Integrated Evaluation and Multi-methodological Approaches for the Enhancement of the Cultural Landscape

Lucia Della Spina(✉)

Mediterranea University of Reggio Calabria, Reggio Calabria, Italy
lucia.dellaspina@unirc.it

Abstract. The paper presents an integrated assessment process for the identification of scenarios of cultural landscape sustainable valorization in a particularly significant area of southern Italy characterized by tangible and intangible resources. The decision-making process uses multi-methodological evaluations in order to support the development of scenarios and alternatives policy strategies, aimed at pre-order a territory development system subject of study. The methodological pathway is structured to allow the interaction among different techniques, which are selected in order to outline a decision support system, dynamic, flexible and adaptive, sensitive to the specificities of the context and oriented to the development of intervention strategies based on of experts and common knowledge, and on recognized and shared values. The selection of 'conscious actions' helps to reduce conflicts turning them in synergies, recognizing that the essential components of a landscape are multidimensional and complex and where interact different systems of values and relationships. Therefore, the strategies will be feasible or practicable in proportion to what projects will tend to achieve the idea of "scenario" for the site shared by social and institutional actors of the local system.

Keywords: Cultural landascape · Complex values · Decision support · Integrated evaluations · Multi-methodological evaluations · Multicriteria analysis

1 Introduction

Today the transformation of the territory represents complex decisional problems, and this highlights the need, more and more evident, to use appropriate evaluation tools for intervention projects. In fact, the plurality of possible solutions strongly require the question of the assessment as a fundamental tool for the comparison of different alternatives and the choice of best "compromise" solution, in order to ensure a progressive accumulation of knowledge. The evaluation of urban transformation alternative scenarios consequently needs to be placed in a correct evaluation framework, starting from the design and planning process, able to ensure the proper effects analysis of the strategic choices for the territory. Therefore, starting by an analysis of the

O. Gervasi et al. (Eds.): ICCSA 2017, Part I, LNCS 10404, pp. 478–493, 2017.
DOI: 10.1007/978-3-319-62392-4_35

applicable evaluation procedures, the paper highlightes how the evaluation may be seen as communication and knowledge production tool, capable of fully expressing its potential when organically integrated in the same project methodology [1]. The evaluation constitutes the basis of dialogue among knowledge and values, able to translate this dialogue in the selection of objectives and actions, in the identification of key values and associated meanings, exploring opportunities and building alternatives, analysing the possible impacts and effects and supporting the management of complex systems with multiple priorities. The integration of different values in the decision-making process helps to build greater acceptability and trust in public decisions [2], including the different perspectives and trying to reduce conflict [3].

In this paper, in order to identify a sustainable strategy for the valorisation of the cultural historical landscape of a particularly significant area in Southern Italy, characterized by tangible and intangible resources and values, a multi-methodologic evaluation process has been structured in order to support the development of scenarios and alternative intervention strategies. The study was conducted through the application of techniques and experimental approaches to a real case. On the operational side, the strategies will be feasible to the extent that the projects will tend to realize the idea of "scenario" of the site, shared by social and institutional actors of the local system. The activity of identifying the potentialities and criticality, or rather representing prefiguration "scenarios" of the immediate future, is finalized to pre-order a territory development system.

The purpose of this study is to provide an operational decisions support framework in order to support policy makers in their future strategic decisions by using a multi-methodological approach, allowing to justify the allocation of public resources with rational arguments able to better deal with critical steps and avoid preconceptions in decision-making. Multi-methodological approaches [4, 5] can be defined as a structured process designed to cope with multidimensional systems and complex problems using knowledges from different disciplines. Therefore, the multidisciplinary approaches deal with multidimensional systems, multi-stakeholder perspectives, using qualitative-quantitative approaches to better study alternative options. Although on the use of multi-methodological approaches there is a broad discussion in decision-making policies, best practices are still scarce [6]. In particular, this paper proposes a group-learning process as decision support methodological framework evolving through three main methods, Stakeholder Analysis, Cognitive Mapping and Multicriteria Analysis. Cognitive Mapping and Stakeholder Analysis have been used in the literature in combination with Multicriteria Analysis [7]. So far, there is no experiment in a real context of the joint use of the three proposed methods in this study, namely the Stakeholder Analysis [8]; Cognitive Mappings [9] and the specific Multicriteria of Regime [10–14]. The reasons that led to the choice of this specific method can be summarized as follows:

1. The Cognitive Mapping are considered one of the most promising tools for structuring problems before the application of Multicriteria Decision Aiding [7, 15].
2. The Stakeholder Analysis, in the form of interest matrix, is particularly suitable for completing Multicriteria technique, in a collaborative decision making process and in a context that does not effectively support reaching a consensus in the elicitation

