LA MEDITERRANEA VERSO IL 2030

Studi e ricerche sul patrimonio storico e sui paesaggi antropici, tra conservazione e rigenerazione

a cura di Marina Mistretta, Bruno Mussari, Adolfo Santini

ArcHistoR EXTRA

La valutazione per promuovere la tutela dei paesaggi. Valorizzare nuovi elementi con la pianificazione paesaggistica

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Obiettivo. Il contributo ha l'obiettivo di delineare le linee guida e un approccio metodologico per la valorizzazione del paesaggio e la pianificazione di politiche per mitigare la distruzione dei valori paesaggistici provocata dal continuo consumo di suolo agricolo, forestale, naturale.
Metodologia. Prima tappa è l'individuazione dei valori paesaggistici nei territori. Seconda tappa è il geo riferimento dei dati sia nel sistema informativo geografico, sia nel sistema valutativo. Terza tappa è la valutazione paesaggistica a Criteri Multipli di elementi e la loro classificazione gerarchica.
Case study. *La Strategia e la Metodologia sono state testate in Casi di Studio applicate ad alcune delle più suggestive aree paesaggistiche dell'Italia Meridionale.*
Risultati. I risultati sono esteso censimento totale, tassonomia, valutazione dei valori paesaggistici. La classificazione gerarchica dei valori è elaborata con la multi criteria valuation*. Ne consegue una gerarchia e gradualità di tutele sintetizzata come segue (a soli fini esemplificativi): protezione elementi con massimi valori paesaggistici; tutela elementi con buoni valori paesaggistici; conservazione elementi con medi valori paesaggistici.*

Valuation to Foster-up Landscape Preservation. Treasuring New Elements through Landscape Planning

Domenico Enrico Massimo, Mariangela Musolino, Alessandro Malerba

The potential collapse of the Earth's environment due to Climate Change is one of the most dangerous threats looming over mankind and its future survival.

People, especially young people, are progressively becoming aware perceiving this enormous risk.

Following pioneer scientific intuitions, dating from the 1960s, anticipated by the forerunners[1], thousands of scholars have been working hard to gather systematic knowledge about the Earth's environment. They also collected incontestable evidence regarding the extreme risk of the present negative ecological trends which will lead to the following:

- Climate Change impacting in complex ecosystem services;

- as well as destruction of natural cultural heritage (or landscape, or nature, or Earth bio diversity).

As far as the environment is concerned, scientists and the world's most prestigious institution (the United Nations, UN) has made the systematic knowledge and the incontestable evidence available

1. Boulding 1966; Meadows et alii 1972; Boulding 1981.

to mankind. This information has been published, since 1990, in several reports[2] issued by the IPCC, Inter - governmental Panel for Climate Change.

Following the directions of IPPC, hundreds of national governments are trying to tackle the impending environmental disaster. They have pledged to reduce planet Głobal Warming by emission mitigation during the future decades. Consequently, governments signed the Kyoto Protocol in 1997 (144 countries out of 192) and the Paris Agreement in 2016 to which 195 (51 more with respect to 1997) countries agreed upon.

In addition to an analysis concerning the environment, the objective scientific findings demonstrated that the destruction of natural cultural heritage (be it landscape or nature or bio diversity or soil) "is as big a threat to humanity as Climate Change". To tackle and mitigate (among other goals) landscape destruction and other threats to the natural cultural heritage, world leaders adopted, in 2015, the "United Nations 2030 Agenda for Sustainable Development", taking in "17 Sustainable Development Goals" or "17 SDGs". Goal 11 deals with the topic of *Sustainable cities and communities*. A specific sub Goal 11.04. focuses on: *Strengthen efforts to protect and safeguard the world's cultural and natural heritage*.

