

## LANDSCAPE AND COMPARATIVE VALUATION OF ITS ELEMENTS<sup>1</sup>

**Domenico Enrico Massimo**  
**Mariangela Musolino**  
**Antonino Barbalace**  
**Cinzia Fragomeni**  
University of Reggio Calabria

**Abstract:** *Landscape planning supports the setting up and the enforcement of new policies to mitigate paysage destruction and soil consumption, facing the following main obstacles: (1) severe absence of scientific knowledge and account about what, how many, where Landscape Elements are; (2) irresolution of approach for comparative valuation of the Landscape Elements quality. Research focused on offering possible answer through the performance of: 1)an almost total census of Landscape Elements; 2)an experimental qualitative valuation adopting Multi Criteria Analysis.*

**Keywords:** *1.Landscape; 2. Landscape Elements; Landscape planning; 4. Multi-dimensional valuation.*

### Introduction

Countries are increasingly subject to the pressure of urban sprawl, infrastructure building-up, technological development, which cumulative actions is causing ecological threats and landscape destruction, transforming natural - arable land into urbanized territory, contributing to Earth Global Warming. To face this dramatic change, governments, international organizations, local and regional communities, and NGOs are setting up frameworks to foster-up:

- a) new more sustainable modalities to better organize development and new constructions in landscape context, *i.e.* a new urbanism;
- b) new policies and new approaches to avoid further destruction of Landscape Elements taking actions to promote their treasuring and valorization.

### 1. Background

Discussion upon incoming destruction of national landscape and world nature confronts at least two opposite positions: preservation *versus* private use.

Preservation as “protection of earth’s natural resources, land, and water on which all life depends, cultural as well as natural landscape”, attempts to avoid

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<sup>1</sup> *Attributions: Massimo D. E. authored § 1, 2. Musolino M. authored introduction and § 5. Barbalace A. authored § 3. Fragomeni C. authored §4.*

privatization and embezzlement of *paysage*, fostering up alternative orientation toward collective enjoyment such as ecological tourism.

Private use, oriented to direct individual use of *paysage* and new development, generating indirect gains for local economies and temporarily helping to avoid crisis and under-development. Thus, at the same time land consumption destroys the structural characteristics of the landscape itself causing permanent negative impacts to the ecosystem.

To prevent nature and landscape destruction some continents have chartered agreements for protection while some countries have established and implemented not only protection policies and actions, but also systemic landscape planning, involving local, regional, and national governments.

## **2. Landscape planning conceptual framework**

Present landscape planning in Italy has been established since 1985 when the Italian legislation (so called “Galasso law”) fostered-up a comprehensive system for the whole country land regarding the preservation and sustainable collective use of landscape through planning, *i.e.* the so called “Regional Landscape Plans” (“Piani Paesaggistici Regionali”) run by regional governments.

It is based upon some relevant investigations, knowledge and operational steps, below briefly summarized.

First step. Investigation and census of “landscape values” in the territories, *i.e.*, detection of all existent Landscape Elements.

Second step. Indexation of each Landscape Element into a taxonomy of homogeneous categories and sub categories, on scientific basis and according to international conventions.

Third step. Provide geo referenced information for each element in a GIS, Geographic Information System.

Fourth step. In the general complex whole framework of landscape planning, set up action programs to treasure each Landscape Element, according to their value ranking, pushing the highest ranked elements to pull up the weakest ones, within the framework of the category clusters.

Two main obstacles jeopardize the set-up, implementation, and effectiveness of landscape planning: (1) severe lack of scientific knowledge about what, how many, and where Landscape Elements and related values are; (2) irresolution in approaches and technical tools for comparative and qualitative valuation of Landscape Elements, coherently belonging to the same category or sub category, to estimate their comparative values and set-up a rank order and hierarchy for preservation priority list.

### **3. Limits and specific goals of the research**

Research goals are focusing on offering possible answers to: (1) lack of knowledge concerning Landscape Elements; (2) irresolution in comparative qualitative landscape multi-dimensional valuation. Thus, one objective of the research is to mitigate this lack of scientific genetic qualitative knowledge and systemic information about Italian Landscape Elements. Case studies, in specific regions, provinces, and districts, might be useful tools to test both the philosophy and operative methodology described in the present research. Producing ancillary data (on an experimental field) as well as a qualitative hermeneutic interpretation (on a philosophical perspective) might foster up an innovative contribution: a total, coordinated, complete and almost definitive knowledge of Landscape Elements existing in a modular area within a: town; district; province; region.

