

THE MANAGEMENT OF CONTEMPORARY CULTURAL LANDSCAPES IN LINEAR INFRASTRUCTURE PROJECTS

A GESTÃO DE PAISAGENS CULTURAIS CONTEMPORÂNEAS EM PROJECTOS DE INFRA-ESTRUTURA LINEAR

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ABSTRACT

This paper aims at reasoning upon the development of contemporary cultural landscapes: do they exist or do only historic cultural landscapes exist? Is it possible to provide an interpretative reading of cultural landscapes through a comprehension of their structure? Does the planning process have a role in developing cultural landscape dynamics?

Many scholars have analyzed cultural landscapes under an historical perspective, nevertheless, an investigation concerning their contemporary potential structure in literature is missing. According to this research, contemporary cultural landscapes are based on an intertwined presence of local-upper local durable dynamics, and differ from historic ones for this stronger relationship.

A shared vision estimates the improvement of linear infrastructures decisive for territories development. Linear infrastructures are an exemplificative, limit case of the relationships between local and upper dynamics, as they derive from rationalities of upper levels but they physically cross local territories. Here the challenge with contemporary cultural landscapes: is it possible to support/ activate cultural landscape dynamics within linear infrastructure projects?

An interpretative model to evaluate the presence of contemporary cultural landscapes will be carried out and applied to three Italian linear infrastructures. The aim is that of starting up the elaboration of a method to support the development of contemporary cultural landscapes in planning processes.

Keywords: “contemporary cultural landscapes”, “linear infrastructures”, “interpretative model”, “durable dynamics”.

RESUMO

Com este trabalho pretende-se reflectir sobre o desenvolvimento das paisagens culturais contemporâneas: será que estas existem ou existem apenas paisagens culturais históricas? É possível fornecer uma leitura interpretativa das paisagens culturais através de uma compreensão da sua estrutura? O processo de ordenamento tem um papel no desenvolvimento da dinâmica da paisagem cultural?

Muitos estudiosos analisaram as paisagens culturais sob uma perspectiva histórica, no entanto, na literatura não existe investigação sobre a potencial estrutura contemporânea. De acordo com esta pesquisa, as paisagens culturais contemporâneas baseiam-se na presença de uma dinâmica permanente entre os níveis local e superior, o que as torna diferentes das paisagens históricas.

Uma visão partilhada prevê a melhoria de infra-estruturas lineares decisivas para o desenvolvimento dos territórios. As infra-estruturas lineares são um caso exemplificativo e limitado das relações entre as dinâmicas locais e de nível superior, pois derivam de

racionalidades de nível superior, mas que fisicamente atravessam territórios locais. Este é o desafio das paisagens culturais contemporâneas: será que é possível apoiar/activar a dinâmica da paisagem cultural no âmbito de projectos de infra-estrutura linear?

Será levado a cabo e aplicado um modelo interpretativo para avaliar a presença de paisagens culturais contemporâneas a três infra-estruturas italianas. O objectivo é iniciar a elaboração de um método para apoiar o desenvolvimento de paisagens culturais contemporâneas nos processos de ordenamento do território.

Palavras-chave: “paisagens culturais contemporâneas”, “infra-estruturas lineares”, “modelo interpretativo”, “dinâmica durável”.

JEL Classification: R1

1. CULTURAL LANDSCAPES: THE ROLE OF LINEAR INFRASTRUCTURES

The perspective which underpins this work has started to be outlined when approaching the research of some experts, among which are the studies of the Italian scholar Almo Farina, (2006), as well as the acknowledgment of some recommendations for future landscape research works provided by a number of experts during the international workshop ‘*Multifunctional Landscapes. Interdisciplinary Approaches to Landscape Research and Management*’ held in Roskilde, Denmark, 2000 (Tress B. et al, 2000). Amongst other experts from Landscape Ecology discipline, particular importance has been granted to Zev Naveh’s position (Naveh 2001), for his approach to multidisciplinary landscapes which this research has intended as the beginning of the academic reasoning upon contemporary cultural landscapes. These approaches have helped to understand the complexity and richness of landscape intended as an evolving system and the many dynamics which can be modified/ weakened/ interrupted when a linear infrastructure comes into contact with such a complex system.

In the same years, the approval of the European Landscape Convention (ELC, Florence, 20th October 2000) has enriched the international debate on landscape underlying the importance to work with the same principles both in relation to outstanding landscapes as well as in the everyday or degraded ones in order to safeguard and/or develop a common heritage based on landscapes of quality.

Linear infrastructure projects, as they strongly modify landscapes, have to be founded on such a premise. The overview of an infrastructure bibliography (amongst which are Bobbio and Morisi 2001, Dematteis and Governa 2001, Graham and Marvin 2001, Ennis 2003) have helped to focalize the attention on the relations which occur between infrastructures, spatial/ urban planning and landscapes, and has underlined the lack of new connections between academic studies on the one side and practical tools for planners on the other, in particular in relation to the development of contemporary landscapes together with the development of linear infrastructures.

On the basis of such a theoretical investigation, this work aims at providing an interpretative reading of the structure of cultural landscapes. In particular it aims at actualizing the concept of cultural landscapes trying to find out which dynamics can structure contemporary cultural landscapes. These theoretical assumptions will be put into practice by finding out which planning rules can generate such dynamics within the framework of linear infrastructure projects. A model (useful for planners) able to match linear infrastructure projects within cultural landscape dynamics will be developed. In order both to test the model and to

evaluate the presence of cultural landscape dynamics in existing contemporary projects, it will be applied to three Italian linear infrastructure projects.

1.1. Linear infrastructures development and cultural landscapes

Many experts in these last decades have drawn their attention to the rapid, multifaceted drivers that are changing the majority of European landscapes: amongst the others, the Italian geographer P. Sereno underlined the clear separation between functionality and culture: from a landscape expression of culture, to an equipped space expression of the division between functionality and culture (Sereno 1981 in Rombai 2002); the English scholar Paul Selman questioned why societies are no more able of producing landscapes of ecological and aesthetic integrity (Selman 2004).

These reflections will be outlined in the following considerations and are strictly related to infrastructure networks development. Infrastructures are a factor of modernization, tools by which services are provided within and among territories. Frequently a distinction is made between “hard” and “soft” infrastructures: the former refer to networks such as gas, electricity, water supply, telecommunications, sewerage and transport, the latter to community infrastructures (e.g. schools), environmental infrastructures (landscaping, open space), and so forth (Ennis 2003). This study focuses the attention in particular on roads and railways.

In the past linear infrastructures (roads, railways) had a central role in the definition of a shared urban identity and in landscape construction. Techniques and configurations of infrastructure development were basic components for the development of the urban space. Similar considerations were valid for the extra-urban context, where linear infrastructure organized territories through configurations capable of enriching the integration of natural and human dynamics and create durable systems.

With the development of the Fordist model, the dimensional relation between infrastructures, societies and territories got lost. From the second half of the XX Century, the speed of infrastructure network development has become a central goal, with the general aim of expanding regional and national economies by linking the main industrial areas. The main experts in charge for the elaboration of the projects were engineers. Their aim was that of simplifying morphological complexity of territories and provide linear connections. Economists were other important professionals in the planning process, as infrastructures are instruments of the economic system. (Farina, Scozzafava *et al.* 2007). In this framework infrastructure networks may have no relations with the environment they cross: nevertheless, they may become the initiators of new developments. Roads may reveal untouched areas for economical activities which in the end cause more negative consequences than the linear infrastructure ever did (Antrop 2000). This underlines the multifaceted and intertwined dynamics which involve a linear infrastructure project: new levels of interrelation from large to focused scales, territorial integration or exclusion, social inclusion or exclusion, struggles for space competition, economic development, morphological changes, social and ecosystem fragmentation.

A large-scale infrastructure overlaps and replaces pre-existing systems based on slow co-evolutions of both natural and social processes such as fields, woods, water courses, historical urban and rural areas. Linear infrastructures, amongst other human works, produce a contamination to the sense of place and to the sense of belonging of an individual to a peculiar and characteristic environmental context (Massey, Jess 1995, Ingold 2000). With respect to the interactions between infrastructure and natural aspects, the issue is mainly based on the erosion of the ecosystemic functions which derives from the de-structuration of ecosystem functionality. The barrier effect determines isolation and impoverishment

phenomena for many species (fragmentation). Such effects highlight the inevitable conflicts between some social processes and natural processes and the complexity of their relations (Farina, Scozzafava *et al.* 2007).

The planning process of an infrastructure should manage physical-structural, ecosystem, socio-cultural resources that vary in terms of intensity according to the single area crossed (urban, rural, natural). The lack of linkages between linear infrastructure, landscape dynamics, infrastructure planning is mainly related to the difficulty to match linear infrastructures with landscape dynamics. The issue is how to maintain/ support the complexity of their structure through an infrastructure project.

1.2. An operative approach to Cultural Landscapes

In environmental and cultural literature there is a lack of a structured approach to cultural landscapes: they are mainly considered “historic” peculiar contexts and few reflections have been carried out about the meaning and the possible presence of contemporary cultural landscapes. Cultural landscapes are strictly related to the sustainable development perspective, as they are a concretization of its foundations: they represent the strongest and most durable interaction between the natural and the social system (Scazzosi 1999, Farina 2000, Rombai 2002). Nevertheless, these thoughts have been theorized for cultural landscapes developed in the past. This research underlines the importance to focus the attention both on the validity of the structure of cultural landscape as a central model for the development of territories and on the importance to actualize such a concept, considering which drivers have changed and which, if adequately managed, permit new durable relations between natural and social systems. The aim is that of providing a model based on their structure to be used as a guideline for the planning process of contemporary linear infrastructures.

2. MANAGING CONTEMPORARY CULTURAL LANDSCAPES

To approach the structure and driving processes of contemporary cultural landscapes a number of steps have been done and here are synthesized; the organization of contemporary cultural landscapes based on the relation resource/ information/ use and on the interaction of natural and social systems have been analyzed; the driving processes of historic cultural landscapes have been overviewed.

2.1. Structure and processes of contemporary cultural landscapes

Cultural landscapes represent a particular kind of relation between society and its environment. They are based on the optimization of the relation resource/information/use, where resource consists of that natural/cultural goods and values available in a context, information is based on knowledge and permits to identify the cultural/natural resources available and use is the ensemble of actions performed according to the resources with advantages both for human settlement and natural system (after Farina 2004).

Many experts testify the speed of landscape changes which is occurring in these last decades (Antrop 2000, Naveh 2001). The structure and processes of landscapes have been rapidly changing in the two last centuries. Many differences characterize the drivers of landscapes developed in the past (mainly cultural landscapes), where economic, cultural and ecosystem processes act at the same hierarchical level, and the nowadays tendency, where economic processes are determinant in landscape evolution.

Historic cultural landscapes, as emerged from the considerations done with the analysis in the previous paragraphs, are based on identity and integration: cultural landscapes are indeed the outcome of local identities and cultures as evidence of a territorial history as well as expressions of the interaction between man and nature (Sauer 1925, Plackter and Rossler 1995, Farina 2001). Multi-scale dynamics (stronger and growing relations between local, regional, national, upper national socio-economic levels) together with rapid socio-cultural innovations are two of the determinant drivers which distinguish contemporary from historic landscapes structure. According to this research, four are the processes which underpin the development of contemporary cultural landscapes: identity process, integration process, multi-scale process, innovation process. An aware management of these processes can lead to the development of contemporary cultural landscapes. In particular, the multi-scale process and the innovation process have affected contemporary landscapes development and have some positive and negative relapses which need to be understood and correctly driven. In the following considerations, the four processes will be briefly overviewed.