Landscape is one of the most important components of the world's cultural natural heritage. The research and measures presented are a direct implementation of the cited 2030 Agenda for Sustainable Development, the Goal 11 and the specific sub Goal 11.04 and aim to detect, protect, safeguard and enhance the landscape. Reliable inter disciplinary reviews[3] provides guidelines to protect and enhance natural cultural heritage, and related ecosystem services. By so doing they implement contents of UN 2030 Agenda with the following related Goals:

- Knowledge. The collection of systematic knowledge of the specific and punctiform Nature Masterpieces or Elements, including all the key relevant points of interest in the territory (small scale and punctiform landmarks, masterpieces, heritage, patrimony); this is carried out through on the field census ("*in situ*"), at required or needed scales (county; province; region; macro region; country; continent).

- DataBase. The transformation of landscape knowledge into information and a data base, together geo referenced in Gis and Web Gis[4].

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2. IPCC 1990; IPCC 1995; IPCC 2001; IPCC 2007; IPCC 2014; IPCC 2018.

3. De Groot 2006; Shuang *et alii* 2010; Hermann, Schleifer, Wrbka 2011.

4. Lee, Elton, Thompson 1999; Bateman *et alii* 2002; Naidoo, Ricketts 2006; Troy, Wilson 2006; Chen, Li 2009.

- Value. Definition of cultural natural heritage value, not only in pure economic monetary but instead in multi criteria \ multi dimensional terms[5]. All this is to avoid the destruction of multi functional natural capital like in Amazonia, North and South Poles and Glaciers where only profit counts. A merely monetary dimension led in the past and would led in the future to destroy natural cultural landscape because money only is unable to encompass multi dimensionality of natura and heritage.

- Valuation. Landscape multi criteria valuation methods. There are many reasons why for understanding the multi dimensional nature of landscape elements and to assess them multi criteria valuation methods and interesting new updating[6] have to be adopted. If not, the under-valuation of the multi dimensional benefits stemming from landscapes will continue, because it is hard and difficult to express their ecological as well as systemic importance in merely monetary terms. Even if several important monetary impacts stem from interaction between landscape (including its urban amenities and organic materials) and green urban buildings and settlements[7].

- Implementation. Cited reliable robust inter disciplinary reviews urge to the experimental implementation of multi criteria valuation methods in landscape planning. The present research develops a case of multi criteria evaluation of punctual or small scale heritage benchmarks *i.e.* elements *i.e.* masterpieces selected following after a census at provincial (geographic and governmental) level.

Multi Criteria Valuation Approaches and Methodological Steps

Various institutions have requested a hierarchical classification taking into consideration the value and beauty of the paysage punctiform (points of interest) masterpieces and benchmarks within a given territorial boundary.

This research focuses on the direct identification, classification and valuation of Paysage Masterpieces within a giving provincial boundary. According to the cited inter disciplinary reviews, the most appropriate valuation strategy is the Multi Criteria Valuation (MCV) system together with its approaches, algorithms and their related operational software. As specified in the case study, the

5. De Groot 2006; Shuang *et alii* 2010; Hermann, Schleifer, Wrbka 2011.

6. Saaty 1980; Bottero, Mondini 2008; Bottero 2011; Lombardi, Trisciuoglio 2013; Bottero, Ferretti, Mondini 2015; Saaty, De Paola 2017; Oppio, Bottero, Arcidiacono 2018; Oppio, Maltese, Mariotti 2018.

7. Musolino, Massimo 2013; Massimo 2015; Malerba, Massimo, Musolino 2018; Massimo, Musolino, Malerba 2018; Del Giudice *et alii* 2019; De Paola *et alii* 2019; Malerba *et alii* 2019; Massimo *et alii* 2019; Musolino, Massimo 2019; Musolino *et alii* 2019; Spampinato *et alii* 2019.

characteristics of landscape elements are adopted and transformed into valuation criteria. Expert valuators have attributed scores to the characteristics of the landmarks.

This research is one of the first of its kind because of the brand new valuation approach, with the math engine and the software, the sum of which is called: McaGisMassimo[8].

This new updated multi criteria valuation approach (including method, Gis, math and software tools) makes the innovations that follow possible.

- An improved assessment, overcoming the handicap of the small number of alternatives and criteria that previous tools were able to process.

