

Defining rural built landscapes: methodology and application

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Abstract

The European Landscape Convention (ELC) aims to promote European landscape protection, management and planning. The ELC has been ratified by a number of European member and no-member states, including Italy. A new generation of landscape plans is developing in order to achieve the aims of ELC.

A renewed interest is growing for landscapes and rural landscapes both at the Italian national and regional level. Sixteen years after the ELC signature, roughly a half of the Italian regions have modified and approved landscape plans with an emphasis for the analysis and design of rural areas. The rural landscapes, in particular, can be studied and classed through several points of view including the forestry, agronomic, pedological, and built dimensions.

The rural built landscape dimension has rarely been studied and integrated within the Italian landscape plans in a satisfactory way. So, after an analysis of the Italian regional landscape plans consistent with the ELC and a literature review about the rural built landscape dimension, we propose a method and some key elements useful to categorize the Sardinian rural landscapes. In this study we present the results achieved, explaining real case studies developed under a research project funded by the Autonomous Region of Sardinia, Italy.

Keywords: European Landscape Convention, classification of rural landscapes, rural landscapes in Sardinia.

1. Introduction

The European Landscape Convention (hereafter, ELC) induced practitioners to focus on landscapes with a renovated interest for territorial systems including not only relevant landmarks but also second order elements. In this respect, ELC implementation in European Union member (and not member) states has paved the way to new tools concerning ordinary and distributed landscapes and referring often to rural and agricultural landscapes. This apparently superfluous specification –in fact, European landscapes are broadly rural– by contrast has attracted in recent times the interest of many scholars (Paracchini and Capitani, 2011). While many definitions of landscape exist, in this paper we refer to the landscape as conceived in the ELC: “an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors” (ELC, 2000). The ELC gives the same importance to all types of landscapes: thus natural, rural, peri-urban and urban landscapes are key for European cultural identity (Piorr and Müller, 2009).

Italy has signed in 2000 and ratified in 2006 the ELC, and approved in 2004 the legislative decree n. 42 ‘Code of Cultural and Landscape Heritage’(hereafter, the Code). The Code introduces the ELC principles in the Italian regulatory system by stressing innovative concepts, such as landscape quality, local identity, and cultural values. According to the Code, state and regions ensure that the whole national territory is properly known, protected, planned and managed. Italian regional administrations approve landscape plans in order to achieve the aims of the Code. Some regions have approved such landscape plans and for the first time focus explicitly on the analysis and planning of agricultural and rural landscapes.

Some papers approach rural landscape definition by describing architectonic and spatial characteristics of rural buildings and settlements (Jeong et al., 2012). The concepts characterizing rural landscapes are also at the basis of the design and management of last generation planning tools approved in Italy according to the ELC. According to De Montis (2016), roughly a half of Italian regions approved such plans with typical instruments, i.e. landscape units, atlases and catalogues, concerning sometimes the definition of rural landscapes.

In this paper, we aim at discussing methods, criteria, and indicators adopted in rural landscape definition and planning with a special interest for the interaction between buildings and landscape. We start from the international literature on the definition of rural landscapes and focus on the design of a method able to assess rural built landscapes. In the perspective of an operative definition, we integrate the method with elements drawn from a study of the approaches to rural landscapes proposed by last generation landscape plans approved by Italian local administrations. We apply the method to the study of rural landscapes in three regions of Sardinia, Italy, and give a contribution to steer the process of extension to the interior part of the island of the Regional Landscape Plan (RLP) of Sardinia.

2. Materials and Methods

The literature on rural landscapes is quite extensive, as that theme has been addressed under a number of points of

view. In 2015, we selected a set of twenty-eight journal articles filtering the sciencedirect.com database through the following keywords: agricultural landscapes, rural landscapes, rural landscape analysis and planning. The articles have been clustered in the five macro-groups reported in Table 2.

Table 2. Macro-groups of the references selected.