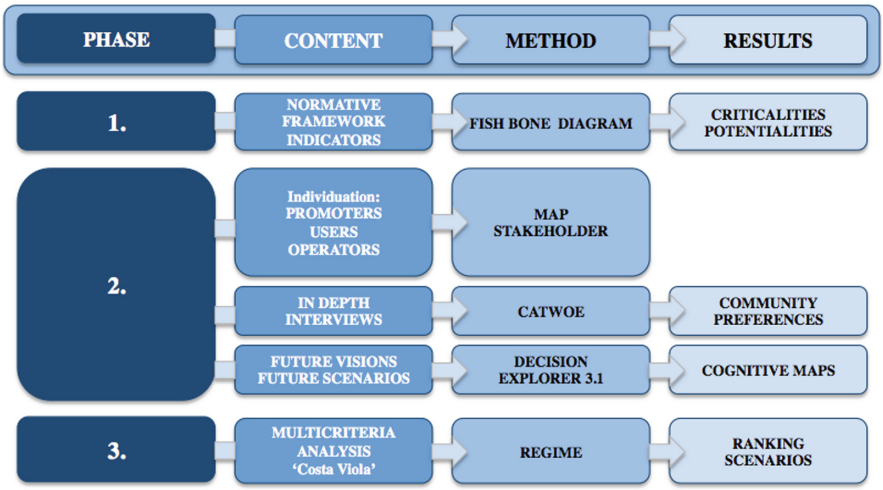

Fig. 1. Methodological framework of the multi-methodological evaluations

phase of preferences [7], referring the need to aggregate different points of view based on their different levels of importance. In addition, stakeholder analysis has shown to be a very important preliminary step in multi-dimensional decision making processes [8], as detailed in Sect. 2.

3. The Regime multicriteria method [10–14] is a method of supporting the decision that, in addition from the possibility of considering data of different nature (quantitative and qualitative) [16], offers the opportunity to assign different weights to the identified criteria, to manage the conflict between goals and to deduce the priorities among alternative options.

In particular, this paper presents the following structure: in Sect. 2 the results of a multi-methodological approach are presented (Fig. 1); the results have contributed to the development of five scenarios of intervention, alternatives with each other. For the evaluation purposes, Multi-criteria Analysis has been elaborated with reference to three objectives and five criteria, deducting a ranking of preferability among the suggested scenarios, applying the Regime multicriteria method (Sect. 2.1). In the conclusions (Sect. 3) the paper proposes final considerations on the opportunity to use a Multi-criteria valuation approach in the conservation and enhancement of the cultural landscape.

2 Multi-methodological Evaluations Applied to the Case Study

Starting from the definition of Historic Urban Landscape (HUL) [17, 18], this paper explores the theme of the historic urban landscape being understood as a 'common good', the result of a historical stratification of cultural values and natural, tangible and intangible components. This field of investigation and experimentation provides an innovative model of local development [19, 20].

Specifically, the landscape that is the subject of study, 'Costa Viola', consists of 15 municipalities situated in the province of Reggio Calabria. These are very heterogeneous, both in terms of location and territorial extension, and also in cultural and economic resources. The territory is characterized not only by small coastal municipalities, but also by more extended hilly municipalities, as well as municipalities that include both a coastal landscape and rural territory.

The fundamental characteristics to be considered in the pursuit of sustainable development of the landscape system are:

- Landscape heritage, characterized by high biodiversity and numerous cultural assets not networked among themselves
- A heterogeneous and fragile territorial system
- Hydrogeological risk
- Abandonment of agricultural terraces, which are a fundamental component of the cultural landscape system
- Agricultural terraces becoming fragmented
- Heterogeneity of the activities and of the local productions
- Seasonal tourism
- Many communities' funding often being spent without an integrated strategy

In the area being studied, in the years of past programming, a several negotiated programming tools were implemented using structural funds from the European Community. When studying the programming and planning tools currently in place, one finds a lack of overall unitary vision, in terms of the lack of coordination and integration of the projects with the different resources and landscape components, and also within the entire local system. However, this reconnaissance of the programming and measures in place allows us to compare the current situation with a more advantageous vision, and therefore to define the design scenarios towards which the future management of the site should be guided.

Therefore, activity preliminary to evaluation found it appropriate to engage a methodological path through a structured evaluation process, which combines different techniques for each of the phases of the decision-making process: this is coherent with applying the Systems Thinking Approach [21–24] to problem solving. The evolution of the ways of structuring decision-making processes has led to the combination of analysis techniques, evaluation and public involvement. Particular attention has been paid to building evaluation processes that can consider conflicts of interest, the plurality of viewpoints and different responsibilities; these processes are built through dialogue and discussion with to the entire community [25–29].

The multi-methodological evaluations selected are finalised to configure a decision support system oriented towards the elaboration of sustainable scenarios for transformation, enhancement and promotion. These must be able to reflect the interactive and dynamic dialogue between experts and communities' knowledge of values recognized and shared, and which can therefore manage the complexity of the interests and objectives involved.

