ECLAS CONFERENCE PORTO 2014

LANDSCAPE: A PLACE OF CULTIVATION

BOOK OF ABSTRACTS

& CONFERENCE GUIDE

EDITED BY ISABEL SILVA &
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Urban green structure in the city of Porto: Morphology and biodiversity. **Paulo Farinha-Marques, Cláudia Fernandes, José Miguel Lameiras, Filipa Guilherme**

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DISCUSSION

LUNCH

DAY 3 / 2.00 PM–4.00 PM / ROOM 2

Methodological proposal for the assessment of vegetation heritage value: application in Central Alentejo (Portugal)

Vegetation is an important part of landscape heritage valuation since it can be not only valuated per se but also as habitat for many wildlife species. Since some years, the authors develop methods to estimate the landscape natural and cultural heritage values. A method to estimate vegetation heritage value is explained in this study being applied to Central Alentejo. A criteria selection and weighting method is presented as well as the evaluation established by a round table of experts. The criteria used were: potential area for vegetation conservation purposes based on horizontal and vertical structure of vegetation patches, tree density, rare species richness, phytocoenotic maturity, importance as ecological corridor, historical record, scientific and educational potential and recreation potential. The vegetation heritage value was calculated by a linear combination of the weighted criteria.

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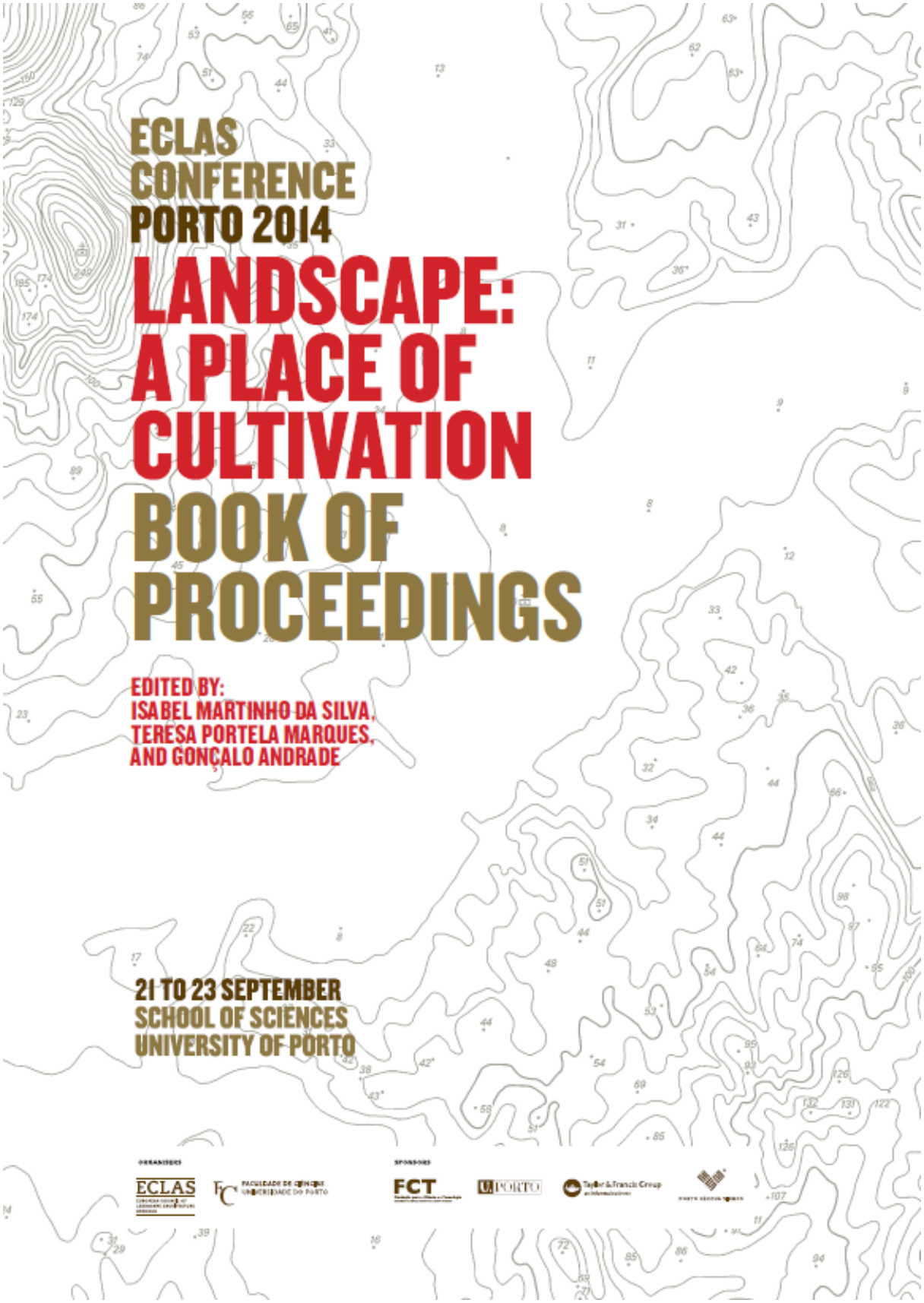

