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The GIS Architecture Elements for the Coastal Areas Along the Adriatic Sea

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Theme D **Geographical information systems and spatial analysis**

Title

The GIS Architecture Elements for the Coastal Areas along the Adriatic Sea

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Key words

GIS Architecture; Landscape Planning; Database Management; Landscape Quality Aims; Strategic Environmental Assessment (SEA)

In this paper we present the aim of the GES.S.TER. project, that is the creation of a protocol for territorial analysis – namely the G.I.S.A.E. Adriatic (Geographical Information System for Activities along the Coast).

The Project is financed by the Interreg IIIA Programme Adriatic Cross Border from 2004 to 2007 (prof. Donatella Cialdea is the Head of GESS.S.TER.). Moreover the Project will be a case-study analysed by the GISIG - Geographical Information Systems International Group.

The areas covered by the project include the national Adriatic coast, in particular the coastal area of Molise, and the cross-border coasts of Albania and Croatia (both partners in the project).

In the definition of the characteristics that a territorial information system of aid to the GES.S.TER project should have, the parameters for the collection of data and for the reordering of the information, which was already in our possession, have been established.

1. The project for the valorisation of the Adriatic coast

The study of the national and cross-border Adriatic coastal areas will be approached by using an interdisciplinary method. A comparative reading will focus on an analysis of the main variations undergone by the area and will try to define all the elements involved in those areas where a conflicting presence exists between high quality environmental factors on the one hand and anthropological aggression on the other.

Studies are currently being set up dealing with the variations of the structure of the territory, landscape and environment of the Adriatic coastal areas; of their morphology and ecology; and experiments regarding alternative solutions for the improvement of supplementary energy sources as well as studies on the possibility of certification of environmental management systems. The project aims at highlighting management and planning in relation to the safeguarding, conservation and valorisation of the natural patrimony. The Geographical Information System to be set up will aid the local authorities of the countries involved by creating a planning tool suitable for the safeguarding of the areas and for the valorisation of any compatible activities therein. Given the real situation of the countries involved in the project, it will take into account the institutional and normative aspects connected to territorial management in each country. The relationship between the urban-territorial system and the environment will be emphasised through an analysis of the settlement system, the agricultural-productive system and the infrastructural networks within areas of environmental quality (**Figure 1**).

The role of agriculture appears to be of primary importance in maintaining a quality environment both in the Italian regions and in the other countries involved: Albania, with its particularly uneven orography which extends along its coastal zone, has a widespread but backward extensive agricultural activity characterized by a notable fragmentation of the land. Croatia, however, has extensive areas of level ground and a rich hydrographical system (with an abundance of water-courses) which permits the development of extensive agricultural and forestry activity. On the coast of the Italian region of Molise for example, many ACI (SIC) areas are present (Areas of Community Interest) which are at present only exist on paper as reserved areas in terms of fauna and vegetation. In fact, to date, no tool exists which has deepened our understanding of the territory, neither do we have studies which determine the criteria necessary for its correct management. On the other side of the Adriatic – in particular along the Croatian coast – many zones have already been declared protected areas and have obtained recognition from UNESCO as being part of world heritage.

The aim of this project is to define the different levels of territorial survey and develop a basic cartography for the countries involved in the project so as to assure the validity of the methodology used in analysing the territory by taking into account the diverse territorial conditions of each country.

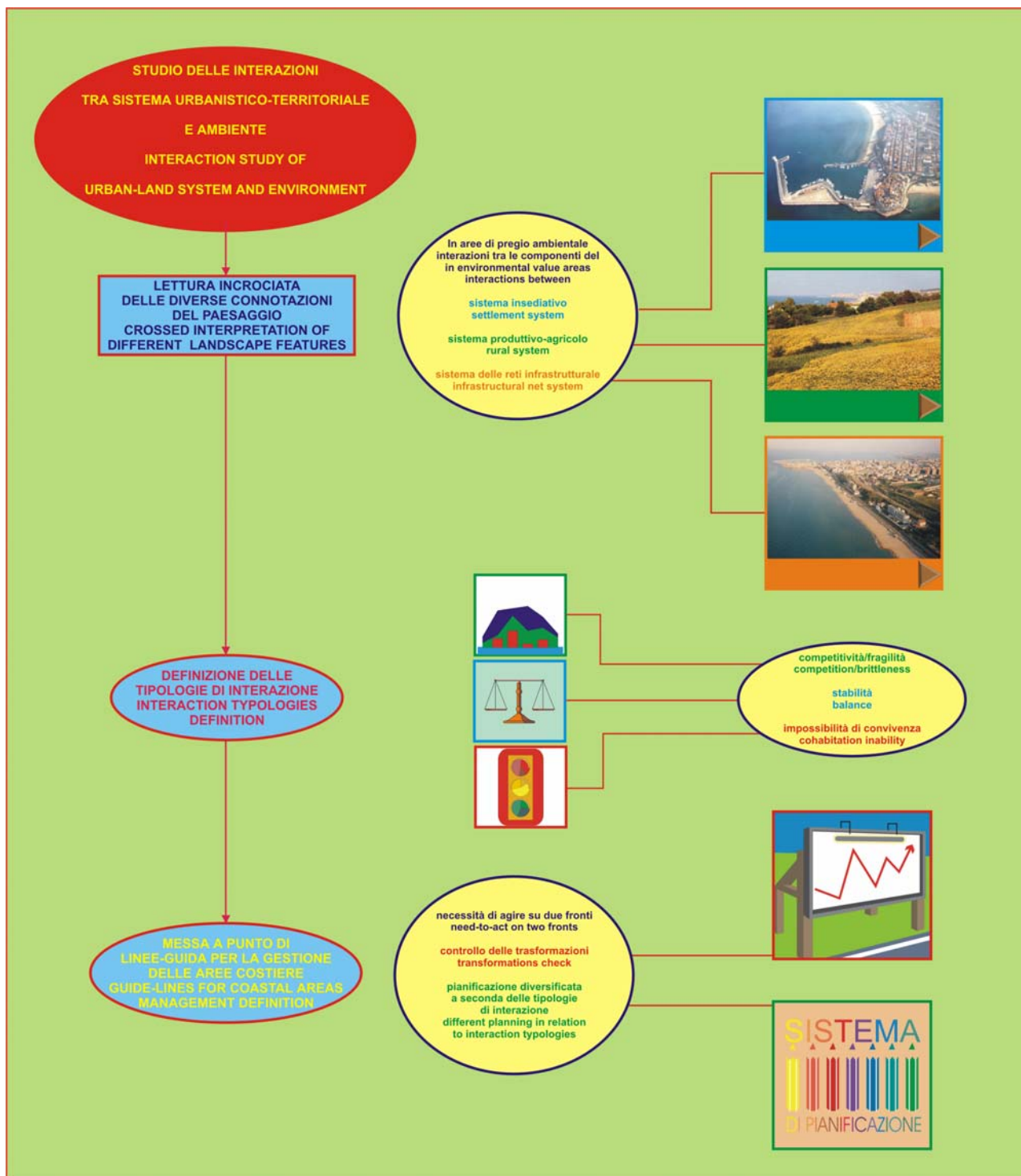


Figure 1 Interaction study between the urban-land system and the environment (D. Cialdea 2005)