As part of this strategic decision-making process, the strategic operational development plan for sustainable development appears to have value as a development tool, specifically for the launch of new and advantageous possibilities of land development on multiple levels and in further directions. As a strategic tool, the plan selects the short- and long-term objectives and how to achieve them, while the operative tool defines a system of actions to be implemented for sustainable local development [20, 30].

The methodological approach is structured in three phases, as identified in Fig. 1. The initial phase of analysis has resulted in the organization of the valid regulatory framework, the identification of the planning instruments currently in use in the territory, and the construction and selection of appropriate qualitative and quantitative indicators representative of the specific problems. The construction of the indicators was carried out with reference to specific thematic areas, such as population, the economy, tourism, transport, infrastructure (ground and underground), hydrosphere, landscape, cultural heritage, and services. On the basis of the selected indicators, the criticalities and potentialities of the territory have been defined in terms of the possible actions of the project, structured in accordance with the Fish Bone Diagram [31]. The diagram classifies the criticalities and the potentialities identified based on their importance, evaluated according to an appropriate rating scale (high, medium, or low importance).

In the central phase, Institutional Analysis has produced a map identifying the various stakeholders, dominant and important figures in the local culture, and characteristics of the places [29]. The stakeholders have been grouped into three prevalent groups: promoters, operators and users. The first group includes the institutions and experts, i.e. those who have a strong influence on making choices oriented towards the common good, due to their knowledge and skills, their strategic positioning, and their representativeness. The second group includes the operators of receptive and productive activity, but also the associations (operators in the dominant economic and social sectors). The third group, finally, comprises citizens and tourists who are also involved in policy making. To identify the views of stakeholders, in-depth interviews were carried out using the CATWOE approach [32], a useful tool for structuring the interviews and exploring the decision-making problem from multiple points of view. The interviews were structured on the basis of asking various questions considered significant for the sustainable enhancement programme of ‘Costa Viola’. This has highlighted the perception criticalities and potentialities, and identified future scenarios of transformation and their related implementation strategies. From the analysis of qualitative information (criticalities, potentialities, actions, future visions, obstacles, actors and environmental limits) contained in the interviews’ verbal protocol, it was possible to develop cognitive maps for the different categories of stakeholders (institutions, hotel managers, restaurateurs and traders, experts, associations, farmers, tourists and citizens). Each cognitive map was prepared using the Decision Explorer 3.1 software. Through the analysis and the comparison the results, it was possible to build the structure of explicit preferences of the various parties involved, and of the future scenarios. The revealed preferences made it possible to shape the future of the visions and of the enhancement scenarios for the historic urban landscape.

The final phase, that of interpreting the results of the two previous phases, has allowed the elaboration of five alternative scenarios (A, B, C, D, E) of possible intervention, constituted by a set of strategic actions integrated according to the interdependencies that characterize the spatial reference system. Specifically, the planned actions constitute specific interventions related to the local territorial system in its entirety; these can promote an actual integrated enhancement of the landscape [33].

In this context, five specific 'scenarios' have been imagined (see Sect. 2.1). These 'scenarios' have been constructed with reference to three different territorial dimensions:

- Cultural Heritage
- Natural Heritage
- Infrastructures of the territorial system

Each dimension has been defined by 'strategic actions' that respond to three strategic 'objectives', identified in relation to the same representative components of the landscape, as follows:

- Protecting and enhancing the Cultural Heritage
- Protecting and enhancing the Natural Heritage
- Improving and reinforcing the Infrastructure System

Finally, the Multicriteria Regime method has produced conclusive results that show the preferability of the future visions for the cultural historical landscape of 'Costa Viola': the overall assessment of the impacts for each scenario are defined with respect to each strategic action, obtaining a ranking of preferability among the scenarios by applying appropriate sensitivity analysis.

2.1 The Multicriteria Analysis

In the construction and evaluation of possible scenarios of development, multicriteria analysis [34] can play a fundamental role in structuring and supporting complex policy problems with multiple and often conflicting objectives. In this context, the 'Multi-criteria approach' can 'evaluate' future scenarios that are achieved through specific projects, and the related objectives of which are identified by the probable impacts on the local system. This enables the choice of strategic projects and their priorities, in order to achieve the goals set.

In addition, the multicriteria approach is able to consider the integration of the different dimensions that coexist in the local landscape, and moreover, can interpret current trends and the dialogue with the actors involved.

The multidimensional approach is necessary to represent the complexity of the landscape: in this way, the multiple dimensions of the landscape become the vital reference points for evaluating the conservation policies and redevelopment of the cultural and environmental heritage. In particular, it contributes to the definition of strategies, objectives and actions of the project, in order to overcome the conflict between environmental protection and development regarding the sustainability of territorial choices [35].