Many scholars have analyzed the relations which occur between landscape and identity and all agree on the importance of such a relation for the development of local landscapes. Identity is related to the historical-cultural character of a place. Differences of places, preservation of cultural and natural specificities, awareness of past evidence in a physical and/ or a symbolic sense, the collective memory of a population, are basic sources for local identities (Scazzosi 2004). The search for identity and sense of place of contemporary societies is reflected on a general “search for landscape” as a reaction to homologation, modernization, globalization (Gambino 2003). The European Landscape Convention gives primary attention to the importance of identity, assuming that landscape underpins its development (ELC, art. 5). UNESCO (2003) defines identity as the cultural tradition of a context; A. Magnaghi (2005) considers identity as the local and regional knowledge which defines the characters of long-duration of a place. The identity process can be supported through the use of information and knowledge, as the basis of new projects related to the local context: information and knowledge, then, as two basic aspects for the continuous re-activation of identity-cultural dynamics.

Integration is the second basic aspect of a cultural landscape. Such a process is enhanced and analyzed in particular by Ecology and Landscape Ecology. Landscape Ecology aims at understanding the interactions between natural and human dynamics which occur within landscapes. A. Farina (2001) defines cultural landscapes as the maximum expression of integration between human activities and environmental dynamics. V. Romani (1994) underlines the intertwined presence of natural laws, which drive the development of nature, and material, cultural social, psychological causes, which drive the development of human society, as one of the main characteristics of landscape. According to D. Cosgrove (2002) landscape is at the basis of enduring sets of linkages based on the relationships between the physical environment and human society. In such a context people are the developers through their engagement with the world around them. The integration process is based amongst other aspects on social comprehension of natural dynamics, conservation of diversity and heterogeneity, use of renewable natural and cultural resources. Integration is furthermore essential not only between the two systems but also within (e.g. “decision making” in the social system).

The multi-scale process underpins both the natural and the social systems which are based on multi level relations. According to Antrop (2000) landscapes evolve continuously by “internal” and “external” factors. Internal factors are those which may be controlled at local level (e.g. by the direct action of the inhabitants). External factors are mostly indirect and influence the local landscape conditions through upper strategies and policies. Decisions are made on different hierarchical levels of policy making and manifest themselves

by actions on different scale levels. The multi-scale process works on connections, junctions, linkages between the dynamics at different levels: e.g. local ecological networks are related to regional networks, to national, and so forth; local identities should be recognized at regional level, at national, and so forth. To control such dynamics is helpful to use recent guidelines/ tools provided at European and national levels which aim at supporting the local context under a multi-scale perspective. An example of these tools are the European Landscape Convention (ELC), the Environmental Impact assessment (EIA), the Strategic Environmental Assessment (SEA), to cite only the most relevant EU instruments. Under this perspective, some scholars underline the importance of a multi-scale planning development, which is considered the more adequate approach to face and manage complex systems such as landscapes (Gibelli 2002 b).

Innovation has been considered the second main driving process of contemporary landscapes development together with the multi-scale process. The innovation process, if properly managed, is a basic aspect for cultural landscapes development as they are time dependent: the durability of a cultural landscape is related to the capability to renovate itself by finding up-to-date answers to the problems of interaction between society and nature. Starting from landscape structures inherited from the past, it is essential to activate an innovative process of cooptation of landscape structures towards new functional contexts, where historic values (both natural and social) are considered a stimulus for new coherent solutions. Innovation includes that dynamic aspects which denote the crossing from a phase to another (Quaini 1992 in Rombai 2002). According to Gambi (1973) the society re-creates and gains its living space through modalities based on evolutionary steps.

2.2. Differences and similarities between historic and contemporary cultural landscapes

The structures of historic and contemporary cultural landscapes have many similarities and a number of differences in the composition of natural and social systems, in their interaction and in the developing processes. Complexity, which characterizes cultural landscapes, is destined to become even harder to grasp and manage, as the increasing number of dynamics expected in contemporary cultural landscapes imply more complex structures. As regards the composition and interaction between the social and the natural systems, some differences occur. About the social component, in contemporary cultural landscapes the awareness of local cultural specificities and uniqueness is expected to be stronger because the comparison with external contexts is higher, as well as the knowledge and the use of external resources and experiences is more accessible and in many cases promoted by the legislation (e.g. ELC guidelines). These mutual interactions between cultures and knowledges from different backgrounds and levels may enrich the scenario of future cultural landscapes with new dynamics, if safeguard of local identities will be a primary issue. As regards the natural component, contemporary cultural landscapes will maintain, and probably increase, the important role as biological and genetic refuges. Nevertheless they will be characterized by an augment of fragility and vulnerability due to a major sensitivity to anthropic disturbance, with a consequent lowering of resilience (Farina 2001). In this case, environmental resilience is intended as the capability of a biological system to bear and survive external disturbance without losing its internal organizational structure (Werner 2005). Two processes are strictly related to contemporary - future scenarios: multi-scale and innovation. The first permits on one hand cultural exchanges at different levels and enriches the local context with new stimuli if compared to historic cultural landscapes, on the other it opens new complex multi-level relations which need to be managed. In this case the risk is to weaken local socio-economic dynamics, identity and nature-society interactions in the name of upper stronger

and powerful relations. Innovation challenges some of the characteristics of historic cultural landscapes, based on slow, rare changes, long time stability, nature adaptation (Farina, 2001). Nevertheless it permits to cross from one phase to another. Innovation may improve and update local identity and knowledge, but it may also start-up new dynamics detached by identity-historical matrices, and in general modify the interactions between natural and social systems, which require adequate knowledge of natural and social matrices. These two processes, together with the two others, need to be managed in order to start-up constructive dynamics and avoid a weakening of the system.

The development of contemporary cultural landscapes is affected by many factors interrelated with each other: as a matter of fact variations can be triggered not only by planning, but also by community values, sense of place, environmental attitudes, administrative skills, political and economic situations.

3. CRITERIA AND INDICATORS FOR THE INTERPRETATION OF CULTURAL LANDSCAPE DYNAMICS

The dynamics of a cultural landscape could be either carried on, started, re-started or weakened, interrupted, cancelled through a planning process. In order to empirically support some of such dynamics, a conceptual and operative model has been carried out (*Cultural Landscape Dynamics Interpretative Model*). The methodology has been performed bearing in mind that cultural landscapes rely on the rules of complex systems and their development is influenced by processes of different dimensions in space and time (Farina 2004). The model is a result of combined criteria worked out under the framework of the contemporary cultural landscape processes. The criteria are the outcomes of the elaborations of aspects, principles and tools taken from spatial planning best practices, Landscape Ecology, and from the analysis of two historic cultural landscapes (the Roman Centuriation and the historical railway). Spatial planning best practices have contributed to elaborate criteria based on cultural heritage and identity preservation, large/local actions management and integration, local development, flexibility, participation. Landscape Ecology perspective has contributed to elaborate criteria based on social-environmental systems analysis, physiognomic structural elements analysis, multi-functionality, growth limits estimation, multi-scale approach. The analysis of the two historic cases have contributed to underline some aspects concerning their structure, their local dimension, their durability and have been useful for the development of further criteria. The model has been applied to three contemporary linear infrastructure projects planned within the last 50 years, both to test its validity and improve its structure and to understand if any planning drivers have developed cultural landscapes in contemporary projects.

3.1. Considerations and criteria from the Roman Centuriation and the Historical Railways

The Roman Centuriation (III-II century B.C.) relies on a territorial system based on infrastructure networks which generated a cultural landscape with persistent and interactive dynamics. Indeed the infrastructure facilities of Centuriation were used extensively until recently. Starting from the road delimitation, the Centuriation structured agricultural-productive arrangements, urban settlements, social organization as well as infrastructure facilities (aqueducts and roads). This represents an excellent example of a persistent cultural landscape (Caravello and Giacomini 1993). Historical railways which developed until the first half of the XX Century, organized punctually the space they crossed and provided

mobility according to the new needs. They permitted to renovate the majority of the urban areas with modern and symbolic solutions.

Follows a list of the main aspects acknowledged from the two cases.

Roman Centuriazione:

- It is a complex program which is based on the integration and planning of different structural-physical elements, ecosystem elements and socio-cultural elements.
- The starting points: actions on environmental structure (ecosystem regeneration: land reclamation, regulation of water courses), definition of the road network, organization/government of the delimited areas.
- Complex territorial structure characterized by environmental significance (amelioration of environmental conditions, human work as generator of ecosystem diversity), social organization (guaranteed life supply, job, subdivision of properties), ground production (crops around the villas and farms, assured the irrigation of fields), transportation and communication facilities (road network), identity values (affects the way of living, has social-religious importance).
- Replicable model because effective under environmental, social, productive, mobility aspects.
- The landscape is based on integration, equal importance is given to all the factors involved.
- Man-measured dimensions, local management and local use.
- It generates a cultural landscape as it integrates the natural with the human system: it is based on a multifunctional ecosystem with a richness of varieties, and on a social efficient system compatible with the local needs, it allows the development of a know-how.
- The landscape is easily recognizable as an interface between man and resources.
- Economic structure is related to landscape dynamics.
- Flexible-capable of adapting to successive needs/ durable system (its structure is still identifiable within some territories).

Historical railways:

- Deep relation between railway development/ urban development and modernization (new urban structures developed).
- Strong symbolic value (synonym of progress related to modernity, relationship, linkages).
- Railway unifies and canalizes economic interests.
- Interest to link different territories started from the local contexts, local dimension of the projects.
- Railway networks cross and serve territories through a number of small stations (overcoming the dichotomy between the importance of the node, and the necessary presence of the segment to connect nodes).
- Railway is a durable system and it has been reconsidered in the last decades (high speed railway).

3.2. Best practices from spatial planning: sustain, develop and re-start cultural landscape dynamics

Spatial planning is a process whose aim is to drive the actions in a context by means of rules and tools. These are based on some general concepts such as knowledge and awareness of the environment, history, heritage of the project area, and are related to the analysis of the context. Assuming that spatial planning changes a context through a project, it consequently

changes the dynamics of a cultural landscape. The aspects below specify a number of criteria and tools of spatial planning related to the development of contemporary cultural landscapes (best practices). Considering that spatial planning (S.P.) uses a number of tools for the analysis of a context before undertaking a number of actions, the following aspects are divided into criteria and tools for the analysis of the context (first part) and criteria and tools for the actions on a territory (second part).

1st PART: analysis of the context (knowledge and acknowledgment of the resources):

- 1: S.P. process is based on the analysis of local interests/ influences. The analysis of the wills of a local society (e.g. will/necessity to connect to other territories) is a primary step.

Tools to perform such analysis: collection of information from local institutions (municipalities) and local associations (cultural groups); elaboration of studies concerning local demand and local needs.

Cultural landscapes and local interests/ needs: Cultural landscapes rise from the awareness of local societies. The awareness of local landscape values strengthens the common sense which individuates the community and permits to safeguard landscape dynamics carrying out appropriate transformations.

- 2: S.P. process analyzes the cultural heritage of a local society. Studies and analysis already present may be important for the development of a project and are acknowledged by the planning group in order to understand the relations between a society, its heritage, the context.

Tools to perform such analysis: collection and study of local documents, historic documents, archive research; overview of local cultural associations.

Cultural landscapes and heritage of local societies: according to Wagner and Mikesell (1963) cultural landscapes are heritages intended as the outcome of eras of evolution. Landscape is an archive, historic sensitivity is needed to study and carry on its dynamics (Gambi 1996 in Rombai 2002).