As far as Molise is concerned (**Figure 2**) the entire coastal area will be included in the study: its 35km long coast has varying characteristics. Three areas in particular have been the subject of study – the mouths of the three major rivers of the region, the Trigno, the Biferno, and the Saccione. The region, in general, has a low coast with the exception tracts near the town of Termoli, which is set upon a promontory, and near Petacciato between the Trigno and the Biferno. Coastal erosion, which will be studied in detail later on, has effected the entire coastline but is particularly evident near the mouth of the Trigno, where in the past artificial break waters have been constructed in order to provide coastal protection.

Along the coast however, as well as tourist areas we also have the presence of ports, industrial areas, and large infrastructures, which also happen to be the most important structures of the region.

Furthermore lying immediately to the back of a short tract of beach, we have the Molise's three main lines of communication: State road 16, the railway, and the A14 Motorway. These lines of communication, which for the most part run parallel to each other, mark the whole of the coast. Some tracts, as indicated in the figure, run practically side-by-side. State road 16, which runs very close to the beach, was built in the early 1900's . It was the first main coast road and later became the Adriatic State road 16. The railway, built in 1860, also runs very close to the beach and along some tracts is at a distance of only 200 metres. A similar observation can be made of the motorway. Much has been said of the railway. Some claiming it is responsible for serious hydrological damage due to its being constructed a few metres above land level. This situation is considered responsible for the extension of areas already subject to malaria, an increase noted in particular near the mouths of the rivers Sinarca, Biferno and Saccione ^[1].

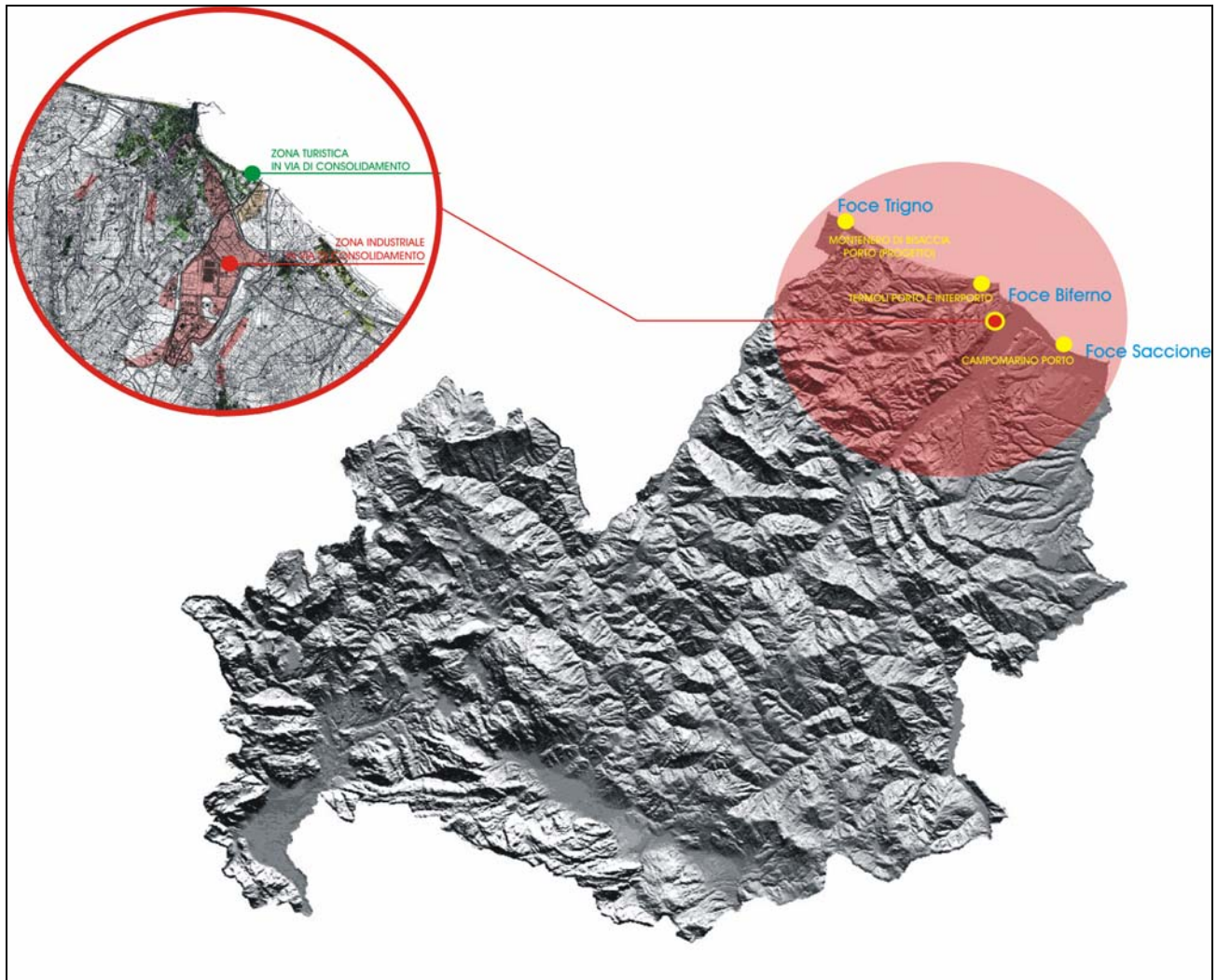


Figure 2 The Molise Region coast (Fonts: Molise Region Hillshade, CTR Molise Region, PTPAAV n. 1 Coastal Area, our interpretation)

In relation to the first cross-border Partner, Croatia, it is a country rich in natural and cultural resources (UNESCO considers these resources to be a part of world heritage).

Moreover, there are many protected areas. Several of which are national parks; four of these are on the coast or on islands. In **Figure 3** we have described the parks around the central area near Spalato: these are the World Reserve of the Velebit Massif Biosphere which covers 165 km along the coast, (MaB Reserve since 1978); The Krha National Park, site of the most beautiful river in Dalmatia, with canyons, lakes, rapids and waterfalls (the Scardina waterfall falls from a tuff barrier 46m high); The Kornati National Park established in 1980, with more than 100 islands within a stretch of sea that is only, 35 km long and 13 km wide; The Markarska Riviera to the south-east of Spalato.