Table 1. The overall assessment of the impacts (Source: Elaborated by ICOMOS 2011)

Value of heritage asset	Intensity of change				
	No change	Negligible change	Minor change	Moderate change	Major change
Overall assessment of the impacts	Effect of change (positive or negative)				
	Neutral	Weak	Moderate	Strong	Very Strong
Very high	Neutral	Weak	Moderate/Strong	Strong/Very Strong	Very Strong
High	Neutral	Weak	Moderate/Weak	Moderate/Strong	Strong/Very Strong
Medium	Neutral	Neutral/Weak	Weak	Moderate	Moderate/Strong
Low	Neutral	Neutral/Weak	Neutral/Weak	Weak	Moderate/Weak
Negligible	Neutral	Neutral	Neutral/Weak	Neutral/Weak	Weak

The multicriteria evaluations allow the landscape to be 're-capitalized' as heritage, in order to build ethical development of the many tangible and intangible components of the place. Specifically, the inheritance of the past is enhanced to produce new wealth, which is not destructive of the consolidated values, but is able to determine 'territorial added value' [36].

The evaluation of the scenarios was conducted with reference to the guidelines for Heritage Impact Assessment (HIA) [17]. The impact evaluation on cultural landscape is a complex process involving several phases, which include the definition of the model and the evaluation of the impact, both direct and indirect. From an operational point of view, the overall evaluation can be achieved by combining the intensity of change with the effects, positive or negative; for this purpose, a five-point scale was used to evaluate the impact (from 'very strong' to 'negligible'), as reported in Table 1 [37].

According to the UNESCO guidelines for each scenario, an overall evaluation of the impacts has been produced, with reference to each strategic action and the following evaluation criteria

- Archaeological Heritage
- Built Heritage
- Historical Landscape
- Natural Heritage
- Infrastructural System
- Socio-Economic System

It should be noted that some strategic actions may be common to several scenarios (Tables 2, 3, 4); the empty cells indicate that the scenario is not affected by the strategic action. Since the assessment of the impacts is related to each strategic action, the resulting effect (expressed on the scale of 'very strong' to 'negligible') is the same for each scenario that contains that strategic action (Tables 5, 6, 7). The impacts are all positive and, for ease of reading, the empty cells show null impacts. To achieve an evaluation synthesis, a multicriteria approach has been adopted, which identifies a

Table 2. Strategic actions for the cultural heritage

Objective 1: to safeguard and to enhance the cultural heritage		Scenarios				
n.	Strategic actions	A	B	C	D	E
a1.1	Restoration of Agriculture Mosaics through the support of agricultural and non agricultural activities	O		O	O	
a1.2	Restoration of the system of terracements and its irrigation system	O		O	O	O
a1.3	Safeguard and recovery of the forest system, connected to the system of terraces and its supply chain	O		O	O	
a1.4	Protection of the distributed ancient settlements			O	O	
a1.5	Redevelopment of settlements and environment			O	O	
a1.6	Strengthening of the tourist accommodation and tourism services in the inner areas: identification of different well-equipped poles (central reception and information services; promotion and sale of local products; interchange station among the tourist buses, etc.)			O	O	O
a1.7	Integrated redevelopment of the main rural network of mule and trails (Rural Service) and complementary infrastructuring to that main rural tracks (hiking trails)			O	O	O
a1.8	Safeguard of the centralized ancient settlements				O	
a1.9	Consolidation and integration of territorial polarities consisting of historical and architectural interest assets			O	O	
a1.10	Integrated safeguard and enhancement of the historical architecture of civilian type and defensive military (such as watchtowers and defense along the coast)			O	O	
a1.11	Promotion of cultural network of the numerous historical and architectural heritage spread all over the territory, with the aim of a cultural tourist circuit, and scholastic circuit			O	O	
a1.12	Enhancement of the religious tourism circuit				O	
a1.13	Enhancement of the museum circuit				O	
a1.14	Enhancement of the archaeological tourist circuit			O	O	
a1.15	Enhancement of the early industrial architecture circuit	O		O	O	

preferability ranking among the different scenarios proposed. The evaluation was structured around the three key objectives (protect and enhance the cultural landscape; protect and enhance the natural resources; improve and strengthen the infrastructure system) and six criteria (archaeological heritage, built heritage, historic landscape, natural heritage, infrastructure system, socio-economic system) with respect to which the impacts were considered [38]. Specifically, the scenarios were compared by applying the Multicriteria Regime method [10–14]. In addition to the possibility of considering the different nature of data (quantitative and qualitative) [16], this method offers the opportunity to assign different weights to the identified criteria, in order to manage the conflict among the objectives, and to deduce priorities among alternative options.

