewpoint (van Rensburg *et al*., 2002; Vanslembrouck and Van Huylenbroeck, 2005).

Summing up the state of development of social indicators of landscape Cassatela and Peano (2011) note a number of generic weaknesses, two of which are of most relevance to this study. The first weakness is that, being derived from 'bottom-up' analytical processes, most existing social indicators cannot be aggregated, as they are relevant only at the local/regional level and in the context of spatially and temporally confined projects and so are not suitable for implementation across regions and at larger scales. Second, these indicators, while they attempt to capture particular anthropic phenomena, for example public perceptions of tranquility, diversity, uniqueness etc, use metrics that lack generalisable anchoring points, i.e. they are highly subjective. The need for exploration of more generalizable approaches to social indicator construction is thus apparent.

The CAP is, by some margin, the policy which has the greatest impact on the rural agrarian landscapes of Europe today (Primdahl and Swaffield, 2010). The purpose of defining indicator sets in the context of the CAP is to monitor and assess the effectiveness of the policy against its declared objectives. Two indicator sets have been made operational so far:

- The common monitoring and evaluation framework (CMEF), designed to measure and evaluate the impacts of all agricultural and rural development interventions, i.e. CAP Pillars I and II (CEC, 2006a), and
- Agri-environmental indicators (AEI), to monitor the integration of environmental concerns into the CAP (CEC, 2006b)

The AEI framework was designed to monitor the achievement of the goal set at the Cardiff European Council (1998) to integrate the environmental concerns into the CAP. By definition, the 28 distinct indicators of the AEI framework focus on the environment. However, while these include some indicators belonging to the social domain, these are only included to the extent necessary to explain why integration of environmental concerns into the CAP may, or may not, have occurred. The AEI therefore monitors issues such as farmers' training levels, use of environmental farm advisory services and risks of land abandonment. By contrast, the CMEF framework places social indicators into the mainstream, reflecting the fact that the CAP has specific objectives to improve the socio-

economic condition of rural areas, for example 'Improving the competitiveness of the agricultural and forestry sector' and 'Improving the quality of life in rural areas'. While landscapes are specifically referenced in CAP policy, through stated policy objectives to restore, preserve and enhance the state of European landscapes, the AEI and CMEF frameworks contain only one indicator specifically targeted at landscape, i.e. the 'landscape state and diversity' indicator (AEI indicator number 28). Within this composite indicator a social component has been embedded, as a means to feeding relevant data into evaluations of the extent to which the social goals of the CAP, relating to rural landscapes, are being met. This social component is called the 'societal awareness of landscape' indicator. This indicator sets out to capture "the multiple ways society, as a whole, perceives, reads and assesses rural agrarian areas as well as its landscapes ... the ways society plans, manages, and uses the rural agrarian landscapes of Europe for productive or non-productive purposes" (Paracchini et al., 2012).

The societal awareness of landscape indicator captures three types of societal actions which are understood to reflect societal values concerning rural agrarian areas:

- Societal protections (in law) afforded to landscapes identified as common resource;
- *In situ* use of landscapes for recreational activities;
- *Ex situ* consumption of local quality products, derived from farming systems that directly maintain traditional landscapes.

The data on which the indicator is based include:

- the share of agricultural land under landscape protection designations, such as (NATURA2000, UNESCO World Heritage sites, IUCN category V World Protected Areas)
- the number of farms reporting agri-tourism activities
- the number, per unit area, of certified products with Protected Denomination of Origin (PDO) and Protected Geographical Indication (PGI) classifications linked maintenance of traditional landscapes, plus the area of quality wines (VQPRD - Vin de Qualité Produit dans des Régions Déterminées).

These three components have been normalized for scale and linearly aggregated to produce the final composite indicator. The exact choice of proxies used in the construction of the composite indicator has been driven by conceptual requirements, but constrained by quality and availability requirements for the input data, including the requirement that the data are: (i) available for all EU regions; and (ii) are already being collected and regularly updated for official purposes.

This composite indicator is now 'operational' in a policy sense, as evidenced by Figure 1 below, showing the indicator of societal awareness of rural agrarian landscapes, measured on 1-10 scale and mapped across NUTS2[i] regions in the EU-27.