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LANDSCAPE: A PLACE OF CULTIVATION

BOOK OF PROCEEDINGS

EDITED BY:
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TERESA PORTELA MARQUES,
AND GONÇALO ANDRADE

21 TO 23 SEPTEMBER
SCHOOL OF SCIENCES
UNIVERSITY OF PORTO

ECLAS 2014 CONFERENCE

LANDSCAPE: A PLACE OF CULTIVATION

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Methodological Proposal for the Assessment of Vegetation Heritage Value: Application in Central Alentejo (Portugal)

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vegetation heritage value | methodology | landscape | central alentejo | OTALEX C

Vegetation is an important part of landscape heritage valuation since it can be not only valuated per se but also as habitat for many wildlife species. Since some years, the authors develop methods to estimate the landscape natural and cultural heritage values. A method to estimate vegetation heritage value is explained in this study being applied to Central Alentejo. A criteria selection and weighting method is presented as well as the evaluation established by a round table of experts. The criteria used were: potential area for vegetation conservation purposes based on horizontal and vertical structure of vegetation patches, tree density, rare species richness, phytocoenotic maturity, importance as ecological corridor, historical record, scientific and educational potential and recreation potential. The vegetation heritage value was calculated by a linear combination of the weighted criteria.

INTRODUCTION

It is generally assumed that the concept of heritage extended to Nature has been accepted at international level, following the 'Convention for Protection of the World Cultural and Natural Heritage', adopted by the UNESCO General Conference, on 16 November 1972. It was then considered that natural heritage included relevant biotic and abiotic elements as well as natural sites.

As vegetation is an important biotic factor for landscape heritage valuation the authors have centered their interest on it. Since some years, they carry out studies in Évora surrounding cultural landscape (Figure 1), in Central Alentejo (Portugal), and develop methods to estimate its natural and cultural heritage values (Barata and Mascarenhas, 2002; Batista et al., 2010).

A method developed to evaluate the vegetation heritage value was applied to Central Alentejo and is presented here.

HERITAGE LANDSCAPES AND VEGETATION HERITAGE VALUE

What is a Heritage Landscape?

Several types of values can be conferred on the cultural landscapes depending on the attribution modes from the persons or group of actors. The heritage value is one of those types. Concerning this aspect the most valued cultural landscapes can be designated as heritage landscapes. The heritage landscape is then a cultural landscape with high heritage value (Capelo et al., 2011a). Vegetation is an important part of landscape heritage values since vegetation can be evaluated not only per se but also as habitat of many wildlife species.

VEGETATION HERITAGE VALUE MODEL

The vegetation heritage value model is based on the following criteria: potential area for vegetation conservation purposes (based on horizontal and vertical structure of vegetation patches and its importance as habitat), tree density, rare species richness,