Table 3. Strategic actions for the natural heritage

Objective 2: to safeguard and to enhance the natural heritage		Scenarios				
n.	Strategic actions	A	B	C	D	E
a2.1	Establishment of the ecological network in order to mitigate the effects of environmental fragmentation and to preserve biodiversity	O				
a2.2	Strengthening of prevention and mitigation of natural and anthropogenic risk factors related to landslides or flooding, as well as the pollution of water bodies (surface and groundwater) and marine waters	O				
a2.3	Mitigation of environmental risk (prevention and control of pollution of surface and groundwater bodies, monitoring and reduction of hydrogeological phenomena	O				
a2.4	Maintenance and reconstruction of the necessary hydraulic-forestry arrangement	O				
a2.5	Conservation and enhancement of the geological heritage	O				
a2.6	Networking of the various natural resources for nature tourism and scientific-educational or also for the recreation and free time	O		O	O	
a2.7	Safeguard of the landscape and environmental connotation of the landscape and environmental of the coastline through the safeguard and enhancement of the seabed	O		O	O	

The method of the regime was applied using the Definite 2.0 software (DEcision on a FINITE set of alternatives) [39]. In the first instance, the same weight was assigned to the three objectives (0.33 for each objective, with the sum of the weights equal to 1.00), and weights were assigned to the criteria by dividing the objective weight by the number of criteria (equal to 6): that is, assigning a weight of 0,055 to each evaluation criterion. The following lists of preferability were built: the first with equal weights for all objectives (Table 8a); the second obtains a set of rankings by assigning, to each goal in turn, more weight than the others, and equal weight to the two remaining objectives; this analyses the sensitivity of the rankings by varying the weights (Tables 8b, c and d). The rankings of preferability against objectives allow us to identify the following complete ranking of preferability among scenarios:

- I: Scenario D (score 1.00)
- II: Scenario E (score 0.75)
- III: Scenario C (score 0.50)
- IV: Scenario A (score 0.25)
- V: Scenario B (score 0.00)

It is specified, therefore, that the ‘strength’ of the results is not sensitive to the change in the distribution of weights assigned to the objectives, but to the characteristics of each scenario’s performance with respect to the evaluation criteria.

Table 4. Strategic actions for the infrastructural system

Objective 1: to safeguard and to enhance the cultural heritage		Scenarios				
n.	Strategic actions	A	B	C	D	E
a3.1	Reorganization of "sea routes" through redevelopment, adaptation and the reinforcement of maritime infrastructure, like the promotion of "collective sea taxi" for the connection or excursions along the coast		O		O	O
a3.2	Specific development interventions on the integrated system of the not only touristic regional port infrastructure		O		O	O
a3.3	Redevelopment of the equipment for the coastal landing place services		O		O	O
a3.4	Strengthening of the equipment for the inter coastline link services		O		O	O
a3.5	Functional redevelopment of the landing place services for maritime links to the islands		O		O	O
a3.6	Restoring of the quay for docking of the hydrofoils and adjustment of the services for inter coastline link		O		O	O
a3.7	Strengthening of equipment for the interregional connecting services to public transport aims and tourist mobility		O		O	O
a3.8	Realization of an intermodal terminal (rail-road-sea-way), with realization of appropriate parking areas for private vehicles and tour buses				O	O
a3.9	Realization of an intermodal interchange station, equipped with reception and service infrastructure in order to dispose of the volume of vehicular traffic, optimize the connections and rationalise the flow of tourists in the area				O	O
a3.10	Integrated strengthening of the tourism services, redevelopment and rationalise of the touristic mobility, promotion of touristic services through urban and environmental redevelopment of poor quality existing settlements			O	O	O
a3.11	Facilitation of traffic flows identifying the entry points to the coast, of the necessary exchange areas and the related parking				O	O
a3.12	Improvement of road and rail infrastructure with relative interchange areas				O	O
a3.13	Strengthening of the existing road infrastructure system, through new parking spaces to service of the historical settlements, with interchange areas, pedestrian walkways, ecological bus, vectors, mechanical, etc.				O	O
a3.14	Realization of a mechanical vectors system for the connection among the coastal towns and the inner cores, like alternative and complementary mobility system				O	O
a3.15	Realization and adaptation of surface for air ambulance service and of civil protection for tourism				O	O

Table 5. Evaluation of the impacts for the cultural heritage

Strategic actions	Criteria						Scenarios				
	Arch. heritage	Built heritage	Historical heritage	Natural heritage	Infrastr. system	Soc. econsystem	A	B	C	D	E
a1.1			VS	S		S		O		O	O
a1.2			VS	S		M		O		O	O
a1.3			S	VS		M		O		O	O
a1.4		VS	S					O		O	O
a1.5		VS	VS	M				O		O	O
a1.6					S	VS		O		O	O
a1.7			M		M	W		O		O	O
a1.8		VS	S							O	O
a1.9	S	VS	M			VS				O	O
a1.10		VS	M			M			O	O	O
a1.11		S	M			M				O	O
a1.12		S	M			S				O	O
a1.13		S	M			VS				O	O
a1.14	VS					S				O	O
a1.15		S	M			M				O	O

VS – Very Strong; S – Strong; M – Moderate; W – Weak

Table 6. Evaluation of the impacts for the natural heritage

Strategic actions	Criteria						Scenarios				
	Arch. heritage	Built heritage	Historical heritage	Natural heritage	Infrastr. system	Soc. econ system	A	B	C	D	E
a2.1				VS				O		O	O
a2.2		M		VS	S			O		O	O
a2.3		M		VS	S			O		O	O
a2.4				S				O		O	O
a2.5				S				O		O	O
a2.6				S		M		O		O	O
a2.7				S		M		O		O	O