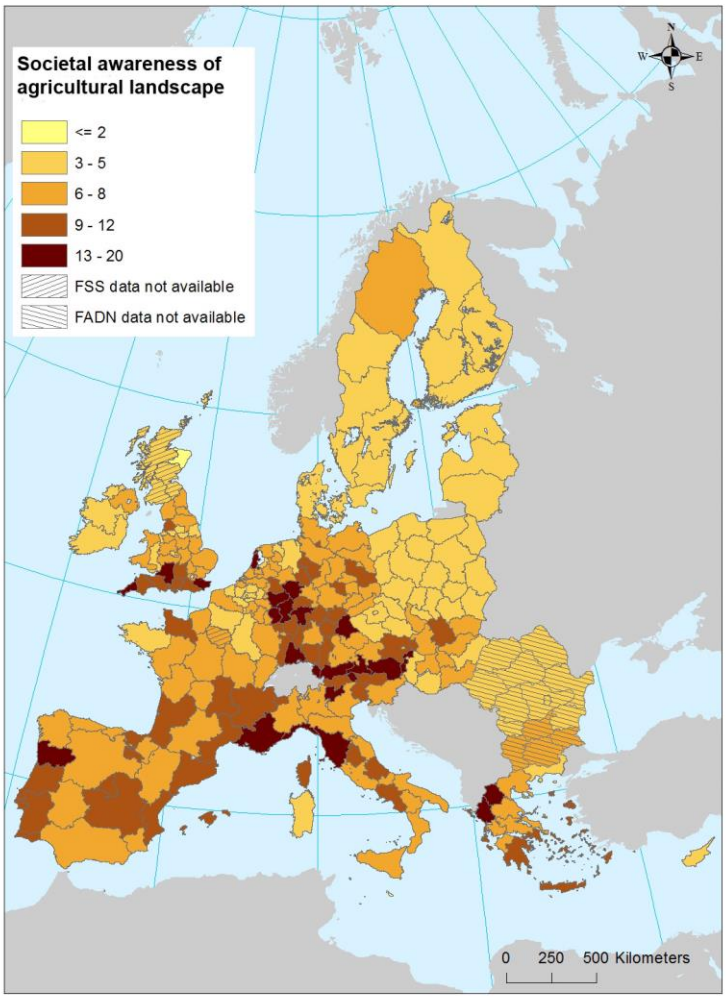


Figure 1: Societal awareness of landscape indicator per NUTS2 region in Europe.

The construction of the awareness indicator was not intended as a purely academic exercise. Rather the indicator is intended for very practical purposes, i.e. for use by policy makers in informing their evaluations of the efficacy of rural policies, particularly the CAP. This places certain minimum functional and quality requirements on the indicator:-

- The indicator must capture a meaningful and relevant social phenomenon in a transparent way
- The indicator must be scalable, such that it can be applied at different levels of governance

- The indicator must be stable, i.e. its meaning and utility must be maintained over different regions and at different scales. For example, to the extent that the indicator is driven by cultural norms and values and a complex set of subjective dispositions, does the meaning and utility of the indicator vary from country to country and region to region?

The top-down approach to the construction of the indicator is a clear departure from existing 'bottom-up' approaches. This indicator is consequently one of the few European-wide approaches to capture the socio-cultural interaction of whole societies with agrarian landscapes. This methodological and conceptual novelty means that these functional and quality minima cannot be assumed, and therefore have to be tested. The selection of a limited set of proxies to represent the whole phenomenon of societal awareness of landscapes, in part due to data availability, is a form of reductionism. In this case the dimensions captured might be seen as limited to aspects of use-value. In view of this, other questions automatically follow, such as: have all relevant dimensions of societal awareness been captured and if not, are accessible and reliable indicators of these missing dimensions available at the EU level?

3. Methodology

In order to analyze cross-scale issues, the societal awareness indicator was downscaled to the municipal level (Local Administrative Unit level 2 - LAU2[ii]) in each of five case study areas in Europe, by applying the same methodology used to produce the EU-level indicator, as described in Paracchini *et al*., this issue. The case study regions have been selected to represent different agricultural management, landscape, and environmental contexts in the EU. The regions selected were: Alentejo (PT), Brabant (NL), Syddanmark (Southern Denmark: DK), Tuscany (IT) and West Midlands (UK). This downscaled indicator served two important functions:

- as a comparator for the indicator presented at NUTS2 level, so that differences in performance with changes in scale could be gauged
- as a comparator for alternative indicators which might be available at regional level, to test their performance relative to the existing composite indicator and its sub-components

The core methodological approach to data acquisition was a stakeholder consultation exercise, by which expert judgments were obtained from a range of stakeholders on the research questions listed above. In order to carry out a detailed critical evaluation of the indicator, a number of evaluation criteria had to be identified, reflecting different user requirements. As there are no established frameworks of evaluation criteria that might be directly applied to this specific indicator, inspiration was drawn from the Bellagio Principles (ISSD, 1997). The Bellagio Principles are a comprehensive set of guidelines designed to assess progress towards sustainable development,

covering the whole of the assessment process, including (i) the choice and design of indicators, (ii) their interpretation and (iii) communication of the result. These assessment criteria are collected into ten 'Principles' such as: perspective, scope, focus and openness, etc. each with 2-5 individual evaluation criteria. It proved impractical to assess the societal awareness of landscape indicator using each and every Bellagio evaluation criteria, in part because some of the evaluation criteria are inapplicable in this case, so three more generalised evaluation criteria were derived from a thematic clustering of Bellagio Principles, as shown in Table 1.