- 3: S.P. process analyzes cultural landscape traces within a territory (grasp elements from existing cultural landscape dynamics).

Tools to perform such analysis: acknowledgment and analysis of traditional durable/ sustainable uses of territory (e.g. traditional agricultural system, protected areas); loss of values analysis/repair strategy.

Cultural landscapes and use/protection of territory: cultural landscapes are related to recognizable, identitary elements and to the evolution of peculiar characteristics of local societies which can be related both to the use or the protection of a context.

2nd PART: actions on territories (supporting the resources)

- 4: S.P. process integrates local tools and exogenous tools for the development of the project. It acknowledges exogenous tools/inputs to manage actions carried on at large-scale levels which weigh on local societies.

Tools to perform such actions: emphasize local plans/ projects and intentions; acknowledge European instruments, such as ELC, EIA and SEA for the development of the planning framework.

Cultural landscapes and exogenous-endogenous tools/ actors: in cultural landscapes local societies are the main actors, nevertheless upper institutions have always stronger responsibilities in local changes and in contemporary cultural landscapes development.

They develop from the use of knowledge present in local societies as well as the acknowledgment and use of external cultural resources-tools.

- 5: S.P. process aims at developing an integrated project (each project as part of an integrated project).

Tools to perform such actions: supporting the structure of local milieu, local culture, local settlement, local environment through focused analysis and projects related to the overall project framework (e.g. a linear infrastructure project).

Cultural landscapes and integrated projects: cultural landscapes are the outcome of intertwined natural, cultural, economic, social dynamics: they are a product of the interplay between a given human community with cultural preferences and potentials, and a particular set of natural circumstances. (Wagner and Mikesell 1963).

- 6: S.P. process elaborates multi - scale integrated plans (integrated plans)

Tools to perform such actions: tools introduced by the EU: EIA and SEA procedures; Multi scale approach i.e. large scale plans integrated to focused scale plans: large scale plans (or guideline plans): they provide guidelines to guarantee the needs of ecological and social systems (i.e. ecological networks together with social networks/ infrastructure networks) where the decisions undertaken in case of conflicts between the large scale project with local aspects have to be clarified. Focused scale plans (or local projects): Starting from the guideline plans, they provide solutions for the local contexts, intended as a part of territory where the relations between infrastructure-settlement, morphology-environment, historic-testimonial components are recognizable as unique (Menichini, Caravaggi 2006). Focused projects can contribute to make large-scale projects on a human scale through different solutions. Ex post solutions are required if a project has not been planned under an integrated approach. In these cases, compensations and mitigations are useful both at large and focused scales.

Cultural landscapes and multi-scale plans: cultural landscapes originate from integrated projects. They are outcomes of the interaction between natural and social elements managed at different scale levels.

- 7: S.P. process makes use of tools to guarantee dynamics of local development, guarantee local awareness - opening of the decisional process.

Tools to perform such actions: useful instrument introduced by the Council of Europe: ELC; guarantee processes of participation, construction, elaboration, of the planning framework with local institutions, associations, groups, in order to guarantee added value to territorial culture (awareness, involvement, exchange of knowledge); guarantee an interdisciplinary-based group to structure and develop the project; elaborate tools to facilitate access to information.

Cultural landscapes and participation: cultural landscapes are public/local goods. Exchange of information is basic for their development. Public participation is essential to promote/ support a project based on common interest, local knowledge and sense of belonging of the communities.

- 8: Flexibility of planning tools, use of extra-ordinary, innovative tools for project definition.

Tools to perform such actions: extra- ordinary/innovative studies elaborated also in collaboration with local institutions (public administration, universities) or informal bodies (local associations); pilot project activation; evaluation of alternative solutions; amplification/modification of the objectives during the analysis of resources/uses-needs; acknowledgment of innovative models.

Cultural landscapes and innovation: innovation is at the basis of cultural landscapes development as they are time dependent: the durability of a cultural landscape is related to its capability to answer to the problems of contemporary society-nature interactions.

3.3. Landscape Ecology: sustain, develop and re-start cultural landscape dynamics

The following aspects specify a number of criteria and tools related to the development of contemporary cultural landscapes through a Landscape Ecology (L.E.) oriented planning process. For each one of the six criteria identified, the relations with spatial planning (after Gibelli, Padoa Schioppa 2002) as well as the linkages with cultural landscapes development are underlined.

- 1: L.E. provides tools to analyze complex systems: i.e. systems meta-stability, meta-population, flows, interaction and connectivity - information and exchange of materials, efficiency, heterogeneity, bio-potentiality.

Planning and complex systems: planning tools need to acknowledge the importance of landscape processes, the presence of flows, the role of ecotones, the ability of nature to purify and restore. Meta-stability and meta-population can be guaranteed through the acknowledgment that the survival of species is based on ecological reserves and ecological linkages. (Jongman, Pungetti 2004).

Cultural landscapes and complex systems: cultural landscapes are accessible and not hostile to species which have adapted to such human structures, as they permit meta-stability, meta-population, flows, interaction and connectivity, efficiency, heterogeneity, bio-potentiality. According to Farina (2004) cultural landscapes follow the rules of complex systems. Within cultural landscapes interrelations and exchanges of information are at the basis of their dynamics.

- 2: L.E. provides tools to analyze the physiognomic-structural elements of landscape: patches, corridors, matrices, constitute the environmental mosaic, which is considered the result of the interactions within landscape at ecosystem level. The entire framework where the single elements interact with each other under a dynamic process is the network (as for example the river system).

Planning and the physiognomic-structural elements: natural interconnections have declined on the one hand with the disappearance of forests and river corridors, on the other with the development of human infrastructures (Jongman, Pungetti 2004). At the basis of their restoration there is a planning system which matches the project with the re-creation, or respect, of ecological networks. Managing ecological networks requires an established planning system (Jongman, Pungetti 2004).

Cultural landscapes and the physiognomic-structural elements of landscape: cultural landscapes are guaranteed by the acknowledgment and durable use of the natural matrix. Their development is based on actions which deeply affect the functioning of natural systems through the 'domestication' of its structural elements to make them functional both for the natural and the social system (Farina 2004).

- 3: L.E. provides tools to analyze the changes of physiognomic-structural elements of landscape. Through the changes made by transportation and urban developing modalities, agriculture and forestry practices, landscapes have suffered rapid and often irreversible transformations. An example is provided by Fry and Gustavsson (1996, in Jongman, Pungetti 2004) which examine such changing drivers: changes resulting from the marginalization of farmland and forests and consequent abandonment of

earlier practices (e.g. mountain agriculture); changes arising from the more intensive use of highly productive land. Farming and forestry more intensive, more specialized, at a larger scale (e.g. plain agriculture). Some general emerging effects are landscape de-structuration, disappearance of multi-functionality, homogenization of diversities, cultural and nature simplification.

Planning and the changing processes of physiognomic-structural elements: spatial planning has to focus on how the physiognomic-structural elements of a context have been changing through chronological analyses of the transformations, in order to delineate critic scenarios and apply some rules to manage these changes, which do not lead to an impoverishment of the structure. Spatial patterns changes such as patches, corridors, matrix, mosaic are useful for spatial planning, since spatial pattern strongly controls movements, flows, changes. (Dramstad, Olson, Forman 1996)

Cultural landscapes and the changes of physiognomic-structural elements: cultural landscapes are dynamic, or in other words are evolving processes, where ongoing spontaneous natural activities are integrated with ongoing activities of human communities (Romani 1994). The nature of their composing elements changes, as do their relationships, according to the needs of the society and the adaptive process of the natural system.

- 4: L.E. underlines the importance of multifunctional uses of territory in order to avoid mono-functional and sectorial uses and prevent the impoverishment of ecosystems, the banalization of ecological mosaic, a diseconomy in terms of soil consumption (e.g. intensive agriculture, extensive infrastructure networks).

Planning and the importance of multifunctional uses of territory: multifunctional solutions are guaranteed only through an elaboration of integrated and multi-functional projects, avoiding mono-functionality and exclusion.

Cultural landscapes and multifunctional uses: cultural landscapes are systems characterized by large heterogeneity. This is determined by the presence of a variety of uses (Farina 2004) which enrich the landscape with multifaceted interrelated dynamics.

- 5: L.E. provides tools to guarantee processes of systems through an estimation of the growth limits.

Human structure and infrastructure network have to be compatible with the needs of the integrated natural/ social system. The carrying capacity of the ecosystem has to be analyzed, in order to prevent irreversible transformations. The carrying capacity depends on the amount of resources available in the ecosystem; the size of the population or community; and the amount of resources each individual within the community is consuming (see Encyclopaedia of Sustainable Development, <http://www.ace.mmu.ac.uk/esd/menu.html>).

Planning and system processes/ growth limits: a growth limits estimation is fundamental for a durable development. It is based on a landscape analysis finalized to the individualization of the carrying capacity of a study area in terms of anthropic infrastructures and structures. Follow some planning key-actions whose aim is to support natural-human interactions under a growth limits perspective:

- identification and prioritization of roads/ greenway interfaces: ecologically based landscape linkages (terrestrial, along rivers). In this context a greenway is a corridor of protected open spaces managed for conservation and or recreation (FGP 1999 in Jongman, Pungetti 2004);
- land-use control along linear infrastructure in order to prevent land exploitation (Smith in Jongman, Pungetti 2004);

- where needed, wildlife crossing structures planned together with each road component (single component which works as an integrated nature/society system);
- EIA and SEA procedures constitute a control of the project in relation to the carrying capacity of the system (Gibelli 2002) and may help to monitor the dynamics activated. Cultural landscapes and system processes/ growth limits: cultural landscapes are guaranteed by social systems based on natural matrix and by a compatible interaction of systems. Human actions have increased ecological diversity and have contributed to the ecological complexity of landscapes by using the natural resources. On the contrary, disruptive processes are at the basis of simplified landscapes, characterized by an unlimited growth of the social system.

6: L.E. is based on an integrated multi-scale approach. Large scales analysis provide guidelines to guarantee the exigencies of the system and to prevent incompatibilities with human networks and ecological networks. Intermediate-focused scales analysis evaluate the resources available in a specific area and the limiting factors.