VS – Very Strong; S – Strong; M – Moderate; W – Weak

Table 7. Evaluation of the impacts for infrastructural system

Strategic actions	Criteria						Scenarios				
	Arch. heritage	Built heritage	Historical heritage	Natural heritage	Infrastr. system	Soc. econ system	A	B	C	D	E
a3.1					VS	M		O		O	O
a3.2					VS	M		O		O	O
a3.3					VS	M		O		O	O
a3.4					VS	M		O		O	O
a3.5					VS	M		O		O	O
a3.6					VS	M		O		O	O
a3.7					VS	M		O		O	O
a3.8					VS	M				O	O
a3.9					S	M				O	O
a3.10		M			S	S			O	O	O
a3.11					S	M				O	O
a3.12					S	M				O	O
a3.13					VS	M				O	O
a3.14					S	W				O	O
a3.15					M	W				O	O

VS – Very Strong; S – Strong; M – Moderate; W – Weak

Table 8. Evaluation multicriteria: ranking scenarios

(a) Equal weight to the three objectives		(b) Greater weight for objective: to protect and to enhance the cultural heritage	
	Regime		*Regime*
Scenario D	1.00	Scenario D	1.00
Scenario E	0.75	Scenario E	0.75
Scenario C	0.50	Scenario C	0.50
Scenario A	0.25	Scenario A	0.25
Scenario B	0.00	Scenario B	0.00
(c) Greater weight for objective: to improve and to reinforce the infrastructure system		(d) Greater weight for objective: to protect and to enhance the natural heritage	
	Regime		*Regime*
Scenario D	1.00	Scenario D	1.00
Scenario E	0.75	Scenario E	0.75
Scenario C	0.50	Scenario C	0.50
Scenario A	0.25	Scenario A	0.25
Scenario B	0.00	Scenario B	0.00

3 Conclusions and Discussion

The study explored the potential of an integrated approach in the elaboration of territorial development strategies, focusing on several specific values and on the complex resources that characterize the cultural historical landscape of 'Costa Viola'. The multi-methodological evaluation approach thus structured was an experimentation within a wider research course, aimed to delineate decision-making processes oriented towards the elaboration of shared design choices [1, 30, 40, 41]. The combined application of different methods and techniques originated from disciplines not necessarily those of the evaluation, and addressed a complex decision problem [20, 33], characterized by multiple variables and a high level of uncertainty, in an incremental and cyclical evaluation process that was characterized by constant feedback and by constant interactions. This method outlined a development plan conscious and shared for the transformation and enhancement, coherent with the principles underlying the approach HUL [17, 18]. This complex decision making requires an active collaboration between the various skills involved and the constant comparison among the territories and stakeholders. This implies that the length of the process depends on the time-period, and on the difficulties, obstacles and dynamics that arise in real contexts [19]. In an integrated decision-making approach, the need to examine 'complex values' [42] supports the structuring of a process of multicriteria evaluation, aimed towards the elaboration of strategic actions and objectives. This approach should be able to consider the material and immaterial values, objective and subjective, of use and non-use, as well as intrinsic values, and their synergistic and complementary relationships, in order to formulate actions. A methodological approach developed in accordance with the proposed model requires that the construction of the cognitive framework is developed over time and accompanies the development of the design choices, constantly drawing on new contributions. The methodological approach thus configured can provide a useful new stimulus to drive the following: the selection of information; the identification of values; the analysis of conflicts; and the construction of shared preferences oriented towards the development of transformation scenarios that respond to the needs of decision-making contexts that are characterized by complexity and uncertainty [30]. As part of the experiment applied to the case study, the use of an integrated and multi-methodological approach has considered the character of the Historical Urban Landscape with its different multi-dimensional components, the system of tangible and intangible relations, and its perception by stakeholders. This has allowed this research to identify the different priorities, and select those actions appropriate to the context, in order to reflect changes in an interactive and dynamic dialogue among communities, local expertise and experts [43].

This type of evaluation approach takes shape and is fed through the concept of HUL [17, 18], by the fielding of the tangible and intangible components and their mutual relations, and by developing in a dynamic and interactive process. The methodological approach proposed constitutes a possible means of constructing alternative intervention strategies in contexts that present the characteristics of the HUL. According to this concept, the system of tangible and intangible relations is an integral part of the local specific characteristics, and requires an integrated approach for

its understanding, interpretation and evaluation. The approach proposed in this paper therefore has an innovative value that derives not only from experimenting with the mix of specific techniques to support decision making with a participatory approach, but also from testing these techniques in the context of public policy and cultural heritage management, where the combination of qualitative and quantitative methods seems to offer greater benefits [6]. Another interesting aspect of the work is linked to the use and demonstration of how prescriptive decision-analysis and participatory problem-structuring can generate new consensus alternatives in a real decision-making process. Therefore, the proposed integrated decision aid is thus expected to constitute a transferable framework to support policy makers in their strategic decisions.