Macro-groups	Key concepts	References
Buildings analysis	Architectural shapes and features, building materials and techniques	Jeong et al. (2012); Tassinari et al. (2010); van der Vaart (2005)
Dynamic analysis	Landscape change in time, landscape natural and artificial matrices	Gulickx et al. (2013); Pôças et al. (2011); Pedroli et al. (2007); Skowronek et al. (2005); Poudevigne et al. (1997)
Landscape ecology	Landscape functions and ecosystem services	Riguccio et al. (2014); Gullino and Larcher (2012); Laterra et al. (2012); Ma and Swinton (2011); Petit (2008); Claval (2005)
Sociologic and policy analysis	Landscape perception and cultural identity	Hiner (2014); Sklenicka et al. (2014); Wheeler (2014); Øian (2013); Primdahl et al. (2013); Ruiz and Domon (2012); Paquette and Domon (2001)
Visual analysis	Human preferences, visual perception	García-Llorente et al. (2012); Qingjuan et al. (2011); Ramírez et al. (2011); Sevenant and Antrop (2007); Natori et al. (2005); Appleton and Lovett (2003)

Then we scrutinize nine Italian regional landscape plans approved in Italy according to the Code. The main features of this plans are reported in Table 3, while Figure 1 illustrates the coverage of the study: the sample represents roughly a half of the population and territorial extension of the country.

Table 3. Landscape plans under scrutiny: main characteristics

Region	Denomination (and code)	Year of approval
Apulia	Regional Landscape and Territorial Plan (RLTP)	2013
Calabria	Regional Landscape and Territorial Framework (RLTF)	2013
Lazio	Regional Landscape and Territorial Plan (RLTP)	2007
Lombardy	Regional Landscape Plan (RLP)	2013
Piedmont	Regional Landscape Plan (RLP)	2009
Sardinia	Regional Landscape Plan (RLP)	2006
Tuscany	Territorial Coordination Plan (TCP)	2014
Umbria	Regional Landscape Plan (RLP)	2012
Veneto	New Regional Territorial Coordination Plan (NRTCP)	2007

We have scrutinized these tools according to the issues reported in Table 4.

Table 4. Scrutiny of landscape plans: issues and description.

N	Issues	Description
1	Landscape units	Clearly bounded territories with homogeneous landscapes
2	Landscape atlases or catalogues	Visual or textual documents illustrating landscape units
3	Rural landscapes: focus	Specific focus for rural landscape
4	Rural landscapes: fact sheets	Detailed analytical documents defining rural landscapes
5	Rural building types and materials	Technologic solutions of rural buildings
6	Methods	Methods adopted for defining rural landscapes
7	Data	Type, resolution, and source of data processed
8	Indicators	Indicators used to define rural landscapes

The first two issues concern the rationale of last generation landscape plans fundamental documents. Issues 3-5 attain the specific focus for rural landscape detailed definition and planning and the clarification of rural buildings' architectural characteristics. The last issues 6-8 report on the eventual reference to analytical frameworks adopted for detecting and defining rural landscapes.