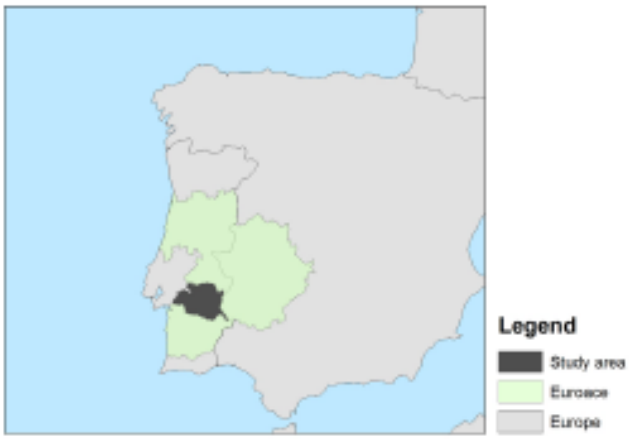

FIGURE 1. Study area

TABLE 1. Criteria used for the landscape vegetation evaluation

CRITERIA	DESCRIPTION	WEIGHTING COEFFICIENT	NUMBER OF EVALUATION CLASSES	VALUE (0-12 convenience scale)
Potential area for vegetation conservation purposes (importance as habitat)	Horizontal structure: refers to the number of horizontal vegetation cover types	4	3	1 dominant specie - classification - 2
				2 dominant species - classification - 6
				3 or more dominant species - classification - 10
	Vertical structure: refers to the number of vertical vegetation layers			1 layer - classification - 2
				2 layers - classification - 6
				3 layers - classification - 10
Tree density	Refers to tree cover density.	3	3	< 10% tree cover-classification - 2
				10% - 50% tree cover-classification - 6
				> 50% tree cover-classification - 10
Rare species richness	Number of rare species with conservation status per unit area (km2)	4	3	0-4 rare species - classification - 2
				5-8 rare species - classification - 6
				9-12 rare species - classification - 10
Phytocoenosis maturity	Position of the vegetation patch in the phytocoenotic serie: young, medium or mature community	3	3	young - classification - 2
				medium - classification - 6
				mature - classification - 10
Importance as ecological corridors	Connectivity	4	2	without connectivity - classification - 3
				with connectivity - classification - 9
Historical record	Existence of historical research data	1	2	not existent - classification - 3
				existent - classification - 9
Scientific and educational potential	Concerns the vegetation patches with high interest to future research and educational activities	3	2	low interest - classification - 3
				high interest - classification - 9
Recreation potential	Concerns the suitability of vegetation patches to future recreation activities	1	2	low - classification - 3
				high - classification - 9

phytocoenotic maturity, importance as ecological corridor, historical record, scientific and educational potential, and recreation potential. These criteria were applied to the most preserved vegetation patches, namely cork oak and holm oak montados, woods, bushes, grasses and marshes, vegetation corridors (stream corridors, mainly) including protected habitats and species with conservation status. The vegetation structure and composition were analyzed through Land cover/ Land use map at scale 1:10 000 (Batista, 2011) and field surveys (Pinto-Gomes et al., 2014). Three or two valuation classes were considered depending on the nature of each criteria (Table 1). Using a general scale of values (convenience scale), a numeric value was assigned to each class, allowing the linear combination and the Global Indicator value (Y) estimation (Capelo et al., 2011a):

$$Y = \sum_{i=1}^{n} ai \, . \, Xi$$

(n - number of indicators; ai - weighting coefficient; Xi – value assigned to indicator i)

For the selection of the weighting coefficients a relatively accurate strategy was applied (Capelo et al., 2011b).

The definition of each criterion as well as the related weighting coefficient and classes of valorization are presented in Table 1.

MONTADO LANDSCAPES IN CENTRAL ALENTEJO

Central Alentejo is located in the south of Portugal. Its area is about 7500 km2. It is a typical Mediterranean area in which traditional land use systems like *montados* occupies around 54% of the total area (Batista et al., 2013). These *montados*, composed mainly of holm oak (*Quercus rotundifolia*) and cork oak (*Quercus suber*) woodlands (Figure 2), have been managed for centuries in a way that supports biodiversity rather than reduces it. They are traditionally related to agro-silvo-pastoral systems in which a rotation of crops / fallows / pastures takes place below the treelike layer consisting of the open formation of oaks (Pinto-Correia et al., 2011). However these *montados* are quite diverse in species, tree coverage and structure. One of the main characteristics of these bio-cultural multifunctional traditional landscapes is the persistence of native scattered vegetation throughout the landscape, constructing a heterogeneous mosaic from a variety of grazed, shrubby and cultivated land uses, witch confers different density structure and composition. This complex formation has produced 'one of the most aesthetically pleasing and biologically rich landscapes in Europe' (Pinto-Correia and Mascarenhas 2001: 100).

In this communication we characterize the vertical and horizontal structure of *montados* in Central Alentejo, and relate them to the presence of vegetation species with conservation status and the presence of ecological corridors in order to obtain a heritage value for the area.

Montados are actually under legal protection since 1999 (Decree-Law 140/99, April 24 – Annex B-1 (republished by Decree-Law 49/2005, February 24); Directive 92/43/CEE, May 21 – Annex I; Decree-Law 169/2001, May 25, with alterations; Decree-Law 155/04, June 30) and can be considered as high value bio-cultural heritage landscapes.