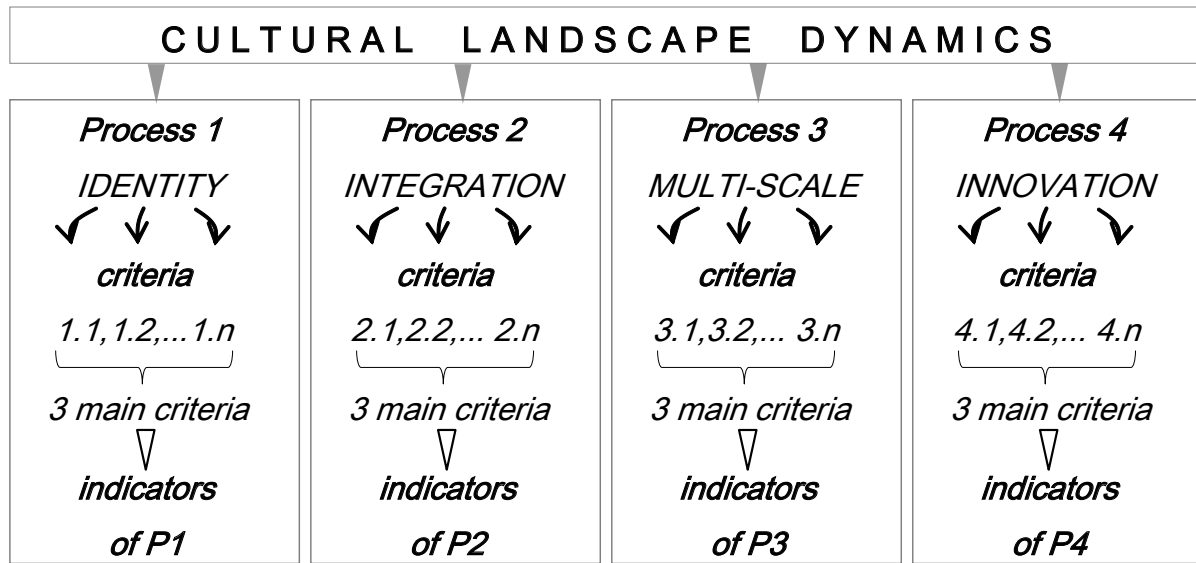
Planning and the multi-scale approach: a strict interrelation occur between the analyses carried out at large, intermediate and focused scales. The analysis at a large scale identifies large interconnections which have to be punctually planned at more focused dimensions, as the limiting factors can be detected and managed only at intermediate and detailed scales. Gibelli (2002) expresses the hierarchy of ecosystems under a spatial perspective: large scales condition the transformations to the more focused scales, whilst the focused scales with their peculiar characteristics and limiting factors affect the asset to the large scales. According to this perspective, territory organization has to be planned with a general large-scale plan and finalized projects at the more focused scales. The motto 'think globally act locally' is based on the need to carry out continuous feedbacks between the different scales (Gibelli, Padoa Schioppa 2002).

Cultural landscapes and multi-scalarity: interdependencies/exchanges between the different scales is a basic aspect for the development of cultural landscapes. An organic landscape is hierarchically organized into micro-units (ecotope) which form the structural basis of a landscape, the mesochores, macrochores (ecosystems), megachores (environmental mosaic) (Romano 1994).

4. CULTURAL LANDSCAPE DYNAMICS INTERPRETATIVE MODEL

The Cultural Landscape Dynamics Interpretative Model (CLDIM) is a result of combined criteria which have been elaborated from the analysis of the two historic cultural landscapes, spatial planning best practices and Landscape Ecology principles applicable to spatial planning. The criteria taken from each domain have been worked out and structured in the model presented in the following scheme.

Figure 4.1. Scheme of the Cultural Landscape dynamics Interpretative Model



The four contemporary landscape processes analyzed underpin the four parts which structure the model. Each part (process) is divided into a number of criteria and a number of indicators which originate from the three main criteria elaborated. The criteria (1.1 ... 4.n) are collected within an analytical-interpretative grid, whose aim is to analyze the present situation of a context and understand a process. The indicators are structured in a table, their goal is to manage a specific planning action. In order to test the validity and improve its structure, the model has been applied to three contemporary linear infrastructure projects. This has permitted to elaborate some considerations on the state of the art of contemporary cultural landscapes development in relation to infrastructure projects.

4.1. Grid of criteria

The aim of the grid of criteria is to analyze the state of the art of a process in relation to a linear infrastructure planning process. The grid is divided into four parts which correspond to the four processes of contemporary cultural landscape dynamics: identity, integration, multi-scale, innovation.

Table 4.1. Grid of Criteria (outline)

IDENTITY PROCESS
Contemporary cultural landscapes are related to identity, as they are based on the cultural expression of local societies. They are related to the evolution of the know-how of local societies. Loss of social interest determines landscape de-structuration.
<i>A.1 Knowledge of dynamics of cultural heritage/ local landscapes</i> → Knowledge/ awareness of the cultural heritage at local level: specialist knowledge (scientific-formal studies) and common awareness (associations, groups), already present and involved in the project definition
<i>A.2 Knowledge of local environment and biodiversity/ evolutions of local environment and biodiversity</i> → Knowledge/ awareness of structural elements of landscape: specialist knowledge (scientific-formal studies) and common awareness (associations, groups) already present and involved in the project definition.
<i>A.3 Which local know-how?</i> → Know-how and skills of the inhabitants of the areas crossed by the infrastructure

A.4 Added value to territorial culture

- Acknowledgment and use of local plans/ projects already present within the areas involved; use of local skills
- Re-activation of traditional territorial structures/approaches (reclaim peculiar traditional landscape structures already present)
- Analyze which different cultures come into contact
- Strength of the local debate related to the project topic. Evaluate the cohesion/rupture percentage of the local debate.
- Evaluate the general utility of the project at local level

INTEGRATION PROCESS

Cultural landscapes are characterized by heterogeneity determined by the presence of a variety of uses: the outcome is an integrated landscape where natural and social processes are compatible. Contemporary cultural landscapes originate from integrated goals: physic, ecosystem, social elements are planned together. They are based on local know-how integrated to experts knowledge (outside tools).

B.1 Territorial project (focus of a planned complex territorial project - includes open spaces, inhabited/productive areas)

- Identify and guarantee, with adequate actions, the presence of flows, the role of ecotones, interaction and connectivity; use the ability of nature to purify and restore through the acknowledgment that the survival of species is based on ecological wellbeing and ecological linkages.
- Coherence/ integration with the existing infrastructure network
- Design new land configurations (relations between infrastructure and protected areas, agricultural areas, settlements which include villages and cities)
- Occasion for landscape re-structuring (opportunity for environmental problems solution/ urban renewal)

B.2 Guarantee/improve multi-functionality

- Guarantee processes through the individuation of uses of territory case-specific (guarantee/improve multi-functionality, variety of uses). Avoid mono-functionality and exclusion

B.3 Openness of the decisional process (integration of actors)

- Capability of the planning actors to incentive socio/cultural inclusion
- Interdisciplinarity of the planning actors
- Involvement of the communities of the place and the interest.

B.4 Project flexibility

- Evaluation of different alternatives, solutions
- Amplification/ construction of the objectives during the resources/ needs analysis

MULTI-SCALE PROCESS

Cultural landscapes are based on a multi-scale system related to interdependencies/exchanges. Natural system: local ecosystem dynamics are related to upper through linkages (e.g. flows and migrations). Social system: in historic cultural landscapes local societies were the main actors. Upper interests which weigh on local systems lead to develop tools (ELC-EIA-SEA) to manage such dynamics at local level.

C.1 Local analysis

- Will to connect expressed by local territories and reasons (provincial-local dimension)
- Analysis of ecological/cultural structure of landscape and dynamics at local level (present - to improve)

C.2 Exogenous analysis

- International, national, regional responsibilities/interests in the planning area
- Multi-scale analysis (without the project effects, ex ante): analysis of the interrelations between local ecological dynamics and dynamics at a large scale level (already present or to be improved). Individuation of hierarchic linkages with local analysis and provision of guidelines in order to guarantee the system needs (ecological networks, socio/cultural networks)

C.3 Growth limits estimation, guarantee of the durability of the structure:

- Growth limits estimation, carrying capacity. Individuation of actions of transformation compatible with the possible equilibriums (identified from the analysis of interrelations between local ecological dynamics and dynamics at large scale level, see criterion c.2)
- Evaluate critic scenarios

C.4 Multi-scale system, systemic project

- multi scale plan (large, intermediate, focused): a project is the outcome of the interrelation of different scales (both for technical choices, socio-economic choices, ecosystem choices).
- Continuous feedbacks among the different scales

C.5 Compensations, transformations: towards a systemic project?

- Compensations: level of integration between the infrastructure planning and the local compensations (nature, culture compensation)
- Transformations: level of integration between the infrastructure planning and the consequent planning of local transformations (infrastructure - soil transformation, apply rules to manage the changes). Land-use control, conservation designation in order to prevent land exploitation

INNOVATION PROCESS

Cultural landscapes are evolving systems and reflect natural and cultural processes which guarantee renewable dynamics. The use of innovative tools compatible with local specificities may denote added value to local know-how. Contemporary cultural landscapes answer to problems of contemporary society-nature interactions

D.1 Use of extra-ordinary tools (ad-hoc)

- Innovative disciplinary outcomes (innovative extra-ordinary studies elaborated by external experts, institutions or informal bodies)
- Pilot projects activation

D.2 National/ international models acknowledged

- Models acknowledged and used as outstanding examples for case-specific aspects

D.3 Learning from the project

- Innovative institutional relations (governance improvement)
- Model exportable to other contexts because recognized compatibility with environment and socio-identity values

D.4 Correspondences between cultural debate at national/ international level and project criteria

- Up-to-date project choices

D.5 Project use and management

- Local users integrated to 'global' users, overcome the dualism node (important) segment (simply necessary to connect nodes)
- Local management integrated to upper management

D.6 New local identities

- Creativities at local level came out with the project. Aptitude to enhance/ renew the local identity

4.2. Indicators table

The aim of the indicators table is to drive a number of actions in order to activate/ support a cultural landscape process in relation to a linear infrastructure plan. The indicators which characterize the second part of the model have been elaborated according to 12 criteria which originate from the interpretative grid. The criteria are divided into the same frameworks of the interpretative grid (identity process, integration process, multi-scale process, innovation process). Each criterion is related to one or more indicators. Some derive from the elaboration of existing indicators, others have been structured *ex novo*. They are divided into pressure indicators and mainly response indicators. The last category aims at addressing a number of actions to contrast pressure factors in order to support cultural landscape dynamics in planning processes, and in general to support sustainable conditions (OCS 2005). The score system related to each indicator has been unified with the aim both at making their compilation easier and allow a compared reading at the end of their elaboration. The score system is a qualitative scale and is based on four levels: +++ = 3; ++ = 2; + = 1; - = 0. The qualitative scale, based on an order by assigning plusses and minuses, is used to describe qualitative effects. This is a useful method as long as the results are interpreted with a degree of caution and not out of context. The scale has a limited number of classes, which often means groups of alternatives may hold the same position. The meaning of each score level is specified for each indicator.