Table 1: Relevant Bellagio Principles addressing the three key assessment criteria

Primary assessment criteria for the societal awareness of landscape indicator	**Relevant Bellagio Principles and subsidiary evaluation criteria**
Meaning: does the indicator measure something meaningful?	Principle 2 – Holistic perspective • Includes a review of the whole system as well as its parts Principle 4 - Adequate scope • Build on historic and current conditions to anticipate future conditions • Define the space of the study that is large enough to include local and long distance impacts on people • Adopt a time-horizon long enough to capture human and ecosystem timescales Principle 6 - Openness • Make explicit all judgements, assumptions and uncertainties
Utility: Is the indicator useful?	Principle 7 – Effective communication • Be designed to address the needs of the audience and users • Simplicity of structure and use of clear and plain language Principle 10 – Institutional capacity • Support development of local assessment capacity
Technical performance: Is the indicator reliable?	Principle 5 – Practical focus • Comparing indicator values to targets, reference values, ranges, thresholds or direction of trends as appropriate • Standardising measurement wherever possible to permit comparison • A limited number of indicators or indicator combinations to provide a clear signal of progress • An explicit set of categories or an organising framework that links

	vision and goals to indicators Principle 9 – Ongoing assessment • A capacity for repeated measurement to determine trends • Be iterative, adaptive and responsive to change and uncertainty because systems are complex and change frequently

The three generalised assessment criteria, derived from these principles, are as follows:

1. *Meaning*

   The concept of societal awareness of landscape is relatively abstract and novel and is subtly different from more traditional concepts of landscape valuation (see above). It is therefore essential to ask: (a) what meaning do stakeholders attribute to the indicator; b) is the indicator meaning stable over different scales; (c) is the indicator meaningful and relevant to the social dimension of landscape?

2. *Utility (or usefulness)*

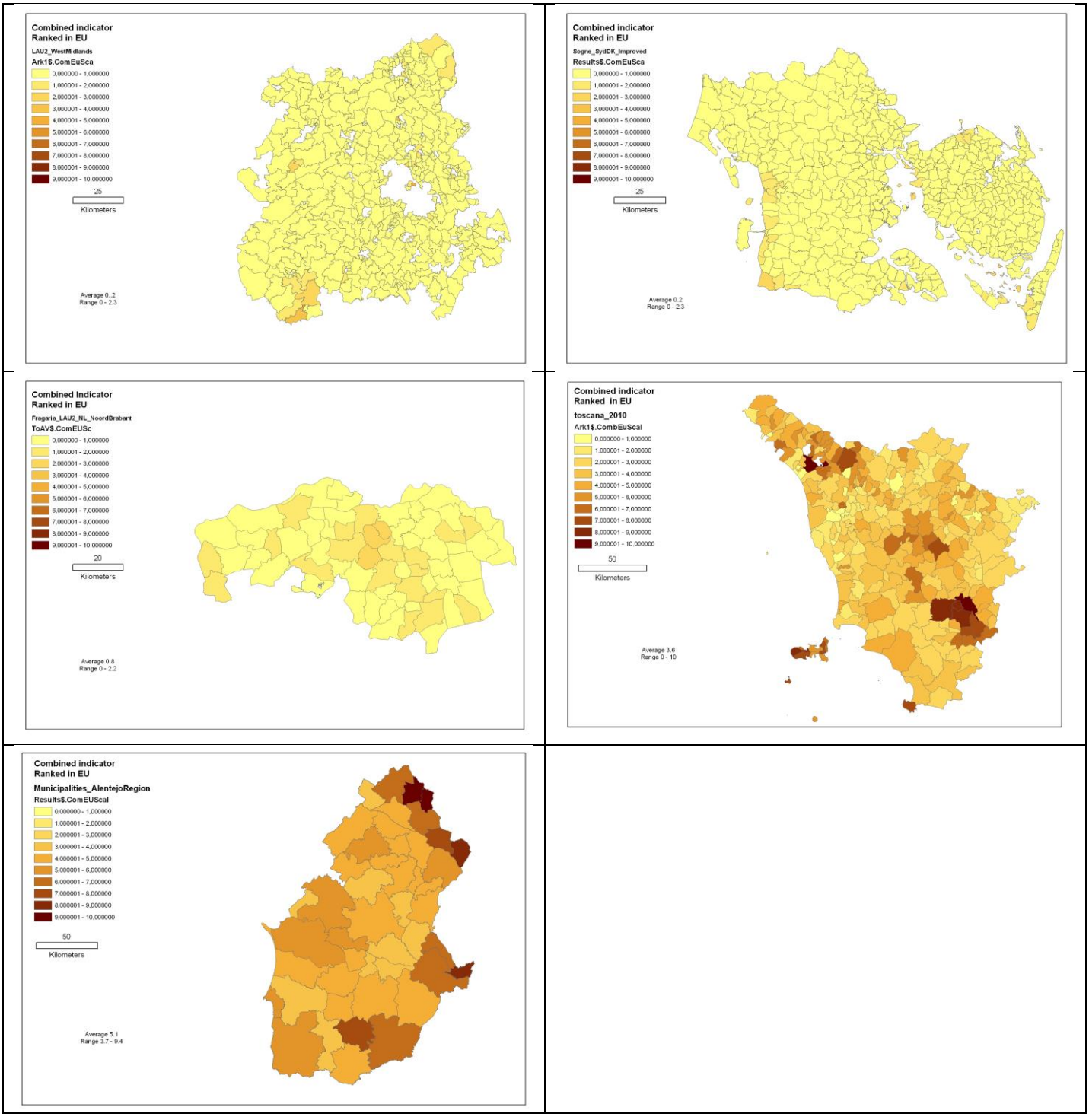
   Who are the potential end users of the indicator and is the indicator constructed in such a way that it addresses the needs of these users operating in different regions and at different scales?