In conclusion, a flexible and adaptive methodological course, combining complex evaluation techniques and stakeholder involvement techniques, can help build enhancement strategies and promote good governance [40]; these processes can improve the local deliberative democracy through effective collaboration among developers, operators and users. With the support of integrated evaluation approaches, it is possible to build shared actions in a long-term vision that is aimed at developing and making public decisions effectively.

Acknowledgements. This study has been supported by the project of the Mediterranea University of Reggio Calabria: Marine Energy Lab - PON03PE00012_1 - P.O.N. Ricerca e Competitività 2007-2013 Avviso n. 713/Ric. del 29/10/2010 - Titolo III - "Nuovi distretti e laboratori".

References

1. Della Spina, L., Scrivo, R., Ventura, C., Viglianisi, A.: Urban renewal: negotiation procedures and evaluation models. In: Gervasi, O., Murgante, B., Misra, S., Gavrilova, M.L., Rocha, A.M.A.C., Torre, C., Taniar, D., Apduhan, B.O. (eds.) ICCSA 2015. LNCS, vol. 9157, pp. 88–103. Springer, Cham (2015). doi:10.1007/978-3-319-21470-2_7
2. Stirling, A.: Analysis, participation and power: justification and closure in participatory multi-criteria analysis. Land Use Policy **23**, 95–107 (2006)
3. Liu, S., Sheppard, A., Kriticos, D., Cook, D.: Incorporating uncertainty and social values in managing invasive alien species: a deliberative multi-criteria evaluation approach. Biol. Invasions **13**, 2323–2337 (2011)
4. Creswell, J.W., Plano Clark, V.L.: Designing and Conducting Mixed Methods Research. Sage, Thousand Oaks (2011)
5. Morse, J., Niehaus, L.: Mixed Method Design: Principles and Procedures. Left Coast Press, Walnut Creek (2009)
6. Myllyviita, T., et al.: Mixing methods-assessment of potential benefits for natural resources planning. Scand. J. For. Res. **29**(1), 20–29 (2014)
7. Stewart, T.J., Joubert, A., Janssen, R.: MCDA framework for fishing rights allocation in South Africa. Group Decis. Negot. **19**, 247–265 (2010)
8. Dente, B.: Understanding policy decisions. PoliMI SpringerBriefs. Springer, Heidelberg (2014)
9. Eden, C.: Cognitive mapping: a review. Eur. J. Oper. Res. **36**, 1–13 (1988)

10. Hinloopen, E., Nijkamp, P., Rietveld, P.: The regime method: a new multicriteria technique. In: Hansen, P. (ed.) Essays and Surveys on Multiple Criteria Decision Making. LNE, vol. 209, pp. 146–155. Springer, Heidelberg (1983). doi:10.1007/978-3-642-46473-7_13
11. Hinloopen, E., Nijkamp, P., Rietveld, P.: Qualitative discrete multiple criteria choice models in regional planning. Reg. Sci. Urban Econ. **13**, 73–102 (1983)
12. Hinloopen, E.: De Regime Methode, MA thesis, Interfaculty Actuariat and Econometrics, Free University Amsterdam (1985)
13. Hinloopen, E., Smyth, A.W.: A description of the principles of a new multicriteria evaluation technique, The Regime Method. In: Proceedings Colloquium Vervoersplanologisch Speurwerk (1985)
14. Hinloopen, E., Nijkamp, P.: Quantitative multiple criteria choice analysis. Qual. Quant. **24**, 37–56 (1990)
15. Belton, V., Stewart, T.J.: Multiple Criteria Decision Analysis: An Integrated Approach. Kluwer Academic Publishers, Boston (2002)
16. Janssen, R., Nijkamp, P., Rietveld, P.: Qualitative multicriteria methods in the Netherlands. In: Bana e Costa, C.A. (ed.) Readings in Multiple Criteria Decision Aid, pp. 383–409. Springer, Heidelberg (1990). doi:10.1007/978-3-642-75935-2_17
17. UNESCO: Recommendation on the Historic Urban Landscape. UNESCO World Heritage Centre: Paris, France (2011)
18. Fusco, G.L.: Toward a smart sustainable development of port cities/areas: the role of the "Historic Urban Landscape" approach. Sustainability **5**, 4329–4348 (2013)
19. Calabrò, F., Cassalia, G., Tramontana, C.: The mediterranean diet as cultural landscape value: proposing a model towards the inner areas development process. In: Calabrò, F., Della Spina, L. (eds.) Book Series: Procedia - Social and Behavioral Sciences, vol. 223, 568–575 (2016)
20. Calabrò, F., Della Spina, L.: Innovative tools for the effectiveness and efficiency of administrative action of the metropolitan cities: the strategic operational programme. In: Bevilacqua, C., Calabrò, F., Della Spina, L. (eds.) Advanced Engineering Forum, vol. 11, pp. 3–10. Trans Tech Publications, Switzerland (2014)
21. Bánáthy, B.H.: Guided Evolution of Society: A Systems View (Contemporary Systems Thinking). Springer, Berlin (2000)
22. Jackson, M.: Systems Thinking: Creating Holisms for Managers. Wiley, Chichester (2003)
23. Checkland, P., Poulter, J.: Learning for Action. Wiley, Chichester (2006)
24. Ackoff, R.L.: Systems Thinking for Curious Managers. Triarchy Press, Gillingham (2010)
25. Medda, F., Nijkamp, P.: A combinatorial assessment methodology for complex transport policy analysis. Integr. Assess. **4**(3), 214–222 (2003)
26. Miller, D., Patassini, D. (eds.): Beyond Benefit Cost Analysis: Accounting for Non-market Values in Planning Evaluation. Ashgate, Aldershot (2005)
27. Fusco, G.L., Cerreta, M., De Toro, P.: Integrated planning and integrated evaluation. Theoretical references and methodological approaches. In: Miller, D., Patassini, D. (eds.) Beyond Benefit Cost Analysis: Accounting for Non-market Values in Planning Evaluation, pp. 175–205. Ashgate, Aldershot (2005)
28. Deakin, M., Mitchell, G., Nijkamp, P., Vreeker, R. (eds.): Sustainable Urban Development: The Environmental Assessment Methods, vol. 2. Routledge, Oxon (2007)
29. Munda, G.: Social Multi-criteria Evaluation for a Sustainable Economy. Springer, Heidelberg (2008)
30. Della, S.L., Calabrò, F.: Pianificazione strategica: valutare per programmare e governare lo sviluppo. LaborEst **11**, 3–4 (2015)
31. Gupta, K.: A Practical Guide to Needs Assessment. Wiley, Hoboken (2011)