The Croatian territory can be subdivided into three geographical areas: the coastal zone, with its many

islands; the alpine-mountain zone, of which more than half is covered by woods and is inhabited by only 3% of the population. The Dinaric Alps are the backbone of the Croatia - like the Italian Apennines and they end on the Adriatic shore with high and rocky coasts (see the Velebit mountain chain or the two canyons, the Velika and the Mala Paklenica, with rocky faces 400 m high and which have numerous caverns); and finally the Pannonian Valley belt to the north (Slovenia and Zagabria).

The rivers of the central mountain area and of the Adriatic coastal belt flow towards the Adriatic.

Areas of interest for our project are the deltas of the Cetina and the Neretva (see **Figure 3**).

The Cetina River, a Karsick watercourse with a potent flow, is currently subject to a number of threats: urbanization, inadequate water sewage system and overuse due to the exploitation of hydroelectric power, especially along the last part of its course.

Further south along the Croatian coast, we have indicated another area of interest: the Neretva delta.

It is a wide river with an abundance of water which in its low course creates large areas of swamp and marshlands. "Between the end of the 19th and beginning of the 20th centuries the delta, which had been used merely for eel fishing, was in part reclaimed. The lands were drained using a system similar to that of the Dutch polders and were then used for cultivation; the reclaimed areas were used for particular kinds of cultivation – today the cultivation of clementines prevails. The remaining marshlands have been declared a natural reserve, allowing birds to nest and fish to reproduce undisturbed ^[2].



Figure 3 The most notable features of the Dalmatian coast (Fonts: TCI, Photos Mondadori 2004 and Dumont 2003, our interpretation)

The other cross-border Partner is Albania whose territory is characterized by a particularly uneven and irregular mountain formation: this is especially so in the north where the mountain formation stretches along the coast. A series of alluvial plains of origin are also present along the northern coast, with marshy areas and numerous lagoons situated between the river mouths. The southern coast is generally high and rocky. There are also many protected areas, even though they are not subject to a real and efficient protection measures.

Figure 4 highlights the area south of Tirana with the Karavasta Lagoon. This was included as a protected area in 1994 under the Convention of Ramsar. It is the most important ecosystem in Albania. Another interesting area included in the Convention of Ramsar is Lake Butrint in southern Albania on the Ionian Sea. In the northern part of the lake, remains of the coast land reclamation undertaken by the socialist administration can be seen. The marshland areas of the coast of Albania form the country's best ecosystem ^[3].



Figure 4 The Albanian coast (Fonts: images from www.ramsar.org/photo_sites_alb_butrint1.htm and www.wetlands.org/RDB/europe/albania_site.html er pianta karavasta)

In relation to our research methodology we have produced **Figure 5** to illustrate the project's progress. The activities foreseen over the next three years are: 1. land survey; 2. data collection; 3. data processing finalized to the creation of the Geographical Information System for the coastal areas. In the land survey phase, which has already started, we have defined the study aims, the criteria for land areas identification and the methodology used to collect the data necessary for defining the indicators.

We will highlight the presence of quality environmental areas with different characteristics through suitable matrices for land interpretation.

These matrices will emphasise the territorial distinctiveness of each area under study, and will link them both to the characteristics of each natural environment and to the restriction policies currently in use.

The aim of international cooperation will emerge from the creation of an outline containing specific Environmental Units whose definition is aimed at the drafting of specific planning tools.

The study of potential environmental risk and an eco-compatible valorisation of quality resources will contribute to the creation of a unified scheme for the definition of territorial variation.

The next phase, is that of data collation, intended as the collection of information about land features and environmental characteristics, that we consider important for the safeguarding and the valorisation of the coastal areas.

The general aim is the construction of a database containing information from different disciplines used in the study. Consequently, each component of the database will be defined according to specific kind of data, with unit of measurement, source, and time reference.

After which a synthesis will be developed of these indices for a final drafting of the indicators considered useful in environmental evaluation.

The last phase, the data processing, concerns also the interpretation and analysis of the results.

The aim is to create the following:

- a specific system of cartography (data-bank and maps on the climate, geomorphology, soil, faunal distribution, vegetation, variations in land use)
- a network which will allow the regional and local authorities of areas with specific problems to organize international collaboration on projects which will help mitigate or prevent problems of environmental degradation
- a network for the reconstruction of the history and identity of the areas concerned (to be developed for each territorial reality - including Albanian and Croatian cultural areas in Italy), and the creation of museums on land history

- a system for the setting up of prototypes for experimentation on energy systems and their verification in the different territories where they will be established
- a brand trademark for environmental quality for those working in quality environment areas.