### **4. Case study**

A case study is implemented to detect and analyze all the Landscape Elements of the large area of a province (Reggio Calabria), and then to experiment and test the answers to unsolved aspects: (1) severe lack of scientific knowledge about what, how many, and where Landscape Elements and values are; (2) irresolution in approaches and technical tools for comparative and qualitative valuation of Landscape Elements. Inside the complex landscape preservation framework, the real world Case Action is located in one of the most amazing coastal area in South Italy: the so-called “*Locride* Landscape Unit” in Calabria, the Southernmost region of Italy. The outcome is an extensive Landscape Element detection, census, taxonomy, classification in categories and sub categories to single out the most valuable Landscape Elements. Afterwards a Multi Criteria Analysis (MCA) has been performed (comparative valuation) to derive a rank order of comparable and close Landscape Elements, and to estimate their “values” in the territories, to support Landscape Planning. The analytical estimate with multiple criteria is done by adopting one of most reliable approaches, algorithms and related software. Among them, there are the Analytical Hierarchy Process (AHP) by Thomas L. Saaty, and the Dominant Regime Method (DRM) by Peter Nijkamp. Census derives a high number of Landscape Elements to be valued with multiple criteria, and the need to continuously monitor their quality and their inclusion in the appropriate cluster. In the case action there are four elements to be evaluated in quality, belonging to a category called “geological monuments” (or “geo-sites”). They have been compared through an analytical estimate adopting one of the potential and available approaches of MCA. According to tested ordinal valuation approach, panellist expert assessors visited each “geological monument” (or “geo-site”). For each entity they individually scored the 14 genetic characteristics (or

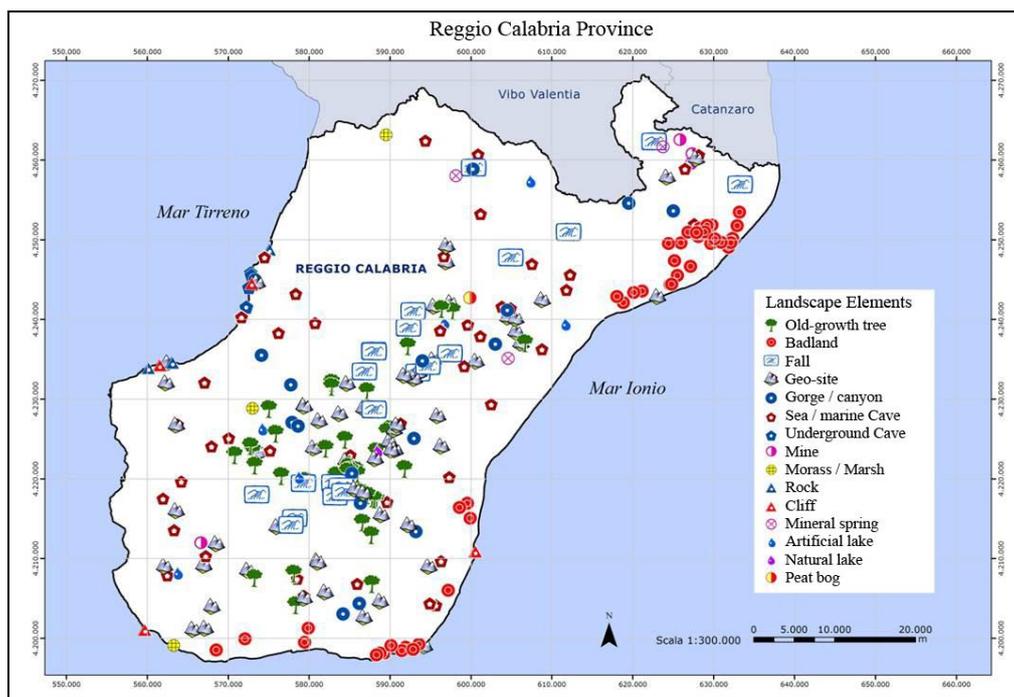
valuation criteria) set up to perform the valuation. Each panellist expert assessor filled out a scoring form creating a 4x14 “Quality Effect Matrix” (QEM). Furthermore, software runs produce the overall ordinal ranking of Landscape Elements visited. The result is a hierarchy sorted proportionally to the quality and value of the elements. It provides the basis to set up a consequent action for landscape preservation and treasuring. The tool and the results have been provided to decision makers to set up the specific policies to treasure and safeguard each Landscape Elements.