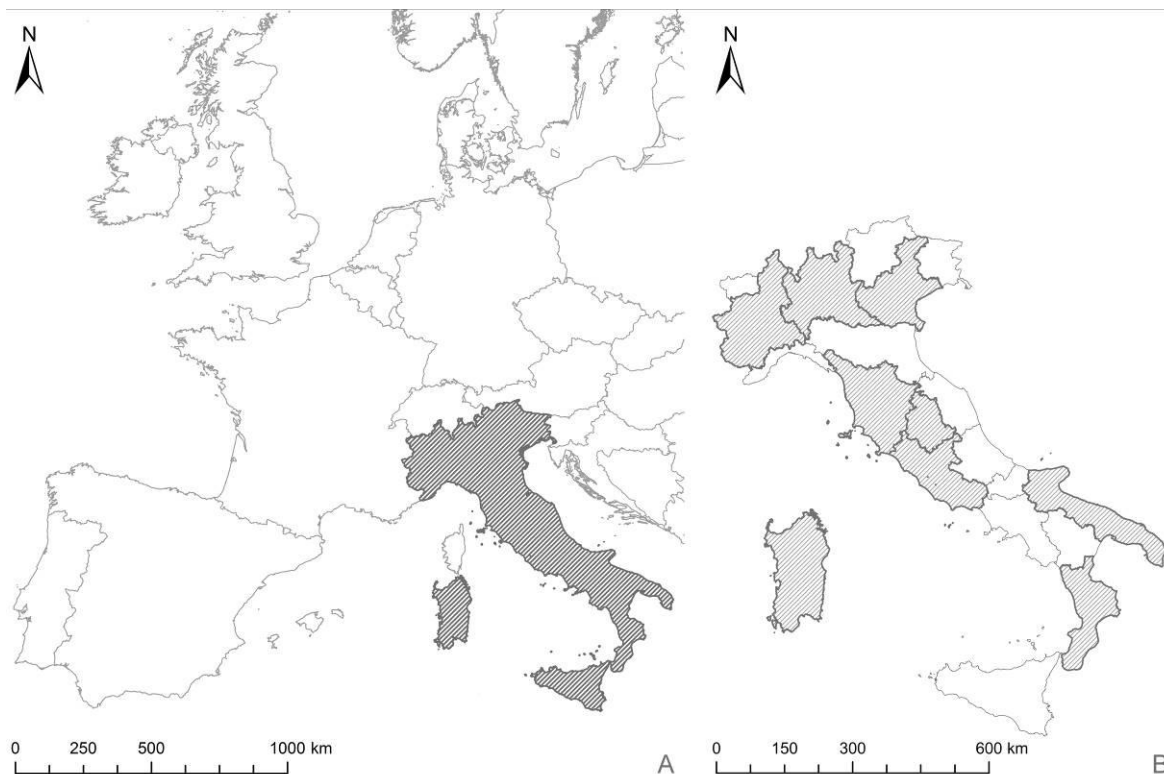


Figure 1. In dark gray, Italy in the European context (A). In light gray, the regions covered in this study (B).

In two regions (Sardinia and Tuscany), planners define specific documents concerning rural landscapes, while in the remaining cases they prefer to refer to the usual and comprehensive concept of landscape. The majority of plans (with the exception of Sardinia) cover the entire region. All the plans selected divide the region in landscape units described with typical photographic atlas or catalogues, where a special interest for rural (or agrarian) landscape emerges. In some cases, planners identify rural or agricultural landscapes by emphasizing the role of specific shaping and modifying human cultivations. Often times the analysis is based on the description of rural buildings with respect to housing type, function, architectonic details and building techniques. Landscape plans approved by Lazio, Lombardy, Piedmont, Tuscany, and Veneto are relevant, as they provide explicitly some information about the rural built landscape. Lazio’s RLTP takes into account historic rural buildings and villages in reclamation areas. As regard Lombardy, the regional landscape plan shows rural buildings like farmhouses (‘cascine’), barns and stalls, through photographic as well as textual documentation. In the case of Piedmont, the plan defines three types of rural areas according also to morphological characteristics of the settlement. The TCP of Tuscany, in addition, stresses the historical aspects and the housing types in peculiar areas devoted to sharecropping.

We now draw from the literature review and the scrutiny of landscape practice key elements for the design of a method useful to characterize rural built landscapes. These key elements are the following: i) the use of a set of broadly qualitative indicators, and ii) the organization of the information in Landscape Fact Sheets (LFSs), whose layout includes indicators’ descriptors and values, cartography, and photographic documentation. The LFS is divided in two sections describing geographical general features and detailed building features (Table 5).

Table 5. LFS section 1 and 2.

Section 1: geographical and general features			Section 2: detailed building features		
N	Themes	Indicator	N	Themes	Indicator
1	Landscape units	Clearly bounded territories with homogeneous landscapes	1	General landscape	Photographic view of the settlement
2	Landscape atlases or catalogues	Visual or textual documents illustrating landscape units	2	Local landscape	Photographic view of the rural building
3	Rural landscapes: focus	Specific focus for rural landscape	3	Toponym	Name of the site
4	Rural landscapes: fact	Detailed analytical documents defining rural landscapes	4	Rural building:	

Section 1: geographical and general features			Section 2: detailed building features		
N	Themes	Indicator	N	Themes	Indicator
	sheets				
5	Rural building types and materials	Technologic solutions of rural buildings	4.1	Age	Age from construction
6	Methods	Methods adopted for defining rural landscapes	4.2	Size	Volume and surface area
7	Data	Type, resolution, and source of data processed	4.3	Use	Current utilization pattern
8	Indicators	Indicators used to define rural landscapes	4.4	Conservation status	Current conservation status
			4.5	Inconsistent elements	Building techniques and materials not consistent with the original architectural morphology
			4.6	Landscape relations	Buildings' coherence with the surrounding landscape
			4.7	Building type	Characteristics of the building type
			4.8	Building techniques and materials	Building techniques and materials adopted
			4.9	Layout and elevation	Layout and elevation
			5	Guidelines	Suggestions about renovation and use/reuse

3. Application of the method

In this section, we apply the method described in section 2 to the definition of three rural build landscapes in Sardinia, Italy. Sardinia is the second largest island in the Mediterranean Sea, is a very old land, and presents landscapes that have evolved in time.