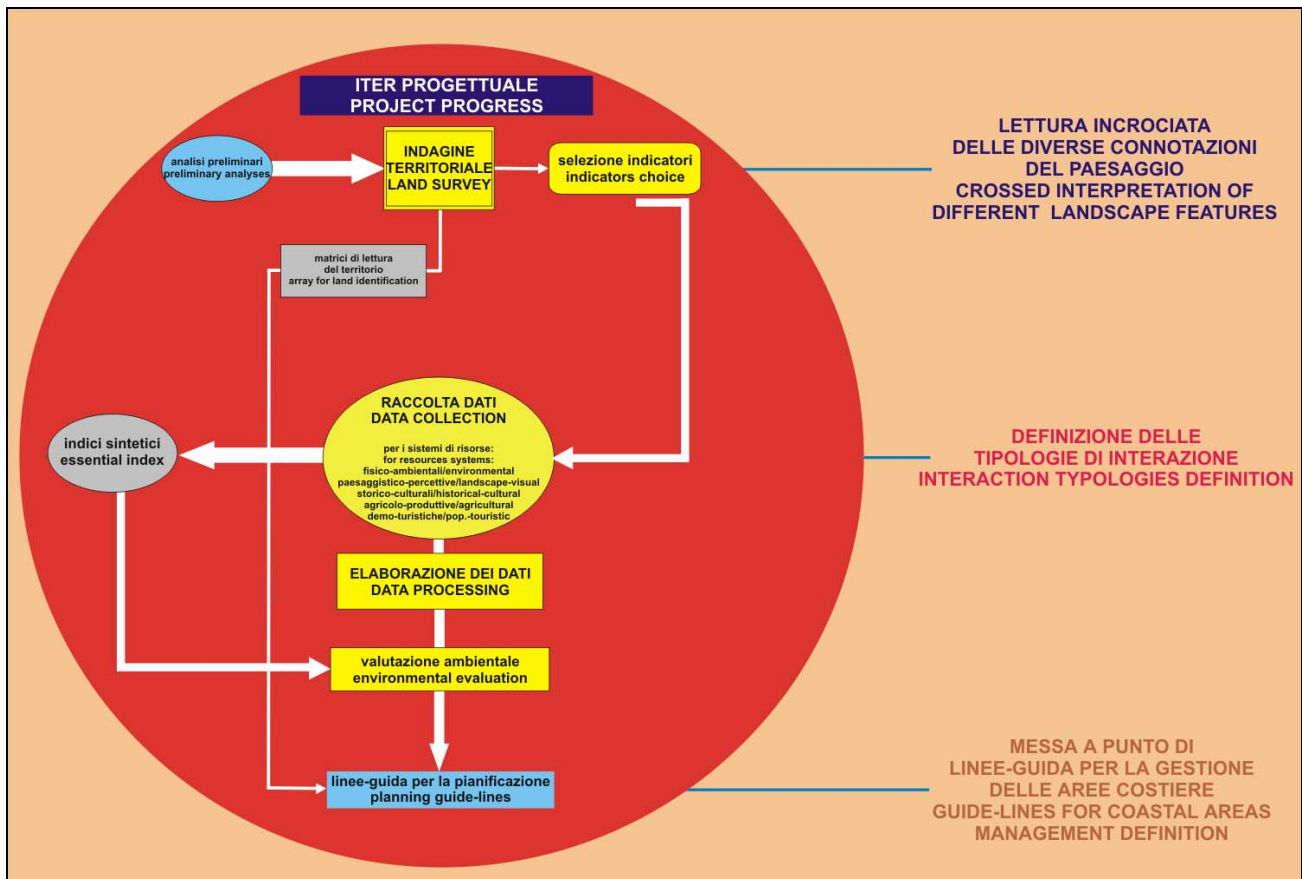


Figure 5 The project progress (D. Cialdea 2004)

2. The principles of GIS aimed at landscape valorisation

The GIS started initially as a desire for the "mechanization of the process of map production" ^[4] and so its aim was to substitute cartography on paper with a database that would be both flexible and easy to update.

This system has since been perfected, so that it now offers the possibility of superimposing the various themes that have been dealt with in a way that would be useful for a better understanding and study of territorial analysis.

The possibility of using GIS for information, both in raster format as well as in vector format or a combination of both, has extended the capacity of the system as well as the number of its potential users.

This data processing tool, upon which the territorial information system is based therefore has the task of being an information archive which also allows elaboration and analysis, as well providing spatial representations.

The GIS architecture, as well as being a system which allows the memorizing, storage, manipulation, and analysis of data, should be organized with the aim of optimizing data comparison. It should also be used, according to the purposes of the system, for the creation of representations, the visualization and analysis of the geographical data itself.

In the definition of the characteristics that a territorial information system of aid to the GES.S.TER project should have, the parameters for the collection of data and for the reordering of the information, which was already in our possession, have been established. Another necessary step has been that of revising and coordinating the existing sources, keeping in mind that the final purpose of the system is to define the objective landscape qualities, we find ourselves having to face the problem of combining, and consequently, comparing, information coming from different sources.

The first step, therefore, has been to provide the basis for the creation of an archive of available information. The archive should be uniform and comparable, the aim being to render effective the system of correlation and utilization, which must become an element of support for the final evaluations to which the GIS is destined.

In particular, as far as the territory of Molise is concerned, a technical regional cartography (1:5.000) is available; furthermore, we have a series of photogram films taken with a certain regularity (from the 1950s to the present day) and we also have easy access satellite photographs.

A further source of information comes from the analysis carried out during the drawing up of the Vast Area Environmental Landscape Territorial Plans (VAELTP), which the Region adopted in the early nineties. In particular, the area under examination is at present covered by the VAELTP no. 1 Coastal strip that includes all the local councils and municipalities along the coast. Even in this case, however, the use made of information contained on maps produced for that purpose, is subject to the verification of data in the event that use is made of it that differs from that for which it was originally developed.

The GES.S.TER project also foresees a comparison between variations in land use with the evolution of the environmental characteristics of the area under study. Consequently, it has become necessary to deepen the study of those environmental aspects which in this case have to be evaluated through opportunistically selected indicators, but which must have some kind of territorial reference determined on a regular basis. Consequently, we have checked the patrimony of the data accumulated by the Region of Molise with the aim of drawing up an *ex ante* environmental evaluation of the ORP Operative Regional Programme (POR) Molise ^[5] and this data has been further elaborated.

The aim is to understand the transformations which have occurred through time, but also to come to an understanding of the principle environmental mechanisms which have provoked or which could provoke modifications through time.

This information must also be correlated to social economic information relative to the municipalities of the area: it is fundamental, therefore, to make use of information technology to be able to set up a system of evaluation of the interactions between all the available data.

These different steps or phases are closely linked to one another: the phase of the organization of the data bank had the primary aim of guaranteeing both in quantitative and qualitative terms, the possibility of data management. The data, as described above, is mainly derived from the elaboration of maps as well as information obtained telemetrically, but it must also be comparable with data obtained from censuses or from up-to-date surveys. This basic data must possess the requisites of being usable and accessible. Their management must be guaranteed by the possibility of their being continuously updated and easily transferable, with the aim of creating links with the already existing data banks.

The elaboration of different levels of information consisted of the comparison and correlation of these levels in order to create an *ad hoc* elaboration highlighting the dynamics of transformation that might develop on the territory in a pre-established and/or limited period.

The comparative phase between the different information available is aimed at setting up the first evaluations for the definition of the objectives of quality landscape for each single territorial area identified within that same area under examination. These will be related to the three fundamental objectives that have been placed as the basis of our study, that is to say: the conservation, compatible development and restoration of the territory.

The scientific community concurs in the belief that the availability of territorial data is fundamental for the efficacy of environmental safeguarding policy.

The European Union proposed, via a directive, the creation of a Community territorial information infrastructure (INSPIRE). The Directive makes the following consideration: "The problems related to the availability, quality, organization, and accessibility of territorial information are common to many issues of policy and categories of information, these problems exist at every level of the public administration. Their resolution involves measures to be taken in the areas of exchange, sharing, access and utilization of territorial data and of the related services coming from different sectors and levels of the public administration. Therefore, an infrastructure for territorial information needs to be set up in the Community" ^[6].

The European Sixth Action Programme for environmental issues, aimed at increasing awareness in the public and in local administrations (informed participation). It also aimed at deepening scientific knowledge and increasing the quality of data and information on the state of the environment. The INSPIRE directive aimed at setting the foundations (material and abstract) to permit access to territorial data and render them useful.

The problems related to the above become clear when attempting to obtain information necessary to define the characteristics of the coastal areas of Molise (region where use is made of territorial data obtained from past studies). Greater problems are presented when dealing with other countries with

altogether different historical and environmental characteristics. It becomes necessary to identify territorial parameters for these countries that are in some way homogenous and comparable with data obtained for the coastal areas of Molise.