## **5. First conclusions**

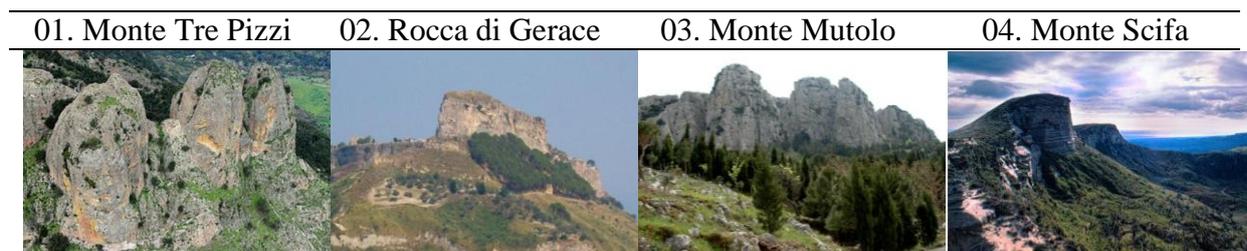
The spatial information and integrated multi-dimensional valuation system represents a framework to help institutions, civil society, and individual actors to make informed decisions, and technical - political public bodies to adopt the tools and perform Landscape Element protection by treasuring them. Landscape preservation decisions could be based upon reliable knowledge, rational analysis, and multi-dimensional assessment performed adopting Multi Criteria valuation. Multi Criteria Analysis seems to be an appropriate approach and tool to value simultaneously several different genetic characteristics of Landscape Elements, assessed through corresponding ordinal or cardinal criterion by assigning a score to each of them and derive a valuation matrix, called Qualitative Effect Matrix (QEM) made of characteristics - criteria - scores.

### **Summary**

Present framework of Italian landscape planning, devoted to *paysage* protection, encompasses several measures such as: (a) preservation; (b) sustainable management; (c) ecological conservation; (d) compatible enjoyment including ecological tourism. Two main obstacles make difficult *paysage* care: (1) severe absence of scientific knowledge about what, where, how many landscape values and Elements are; (2) difficult in performing comparative qualitative Elements valuation. Research focuses on offering possible answers to institutional demand, building up a geo referenced knowledge system about landscape and its Elements. A valuation system is built up to derive rank order of resource quality as basis for prioritize actions and interventions for preservation, conservation, treasuring. Case Study tested methodology allows Landscape Elements Valuation. For the prototype experimentation in the present research where selected four “Geological monuments” or Geosites”.



**Figure1. Province of Reggio Calabria.**  
**Georeferenced detection in categories of Landscape Elements**



**Figure2. “Locride” district.**  
**“Geological monuments” or “geo-sites”. Sample of four elements**

Table 1.

**Landscape Elements. Multi Criteria Valuation. Four “geo-sites”.**  
**Qualitative Effect Matrix (QEM)**

ID	Municipality	Classification	Intrinsic	Usage	Specific Value	
			Value IV	Value UV	VS	VS
			Landscape quality	Integrity	Access-ibility	Geological singularity
1	Ciminà	Monte Tre Pizzi	5	4	4	4
2	Gerace	Rocca di Gerace	3	3	2	3
3	Canolo	Monte Mutolo	5	3	3	4
4	Mammola	Monte Scifa	3	3	1	3

Table 2.

**Landscape Elements. Multi Criteria Valuation. Four “geo-sites”.**

**Outcomes: Qualitative ordinal ranking of alternatives**

ID	Municipality	Classification	Ranking DRM	Score DRM
1	Ciminà	Monte Tre Pizzi	1	0,943
2	Gerace	Rocca di Gerace	3	0,179
3	Canolo	Monte Mutolo	2	0,715
4	Mammola	Monte Scifa	4	0,163