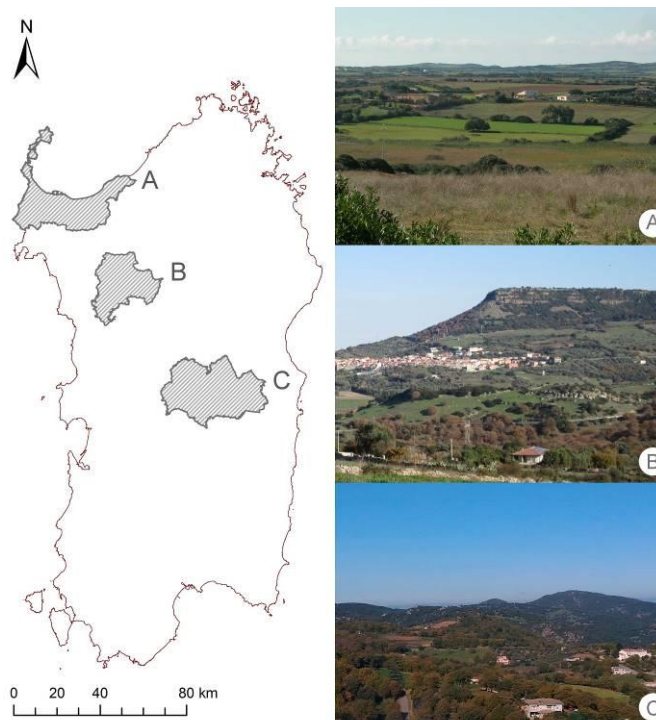


Figure 2. Cartographic and photographic representation of the landscape units: the Gulf of Asinara (A), Meilogu (B), and Mandrolisai-Gennargentu (C).

Landscape planning in Sardinia was rarely applied until the early 1990’s, when the regional administration approved fourteen regional landscape plans with the aim at valorising the environmental and landscape elements according to an ecological and environmental integrated approach to nature protection (De Montis and Caschili, 2012). In 2006, the regional administration approved a Code-based RLP that is still effective on a limited part of the island, namely the first homogeneous area, and includes twenty-seven landscape units located along the coastline. After ten years, the regional administration is willing to complete the design of the RLP by extending it to the interior part of the island. At the same time, the regional administration decided to focus on the identification of landscapes with distinguishing rural characteristics. These advancements have led in 2013 to the approval of an Atlas of rural landscapes specifically dedicated to the agricultural and forestry matrices of Sardinian landscapes. This Atlas was included in the 2013 update of the RLP, which was shortly later withdrawn for mainly political reasons.

In this institutional and planning context, we apply our method to the analysis and characterization of three landscape units localized in northern and central Sardinia (Figure 2): ‘Gulf of Asinara’, ‘Meilogu’, and ‘Mandrolisai-Gennargentu’. The first unit belongs and is affected by landscape planning connected to the first homogeneous area of the RLP. The remaining two units fall in the interior areas of the island and are not subject to any landscape planning yet.

4. Results and Discussion

In the reminder of this section, we present a synthesis of the characterization of the rural built landscapes assessed in the three landscape units. As regard the unit ‘Gulf of Asinara’, rural built landscapes are often characterized by scattered settlements and isolated buildings. The most frequent building type is dialectically called ‘cuile’, and presents very simple layout and elevations: the rooms, located in a single ground floor, were realized in adjacency and one after the other. Thus, cuiles are nowadays buildings mainly developed in line. The structure consists of a weight bearing wall usually made of local stone (shale) and finished with a layer of plaster. The roof is sustained by wooden A-frames and realized with cane tapes, mortar, and terracotta tiles. In Meilogu and Mandrolisai-Gennargentu, the building type differs from that we found in the Gulf of Asinara and the buildings are generally aggregates, on the contrary of the *cuiles*. In Meilogu, linear multicellular buildings developed both on a floor and on two-three floors have been identified. The Mandrolisai-Gennargentu is characterized by rural buildings embedded in the urban center. The rural buildings usually develop on two or three floors. The main reason for these changes is due to the orography of the area: the linear buildings like *cuiles* have developed in almost flat areas, while in the Sardinian outback and mountainous areas the buildings have been built on slopes, according to the contour lines, and this circumstance explains why the rural buildings of Mandrolisai-Gennargentu have mainly developed according to a vertical growth. In such buildings, the walls are generally made of regular stone blocks, without a layer of plaster. The typical color of the interior walls is blue or light blue.