The difficulty of using information available on the Italian coast, (for which no metadata is not available), is compounded by the difficulty of obtaining information on the trans-frontier countries. A further problem arises when, having obtained this information, it needs to be compared with our information and that when used in strategic environmental evaluation, is able to give reliable results.

Metadata ^[7] is particularly useful for research on available information, but an insufficient quantity of metadata is available. Only a few places similar to a 'library' resource existed where territorial data sets could be consulted before the advent of internet and this data was contained on supports that were difficult to duplicate and/or reproduce.

The INSPIRE directive obliges the member states to develop metadata within certain time limits, see the entire (Chapter II) on the subject ^[8].

The JRC (Joint Research Centre) ^[9] drew up the directive and it offers technical support for this Community need. In fact, within Europe the GIS has become an indispensable tool given the ever-increasing importance of territorial issues.

The INSPIRE Directive is based on the need to harmonize territorial data and to guarantee them a geographical quality; given that all the themes related to the environment (data on water, woods, climate, soil, and biodiversity) have a spatial dimension. The GIS is an extremely efficient and necessary instrument for the evaluation of the effects of variations in these parameters.

If a directive from the European Parliament was deemed necessary to make territorial data available, then at least two things are implicit:

The first is that throughout the European Union there are serious limits to the availability of data, despite the fact that the need for such data is considered to be of vital importance. The second is that the aim of obtaining data availability, a complex issue that requires a definition of a series of standards of interoperability as well as some minimum requirements for the infrastructure whose function is to manage the data.

The INSPIRE Directive indicates that simple goodwill is insufficient to make data available – not least because no efficient system for doing so is yet available. It is necessary therefore, to invest in financial and human resources for the creation of a system of data and protocols that will make the technical availability of data possible ^[10].

In the case of the GES.S.TER project, the aim is to create an information system that takes into consideration the parameters connected to the productive activity in areas of environmental quality, whilst bearing in mind the aim of drawing up a planning tool for the valorisation of the coast.

It is for these reasons that within the GES.S.TER project a link has been established to the Nature-Gis group (a European thematic network dealing with protected areas and Geographical Information), whose main aim is the creation of interaction between those who use GIS in areas where the need to protect nature is paramount ^[11].

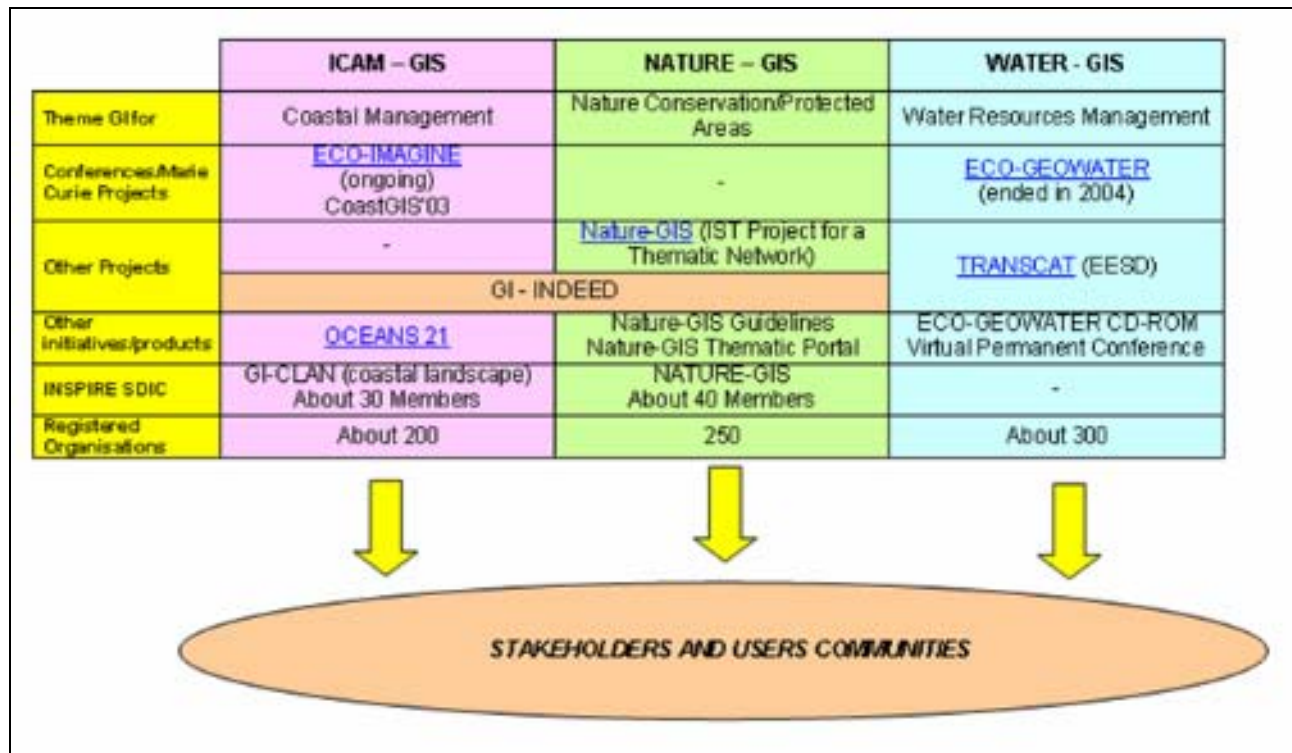
The Nature-GIS network, by permitting access to quality geographical information, "will make an important contribution within the VI European Environmental Action Plan, and will become a focal point for the exchange of information and identification of specific GI-GIS requirements. The aim is to promote the protection of nature and biodiversity through a complete series of initiatives and policies at European level. Nature-GIS will also indicate in what way information is to be managed and will create a structure for a spatial database. The project will permit access via internet to complete GIS high quality information on the protected natural areas of Europe. The project team will also produce guidelines for the infrastructures and data relative to the protected areas. The aim being to contribute to the improvement of access to geographical data and its exchange, thanks to the process of standardization".

It is for this reason that the GISIG group has created some SDICs, (Spatial Data Interest Community), for both the protected and coastal areas.

The first SDIC refers to the proposal for an INSPIRE Spatial Data Interest Community expressly linked to NATURE-GIS relative to geographical information in the protected areas and to the conservation of nature, (Geo-information in Protected Areas and Nature Conservation) ^[12]. The second SDIC refers to a proposal for an INSPIRE Spatial Data Interest Community linked to a GI-Clan relative to geographical information that regards the coastal landscape of the Mediterranean in particular (Geo-Information Community in Coastal Landscape) ^[13].