3. *Technical performance*

   Two dimensions of technical performance are identified: (i) Comprehensiveness, i.e. the proportion of relevant 'events' that are captured by the indicator; and (ii) Accuracy, which includes such issues as the error count and modernity of the data.

Twenty-one stakeholders, with a minimum of two stakeholders in each of the five case study regions, were recruited to evaluate the indicator, on the basis of the above assessment criteria. Given the subtlety and novelty of the underlying concept, it was decided to perform, wherever possible, face-to-face interviews with the stakeholders, although this limited the number of participants that could be included in the process, due to resource constraints. Stakeholders were drawn from groups with particular expertise and interests in the current condition and future management of rural agrarian areas in their regions. These groups included local authority planners, national park officers, wildlife and conservation officers, agricultural and rural tourism officers etc. Stakeholders were provided with a briefing document that explained the design and purpose of the societal awareness of landscape indicator, or rather, as it was called at that time, the societal 'appreciation' of landscapes indicator, together with a mapping of the composite indicator and sub-

1 indicators, for each of their case study regions. The stakeholders were then asked a set of common
2 evaluation questions. The basis of stakeholder judgements were comparisons of the indicator
3 mapped at NUT2 (Figure 1) and at LAU2 (regional) level (Figure 2).
4



5 *Figure 2: downscaled composite societal awareness indicator mapped at LAU2 level for*
6 *(from left to right) the East Midlands (UK), Syddanmark (South Denmark), Brabant (NL),*
7 *Tuscany (IT) and Alentejo (PT).*
8

4. Results

4.1 The meaning of the indicator (given and perceived meaning)

Because the concept of societal indicators is relatively novel, there is a risk that the meaning attributed to it by individual stakeholders to the awareness indicator will vary from the meaning intended by its designers. To assess this risk, stakeholders were asked to set aside the given label of the indicator and suggest their own, based on its design and mapped outputs. As Table 3 shows, the perceived meaning of the indicator is not consistent across stakeholders. Only 3 of the 21 stakeholders identified with the original label of the indicator, i.e. 'appreciation', and based on their understanding of its meaning numerous alternative labels were suggested. No single label dominated the thinking of stakeholders, although it could be argued that some labels combine readily into larger coherent complexes, such as 'valuation' and 'appeal'. There are two possible sources for this instability of meaning, the first being that users cannot take hold of this novel concept due to pre-conceptions about the nature of 'traditional' landscape valuation indices, and the use of traditional landscape maps (reflecting geophysical structures) in this type of exercise. The second potential source of instability is reflected in observations from stakeholders of incongruity between some of the concepts attached to the official label i.e. 'appreciation' and those attached to the proxies that make up the indicator, which appeared to them to be based on notions of valuation, especially in the case of the protected areas sub-indicator and to some extent the tourism sub-indicator.

Table 3: Frequency of stakeholder identification of different labels to capture the perceived meaning of the composite indicator, by region

Descriptive label	**Syddanmark (DK)**	**West Mids. (UK)**	**Brabant (NL)**	**Tuscany (IT)**	**Alentejo (PT)**	**Total**
Appreciation		**1**	**2**			**3**
Valuation	**1**	**1**				**2**
Appeal / potential appeal				**1**		**2**
Awareness		**2**				**2**
'Connection with'		**2**				**2**
Perception				**1**		**1**
Familiarity						
Understanding		**1**				**1**
Designation	**1**					**1**

The obvious conclusion to draw from this is that, to some extent, the perceived meaning of the indicator can differ from the intended meaning and be determined by the past experiences, knowledge, perceptions and requirements of the end-user. This opens the possibility that the

meaning of the indicator might change with scale of presentation because there may be different sets of end users, with different requirements for the indicator, operating at different scales. This question is reviewed further in the Discussion section.