IMPORTANCE AS HABITAT – HORIZONTAL AND VERTICAL STRUCTURE

This criteria describes landscape patches by attributes relating to ecosystem structure which refers to the internal heterogeneity composition of landscape patches, namely the height of different canopy levels (vertical layers) and the complexity

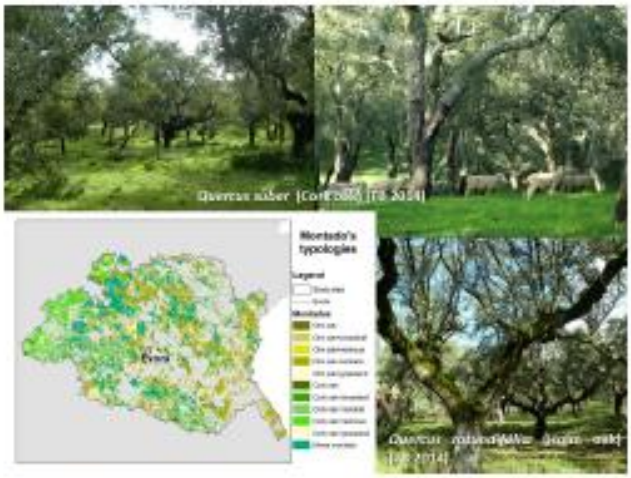

FIGURE 2. *Montados* landscapes typologies. Examples: cork oak and holm oak.

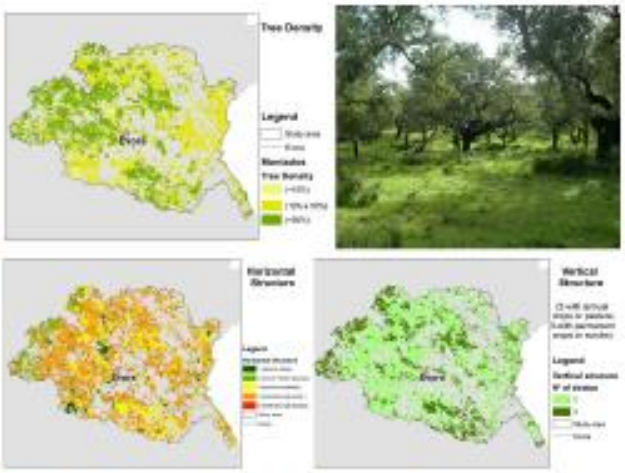

FIGURE 3. Tree density, vertical and horizontal structure of montados

FIGURE 4. Stream vegetation galleries: localization map and example

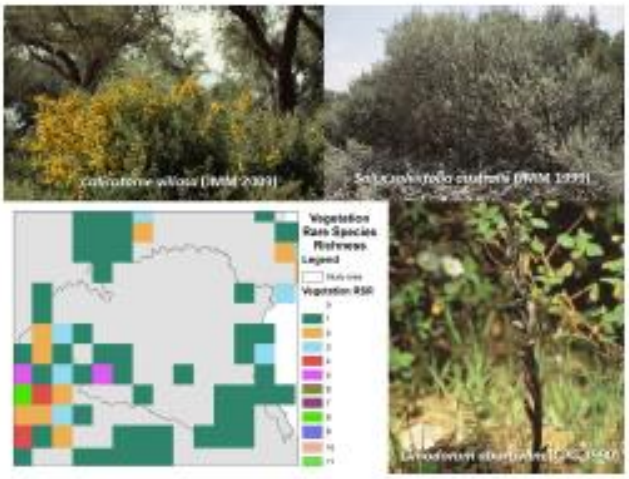

FIGURE 5. Rare vegetation species richness map and examples: *Callcotome villosa shrublands, Salix salvifolia* and *Limodorum abortivum*.

of the composition (horizontal structure). The vertical structure is related with the vertical distribution of plants according the three main layers: herbaceous, shrubby and arboreous. The horizontal structure concerns the number of dominant species present in each vegetation patch. These structures are considered as habitat indicators giving the potential of the area for conservation purposes (Figure 3).

VEGETATION CORRIDORS

Ecological corridors are considered as one of the most important features in landscape, because of their important role in connecting patches, reducing fragmentation and isolation, transporting water, energy and materials. Forman and Godron (1986) define corridors as 'narrow strips of land which differ from the matrix on either side'. Hoechstetter (2009), argue that corridors can be regarded as a special kind of patch: a 'longish' patch, which is separately considered because of its important functional role in landscapes. Corridors can also be defined according to their functional character – as 'narrow strips of habitat surrounded by habitat of other types' (Farina, 2006).