The University of Molise, and the GES.S.TER project group on its behalf, takes part in both groups. It is considered a useful relationship with the (Community) which enriches this study through the experience

and under the supervision of the most important international group dealing with the issues of geographical information use as an aid to the safeguarding of the territory. It is undertaken in the spirit of GES.S.TER, which deals with the protection, and valorisation of the coast along the Adriatic (**Figure 6**).



THE CONCEPT OF SPATIAL DATA INTEREST COMMUNITIES (SDIC)

Groups involved in specific territorial data/services

- THE TERRITORIAL DATA IS USED BY COMMUNITIES OF MULTIPLE USERS
- INSPIRE CAN BE DEALT WITH THROUGH A NETWORK OF SDICS
 - which include human expertise, technical competence, financial and political resources of the data providers, service providers, users, with an interest in better resource management and the development of innovative service
- STAKEHOLDERS FORM A SDIC BECAUSE THEY HAVE A COMMON INTEREST IN:
 - Diverse data types (INSPIRE Annexes I, II, and III)
 - Services
 - Legal and procedural processes (data policy, monitoring etc....)
 - Sectors of society (public services, private sector, research centres...)
 - Role within the chain
 - Legal mandate for the management of data, users, providers, associations....
 - Geographical area

WITHIN THE AMBIT OF THE CALL INSPIRE GISIG HAS PROPOSED TWO THEMATIC SDIC

GI-CLAN: Geo-Information Community in Coastal Landscape

e

NATURE-GIS: Geo-Information In Protected Areas And Nature Conservation

Figure 6 The GISIG Activities (G. Saio 2005)

3. Information collection

The criteria have been defined for the selection of the indicators that will be useful for the assessment of transformations through time of the territories being studied. Five resource systems have been selected:

- physical-environmental
- landscape-visual
- historical-cultural
- agricultural-productive
- Demographic-tourism.

As far as the *first system* is concerned, it includes the indicators relating to Climate and Atmospheric conditions, Water and waterways, and Marine and coastal environments. The indicators selected can be obtained from a number of sources – The Council Department for Public Works of the Molise Region, the Arpa Molise, and the Consortium for the Industrial Development of the Biferno Valley.

The analysis of the data, which can be found in historical series, will be compared with information obtained from Soil Science and Geological Maps as well as from Geomorphologic maps already drawn up by the region and which include the period from 1954 to 1992. Maps of hydrological restrictions will also be consulted and a map of environmental danger related to landslide and hydrological risk based upon the most recent regional studies will be produced.

The *second system* aims at defining the diversity of the territory. The morphology of the land and the settlement system will be the particular object of this part of the report. These will be examined through a reading of the values already attributed to them in current landscape plans. We will also examine the evolution of the land areas subject to landscape restrictions as well as the landscape values currently attributed to these areas. A map will also be produced of the officially recognized natural ecosystems based upon the SIC sites identified by the Natura 2000 Network. Finally, information will also be obtained from Regional Vegetation Maps (1954-1992) and from maps drawn up by the Regional Administration of Corine Land Cover level IV soil use.

The *historical-cultural resource system* will be analysed through a reading of the elements and areas currently subject to restrictions for historical reasons, through an identification of building typology and through an analysis of landscape (visibility). The analysis of areas subject to restrictions will be made by studying each protected historical building and archaeological site. The Systems of buildings will be analysed with an emphasis on the different typologies such as historical centres, rural buildings, towers and coastal defence systems, buildings that were a product of land reforms, large estates, post-earthquake reconstructions, monastic and religious buildings, buildings linked to drove-roads, and buildings associated to waterways.

The *fourth system*, related to productive-agricultural resources, aims at defining the functions of agriculture in the territory under examination. This will entail an analysis of the land areas (on the basis of historical census information and the disgregation of local towns) and the fruition of the land in agricultural terms (based upon local council indicators as well as indicators based upon the presence of farms). All activities linked to agriculture will be examined: the traditional farm type, the industrial type, and agricultural tourism. Particular attention will be paid to irrigation, given that the coastal areas, as well as the pre-coastal strips, are major areas of irrigation.

The *fifth and final resource system*, demographic-tourism, will at first be analysed making use of subdivision of local township indicators. These indicate demographic changes, including changes in the farming population, which will then be compared to specific indicators linked to industrial activity. Verification of local council urban planning tools will be included, and attention will be focused on the large infrastructures foreseen, as these are responsible for major landscape variations, particularly those linked to the sea, ports and inter-ports as well as land communication systems, whether these include further development of pre-existing systems or the creation of new infrastructures.

As regards the organisation of the data base it must be stressed that the primary objective is the construction of a data model which, although maintaining the distinctiveness of the diverse areas of territorial investigation and the diverse types of source, constitutes a single methodology for the identification of indicators that are useful for the definition of landscape quality objectives.

As a result of the phase of data collection a substantial amount of information is available, which from here on will be called *sources*. Most of the available sources are already structured, but there are several cases in which the information is in raw form and not immediately usable (aerial photographs, descriptive sources etc...). It is therefore necessary to refine and standardize this bulk of information in order to extract a minimum set of data (*elementary data*) to be used for formulating the indicators.

Moreover, as the choice has been made to work with GIS, the data and indicators in question must have a territorial reference.

The following model (**Figure 7**) describes in macro the data base model used to organise the process of identification of the indicators.