Our LFS-based approach to landscape assessment enabled to associate a specific rural built landscape to given rural building type and housing system (Figure 3 and 4). The Sardinian rural built landscapes show different features depending on specific geographic context we consider. These distinguishing features include, among other things, the orography, geology, history and culture of the places. Our study shows that the materials used for building up the rural buildings are often derived from the typical rocks of the area, and that buildings grow in elevation depending on the slope of hillsides or plain areas. Also colors are often a useful indicator, as for example the red (externally) or the blue (internally) color used for painting respectively the *cuiles* in the “Gulf of Asinara” and the high buildings in “Mandrolisai-Gennargentu”. We are therefore able to provide some suggestions for the recovery of rural buildings, which are often in ruin condition.

Ambito n° 14 "Golfo dell'Asinara" - SIR 06: Cuile Issi			Sistema insediativo
Inquadramento	Sistema paesaggistico-ambientale e infrastrutturale	Struttura insediativa	Organizzazione spaziale
<p>Coordinate: E 1439181, N 4521658</p> <p>Descrizione: l'area di studio ricade nell'ambito n°14 Golfo dell'Asinara</p> <p>Provincia: Sassari</p> <p>Dato, fonte: sistema di riferimento: Monte Mario 1, PPR RAS (2006), ortofoto RAS (2006)</p>	<p>Elementi ambientali e paesaggistici: area di bacino del Rio San Nicola-Stagno di Pilo.</p> <p>Visibilità: SP 57</p> <p>Descrizione: il cuile Issi si trova in un'area con vegetazione prevalente a seminativi e a pascolo e macchia mediterranea.</p> <p>Dato, fonte: IGM (1992), PPR RAS (2006)</p>	<p>Tipo insediativo: isolato</p> <p>Indice di densità edilizia: 0,14 mc/mq</p> <p>Descrizione: il cuile dista circa 27 km dal capoluogo di provincia (Sassari) e circa 80 m dalla SP 57.</p> <p>Dato, fonte: CTR RAS (1998)</p>	<p>Tipi di organizzazione: campi chiusi del tipo maglia a trama irregolare.</p> <p>Descrizione: 2,3.1 Campi in parte chiusi di terre private e pubbliche frammati con arativi, pascoli, frutteti, boschi.</p> <p>Dato, fonte: Ortofoto RAS (2006), DipNet Eucland Project European Agricultural Landscape Classification: UDS – RAS (2008); MIPAAF Paesaggi Rurali Storici.</p>
Inquadramento territoriale	Stralcio IGM	Stralcio CTR	Stralcio ortofoto

Figure 3. Example of LFS: Geographical and general features.

Ambito n° 14 "Golfo dell'Asinara" - SIR 06: Cuile Issi				Elementi costruiti	
<p>Foto d'insieme</p> 	<p>Tipologia edilizia</p> <p>Tipo edilizio: in linea su unico livello Tipo storico: cuile</p> <p>Descrizione: la configurazione è lineare, l'accesso è agevole ed avviene dalla strada principale per Stintino. La vicinanza allo stagno di Pilo conferisce pregio ambientale e paesaggistico.</p>	<p>Foto del bene</p> 	<p>Caratteri generali</p> <p>Ubicazione: Sassari Loc. Baddi d'Issi Età: seconda metà 1800 Dimensioni: 480 m²</p> <p>Stato di conservazione: cattivo stato di conservazione e crolli parziali nella parte posteriore.</p>	<p>Uso</p> <p>Non più in uso</p>	
<p>Relazioni paesaggistiche</p> <p>Descrizione: l'edificio rurale è coerente con il paesaggio circostante, tuttavia contrastano gli effetti di area vasta quali impianti eolici, elettrodotti e la zona industriale di Fiume Santo</p>	<p>Prospetto Sud</p> 	<p>Materiali e elementi costruttivi</p> <p>Edificio realizzato in pietra, intonaco originale costituito da malta di terra e calce. Tracce di intonaco e colore ocra originale</p> 	<p>Elementi di conflitto</p> <p>Sostituzione degli infissi originali nella parte centrale, eseguita negli anni con elementi in alluminio anodizzato, non conformi ai tipi locali. L'intonaco della parete esterna non rispetta i canoni tradizionali. Parziale sostituzione della copertura con lastre in fibrocemento.</p>		
			<p>Linee guida per la progettazione paesaggistica</p> <p>Categoria di indirizzo: recupero</p> <p>Descrizione: si ipotizzano opere di consolidamento e recupero che rispettino i tipi edilizi locali.</p>		