Table 4.2. Indicators table (outline)

PROCESS	CRITERION	DESCRIPTION	MEASURES/ INDICATORS
IDENTITY PROCESS	1: Sustaining local processes for the valorization of cultural heritage	<i>Acknowledgment of the local-social heritage:</i> A. INVOLVEMENT OF ASSOCIATIONS/ GROUPS (related to cultural/environmental heritage) B. INVOLVEMENT OF LOCAL INSTITUTIONS C. ENHANCE EXISTING LOCAL PROJECTS developed by local institutions	A. ASSOCIATIONS/ GROUPS 1.1 <u>Activism of associations/ spontaneous groups in the project elaboration</u> a. in problems identification b. in choosing options c. in the project approval +++ many in the 3 phases ++ many/some in two/three phases + one (few) in one phase - options that did not change the project/ obstructionism because not involved; - no activism from local associations B. LOCAL INSTITUTIONS 1.2 <u>Activism of local institutions in the project elaboration</u> a. in problems identification b. in choosing options c. in the project approval +++ many in the 3 phases ++ many/some in two/ three phases + many/some in one phase - obstructionism because not involved - no activism from local institutions C. USE OF LOCAL PLANS/PROJECTS ALREADY PLANNED IN THE AREAS INVOLVED 1.3 <u>Amplify local plans/ projects already planned in the areas involved</u> +++ acknowledged and re-elaborated where possible ++ re-elaborated in some cases + re-elaborated in few cases - not considered
	2: Managing land quality changes	A. CHANGES OF SURFACES comparison between agricultural land, sustainable land, urban areas reduction B. CONFIGURATION relations between the infrastructure with sensitive areas (natural parks, regional/ provincial parks, Nature 2000, botanic gardens, historical gardens); relations with agricultural areas; relations with urban areas; C. REPAIR STRATEGIES activation of repair measures (mitigations) concerning the relations with sensitive areas, loss of quality value of the fields, loss of quality life	A. CHANGES OF SURFACES 2.1 <u>ha/km expropriated (agricultural, urban, natural)</u> B. CONFIGURATION 2.2 <u>Repair strategies for loss of value in sensitive areas (mitigations: avoid fragmentation, prevent pollution)</u> +++ systemic project (integrated project) ++ shared projects between planners/ local institutions (concerning fragmentation, pollution, disturbance); + some interactions between planners/ local institutions (concerning fragmentation, pollution, disturbance); + money plus guidelines provided to local institutions - no actions 2.3 <u>Repair strategies in the area of production (mitigations: avoid fragmentation, prevent pollution)</u> +++ systemic project ++ shared projects b/w planners/ local institutions + some interaction b/w planners/ local institutions; + money plus guidelines to local institutions - no actions 2.4 <u>Repair strategies to prevent loss of quality life (mitigations: avoid villages fragmentation, prevent pollution)</u> +++ systemic project ++ shared projects b/w planners/ local institutions + some interaction b/w planners/ local institutions; + money plus guidelines provided to local institutions - no actions
	3: Supporting the structure of local milieu	The criterion aims at enhancing whether or not the infrastructure matches with the local milieu. Local utility of the infrastructure?	3.1 % of local/ regional/ national/ international transport 3.2 Objectives and actions declared to support the local milieu +++ main aim since the preliminary steps; +++ integrated (local level- upper level) aim since the preliminary steps ++ enhanced after the presentation to local institutions + considered only after the presentation to local institutions - no actions

INTEGRATION PROCESS	4: Interdisciplinarity	<i>Presence/absence of experts from different disciplines. Early or late presence? (macro-areas: agronomy, architecture, ecology, economy, engineering, geography, geology, history, sociology)</i>	4.1 Participation since the early steps in the project elaboration. Number of disciplines: +++ maximum interdisciplinarity ++ medium/ high interdisciplinarity + few interdisciplinarity - absence of interdisciplinarity 4.2 Calls for specific studies (late/partial participation). Number of disciplines: +++ the majority ++ half + few - one
	5: Integrated land configurations	<i>Capability to carry out an integrated territorial project through integrated solutions which consider urban and environmental solutions in the territories involved</i>	5.1 Occasion for urban renewal +++ widespread approach of the local institutions together with the infrastructure planning group (integrated initiative) ++ approach in some areas of the local institutions together with the infrastr. planning group (integrated initiative) + sporadic cases (local initiative) - no cases 5.2 Occasion for environmental renewal +++ widespread approach of the local institutions together with the infrastructure planning group (integrated initiative) ++ delimited approach of the local institutions together with the infrastructure planning group (integrated initiative) + sporadic cases (local initiative) - no cases 5.3 Coherence/ integration with the existing road-network y/n
	6: Flexibility	<i>Elaboration/evaluation of alternatives projects during the planning phase</i>	6.1 Elaboration and evaluation of alternative projects. +++ elaboration and evaluation of alternatives undertaken by the planning group ++ project re-organization after requests + acknowledgment of limited requests - no alternatives undertaken

MULTI-SCALE PROCESS	7: Multi-level compensations	<i>Relations between planning infrastructure and planning local compensation. Towards a systemic integrated project ?</i>	7.1 Active compensations +++ systemic project (integrated project) ++ shared projects btw planners/ local institutions (master plan) + local independent actions (money provided to local administrations) - no actions
	8: Managing land transformation effects	<i>Relations between planning infrastructure and planning local transformations. Towards a systemic integrated project ?</i>	8.1 Active territorial transformations +++ systemic project (integrated project) ++ shared projects btw planners/ local institutions (master plan) + local independent actions - no actions
	9: Supporting systems complexity A. Infrastructure as a component of a complex system (large scale) B. Infrastructure as a system (intermediate scale) C. Single work as a system (focused scale)	A. infrastructure coherency in relation to the ecological system, settlement system and agricultural areas B. Infrastructure as a system: coherence of typological choices and materials C. Single work as a system: ecological and technical values of the single work (tunnel, viaduct, bare road, trench road) and relation with the context, (settlement system, ecological system)	A. RELATIONS WITH THE EXTERNAL STRUCTURES 9.1 Compatibilities with the ecological network +++ acknowledged: re-structure a new ecological network after the changes provoked ++ acknowledged: provide effective solutions for the majority of the incongruities provoked + provide only sporadic solutions - not considered 9.2 Compatibilities with settlements (inhabited areas) +++ analyze and plan new effective scenarios ++ analyze and plan effective scenarios in some cases + provide only sporadic solutions (mitigations) - not considered 9.3 Compatibilities with land-use values (i.e. agricultural areas) +++ analyze and plan new effective scenarios ++ analyze and plan effective scenarios in some cases + provide only sporadic solutions (mitigations) - not considered B. INFRASTRUCTURE AS A SYSTEM 9.4 Typological and materials coherence +++ planned and recognizable as a unique infrastructure ++ recognizable the coherence for the majority of the infrastructure + recognizable partial coherence - no coherence of solutions 9.5 Comfort for the driver/ traveler considered/ not considered y/n C. SINGLE WORK AS A SYSTEM 9.6 Value 1: technical value (quality of the choices) +++ high value ++ good + fair - low/ not considered 9.7 Value 2: ecological value +++ high value ++ good + fair - low/ not considered 9.8 Value 3: relation between the single work and the context +++ planned considering each different context ++ planned considering different works for a number of different contexts + planned only in sporadic contexts - no relation

INNOVATION PROCESS	10: Models acknowledged	<i>Use of infrastructure project models as guideline</i>	10.1 <u>Acknowledgment of innovative models</u> yes/ no, for which part of the planning process
	11: Extra-ordinary institutional relations	<i>Actions and processes aimed at improving governance (social-institutional learning)</i>	11.1 <u>Supporting experiences of interrelation</u> btw institutions ++ + yes with all/ majority of the institutions involved. Long term duration (at least during planning execution) +++ innovative early experiences of interrelation ++ yes with all/ the majority of the institutions involved. Medium/short term duration (during the planning phase) + with some institutions - sporadic experiences of interrelations 11.2 <u>Ad hoc significant studies</u> elaborated by other institutions and/or informal bodies in itinere/ ex post
	12: Project creativity (inclusion of unusual, complementary, innovative uses)	<i>Capability to overcome the basic mission of the infrastructure (transport) uses of infrastructure spaces for social cohesion - alternatives to transport. Creativities may rise at local level in relation to the project development (e.g. creation of laboratories, exhibitions, cultural meetings)</i>	12.1 <u>Project creativity</u> ++ + ex: creative solutions (e.g. permeable motorway in urban areas - Boulevard JFK, Luxembourg, arch. T. Latz) ++ ex: peculiar projects for complementary aspects i.e. stop areas, specific single works with a symbolic value + ex: call for competition (ideas) for complementary aspects - ex: only transportation 12.2 <u>Creativities at local level</u> born with the project ++ + new/existing associations work out related creative projects. Widespread the outcomes, awaken the society ++ new or existing associations (formal-informal) elaborate creative projects related to the infrastructure project + limited experiences - no reactions at local/ informal level

5. APPLICATION OF THE MODEL TO THREE CASE STUDIES

The three case studies have been chosen following mainly four criteria: select the projects within a national context (Italy) in order to understand the evolution of the approaches of linear infrastructure planning and the related legislative-cultural debate; the period of realization identified according to a peculiar phase concerning linear infrastructures development; the evolution of the approaches of planners and landscape architects concerning the relationships between landscape and infrastructure; the innovative character of a single project identified within each period. Concerning the periods of realization, three different phases have been identified: the 1960s, characterized by the taking off of the Italian motorway network; the 1980s, characterized by a re-launch of the railway network with the high speed railway project as an alternative to the road and flight networks; the 2000s, representative of the nowadays situation concerning linear infrastructure development within high-density extra-urban contexts. The case identified in the 1960s is the Brenner Motorway, located in north-east Italy (regions of Trentino Alto Adige, Veneto, Emilia Romagna). The project demonstrates the attention put in those years to the innovative technical solutions which were at the basis of the rapid development of the road system. In this case the approach to landscape was mainly aesthetic and based on visual choices (use of arboreal and floral species). In general, landscape projects related to linear infrastructures were rare. The second case is the High Speed Railway Bologna-Milan located in north Italy (Emilia Romagna, Lombardy regions). In the 1980s in Italy the attention started to focus on the “environmental” aspect of landscape, which culminated with the acknowledgement of the Environmental Impact Assessment (law 349/1986). In this case, a deep symbolic approach to landscape was carried out in parallel by assigning some exemplary projects to renowned architects. The nowadays case identified is the Pedemontana Lombarda Motorway located in north Italy. The motorway, planned within the Lombardy region, is a picture of the nowadays Italian innovative approach to landscape development in relation to a large infrastructure plan. Particular attention has been put to elaborate the compensation as well as the mitigation aspects through a structured and organic project. A widespread involvement of the local communities (municipalities, local parks) has characterized the elaboration of a number of focused projects.

5.1. Application of the model to the Brenner Motorway

The following considerations are an overview of the information collected by applying the grid of criteria to the case studies. Such information have helped to fill the indicators table whose outcomes will be outlined and compared for the three cases in chapters 6 and 7.

The identity process and the Brenner motorway: the infrastructure planning started from a bottom-up process that began with the creation of a local partnership. The group aimed at planning a new motorway to overcome the isolation of the population of Trentino Alto Adige region by ameliorating the linkages with Austria and the North of Italy. In order to support the choice of the infrastructure lay-out, the connections between the infrastructure with a historic important road were underlined by many studies, as the motorway follows an ancient way used since the Bronze Age (first a path, then a trade way, later a military road).

A certain attention for the land owners was taken into consideration by the planning group through a number of choices which aimed at avoiding the fragmentation of fields where possible, and guaranteeing indemnities for the fields reduction decided together with the representatives of the group of farmers. For what concern their business, in general farmers were indifferent to the effectiveness of the project on such aspect, considering that their attention was mainly related to the local markets. The infrastructure nevertheless

could open to new socio-cultural relationships, as it linked new areas and permitted the development of tourism.

The local associations and institutions were in some cases favorable to the project development, in other cases against, although the majority of the debate was carried on by institutions or bodies directly involved or on the contrary marginalized by the project. Citizens had an active role mainly in the debate upon the crossing of the city of Bolzano and were stimulated by the strong propaganda of the local newspaper *Alto Adige* and some local groups. The areas marginalized by the project presented alternative solutions which were considered a menace, instead of an alternative, by the partnership in charge of planning the infrastructure.

With regards to the relation of the infrastructure with the traditional structure of the territories crossed, many relationships were changed and got lost. The interactions between the infrastructure and the rivers, as well as the relationships between these last and the territories around, was simplified through a rectification of the banks and through an alignment of the infrastructure along the rivers courses.

The integration process and the Brenner Motorway: the infrastructure project answered to an increasing demand for individual transportation. It aimed at overcoming the social isolation of the region with new social linkages and new job opportunities in particular related to the economic and tourist sectors. The land-use plan of the province of Trento (1967), underlined the openness of the province to projects which supported economic development and considered the motorway a step towards this aim. Nevertheless, the acquisition of the agricultural areas for the motorway construction had economical, social and structural relapses. Many farmers suffered a damage for a reduction of their fields and a consequent loss of value. It was impossible for locals to use their skills based on agricultural heritage to evolve in other creative and strong linkages with the context modified by the infrastructure (no relations between motorway and transport of the products, at least in the first years).