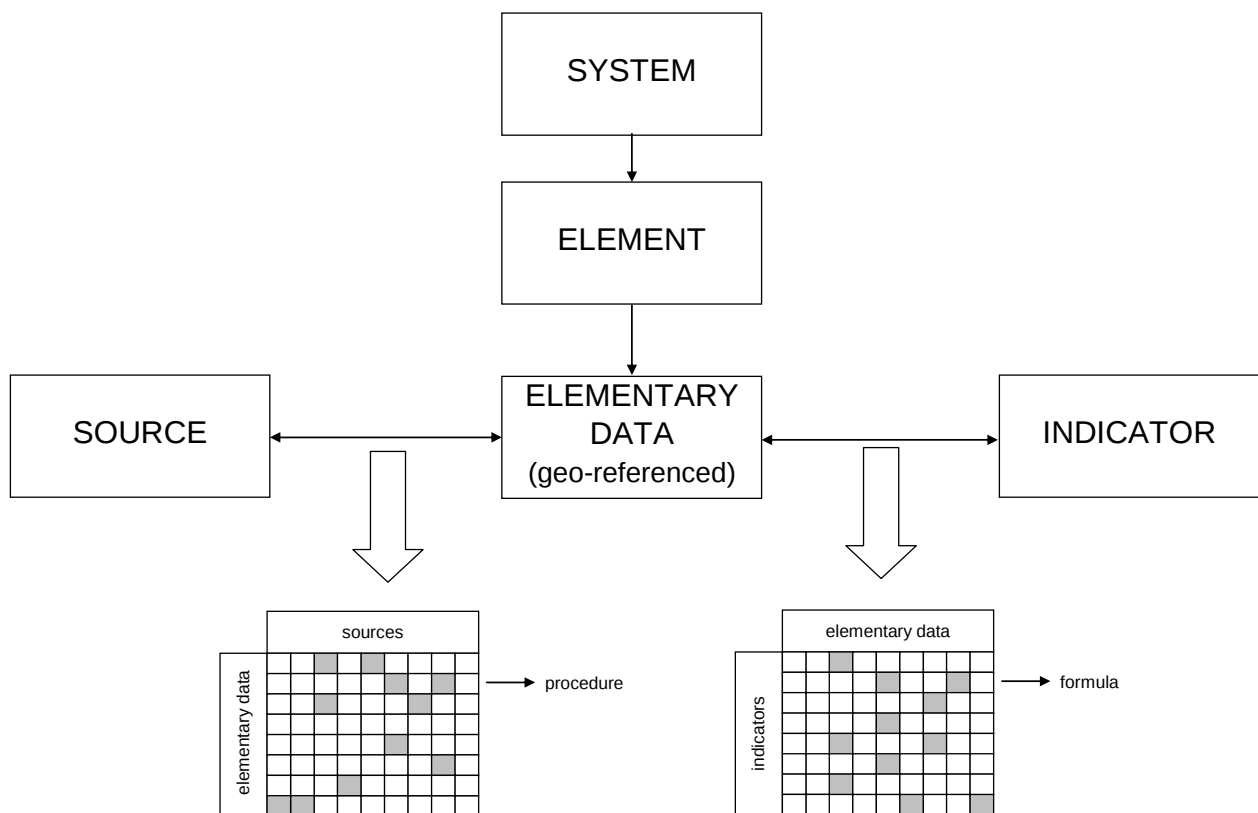


Figure 7 Data base model (Vitiello Di Nucci 2006)

For each source found the elementary data which are of interest are identified: where the source is already structured this operation is relatively easy, whilst it becomes necessary to construct (process) the data if the available sources are descriptive. Moreover, it is possible that a single data typology may be extrapolated by cross referencing diverse sources, whilst the same source may produce several types of elementary data.

As regards methodology it is useful to represent this passage using a matrix, in order to document the criteria for the identification of elementary data, especially in situations where the data is not immediately usable. It would also be useful to describe the path (*procedure*) which lead to the identification of the data beginning with the sources, which will also include geo-referencing, if territorial data is not involved. In this phase, as in the entire process of model construction, work is undertaken making constant reference to the 5 resource systems and to the *elements* characterising these systems: this hierarchy is used as a discriminant and guide for the derivation of elementary data and indicators.

The elementary data thus identified constitute the nucleus of the data base and support for the *Adriatic G.I.S.A.E. (Geographical Information System for Activities along the Coast)*.

During the planning phase of the data base particular attention should be paid to the description of the elementary data, especially if the intention is to extend the project and its methodology to other countries. The objective to be aimed at is the gathering and/or production of metadata from the territorial data inserted into the data base, in conformity with the INSPIRE directive, using a structure of metadata compatible with the ISO/TC 211 standard (**Figure 7a**).

Once a set of elementary data organised in a territorial data base and suitably described is available for each resource system, the indicators, intended as a synthesis of the elementary data, can be identified. Within the ambit of each resource system the indicators must gauge factors of attention, risk and assessment for each element.

RESOURCE SYSTEM	ELEMENT	ELEMENTARY DATA	CODE	TIME REFERENCE	DATA SOURCE	FILE NAME
PHYSICAL-ENVIRONMENTAL						

	ONLY IF IT IS A CARTHOGRAPHIC DIGITAL DATA		ONLY IF IT IS A CARTHOGRAPHIC DIGITAL OR PAPER DATA		ONLY IF IT IS A NO CARTHOGRAPHIC DATA
	RASTER	VECTOR			
DATA TYPOLOGY	PIXEL RESOLUTION	FEATURE CLASS	SCALE AND GEOGRAPHICAL REFERENCE SYSTEM	MINIME PERFORMABLE ENTITY	LAND REFERENCE

Figure 7a From sources to elementary data(Vitiello Di Nucci 2006)

The elementary data must then be interpreted following these three directions: the interpretative work must be summarised in a *formula* which describes how the data, to which a weight can be attributed, is combined in order to arrive at the identification of an indicator (Figure 7b)

INDICATORS		SYSTEM N 1 PHYSICAL-ENVIRONMENTAL									formula
		ELEMENT N. 1			ELEMENT N. 2			ELEMENT N. 3			
		ELEMENTARY DATA			ELEMENTARY DATA			ELEMENTARY DATA			
ACTUAL											
TIME EVOLUTION											
PREVISIONAL											

Figure 7b From elementary data to indicators (Vitiello Di Nucci 2006)

4. The Assessment of Landscape Quality

Any interpretation of the territory must highlight the connotations and the distinctive aspects of the landscape.

In the literature on the subject, there is in fact no uniformity of opinion on how to define a landscape quality ^[14]. Very often, the approach to the study of the landscape is based upon the type of values that are to be attributed to each single component involved in the analysis. Furthermore, in Italy, and here we would need to have a better understanding of what happens in the countries of our partners of the project, the role of the agencies involved in the safeguarding of landscape heritage, is often taken up by a section of the Ministry for Culture Heritage and Activities as well as by the Regions.

The landscape is, in fact, analyzed through its different components as constituting assets or patrimonies to be safeguarded and for which restrictive solutions are often proposed; solutions which are given within a system of interpretation for each patrimonial category.

This interpretation, in fact, is far removed from a vision of what constitutes the "landscape patrimony".

The landscape should be understood as having its own characteristics, each of which is to be safeguarded and which is constituted by a multiplicity of factors that compose it. In addition, the identification of the whole of these elements ought to guide the safeguarding of the landscape, to which will then be attributed the recognition as a "special place".

The history of attention to the landscape has in fact utilized methods and points of view that have changed through time.

In Italy, the planning tool dealing with the protection of the landscape has been the Landscape Plan of which mention was first made in 1939. In that year, two laws were promulgated: Statute L. 1089 ^[15] and Statute L. 1497 ^[16], which introduce the concept of restrictions on the patrimonies to be protected.

In particular, Statute L. 1089/39 dealt with the safeguarding of all that is of historical and artistic interest, whether it is movable or not and tries to create historical restrictions for their integrity. Statute 1497/39 deals with the protection of areas of panoramic and natural beauty and foresees the creation of landscape restrictions on those areas of patrimony for which a list must be made and for which eventual interventions in those areas would be subject to the granting of an authorization.