Figure 4. Example of LFS: Detailed building features.

5. Conclusions

In this section, we present the concluding remarks of this paper. The discussion above stresses that some indicators are useful for defining what rural landscapes are and mean, with respect to the building and settlement dimensions. The level of integrity and typical shape of buildings and settlements, their history, and the building materials adopted are of paramount importance. In a geographical perspective, an often adopted indicator is the housing density, which is usually reported with low values in rural landscapes. In addition, the degree of openness and remoteness are powerful measures for arguing about how rural a settlement is. Photographic documents are very important because original and elaborated pictures are still unabridged media for recording in a synthetic format both the characteristics and relations of single buildings in rural landscapes and the features of rural landscapes surrounding the entire settlements.

We designed a fact sheet concerning the identification of rural landscapes with respect to the building and settlement dimensions and tested the viability of the fact sheet by applying it to the description of three case studies. Through such tool we are able to provide an overview on rural built landscape at global and local scale, in order to give advice about a recovery of rural buildings which is consistent both with the history of the building itself and the surrounding landscape.

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References

Appleton, K., A. Lovett, 2003. GIS-based visualisation of rural landscapes: defining 'sufficient' realism for environmental decision-making. *Landscape and Urban Planning*. 65, 117-131.

Claval, P. 2005. Reading the rural landscapes. *Landscape and Urban Planning*. 70, 9-19.

De Montis, A., 2016. Measuring the performance of planning: the conformance of Italian landscape planning practices with the European Landscape Convention. *European Planning Studies*. <http://dx.doi.org/10.1080/09654313.2016.1178215>.

De Montis, A., S. Caschili, 2012. Nuraghes and landscape planning: Coupling viewshed with complex network analysis. *Landscape and Urban Planning*. 105, 315–324.

ELC, 2000. European Landscape Convention. Florence, 20/10/2000 - Treaty open for signature by the member States of the Council of Europe and for accession by the European Union and the European non-member States. CETS No.176.

Garcia-Llorente, M., B. Martin-Lopez, I. Iniesta-Arandia, C. Lopez-Santiago, P.A. Aguilera, C. Montes, 2012. The role of multi-functionality in social preferences toward semi-arid rural landscapes: An ecosystem service approach. *Environmental Science & Policy*. 19-20, 136-146.

Gulickx, M.M.C., P.H. Verburg, J.J. Stoorvogel, K. Kok, A Veldkamp, 2013. Mapping landscape services: A case study in a multifunctional rural landscape in The Netherlands. *Ecological Indicators*. 24, 273-283.

Gullino, P., F. Larcher, 2012. Integrity in UNESCO World Heritage Sites. A comparative study for rural landscapes. *Journal of Cultural Heritage*. 14, 389-395.

Hiner, C.C., 2014. "Been-heres vs. come-heres" and other identities and ideologies along the rural–urban interface: A comparative case study in Calaveras County, California. *Land Use Policy*. 41, 70-83.

Jeong, J.S., L. Garcia-Moruno, J. Hernandez-Blanco, 2012. Integrating buildings into a rural landscape using a multi-criteria spatial decision analysis in GIS-enabled web environment. *Biosystems Engineering*. 112, 82-92.