4.2 The utility of the indicator mapped at different scales

Downscaling the composite indicator, and its subcomponents, to LAU2 level revealed that NUTS2 regions can contain highly differentiated zones. Figure 2 illustrates this by comparing the downscaled rural tourism proxy mapped at LAU2 level within the Tuscany region to the NUTS2 mapping of the same region. Stakeholders were quick to point out that most definable landscapes bear no relationship with the broad NUTS2 geo-political units, the great majority of which are smaller in extent than NUTS2. Therefore, expressing indicators at the NUTS2 level conflates multiple, potentially diverse landscapes, with key variations over landscapes not expressed. Mapped at LAU2 level, as Figure 2 demonstrates, clusters of adjoining LAU2 units become apparent, suggestive of possible landscape structures. In this particular example the clustering perhaps arises from the effect on the composite indicator of the certified products proxy. Looking at the results for all case study regions, there would appear to be a clear latitudinal effect relating to the spatial scale of PDO/PGI designations, with Mediterranean countries having products, especially wines, defined over small units (villages, municipalities, valleys etc.) and northern latitudes having local products, especially dairy products, defined over larger areas. For example, in the UK, PDO/PGI declarations are commonly phrased using a county descriptor (e.g. Shropshire Blue cheese), with counties lying between NUTS 2 and NUTS3. Because the LAU2 mapping better captured perceptions of inter-landscape variation, stakeholders uniformly agreed that the utility of the composite indicator increased considerably at the LUA2 level and that the LAU2 indicator was the appropriate scale of mapping to support policy decisions at levels of governance below NUT2.

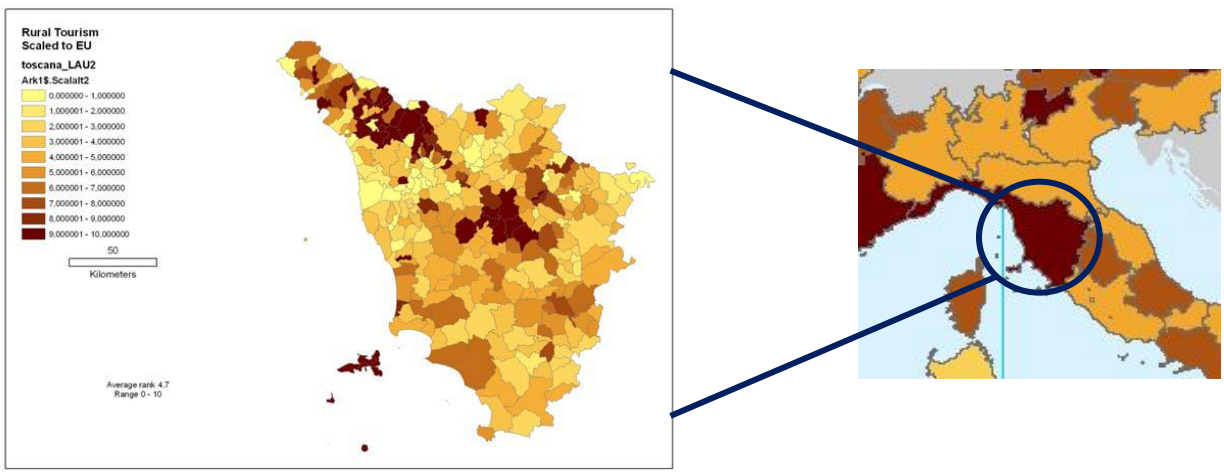


Figure 3: Effect of downscaling the rural tourism indicator from NUTS2 to LAU2 for the Tuscany region.

4.3 The utility of the indicator in different regions

There was some variation in the perceived utility of the composite indicator between NUTS2 regions. The results presented in Table 4 clearly show that the majority of stakeholders do not think that the composite indicator adequately reflects the 'real' societal awareness of landscapes in their region. Stakeholders in Tuscany believed that the indicator under-represents 'total' social awareness in their region, while stakeholders in the Netherlands were more inclined to think that the absolute level of awareness reflected by the indicator for their region was adequate.

Table 4: Frequency indicating that indicator does, or does not adequately represent societal awareness of landscape in each region at a scale from 1 (very low relevance) to 5 (very high relevance)

	Syddanmark (DK)	**West Midlands (UK)**	**Brabant (NL)**	**Tuscany (IT)**	**Alentejo (PT)**	**Total**
'Yes', adequate			**1**			**1**
'No' inadequate		**1**	**1**	**4**		**6**

The composite indicator is based on a linear, un-weighted aggregation of three proxies. However, there was a strong sentiment amongst stakeholders that the relative importance and therefore, utility, of these three proxies, as expressions of societal awareness, varied by region (see Table 5). For example, in the Brabant region the market for certified products linked to specific landscapes and farming systems is undeveloped and therefore this particular proxy was viewed as having no usefulness for this area. The Certified products proxy was also given a low utility rating in the West Midlands, perhaps because the type of product produced in the region, for example cheeses, have large defined production areas compared to products such as wines, which are important for Tuscany and Alentejo. In all case study areas the perceived utility of the farm tourism proxy is low relative to the other two proxies.