- Working in synergy with further parallel valuation tools and software *e. g*. with Sami platform[9]; AHP&N[10] approaches or Flag Models or future diversified Mca tools.

- Adopting state of the art computer programming languages, such as Python.

- Sharing the information on the web and publish it.

- Very importantly, geo referencing Landscape Benchmarks or Masterpieces or Elements on Gis Base Map.

The Qualitative Effect Matrix collects the scores assigned by each assessor to each criterion (characteristics) for each alternative. This Qualitative Effect Matrix is processed by the above introduced state of the art, innovative and updated multi criteria valuation engine McaGisMassimo. By so doing the expected final result of research is achieved *i.e*.: Quality Ranking.

Testing Methodology. The Case Study

The brand new Case Study tries to satisfy and comply the most demanding institutional request *i. e*. to define, identify, select, visit directly, score and rank (in several small homogeneous contiguous clusters) all the Landscape Masterpieces or Elements in the province of Reggio Calabria, the Southernmost province of continental Italy.

This Case Study aims to overcome some unresolved issues such as the lack of scientific knowledge concerning what, how many, and where the Landscape Masterpieces are and the inadequacy surrounding the existing tools for the comparative and qualitative valuation of them.

8. Massimo, Cefalà 2016.
9. Sami 2000.
10. Saaty 1980; Saaty, De Paola 2017.

Landscape Elements. Categories

01. Monumental trees
02. Gullies \ Ravines \ Bad-lands
03. Falls
04. Geosites
05. Canyon
06. Underground Cave
07. Marine Cave
08. Mine
09. Marsh \ Swamp \ WetLand
10. Rock
11. Cliff
12. Mineral Spring
13. Artificial lakes
14. Natural lakes
15. Peats

Figure. 1. Case Study. Province of Reggio Calabria. Italy. Geo Landscape Element categories. Taxonomy (Author's own compilation).

The first step was a unique extensive identification process of all Landscape Masterpieces or Elements in the area. The census and taxonomy were compiled and classified in categories and sub categories (fig. 1) and the Landscape Masterpieces or Points of Interest were singled out. The first results of all this research field work is a thorough knowledge of all Landscape Masterpieces or Elements present at a provincial\local level. In particular, quantification, through the full census in the Case Study area, provides numerical data of the existence of all the entities. According to objective characteristics, scientific literature, and exemplary planning benchmarks, the GIS tools made it easy to subdivide the layers of Landscape Masterpieces or Elements into the following main Categories: 01. Monumental trees; 02. Gullies\Ravines\Bad lands; 03. Water falls; 04. Geo-sites; 05. Canyons; 06. Underground caves; 07. Marine caves; 08. Mines; 09. Marsh\Swamp\Wet Land; 10. Rocks; 11. Cliffs; 12. Thermal spring; 13. Artificial lakes; 14. Natural lakes; 15. Peat\Bogs.

The second step was the application of the Multi Criteria Analysis (MCA) or Valuation (MVA) (comparative evaluation) in order to arrive at the classification and ranking of all Landscape Masterpieces or Elements belonging to small homogeneous contiguous clusters or small specialized groups. The Valuation\Assessment aims to develop the resource quality ranking from two points of view which are as follows:

- the intrinsic beauty or value of the Landscape Masterpieces or Elements in themselves with a view from a protection perspective;

- and the value resulting from a different possible use compatible with its safeguarding but aiming at the eco tourist enhancement of the Masterpieces or Elements as an organized network.