Corridors are especially characterized by their connectivity over large distances and sharp environmental gradients from one side to the other (Forman and Godron, 1986). Corridors can be classified as: linear corridors (such as roads, hedgerows, propriety boundaries, drainage ditches and irrigations channels); strip corridors; and stream corridors (bordering water courses) (Forman and Godron, 1986).

Especially important are the vegetation corridors associated with habitats and connectivity. The most important ones are riparian, hedges along walls, fences and roads corridors. These can be composed by trees (arboreal), shrubs and grasses in several different compositions. In Mediterranean conditions riparian corridors are composed mainly by willows (*Salix atrocinerea, S. neotricha* and *S. salviifolia subsp. australis*), ashes (*Fraxinus angustifolia*), alders (*Alnus glutinosa*), poplars (*Populos nigra* and *P. alba*) and elms (*Ulmus minor*) (Figure 4).

The vegetation corridors contribute to the effectiveness of ecological networks. An ecological network is defined by Bennett and Wit (2001) as 'a coherent system of natural and/or semi-natural landscape elements that is configured and managed with the objective of maintaining or restoring ecological functions as a means to conserve biodiversity while also providing appropriate opportunities for the sustainable use of natural resources' (Jongman 2008: 8).

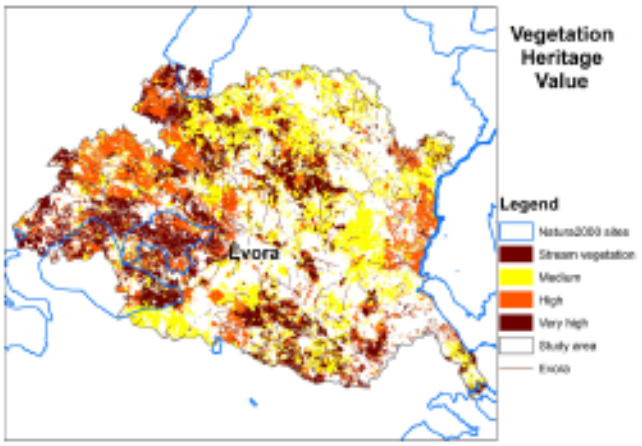

FIGURE 6. Vegetation heritage value map

VEGETATION RARITY AND CONSERVATION STATUS

Évora district presents several ecosystems included in the Natura 2000 network, such as the montados (habitat 6310). On these ecosystems, it can be found flora belonging to Natura 2000 Annexes such as *Narcisus bulbucodium*, *N. fernandesii*, *Ruscus aculeatus* and *Halimium umbellatum var. verticillatum*. Also, as result of continued anthropogenic activity on this territory, there can be found in abundance different perennial swards dominated by *Poa bulbosa* (habitat 6220*). The thick pre-forest mantles (habitat 5330) are also important, including some short distribution subtypes belonging to thorny *Calicotome villosa* shrublands (Figure 5). Despite the rare presence of climacic woodlands, some cork oak (9330) and holm oak (9340) forests are present, where invariably *Ruscus aculeatus* appears in the undercover (Costa et al., 2012; Ramirez et al., 2013).

The streams retain essentially three kind of woodlands: ashes (91B0), alders (91E0) and willows (92A0), which include some rare species such as the *Salix salviifolia subsp. australis*.

RESULTS AND DISCUSSION

The results obtained through the application of this method permitted to identify the most important vegetation heritage areas as it can be seen in Figure 6. The authors observed that these areas are often coincident with the actual Natura 2000 sites. However the application of the method revealed also the existence of many places with high and very high vegetation heritage value that are outside of the referred protected areas. This research result is important as it shows the fundamental places where vegetation should be preserved and that must have particular attention from nature conservation authorities and territory managers and planners, including the regional and municipal ones. Thus, these presently excluded areas should be considered in future conservation design projects.

CONCLUSION

This study is the first application of this method to a considerable extended area (7500 km2). The presented method is very understandable and easy to be applied even over extensive areas and in different regions and continents. Nevertheless its accuracy can be improved namely through the introduction of new evaluation criteria or by new ways for selection of the weighting factors. One of the main areas for future researches is related to aesthetic, aromatic and iconic vegetation values.

ACKNOWLEDGEMENTS

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ECLAS CONFERENCE PORTO 2014 LANDSCAPE: A PLACE OF CULTIVATION
METHODOLOGICAL PROPOSAL FOR THE ASSESSMENT OF VEGETATION HERITAGE VALUE: APPLICATION IN CENTRAL ALENTEJO (PORTUGAL)
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