Table 5: Average rank of the relevance of each proxy as a measure of societal awareness in each case study region (on a 5-point scale where 5=highest rank)

	Syddanmark (DK)	West Midlands (UK)	Brabant (NL)	Tuscany (IT)	Alentejo (PT)	Average rank over all regions
Protected areas	**4.3**	**4.3**	**3**	**2.5**	**3.7**	**3.5**
Certified products	**3.0**	**2.5**	**N.A.**	**4.3**	**3.7**	**3.4**
Farm tourism	**2.0**	**2.7**	**3.5**	**3.5**	**3.4**	**3.0**

4.4 The technical performance of the composite indicator

Technical performance was assessed in terms of: (i) Comprehensiveness, which reflects the proportion of targeted events that are captured by the indicator; and (ii) Accuracy, reflecting such issues as the error count and modernity of the data (how up-to-date the data are), both of which are impacted by the data collection methodology (survey or census) and the frequency of measurement. Only one of the three proxies is singled out as having potential problems in terms of comprehensiveness, i.e. the farm tourism proxy which, as Table 4 shows, obtains a low stakeholder rating relative to the other proxies. In this case the perceived problem stems from the fact that the proxy is based on data solely for farm tourist activity, when this measure is acknowledged to capture only a fraction of the tourist activity in rural areas. Stakeholders from the Tuscany case study region cited one marked effect of this limitation, pointing out that because of the normalisation of number of farms with tourism activity to areas with very a small percentage of utilized agricultural area (UAA), the rural tourism proxy generates similar scores for the Appenine region, the Island of Elba and the central Chianti region when in fact these regions differ very significantly in terms of rural tourism (see Fig. 3).

The evaluation of the modernity of the proxy data is based on the rate of change in the phenomenon being measured. For proxies such as protected areas, rates of change in the data are likely to be very slow, while for the other proxies data may change quite rapidly. However, it has to be accepted that there are practical constraints on the frequency with which new measurement exercises can occur, and as new measurements were already being undertaken annually there were no concerns raised by stakeholders over the modernity and rates of updating of these proxies.

Table 6: Average rank of the comprehensiveness (i.e. captures all relevant cases) of each of the three proxies in each case study region at a scale from 1 (very low relevance) to 5 (very high relevance)

	Syddanmark	West	Brabant (NL)	Tuscany	Alentejo (PT)	Average

	(DK)	Midlands (UK)		(IT)		rank over all regions
Protected areas	**4.3**	**3.7**	**3.5**	**1.3**	**3.8**	**3.3**
Certified products	**4.0**	**1.3**	**N.A.**	**3**	**3.4**	**2.9**
Farm tourism	**3.5**	**2.0**	**3**	**1.3**	**2.6**	**2.5**

4.5 Do we have the right proxies (sub-indicators)?

There are two questions of relevance here: (i) are better measures of the existing dimensions used in the indicator available; and (ii) are these the right dimensions to use, i.e. does the indicator capture the right dimensions of societal value of landscapes?

A stakeholder-assisted search of EU and regional datasets was undertaken to identify new indicators that might capture the three existing dimensions of societal appreciation more efficiently, i.e. capturing a higher proportion of relevant observable 'events', or capturing them more accurately. The search identified just two candidate measures that might act as alternatives to each of the rural tourism and protected areas proxies (see Table 7). However, none of these alternatives were found to offer obvious improvements in performance over existing measures, as all were found to have significant shortcomings. For example, there is no reason to suppose a stronger association between number of camping sites in rural areas (Table 7, line 2) and societal awareness of agrarian landscapes than there is for the number of farm-based tourist activities.

Table 7: Search results for alternative social landscape proxies available Europe-wide

	Tourism in rural areas		**Agricultural areas in protected and valuable sites**	
Indicator description	Tourism intensity in agricultural areas	POI camp sites in agricultural areas	Agricultural land use in protected sites	Appreciation of cultural heritage
Unit of measurement	Percentage of total income derived from tourist activity	Number of camp sites	Percentage of agricultural land in protected sites	Area percentage
Spatial reference	NUTS 2/3	LAU2	NUTS 3	NUTS 2/3/ Corine CC

Data source	FADN	TomTom (www.tomtom.com – permission to use acknowledged by TomTom)	Corine CC & Designated Area	Eurostat Tourism data & Designated Area Database

On the issue of whether each of the proxies reflected in the composite indicator were appropriate to capture societal awareness of agrarian landscapes, stakeholders broadly rated the certified products indicator as the most relevant (see Table 8). However, there was considerable variation in this rating over regions with, for example, the indicator viewed as an irrelevance in Brabant but very highly regarded in Alentejo and Syddanmark. The fact that the ratings for two of the proxies were rated as adequate at best suggests that a search for alternative proxies would be worthwhile. A stakeholder-assisted review of available EU data sources revealed no alternative proxies available at this scale, so the search was extended to datasets available at the regional level. While this search identified a limited number of possible alternative proxies (see Table 9), none of these were adjudged to capture relevant new dimensions of societal awareness, i.e. they were not distinct enough from those already being represented to warrant being added to the composite indicator.