- Laterra, P., M.E. Orúe, G.C. Booman, 2012. Spatial complexity and ecosystem services in rural landscapes. *Agriculture, Ecosystems and Environment*. 154, 56-67.
- Ma, S., S.M. Swinton, 2011. Valuation of ecosystem services from rural landscapes using agricultural land prices. *Ecological Economics*. 70, 1649-1659.
- Natori, Y., W. Fukui, M. Hikasa, 2005. Empowering nature conservation in Japanese rural areas: a planning strategy integrating visual and biological landscape perspectives. *Landscape and Urban Planning*. 70, 315-324.
- Øian, H., 2013. Wilderness tourism and the moralities of commitments: Hunting and angling as modes of engaging with the natures and animals of rural landscapes in Norway. *Journal of Rural Studies*. 32, 177-185.
- Paquette, S., G. Domon, 2001. Trends in rural landscape development and sociodemographic recomposition in southern Quebec (Canada). *Landscape and Urban Planning*. 55, 215-238.
- Paracchini, M.L., C. Capitani, 2011. Implementation of a EU wide indicator for the rural-agrarian landscape. Joint Research Centre, European Commission. Available from http://agrienv.jrc.ec.europa.eu/publications/pdfs/EUR_25114.pdf Accessed: March 14, 2015.
- Pedroli, G.B.M., Th. Van Elsen, J.D. Van Mansvelt, 2007. Values of rural landscapes in Europe: inspiration or by-product? *NJAS - Wageningen Journal of Life Sciences*. 54, 431-447.
- Petit, S., 2008. The dimensions of land use change in rural landscapes: Lessons learnt from the GB Countryside Surveys. *Journal of Environmental Management*. 90, 2851-2856.
- Piorr, A., and K. Müller, 2009. *Rural Landscapes and Agricultural Policies in Europe*. Berlin Heidelberg: Springer-Verlag.
- Pôças, I., M. Cunha, A.R.S. Marcal, L.S. Pereira, 2011. An evaluation of changes in a mountainous rural landscape of Northeast Portugal using remotely sensed data. *Landscape and Urban Planning*. 101, 253-261.
- Poudevigne, I., S. van Rooij, P. Morin, D. Alard, 1997. Dynamics of rural landscapes and their main driving factors: A case study in the Seine Valley, Normandy, France. *Landscape and Urban Planning*. 38, 93-103.
- Primdahl, J., L.S. Kristensen, S. Swaffield, 2013. Guiding rural landscape change. Current policy approaches and potentials of landscape strategy making as a policy integrating approach. *Applied Geography*. 42, 86-94.
- Qingjuan, Y., L. Bei, L. Kui, 2011. The Rural Landscape Research in Chengdu's Urban-rural Intergration Development. *Procedia Engineering*. 21, 780-788.
- Ramírez, Á., E. Ayuga-Téllez, E. Gallego, J.M. Fuentes, A.I. García, 2011. A simplified model to assess landscape quality from rural roads in Spain. *Agriculture, Ecosystems and Environment*. 142, 205-212.
- Riguccio, L., G. Tomaselli, P. Russo, C. Falanga, 2015. Identification of "Typical Agricultural Districts" for the development of rural areas applied to Eastern Sicily. *Land Use Policy*. 44, 122-130.
- Ruiz, J., G. Domon, 2012. Relationships between rural inhabitants and their landscapes in areas of intensive agricultural use: A case study in Quebec (Canada). *Journal of Rural Studies*. 28, 590-602.
- Sevenant, M., M. Antrop, 2007. Settlement models, land use and visibility in rural landscapes: Two case studies in Greece. *Landscape and Urban Planning*. 80, 362-374.
- Sklenicka, P., P. Símová, K. Hrdinová, M. Salek, 2014. Changing rural landscapes along the border of Austria and the Czech Republic between 1952 and 2009: Roles of political, socio-economic and environmental factors. *Applied Geography*. 47, 89-98.
- Skowronek, E., R. Krukowska, A. Swieca, A. Tucki, 2005. The evolution of rural landscapes in mid-eastern Poland as exemplified by selected villages. *Landscape and Urban Planning*. 70, 45-56.
- Tassinari, P., E. Carfagna, D. Torreggiani, S. Benni, M. Zagaraiou, 2010. The study of changes in the rural built environment: Focus on calibration and improvement of an areal sampling approach. *Biosystems Engineering*. 105, 486-494.
- van der Vaart, J.H.P., 2005. Towards a new rural landscape: consequences of non-agricultural re-use of redundant farm buildings in Friesland. *Landscape and Urban Planning*. 70, 143-152.
- Wheeler, R., 2014. Mining memories in a rural community: Landscape, temporality and place identity. *Journal of Rural Studies*. 36, 22-32.