Many critiques and dissatisfactions were carried out by the territories cut off from the project which experienced a sense of exclusion. Nevertheless, as underlined previously, planners in charge of the project development together with the local partnership did not take into consideration other solutions. This underlines on the one hand a little transparency in the choice of the project lay-out, on the other hand a strong activism of the local territories which struggled for being included in the project.

In spite of the different skills which took part in the project development (engineers, geologists, economists, architects, surveyors), such experts were not coordinated under a working-group and were contacted only when particular issues had to be solved.

A number of meetings directed to the local institutions were organized by the partnership in some of the cities involved in the project to widespread the studies undertaken in the 1950s concerning trade and economic activities, tourism, public services, job opportunities and road accidents.

The multi-scale process and the Brenner Motorway: a local solidity and optimism underpinned the institution of the local partnership whose goal was the motorway planning and construction. For this reason the linkages between the project management and some local institutions were guaranteed. Nevertheless, some local interests prevailed on others, as the lack of the control from the nation was determinant, and excessive power was recognized to the partnership. Upper institutions did not guarantee a structured framework to coordinate local and super-local actions as many underlined, and other local interest were not taken into account with an impartial perspective. In general, no multi-scale studies were carried out during the preliminary phase, except for geologic and economic analyses. No attention was given to the alteration of the relations between the open spaces and the infrastructure,

nor concerning the rectification/ simplification of the river courses, although in the following years the large use of viaducts that were planned for the motorway was recognized as an optimum solution both for environment and landscape.

A landscape architect was contacted for the elaboration of a project with the aim at ameliorating the aesthetic and the comfort characteristics of the infrastructure. Through the choice of some materials and the use of arboreal and floral species, he provided both punctual and integrated solutions. Nevertheless, his contribution was marginal as he was called after some struggles by the Bolzano province when the main aspects of the project had already been outlined.

The innovation process and the Brenner Motorway: in general the Brenner motorway presented a number of innovative technical solutions elaborated for the first time to overcome many demanding environmental obstacles present along the valleys of the mountainous region of Trentino Alto Adige.

An important innovative approach for the Italian experience, was the involvement of a landscape architect who studied some aesthetic and comfort aspects. The fact that he was contacted only when struggles dependent on the extensive impact of the project within the Bolzano province started to occur, underlines the scarce awareness at the time concerning the impact of a large infrastructure on landscape. Outside the Italian context, to provide an example, in particular in Switzerland, a more evolved planning approach demonstrated a deeper attention concerning the different aspects involved in a large infrastructure project which include cultural, economic, technical, social and environmental aspects. The attention of planners was mainly focused on the urban areas crossed by the motorway and in particular on the city of Bolzano, where many experts analyzed the situation and underlined the importance of designing an outstanding and modern solution.

The local Partnership which managed the project development and execution established an early inter-regional and international work experience between the institutions involved.

According to the cultural debate on the road network development of that years, the Brenner motorway was seen as an investment for the future as well as a way to overcome social exclusion, expand the regional economy and incentive the development of local transportation through a modern and innovative motorway project.

5.2. Application of the model to the High Speed Railway Bologna-Milan

The identity process and the HSR Bologna-Milan: activism is a feature of the local cultural and environmental groups, both spontaneous and structured, which are present with numerous representations within the regions crossed by the project. This consideration is valid in particular for the Emilia Romagna region, where local interest and participation traditionally characterizes the public panorama.

The physiognomic-structural as well as cultural aspects of landscape were underlined by the local administrations and the regional agency for environmental protection (ARPAV) and were used for a project re-definition at regional/ provincial level, considering that the project was preliminarily elaborated by the national HSR group and did not take into consideration local sensitive areas.

In sporadic cases an integration between the HSR project with local projects under development at the time occurred. An example of a project that could benefit of this approach is the *Gessi Bolognesi Park* near Bologna.

At European level one of the HSR objectives is to increase the local (regional) with upper (national-European) relations. The local interventions undertaken by the regions involved together with the provinces and the municipalities have enhanced such a characteristic, through more widespread and numerous connections with the local territories. At local level

the utility of the project is based on the interests of the local economy to speed up the linkages with upper markets as well as to ameliorate and reorganize the local mobility in general.

The integration process and the HSR Bologna Milan: the project is part of a national and international railway network system and is strictly related to the design of a railway high speed line. The choice to work at more integrated projects and to consider the surrounding areas within the planning context was up to the regional and local administrations. In some cases they worked at the development of more complex territorial projects based on the amplification of the objectives of the preliminary national project as well as on a more strong socio-cultural inclusion.

Many changes of the railway lay-out presented by the national HSR group took place according to the protected areas as well as to the need to safeguard the more sensitive local contexts; with this aim, particular attention was put to carry out the mitigation projects. The task to fulfill an integrated coordination of the environmental mitigation projects and to overview the correct execution of the works was assigned to an Environmental Observatory instituted for the occasion. Nevertheless this was not the widespread approach and changes occurred only in some localized areas according to the sensitivity of the local administrations.

By means of a number of prescriptions elaborated at regional and local level, the high speed project Bologna-Milan integrates local users to global users through a creation of linkages based on a number of interconnections between the high speed line and the local railway network.

In the municipality of Reggio Emilia, the HSR became a pretext for an ample urban renewal. The Spanish architect Santiago Calatrava was involved in the project promoted by the municipality. He elaborated a plan for the renewal of the city which included three bridges, the HSR station in Reggio Emilia, a motorway tollbooth and an integrated project developed through green connections.

A number of successful working tables were organized mainly by the regions and in some cases by the local administrations both with institutional and informal groups.

The multi-scale process and the HSR Bologna Milan: the idea of a high speed line was developed at international/ national level. When the preliminary projects were elaborated at national level, no considerations concerning ecological dynamics at different scales were carried out. Regional and local administrations had the opportunity to change the majority of the infrastructure lay-out. The reactions to the preliminary project focused the attention on a number of aspects related to local protected areas and settlements, with the aim at punctually solving the contrasts between some contexts and the infrastructure. Although the presence of an Environmental Observatory and the Procedimental Agreements instituted for the case, a large-scale environmental project was missing, and only environmental solutions related to focused scales were undertaken. A mitigation project was carried out in order to solve some direct consequences produced on local contexts by the new infrastructure (barriers and tree rows to prevent noise and pollution).

A multi-scale transport project was elaborated at regional level through an interconnection of the upper high speed line with the local railways. To avoid a further deterioration of the ecological dynamics and prevent an excessive soil consumption, the regional administration decided to place the new line close to the historic railway and the motorway A14.

As for the environmental aspects, a focused approach was followed for the elaboration of urban solutions. A project renewal of some urban areas was carried out by the municipality of Reggio Emilia. With the purpose to create connections between the new railway project and the urban context, the architect S. Calatrava elaborated a local urban renewal plan within an area of 2 square km which included five outstanding projects (a new railway station, three bridges, a new motorway tollgate).

The innovation process and the HSR Bologna Milan: some innovative disciplinary outcomes (innovative designs of the Reggio Emilia railway station and of three motorway bridges) were carried out in the urban renewal of the city of Reggio Emilia planned with the occasion of the HSR development. Nevertheless, the strong aesthetic value of the projects designed by the architect Calatrava, considered outstanding, cannot be considered examples to reproduce under a start-up vision capable of establishing more punctual renovations at local level.

New experiences of institutional integrations were performed with the Procedimental Agreements and the Environmental Observatories which collected together the commitments of the Ministry of the Environment, the Ministry of Transports, the regions, the national railway society and the Italian high speed railway society (TAV). Such instruments contributed to develop an aware management of the environmental changes due to the introduction of the HSR within the Emilia Romagna and Lombardy regions.

A certain correspondence between the project and the cultural debate which characterized the second half of the XX Century and pointed the attention at the development of a high speed railway system emerges, although other nations were more receptive than Italy in developing the HSR network (e.g. the early project of the France TGV).

As a consequence of the HSR development within Emilia Romagna region, a number of creative projects born at local level: the project "High speed railway line Bologna - Milan", (an activity based on photography surveys, workshops and laboratories) and the project "Km 129" (based on a number of initiatives related to the valorization of the high speed railway works) are two outstanding outcomes. Their aim is to widespread the HSR project as well as to make more aware the local communities concerning the landscape changes induced by the project.

5.3. Application of the model to the Pedemontana Lombarda Motorway

The identity process and Pedemontana Lombarda: the context of the Lombardy region is characterized by a widespread presence of associations and local parks, with a strong cultural as well as environmental awareness. Such local resources, together with the local associations, have been involved in the definition of the compensation project. The collection and re-elaboration of a number of local existing projects to structure the master-plan of the environmental compensations testifies an acknowledgment of the local identities. The elaboration of deep-rooted solutions in some cases have contributed to re-activate traditional territorial matrices such as historic road networks and historic agricultural structures. Nevertheless, such a process has characterized only the compensation project which has been developed after the elaboration of the Pedemontana Lombarda project with the goal to compensate the damages provoked by the motorway. Such a focused attention concerning the local contexts, has led in general to an acceptance of the Pedemontana Lombarda project. As a matter of fact, the idea of planning a motorway along that territories goes back to the 1960s and has always been strongly opposed by the local associations and administrations.

The local know-how based on industrial and entrepreneurial features is strictly linked to the efficiency of the infrastructure network and consequently interested in the development of the new motorway, which opens a new east-west connection. At local level the importance of such a choice is based on a re-elaboration of the context compromised by a congested road system through an efficient as well as lacking connection. The traditional regional road network is indeed radio-centric towards the capital of the region, Milan.

The integration process and Pedemontana Lombarda: a number of choices related to the compensation project guarantee where possible, and in some cases restore, some environmental characteristics. A greenway which follows the infrastructure lay-out is the

green back-bone of the project and in many cases links together a number of local projects related to punctual environmental restorations. For the first time the parks of the region are involved within an organic project whose aim is to interrelate the different north-south natural systems present in Lombardy region which link the plain with the pre-Alps.

The motorway project answers to an historic exigency based on the need to connect the northern part of the region from east to west. This in order to provide an alternative to the radio-centric congested road network structured towards Milan. The motorway nevertheless is defined within a framework where it is still uncertain the lay-out of the high-speed railway project that will be developed in north Italy in the next years: an integrated transportation project is lacking.

Some new land configurations have been designed by the local administrations together with a group of the Milan Polytechnic. In particular a number of multifunctional environmental projects have been developed, such as urban parks and historic agricultural restored areas. Nevertheless, other crucial aspects cannot be affected by the compensations and weaken some existing land configurations: the woods of Bernate and Moronera are taken as an example of this condition. The deterioration of their configuration is even more critical if considering that such remnant woods are included within one of the most densely populated areas of the south Europe, characterized by a rare, in many cases absent, environmental structure.

Co-designing and co-realization have characterized and enriched the building process of the environmental compensations, which represent the outcome of the efficient relationships among the planners in charge of the compensation project, the parks and the institutional levels (the region, the provinces, the municipalities). Nevertheless, the compensation project has to remedy with *ex-post* solutions to the damages caused by the already planned infrastructure lay-out. As a matter of fact, the master plan of the environmental compensations does not follow the practice of the integrated planning but has to 'compensate' to a damn.