Table 8: Average rank of the meaningfulness of each of the three proxies contributing to the composite indicator of societal awareness of landscape in each case study region (where 1 = very low relevance and 5 = very high relevance)

	Syddanmark (DK)	**West Midlands (UK)**	**Brabant (NL)**	**Tuscany (IT)**	**Alentejo (PT)**	**Average rank over all regions**
Protected areas	**4.0**	**3.5**	**2**	**1.7**	**3.9**	**3.0**
Certified products	**3.7**	**2.5**	**N.A.**	**3.3**	**3.9**	**3.4**
Farm tourism	**2.3**	**2.5**	**3**	**2.3**	**3.5**	**2.7**

Table 9: Measures from regional datasets reflecting potential alternatives dimensions of societal awareness of rural agrarian landscapes

	West Midlands (UK)		Brabant (NL)	Syddanmark (DK)	Alentejo (PT)		Tuscany (IT)
Dataset / indicator	Scheduled Ancient Monuments	Listed Buildings	Appreciated Landscapes	Rural Landscapes	Landscape Diversity	Complex Patterns	Countryside itineraries
Source			Survey: My-Place-To-Be	LPIS	Corine	Corine class 242	Regione Toscana (2014)

Maximum available resolution			LAU2	LAU2	NUTS2	NUTS2	LAU2

5. Discussion

Because the use of indicators capturing the social dimensions of landscape in policy analysis is relatively novel many of the stakeholders in this study struggled to set aside the more traditional concepts of landscape preference and valuation when dealing with the new indicator. This problem appears to be accentuated by stakeholders' perceptions that two of the proxies contributing to the composite indicator are themselves forms of valuation. This difficulty in grasping the intended meaning of the indicator was found to be more acute at finer scales of presentation, perhaps because at this level the indicator is most readily associated with identifiable physical landscapes about which preferences have already been formed. The risk inherent in this is that at different scales and in different regions, stakeholders may bias the indicator's given meaning, according to their own experiences and understandings. This problem was compounded somewhat by the fact that the label first attached to the indicator, i.e. 'appreciation', reads into notions of pre-cognitive processes of feeling and liking (i.e. preferences). The revised label for the indicator, i.e. 'awareness', goes some way to reducing this problem, as it is more related to embedded knowledge and past experience, and as such more clearly conveys the designers' original conception of the indicator.

While the composite indicator is billed as capturing 'awareness', of landscapes in a very broad sense, i.e. as expressed by society as a whole, there is of course no assurance that all expressions of awareness are being captured and indeed other expressions of awareness might be envisioned, for example representations of landscapes in the media, including social media. Unfortunately, at the present time, insufficient data exist to allow for the incorporation into the indicator of these other possible expressions of societal awareness. However, further exploration of these issues is recommended (Wood, et al., 2013). For the present then, it must be concluded that the AEI composite indicator of societal awareness of agrarian landscapes captures the only dimensions of this phenomenon that can be reliably measured.

Since the choice of the proxies used in the indicator was constrained by the availability of existing data (Paracchini et al., this issue) it is inevitable that these measures would not fully capture all of the events relevant to the dimension that they present. It hardly needs stating that all proxies could,

in a perfect world, capture the relevant events within their specified dimensions better than they do. However, in this case, the farm tourism proxy was singled out as being most in need to remedial work, to reduce potential bias caused by the weakness of this proxy, through the inclusion of other rural tourism-related events, particularly where the addition of these proxies overcomes the current singular focus on farm tourism. The important point to note, however, is that limitations of this kind do not reflect a flaw in the composite indicator concept, but are merely implementation issues and amendable to resolution through the use of datasets available at more local scales.

There was a consensus among stakeholders that the utility of the composite indicator increased as the scale of presentation decreased, and an acknowledgement that expressing the landscape indicator solely at NUTS2 risks conflating multiple, potentially diverse landscapes. Stakeholders were concerned that if regionally important landscapes are not visible, they may be subject to inappropriate policy decisions. The ELC defines landscape as '*... an area, as perceived by people*' (ELC, 2000) and in this sense landscape is not solely a physical phenomenon with a single objective reality, but a cultural one with a set of subjective realities (Jackson, 1979), reflecting the so-called 'cultural values' model of landscape (Olwig, 2005). In view of this, stakeholders may be placing maximum utility at the level at which they perceive landscapes to exist. Additionally, these stakeholders were not operating at the geographical scale of EU policy makers and therefore may place maximum utility at the scale at which they themselves are concerned with governance. This issue of the utility of an indicator varying with the scale at which it is presented is, of course, common to all mapped indicators. Because the study has demonstrated that the indicator can be reliably presented at multiple scales of resolution, it can be scaled to suit the needs of policy makers and other stakeholders operating at a range of scales of governance.

The traditional approach to understanding appreciation and awareness of landscapes is through the use of local case studies to capture local dynamics. This approach has predominated because of the weight of evidence that peoples' attitudes to, and perceptions of, landscape are place-specific (Scott and Benson, 2002; Swanwick, 2002; Swanwick, 2009). It is very probable therefore, that the way in which awareness of landscapes is expressed will also vary between societies. This study has shown that the current use of a constant relative weighting for the three proxies of awareness in all regions potentially neglects these local dynamics and therefore should be reviewed. For example, using an un-weighted aggregation of proxies, much higher awareness scores occur in the two Southern European regions, Alentejo and Tuscany, than in the more northern Brabant and Syddanmark regions. This is due to the fact that in the northern regions the quality products proxy has very little

relevance because of an absence of quality products with a link to landscape. The way in which the indicator has been constructed does not preclude the application of variable weights to proxies on a regional basis, and therefore the representativeness of the indicator can be improved in this manner, assuming that relevant data, available across the whole EU, can be sourced on which to base such weights.