32. Rosenhead, J., Mingers, J.: Rational Analysis for a Problematic World Revisited: Problem Structuring Methods for Complexity, Uncertainty and Conflict. Wiley, Chichester (2001)
33. Della Spina, L., Ventura, C., Viglianisi, A.: A multicriteria assessment model for selecting strategic projects in urban areas. In: Gervasi, O., et al. (eds.) ICCSA 2016. LNCS, vol. 9788, pp. 414–427. Springer, Cham (2016). doi:10.1007/978-3-319-42111-7_32
34. Figueira, J., Greco, S., Ehrgott, M. (eds.): Multiple Criteria Decision Analysis: State of the Art Survey. Springer, New York (2005)
35. Guarini, M.R., Battisti, F.: Application of a multi-criteria and participated evaluation procedure to select typology of intervention to redevelop degraded urban area. In: Calabrò, F., Della Spina, L. (eds.) Procedia Social and Behavioral Sciences, vol. 223, pp. 960–967 (2016)
36. Balletti, F., Soppa, S.: L'integrazione del paesaggio nelle politiche territoriali. Ricadute sugli strumenti di piano e sulle prassi concertative. S.I.U. - VIII Conferenza Nazionale, Mutamenti del territorio e innovazioni negli strumenti urbanistici, Firenze (2004)
37. ICOMOS: Guidance on Heritage Impact Assessments for Cultural World Heritage properties. Icomos, Paris, France (2011)
38. Rugolo, A., Calabrò, F., Scrivo, R.: The assessment tool for the design of the territories. The impacts from the road infrastructure in the Inland areas of the province of Reggio Calabria. In: Calabrò, F., Della Spina, L. (eds.) Procedia Social and Behavioral Sciences, vol. 223, pp. 534–541 (2016)
39. Janssen, R., van Herwijnen, M., Beinat, E.: DEFINITE (version 2) DEcision support system for a FINITE set of alternatives. Institute for Environmental Studies, Vrije Universiteit, Amsterdam (2001)
40. Calabrò, F., Della Spina, L., Sturiale, L.: Cultural planning: a model of governance of the landscape and cultural resources in development strategies in rural contexts. In: Proceedings of the XVII - IPSAPA Interdisciplinary Scientific Conference, vol. V, pp. 177–188. Rezekne Higher Educ Inst-Rezeknes Augstskola, Lettonia (2013)
41. Campanella, R.: Un progetto di territorio per il turismo sostenibile l'esperienza di ricerca applicata del PISL "Slow Life. Viaggio tra culture e natura nel Parco Nazionale d'Aspromonte, dal Tre Pizzi al Limina". LaborEst **10**, 17–22 (2015)
42. Fusco Girard, L., Nijkamp, P.: Le valutazioni per lo sviluppo sostenibile delle città e del territorio, Angeli, Milano (1997)
43. Mollica, E.: Le Aree interne della Calabria: una strategia e un piano quadro per la valorizzazione delle loro risorse endogene. Rubbettino, Soveria Mannelli (1996)