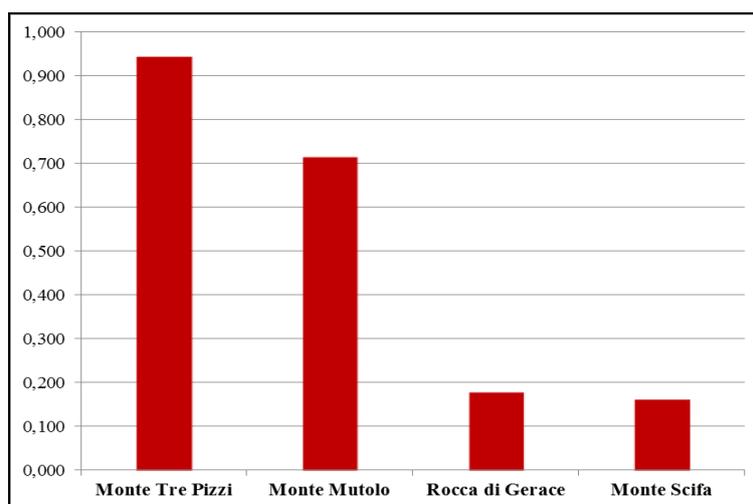


Figure 3. “Locride” district. “Geological monuments” or “geo-sites”.  
**Quality rank order bar-graph. Sample of four elements.**

**Bibliography**

1. Nijkamp, P.; & Bal, F.; & Medda, F. (1999): *A survey of methods for sustainable city planning and cultural heritage management*. In: European Union Commission, Raphael Programme, Rome. Mimeo 1999.
2. Nijkamp, P.; & Vreeker, R.(2000). *Sustainability Assessment of Development Scenarios: Methodology and Application to Thailand*. In: *Ecological Economics*, n. 33, 2000, pp. 7-27
3. Massimo, D. E.; & Barbalace, A. (2009a). *Urban sprawl e crescita economica territoriale. La sfida della scala in una stima a livello sub-regionale*. In: *Atti della XXX Conferenza Italiana di Scienze Regionali*, AISRe. Federalismo, integrazione europea e crescita regionale. Firenze, 09-11.09.2009. AISRe, Milano. CD-Rom.
4. Massimo, D. E.; & Barbalace, A. (2009b): *Valutazione dell’ urban sprawl e strumenti GIS*. In: Asita (ed): *Federazione delle Associazioni Scientifiche per le Informazioni Territoriali ed Ambientali*. Asita, Milano, Vol. II: pp. 1399-1404. ISBN 978-88-903132-2-6.
5. Massimo D. E., & Musolino M., & Barbalace A., & Fragomeni C. (2014). *Landscape quality valuation for its preservation and treasuring*, in C. Bevilacqua, F. Calabrò e L. Della Spina (eds) *New Metropolitan Perspectives, The Integrated Approach for Urban Sustainable Development*. (ISTH 2020), May 6-8, 2014.
6. Nijkamp, P. (1988). *Culture and Region: a multidimensional evaluation of monuments*. In: *Environment and Planning B*, n. 15, 1988, pp. 5-15.

7. Rothenberg, J. (1990). *Lectures of the Course 1.1485-14.111J: Economics of Project Evaluation*. Dep. of Civ. Eng. and Dep. of Econ., Massachusetts Institute of Technology, Cambridge, MA (on magnetic tapes).
8. Saaty, T. L. (1980). *The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation*. McGraw-Hill International Book Company. New York. ISBN 0-07-054371-2.
9. Hinloopen, E. (1985). *De Regime Methode. Doctoraalscriptie Interfaculteit Actuarieat en Economie*. Vrije Universiteit, Amsterdam. 25 April 1985. Mimeo, 1985.
10. Hinloopen, E.; & Nijkamp, P. (1986). *Regime-methode voor ordinale multicriteria-analyses; Een beschouwing en een commentaar*. [Regime-method for ordinal multicriteria analysis; an evaluation and a critique] *Rev. Kwantitatieve Methoden*, 22, 1986, pp. 61-78.
11. Hinloopen, E.; & Nijkamp, P. (1990). *Qualitative multiple criteria choice analysis. The Dominant Regime Method*. In: *Quality and Quantity*, 24, 1990, pp. 37-56.

<b>Domenico Enrico Massimo</b>	PAU Department University of Reggio Calabria, Italy E-mail: massimo@unirc.it
<b>Mariangela Musolino</b>	PAU Department University of Reggio Calabria, Italy E-mail: mariangela.musolino@unirc.it
<b>Antonino Barbalace</b>	PAU Department University of Reggio Calabria, Italy E-mail: barbalac@mit.edu
<b>Cinzia Fragomeni</b>	PAU Department University of Reggio Calabria, Italy E-mail: paugis@libero.it

*Domenico Enrico Massimo, Mariangela Musolino, Antonino Barbalace, Cinzia Fragomeni.  
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