6. Conclusions

There are few precedents for the construction of geospatial, continent-wide indicators of cultural landscapes, with Mücher et al. (2010) providing one of the few available. Consequently, there has been little developmental analysis of these constructs. The EU composite societal awareness of landscape indicator is undoubtedly a useful step in this direction. The indicator has demonstrated that this social phenomenon can be captured using a top-down data gathering approach and that the indicator so constructed is sufficiently meaningful and reliable for use in policy analysis at various scales of governance. Indeed the indicator reveals itself to be more holistic in conception than it first appears, as an analysis of its components reveal that it captures both the use-value dimension of social values and pre-cognitive preference. The use-value dimension is captured through reflection of *in situ* and *ex situ* consumption of: (i) landscape amenity and (ii) agricultural products linked to particular landscapes, while pre-cognitive preference is expressed through landscape designations, i.e. based on the principle of 'if society protects, then society values'. In this sense 'awareness' can be understood as the knowledge and experience-based foundation to all these other perceptions and functional relationships with rural agrarian landscapes and is therefore, perhaps, the ideal proxy to represent them.

That said, further work needs to be done to develop this and other social indicators to ensure capture of more of the many forms of interaction with rural agrarian areas that are expressed by society at different scales and in different regions (Ode et al., 2009, Pelosi et al., 2010). A number of issues have been identified in this study leading to beneficial improvements to the indicator. Some of these issues are of a practical nature and obvious short-term solutions present themselves, while others will require further conceptual development over the longer term. In the short term, the following developments might be suggested:

- the landscape protection proxy does not capture some productive landscapes, especially accessible areas, that society might be widely aware of. The addition of national landscape designations to this proxy, complementing the existing EU designations, should therefore be considered;

- the use of weights for each of the proxies contributing to the indicator should be considered, based on their relative importance in expressing societal awareness of landscape in different regions. These weights might be generated through stakeholder consultation exercises or surveys of regional publics;
- the NUTS2 composite indicator is recognised as being a useful tool for EU policy makers, but the expression of the indicator at lower governance levels is also recommended, so that different stakeholders can find a scale that is suitable for them;
- the rural tourism proxy should be buttressed with other tourism proxies, capturing the widest possible range of tourist activities associated with agrarian landscapes. Further research might consider the potential of such measures as: numbers of rural restaurants, availability of non-farm small-scale accommodation, number of visitors in agricultural areas using trails and footpaths and associated car parks etc.
- Some consideration should be given to the normalization method used to scale the indicator when the indicator is being mapped at scales lower than NUTS2. It is apparent that the 0-10 scale currently used, when normalized at the EU level, i.e. the so-called 'pooled' normalization, when applied to regions with indicator scores well below the EU average, does not reveal some variation between landscapes that publics in those regions may identify as significant.

Stakeholder perception was that the utility of the indicator increases with reduction in the scale of mapping, due to the greater level of within-region variation revealed. Tthese stakeholders operate locally and therefore have a greater depth of awareness and understanding of the landscapes represented within their regions, based on stories, genealogies and an understanding of historic and current management practices, than do 'outsiders' (Stephenson, 2008). This provides added support for the view that societal awareness of agrarian landscapes might be at its richest when expressed by locals at the local level. Future research into mapped indicators of social interaction with agrarian landscapes should therefore explore ways of capturing this, as yet largely uncharted realm of human interaction with landscapes, i.e. collecting into one measure numerous local expressions of interaction with agrarian landscape. This might be done, for example, by including within the composite indicator proxies such as local protection designations, or density of rights of way etc.

The CAP is without doubt one of the primary drivers of landscape change, but it is not the only driver of changing societal attitudes to landscape. Perhaps the most cognitively challenging question arising from the development of this indicator is how to distil from observed changes in the state of

the societal awareness indicator the specific role of public interventions, and in particular CAP. Societal awareness is fully anthropocentric and values attached to any measure(s) of this phenomenon will evolve through time with changing societal values and developments in culture more broadly (Paracchini et al., 2014, this issue). More specifically, cultural attitudes will be driven by science and policy, but also socio-economic factors. Observation suggests that these broad societal changes will lead to an increasing disconnection with the landscape and changes to the way that society expresses awareness of landscape (Stephenson, 2007, 2008). Policy makers therefore need to recognise that the dimensions along which society expresses awareness of landscape may change, requiring new proxy indicators and new views on the balance between proxies (longitudinal change, as well as cross-sectional change)(Turpin *et al*., 2009; van Eupen *et al*., 2012).

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[i] Nomenclature d'Unités Territoriales Statistiques (NUTS). The NUTS2 divisions correspond to the largest sub-national statistical divisions, such as states, planning regions and provinces etc.

[ii] Local Administrative Units (LAU). LAU2 is an administrative division below NUTS2 corresponding to municipalities or electoral districts, for example Wards in the UK.