The multi-scale process and Pedemontana Lombarda: the local territories included in the north of the region have experienced a re-structuring of the road network through the development of the Pedemontana motorway. The project has a regional-provincial dimension and aims at providing more efficient connections within the congested areas which go from Varese (west) to Bergamo (east). This is the first important connection of the northern part of the region which does not include a direct linkage with Milan.

The new east-west infrastructure project, cuts orthogonally a number of regional and local parks and five rivers. Numerous multi-scale studies have been carried out by the planners in charge of the compensation project to elaborate large-scale solutions (for the first time a green connection along the east-west axis between the parks has been developed) and local level environmental restoration projects. In a number of cases the local solutions are not directly related to the infrastructure and involve different compromised areas.

A multi-level planning process which has involved the region, the provinces, the municipalities and the park bodies has characterized the development of the projects.

Some interesting solutions have been carried out by the architects in charge of the design of the infrastructure components (barriers, service areas, galleries...), through the development of a unitary project based on a coherency of the typological and material choices.

A multi-scalar interrelation between the infrastructure project and the compensation project is absent. As a matter of fact, the latter has been developed with other integrated methodologies and after the design of the infrastructure lay-out.

A land-use control plan of the possible land exploitations of the residual open spaces along the infrastructure remains a lack, as no plans nor programs avoid such possible relapses.

The innovation process and Pedemontana Lombarda: two aspects in particular have been pursued to obtain a quality project: a typological study based on a unique coherent project

and an innovative, organic compensation project. In those two cases, up-to date project choices have been carried out according to the high-quality criteria followed.

The approaches acknowledge the environmental compensation models developed for the infrastructure projects in some European countries, which have been lacking in the Italian context for many years. According to a number of Italian and foreign planners (e.g. S. Boeri, Pedemontana group, Milan Polytechnic; A. Kipar, landscape architect) the compensation project, based on a multi-level structure and coherent relation with local institutions, could even become an Italian/ European model.

Innovative institutional relations have been at the basis of the development of the compensation project, as the importance to create active linkages with the provinces, the municipalities and the park bodies has underpinned its evolution. A shared planning procedure has permitted to develop integrated projects; a financial agreement, has permitted to the local administrations to manage the realization of the local projects.

Creativity is in particular related to the importance of strengthening and valorizing the residual open spaces, which through the compensation projects are transformed in 'open places'. Such local interventions have been planned as start-up projects with the aim at enhancing and spreading a correct environmental and cultural planning approach within the local contexts.

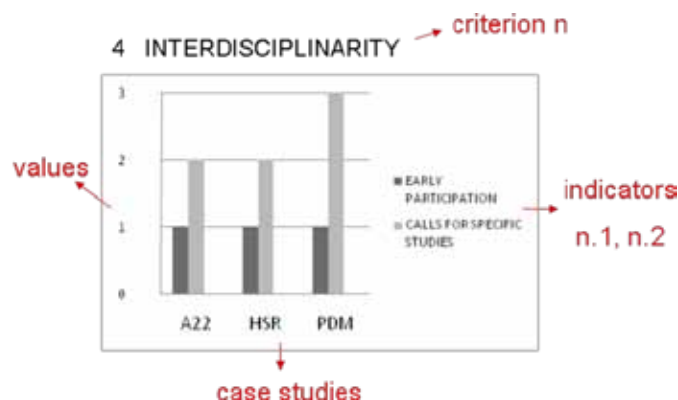
6. RESULTS FROM THE CASE STUDIES

This part will underline the main findings of the work starting from a comparison of the four processes through an elaboration of the outcomes of each case study. Considering that the three projects are innovative for the period in which they are planned, this comparison aims at presenting a first general trend of the modalities of development that cultural landscapes are undertaking. It is important to underline that the three projects represent to some extent exemplary cases, therefore do not characterize the ordinary planning approaches.

6.1. Comparisons and trends of the four processes in the three case studies

In order to structure the comparison a number of graphs have been elaborated. They are the graphic representation of the outcomes of the indicators table, and aim both at underlying and comparing the results of the three case studies. The graphs are based on the 12 criteria which structure the indicators table. Each graph represents a criterion (except for criterion 9 which has been divided into 3 graphs) and collects together the related indicators, as observable in the following sample.

Figure 6.1. Structure of the graph (sample) used for the comparison of the outcomes obtained from the indicators table



The x axis represents the case studies (A22= Brenner Motorway; HSR = high speed railway Bologna-Milan; PDM= Pedemontana Lombarda motorway). The y axis represents the values (- = 0; + = 1; ++ = 2; +++ = 3) and corresponds to the score-system used for each case in the indicators table. The rectangles represent the outcomes of each indicator. In some cases a graphic representation has not been performed, due to the different measurement unit of the indicators (i.e. binary measure, yes/ no). The results have been contextualized in each period. For example, the indicator “technical value” has obtained the maximum score (+++) both in the Brenner motorway case (1960s) and in the Pedemontana Lombarda motorway case, although this last has been planned more than 40 years later.

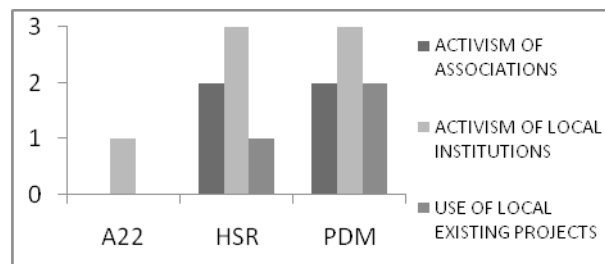
A comparison of the indicator outcomes follows, together with an elaboration of the results divided into the 4 processes.

Identity process: outcomes

The identity process is divided into three criteria: “1. Sustaining local processes for the valorization of cultural heritage”, “2. Managing land quality changes”, “3. Supporting the structure of local milieu”.

1. Sustaining local processes for the valorization of cultural heritage

Indicators: 1.1 “Activism of local associations/ spontaneous groups in the project elaboration”; 1.2 “Activism of local institutions in the project elaboration”; 1.3 “Use of local plans/projects already planned in the areas involved”:



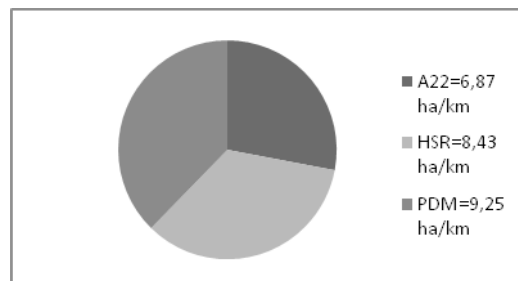
(I)

2. Managing land quality changes

This criterion is divided into 2 parts: a. Changes of surfaces; b. Configuration, repair strategies.

a. Changes of surfaces

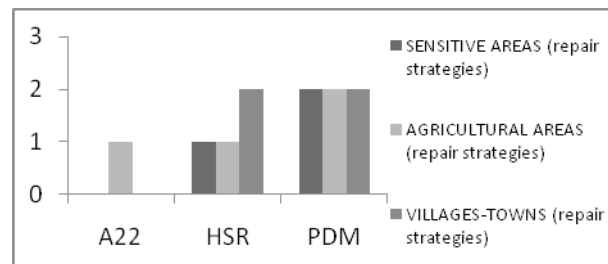
Indicator 2.1 “Hectares per kilometer expropriated” (quantitative measurement unit):



(II)

b. Configuration, repair strategies

Indicators: 2.2 “Repair strategies for loss of value in sensitive areas”, 2.3 “Repair strategies in the areas of production”, 2.4 “Repair strategies to prevent loss of quality life”.

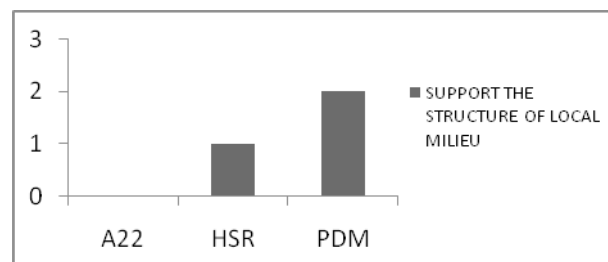


(III)

3. Supporting the structure of local milieu

Indicator 3.1 “Percentage of the local, national, international transport”:

A22: > national/ international; HSR: > national/ international; PDM: > local/ regional
 indicator 3.2 “Objective and actions declared to support the local milieu”.



(IV)

From the comparison of the three cases concerning the identity process, emerges that in general this is growing of importance from the 1960s and characterizes always more the planning process towards a landscape based on identity values. An almost constant development of the planning actions in the direction of the objectives represented by the criteria is observable. This is a result of the improvement of the planning instruments as well as the acknowledgment of the importance of local communities for heritage conservation and renovation. The adoption in the 2000 of the European Landscape Convention and its acknowledgment by a growing number of European states, confirms such an awareness. Nevertheless, as shown by the graphs, the maximum level is still far to be reached in the majority of the cases. An improvement of the process can be obtained through a more active involvement of the local stakeholders, in particular the cultural and environmental associations, which still do not have any influence in the architecture of the decisional bodies (I). A consequence of this is the lack of attention concerning the residual open spaces (e.g. woods), in some cases sacrificed to safeguard other land structures (e.g. agricultural areas characterized by explicit economic values). The inclusion of local projectualities is an aspect to strengthen as well as to consider from the beginning of the planning procedure (in the case of Pedemontana Lombarda it has been undertaken only for the compensation project). Another aspect enhanced is the relation which occurs between the hectares expropriated and the infrastructure (II). Such a phase of the planning procedure requires further investigations as a re-organization of the fields/ open areas consequent to the transformation is needed. To provide an example of the large impact of such an aspect on the local communities, for the High Speed Railway Bologna-Milan thousands farms have been involved in those transformations. The data provided by Pedemontana Lombarda SpA, FSI SpA, and a literature overview as regards the Brenner motorway, demonstrate increasing levels of expropriations from the 1960s. These augments are for the majority consequent to the expropriations for mitigation and compensation projects. Land quality changes have been better managed in the last case (III). Nevertheless a further improvement could be carried out if the project of the infrastructure (which comes earlier) won't be detached from the environmental project (which is planned later as a remedy). In this sense, a change of

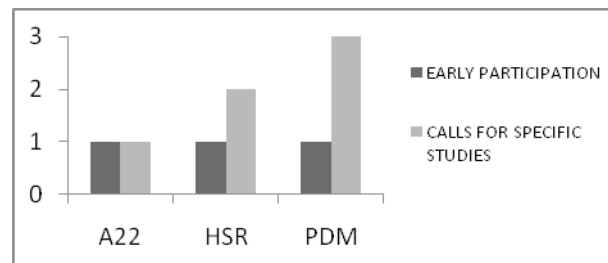
perspectives should be undertaken. The strongest support to the local milieu is observable in the case of the Pedemontana project (VI). As a matter of fact, the aim of the Pedemontana motorway is to sustain the economic structure of the Brianza (area located in the north of Lombardy region). Also the case of the high speed railway is emblematic in this sense, as its primary aim is to link faster the national and international centers, nevertheless the activism of the local institutions permitted to obtain the interconnection between the new line and the local railway network.

Integration process: outcomes

The integration process is divided into three criteria: “4. Interdisciplinarity”, “5. Integrated land configurations”, “6. Flexibility”.