The province territory, with Landscape Masterpieces (fig. 2), has been sub divided into small areas (fig. 3) called: landscape units. For this purpose, Landscape Masterpieces, characterized by strong genetic similarities and spatial proximity, were compared to each other. The characteristics of the
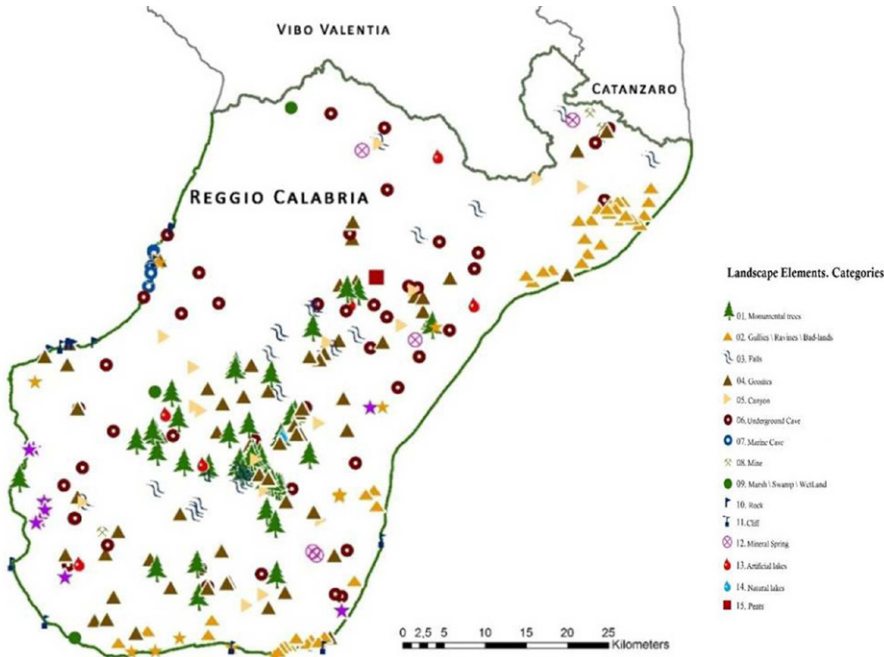
Figure 2. Case Study. Province of Reggio Calabria. Italy. Geo-referenced identification in the categories of Landscape Elements (Author's own compilation).

elements were used as a criteria for the valuation by applying the Multi Criteria Analysis tools such as the new Dominant Regime Method, DRM[11].

The quality of the individual Masterpieces or Elements is defined by the ordinal valuation\estimation\assessment of some characteristics. The schematic valuation\estimation\assessment framework is as follow:

Landscape Masterpieces→ Characteristics→ Values→ Valuation criterion→ Scores→ Valuation matrix→ Ranking.

Characteristics = Criteria are the ordinal factors of the Qualitative Effect Matrix, QEM, i.e. the fundamental key instrument to the whole assessment procedure.
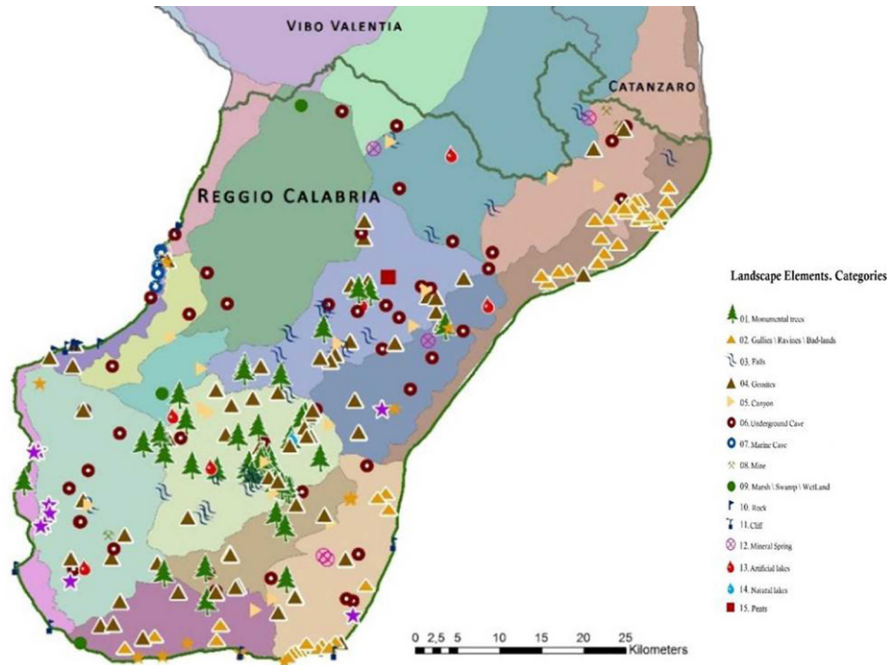
11. MASSIMO, CEFALÀ 2016.