4. Interdisciplinarity

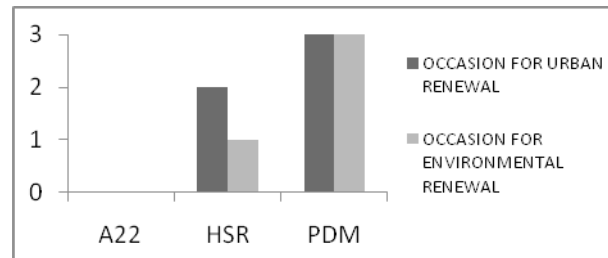
Indicators: 4.1 “Participation since the early steps in the project elaboration”; 4.2 “Calls for specific studies (late-partial participation)”



(V)

5. Integrated land configurations

Indicators 5.1 “Occasion for urban renewal”; 5.2 “Occasion for environmental renewal”.



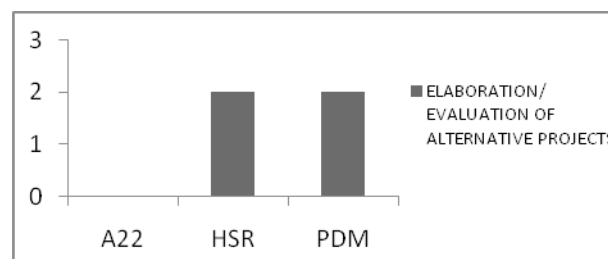
(VI)

Indicator 5.3: “Coherence/integration with the existing road network” (binary measurement unit, yes/no):

A22: Y; HSR: Y; PDM: Y.

6. Flexibility

Indicator 6.1. “Elaboration/ evaluation of alternative projects”



(VII)

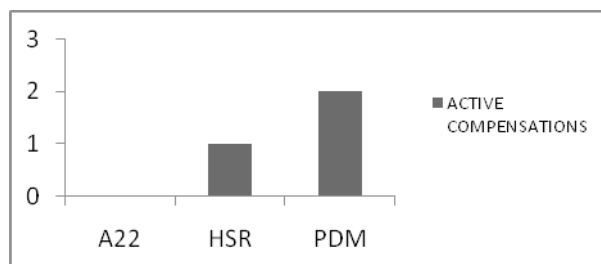
This comparison testifies that the integration process grows following a dynamic which is less homogeneous if compared with the tendency of the identity process. As shown by the graphs, except for some indicators, the desideratum is still far to be reached in a number of cases. In general, a determinant step forward is noticeable in the case of the Pedemontana Lombarda motorway. The participation since the very beginning of the planning phase of multidisciplinary professionals nevertheless (V), is an aspect which has to be reconsidered and improved, as the analysis demonstrates still a low early participation. Good quality levels of urban and environmental renewal related to the infrastructure project have characterized the Pedemontana Lombarda compensation project (VI). In this case a high level of integration between planners and local institutions have been observed. The projects demonstrate growing levels of flexibility in relation to the elaboration and evaluation of the alternatives (VII). Nevertheless, other steps forward need to be undertaken: the detachment which occurs between the early infrastructure lay-out and the changes to the project required by the regional, provincial, local institutions only in some cases lead to effective changes.

Multi-scale process: outcomes

The multi-scale process is divided into three criteria: “7. Multi-level compensations”, “8. Managing land transformation effects”, “9. Supporting systems complexity”.

7. Multi-level compensations

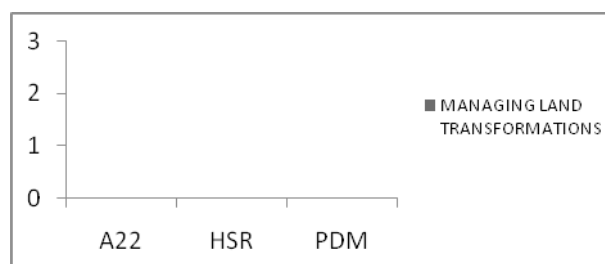
Indicator 7.1 “Active compensations”



(VIII)

8. Managing land transformations effects

Indicator 8.1 “Active territorial transformations”



(IX)

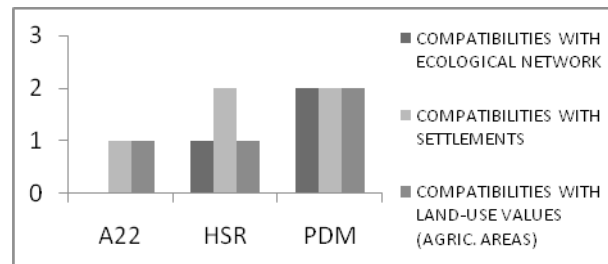
9. Supporting systems complexity

This criterion is divided into three parts: a. Relations with the external structures; b. Infrastructure as a system; c. Single work as a system.

Each part is composed of one or more indicators.

a. Relations with the external structures

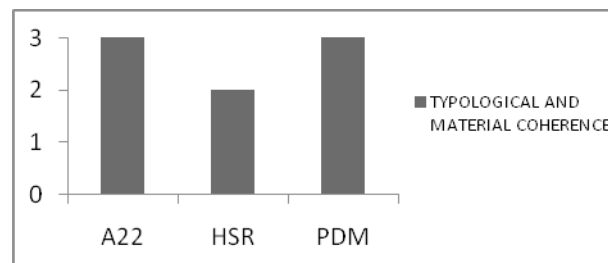
Indicators 9.1 “Compatibilities with the ecological network”; 9.2 “Compatibilities with settlements (inhabited areas)”; 9.3 “Compatibilities with land-use values (e.g. agricultural areas)”



(X)

b. Infrastructure as a system

Indicator 9.4 “Typological and materials coherence”

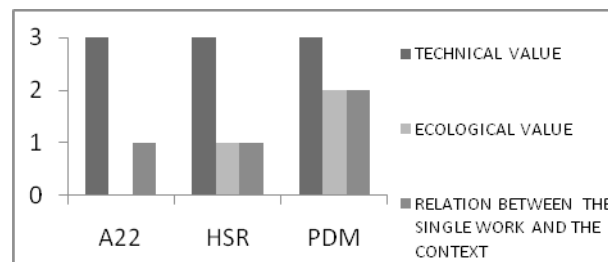


(XI)

Indicator 9.5 “Comfort for the driver/ traveler” (binary measurement unit, yes/ no):
A22: y; hsr: y; pdm: y

c. Single work as a system

Indicators: 9.5 “Technical value”; 9.6 “Ecological value”; 9.7 “Relation between the single work and the context”.



(XII)

The multi-scale process has a variable trend according to the different criteria. In general a tendency towards the desiderata is noticeable. In some cases there is a late development of a dynamic, in other there is a lack of attention, in other a criterion losses of importance. In all the circumstances the better condition is verifiable in the Pedemontana project, except for a case (IX). Two criteria which require some reflections emerge: “multi-level compensation” and “managing land transformation effects”. The first is a prerogative mainly of the Pedemontana Lombarda case (VIII). The analysis underlines a general high value of the compensation project which elaborates ex-post remedial solutions to the infrastructure project designed in advance. In order to improve its outcomes new planning perspectives should be explored towards the development of a systemic integrated project. This should be based on the inclusion and the management of the cultural and environmental dynamics

which characterize the context since the beginning. The second criterion is related to the prevention of land exploitation in the areas involved by the infrastructure (IX). This aspect requires deep attention as satisfying levels of management have not been achieved in the three cases analyzed. The development of an effective multi-scale legal framework which engages the region, the provinces and the municipalities could be a performing solution to manage the areas potentially included in the exploitation. The considerations carried out for the criterion “supporting system complexity” (X, XI, XII), which underlines a multi-scale analysis of the projects, has reached satisfying levels mainly in relation to the intermediate scale and the focused scale. The large-scale level (relations with the external structures) still have to be improved and this can be obtained through the development of a systemic project as underlined above.

Innovation process: outcomes

The innovation process is divided into three criteria: “Innovative models acknowledged”, “Extra-ordinary institutional relations”, “Project creativity”.

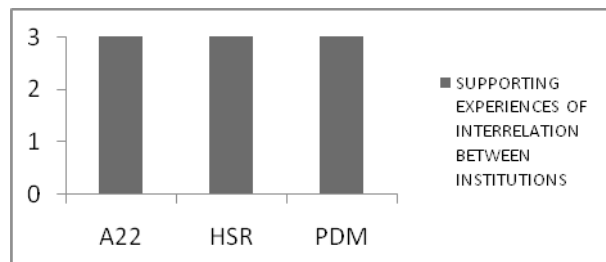
10. Innovative models acknowledged

Indicator 10.1 “Acknowledgment of innovative models” (binary measurement unit):

A22: y; hsr: y; pdm: y

11. Extra-ordinary institutional relations

Indicator 11.1 “Supporting experiences of interrelation between institutions”



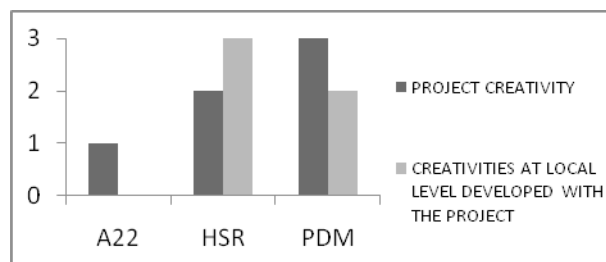
(XIII)

Indicator 11.2 “Ad hoc significant studies elaborated by other institutions [universities...] and/ or informal bodies [associations...]” (binary measurement unit):

A22: y; hsr: y; pdm: y.

12. Project creativity (inclusion of unusual/ complementary/innovative uses)

Indicators 12.1 “Project creativity”; 12.2 “Creativities at local level born with the project”.



(XIV)

Innovation is one of the prerogatives which drove the choice of the three projects. Therefore, such a process is relatively developed for the three cases. However, as visible from the graphs, some differences which have characterized the development of the process from the 1960s are evident. Innovative models have been acknowledged to develop parts

of each project (e.g. to develop the landscape project of the Brenner Motorway, exemplary international models were acknowledged from the US, England, France, Germany). High levels concerning the innovation process have been reached with the three projects in relation to the development of experiences of interrelation between institutions at different levels (governance improvement) (XIII). Good levels of creativity have been achieved to design the single works (XIV). The project of the high speed railway has furthermore experienced the development of local creative reactions based on laboratories, workshops and exhibitions. The aim was that of widespreading the project to the communities in order to start-up some reflections concerning the changing drivers of local landscapes. This experience could be an interesting aspect to re-propose in other contexts through the involvement of the local cultural associations.

7. CONCLUSIONS: AIMS REACHED AND IMPROVEMENTS

The first aim of the model is that of evaluating the development of cultural landscape dynamics related to linear infrastructures development. In this sense the model has been effective as it has been helpful to compare the three case studies as well as to draw a number of conclusions. It has permitted to enhance the strengths and weaknesses of the planning processes with the aim at determining whether or not these have led to the development of cultural landscape dynamics as intended in this research. It has also permitted to evaluate how the processes have been transformed, as well as to enhance which processes have reached a good value and which can be ameliorated and how. The second aim of the model is that of providing a replicable method to reduce the pressure of linear infrastructures on local dynamics in general, and in particular on the historical, cultural, environmental heritage. This can be achieved through the management and support of cultural landscape processes in planning procedures, and this is what the model intends to perform. Its application to future linear infrastructure projects from the very beginning of the planning phase is therefore required to evaluate and improve this second effectiveness.

The present research has been worked out bearing in mind that the interacting processes between natural and human factors underpin the cultural landscapes. Starting from these assumptions, different perspectives and interpretations are possible. This methodology provides one of the possible reading keys. The research intention was that of contributing in making the complexity of cultural landscapes manageable: the resulted model has suggested guidelines for the management of their processes.

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