Figure 3. Case Study. Province of Reggio Calabria. Geo-reference identification within the categories of Landscape Elements in the Landscape Units (Author's own compilation).

Case Study Findings

In the Case Study there are five Masterpieces or Elements to be evaluated belonging to the category: "monumental trees" (fig.4).

Masterpiece characteristics (quantitatively and qualitatively measurable) are transformed into criteria than valuated\assessed. According to the tested ordinal valuation approach, a panel of expert assessors visited each "old-growth tree". For each entity each assessor gave a personal individual score regarding each genetic characteristics (= criteria) performing a key step of the valuation\ assessment process.

In the specific Case Study some criteria were adopted after direct field observation and theoretical comparison. These criteria embraced implied two different valuation scenario one based on the intrinsic value and the other based on the use value (table 1). They are listed and described below:
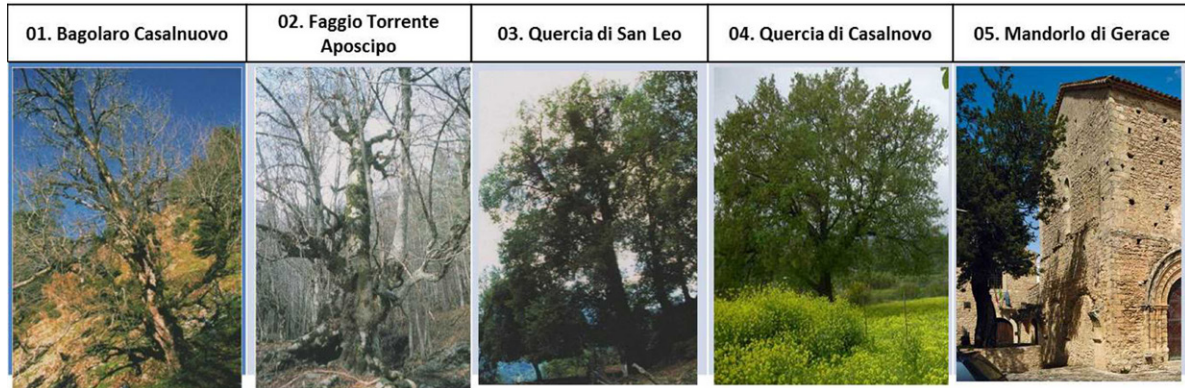
| 01. Bagolaro Casalnuovo | 02. Faggio Torrente Aposcipo | 03. Quercia di San Leo | 04. Quercia di Casalnovo | 05. Mandorlo di Gerace |

Figure 4. Case Study. Province of Reggio Calabria. Italy. "Monumental trees" or "old-growth tree". Sample of five Elements. (Author's own compilation).

(A) Intrinsic value criteria, i.e. value of the landscape masterpieces itself:

1. Landscape Quality. The value of Landscape Element itself in its surroundings.

2. Integrity. The degree of Landscape Element conservation compared to its original form.

3. Symbolic content. The existence of data or information or tradition or legend or myth regarding the landscape Element to be evaluated.

(B) Use value criteria. These criteria are correlated to the social and tourist potential of the Landscape Element, from the enhancement point of view. It is also correlated to the risk connected to its intensive use:

4. Accessibility. The presence of easy accessibility, transport systems, road, paths, pedestrian networks.

5. Usability. The presence of tourist facilities near the Landscape Element being valuated.

A new experimental criterion was introduced for each specific categories :

(C) Specific value criterion, i.e., the specific value of the Landscape Masterpieces or Element belonging to each category. For the specific "old-growth trees" category, the specific value criterion is selected taking into account some aspects that can help for the Landscape Masterpieces or Element enhancement, i.e.:

Tree		Criteria					
		Intrinsic Value IV			Usage Value UV		Specif. Value SV
Munici pality	Classifi cation	Landscape Quality	Inte grity	Symbolic Content	Accessi- bility	Usabi- lity	Landscape Context
Africo	Alberi Bagolaro di Casalnuovo	3	4	1	1	1	4
Africo	Faggi del Torrente Aposcipo	3	3	1	2	1	5
Africo	Quercia di Casalnuovo	4	5	1	4	3	1
Africo	Quercia di San Leo	3	4	1	4	3	2
Gerace	Mandorlo di Gerace	4	3	3	5	5	3

Table 1. Landscape Elements. Multi Criteria Valuation. Five "Monumental trees". Qualitative Effect Matrix (QEM) (Author's own compilation).

6. Landscape Context. The degree of integration of the Masterpieces or Element in a background which have been compromised to a lesser or greater degree.

The Multi Criteria Valuation engine processes the Qualitative Effect Matrix, QEM, deriving a qualitative ordinal ranking of five "Monumental Trees" .

The brand new MCA approach (DRM tool) gives a clear hierarchy (table 2) and a ranking order of valuation alternatives (graph 1).

Conclusions

The basis of Heritage management and enhancement lies in the knowledge and valuation of its punctiform Masterpieces, the so called punctiform "Landscape Elements". The research presented provides a framework taking in an information system linked to a general valuation framework and to an operational approach. These coordinated tools allow governments to identify, to protect and to enhance punctiform Landscape Masterpieces or Elements on the basis of their comparative ranking based on scientific Multi Criteria Valuation.

ID	Municipality	Classification	Euristic Ranking	Ranking DRM	Score DRM
1	Africo	Alberi Bagolaro di Casalnuovo	3	2	0,672
2	Africo	Faggi del Torrente Aposcipo	4	5	0,078
3	Africo	Quercia di Casalnuovo	2	3	0,584
4	Africo	Quercia di San Leo	5	4	0,234
5	Gerace	Mandorlo di Gerace	1	1	0,931
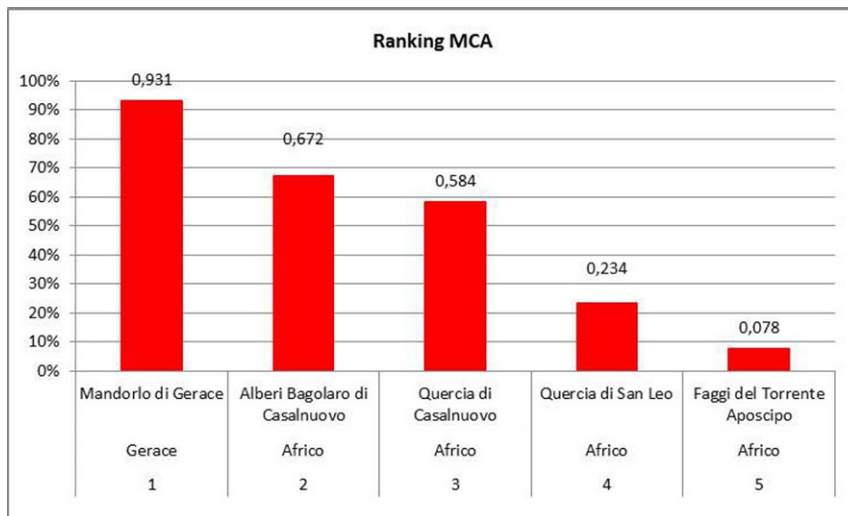
Above, table 2. Landscape Elements. Multi Criteria Valuation. Five "Monumental Trees". Outcomes: Qualitative ordinal ranking of alternatives (Author's Own Compilation); left, graph 1. Hierarchy and a rank order of valuation alternatives (Author's own compilation).

Furthermore, it encourages civil participation. In fact, the spatial information and integrated valuation system is a framework that helps institutions, civil society and individual agents to make their participation meaningful.

Protection, preservation, conservation and enhancement through the paysage ecotourism can therefore be organized by "landscape planning" in which the community participate and cooperate in order to achieve to get a more sustainable world.

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