In the presence of landscape restrictions, any work projects to be undertaken must be authorized by the competent authorities. In fact, this latter Statute also foresees the creation of territorial landscape plans regulated by the successive Statute 1357/40, whose aim is to centralize any changes in the landscape and not make it depend upon single local authorizations. Landscape, insofar as it is an environment to be safeguarded, is considered for the first time a public patrimony.

It was only in the mid-eighties that a new law was produced, Statute n. 431/85 ^[17], also known as the Galasso Law, which introduced new concepts for the safeguarding of zones of particular environmental interest. This law established for the first time the obligation, on the part of the Regions, to carry out an effective, organic and systematic safeguarding of its territory. The Regions are called upon to discover those areas that need safeguarding and are obliged to produce, for those areas, Vast Area Landscape Environmental Territorial Plans. The major innovation in this law is that attention is not only placed on intervention for individual or exceptional natural patrimonies but the need is felt to look at the entire environmental system and is, in effect, composed of the natural, environmental as well as cultural and historical patrimonies.

For the elements of particular interest the plan defines the modes of land transformation.

The landscape plans of Molise ^[18], for example, foresee two kinds of interventions: A1 Conservation; having present day use and A2 Conservation with partial transformation due to the introduction of new compatible uses. Territorial transformation can make use of the AA Advisability Assessment (VA) model. This form of transformation must be subject to verification during the formation of urban planning tools. It must be checked through the study of the compatibility and admissibility of anthropological transformation (due to settlements, infrastructures or productive uses). These must remain within the guidelines of the CT Conditioned Transformation (TC). This may be the CT1, a conditioned transformation as a planning necessity which must be verified at the moment in which authorization is given according to Statute 1497/39, or CT2 (a conditioned transformation to project requisites which must be verified during the granting of authorization according to Statute 10/77).

There is, however, a great difference between the conception of restrictions according to Statute 1497/39 and Statute 431/85 c.d, the so-called Galasso Law. For the first, in fact, any landscape restriction is a legislative tool that guarantees the safeguarding of the aesthetic and visual aspects of the landscape. The second law however, extends the concept to the environment in its totality and includes all those aspects that are necessary for the safeguarding of the environment.

Following the Galasso Law, at the end of the nineties a Unified Text ^[19] was produced, with the aim of putting together all the legislation available on the issue of environmental and cultural patrimony.

At the beginning of 2004, the New Code dealing with landscape and cultural patrimony was definitively presented ^[20]. This law came into effect in May of the same year and was subsequently supplemented with a decree issued by the Presidency of the Council of Ministers at the end of 2005. (note: see the Supplement to the Code for the cultural and environmental patrimony [d.lgs. of the 22nd January 2004, No. 42] as foreseen by sect. 10, clause 4 of the enabling act of the 6th July 2002 No.137 the meeting of the Council of Ministers on the 18th November 2005 annulled the legislative decree containing the corrective and supplementary dispositions of the Code(DPCM of the 12th December 2005, published in the G.U. No. 25 of the 31st January 2006).

The New Code, in fact, makes use of the concept of landscape patrimony rather than environmental patrimony, intending by this to highlight the multiple components of the landscape, components which go from the morphology of the land to its architecture and its history without ignoring, obviously, its environmental component ^[21].

The great novelty consists in the fact that the aim is not simply to safeguard the landscape but also to valorise it. This occurs due to the necessity of fulfilling the regulations of the reform of Chapter 5 of the National Constitution that makes a distinction between all activities relating to safeguarding from those relating to valorisation. The text states that the cultural patrimony must be protected and conserved so that it can be made use of by the collective majority ^[22]. Regional governments and Local Agencies are therefore called upon to organize activities aimed at creating an integrated system of valorisation of the patrimony. Inevitably, in organizing the regulations which regard the safeguarding and the valorisation of landscape patrimony, the New Code takes into consideration the *European Landscape Convention* ^[15] and in defining the criteria for those activities which would be permitted on the landscape. It has also highlighted the possibility of sustainable development and, through this, the possibility of minimising of any impact, and the assuring the planning quality of the works or any interventions which it may be necessary to undertake in areas of particular value ^[22].

The Planning Tool will play a fundamental role. The first innovation, in contrast to the preceding norms, and in contrast to the Unified Text, is that the planning must also take into consideration the entire regional territory. As noted, the Galasso Law obliges the Regions to define the areas in which to define landscape planning, but the plans themselves did not necessarily have to include the whole Region. This has been the situation in Molise, for example, which has at least 8 landscape plans but has left uncovered by legislation some very large areas, such as for example the area of the town of Isernia and other municipalities in the surrounding area and above all the vast area of central Molise ^[23].

Another important innovation is in the content that the new plan, now called the Landscape Plan, should possess. First of all the plans must begin with the whole of the regional territory and deal with homogeneous areas, and for these homogeneous areas it must specify that they can include both areas of high quality landscape or quality landscape as well as those areas which have already been compromised or degraded. This is an important fact, because it means that the plan must now highlight the diverse levels of value within landscape and must re-qualify degraded environments, in essence it must define all the different kinds of safeguarding and valorisation of the entire regional patrimony.

Another important consideration is the value that the plan must establish for each objective concerning landscape quality. These objectives may be quality landscapes recognised as already existing and consequently to be preserved, or the will to improve the landscape through interventions aimed at re-qualification. It might be useful to cite briefly the Statement of Intent given by the Ministry regarding the above: "The primary conservation activity of the values and morphologies typical of the territory must be supported by an elaboration of general lines of development which are compatible with respect to the different levels of those values already established. Any development must not, in any way, diminish the value of the landscape and it must, in particular, safeguard those agricultural areas that receive particular attention in the provisions. Amongst the objectives is also included the re-qualification of areas compromised or degraded and as a consequence the recuperation of the values lost or the creation of a new landscape or completely new landscape values." ^[22, 24]

Finally, the Code indicates the functions of the plan and here it is necessary to emphasize another innovation. The Plan has three functions: the landscape plan must have a descriptive content as well as a prescriptive one, and must also contain a proposal. Consequently, a survey should be made of the entire territory through an analysis of these characteristics, and an analysis must be made of the dynamics of transformation of the territory through an identification of the risk factors and through the vulnerable elements within the landscape. Furthermore, landscape areas and the relative objectives of landscape quality must be identified ^[24]. Consequently the plans must include all those measures for the conservation of the particular characteristics of the areas that have been safeguarded by law and when necessary of management criteria and any interventions aimed at the valorisation of the landscape or real estate, as well as of those areas declared to be of notable public interest. An identification must be

made of all the interventions to recuperate and re-qualify of all those areas that have been notably compromised or degraded as well as identifying the necessary measures for the correct utilization of interventions of transformation on the territory within the landscape context.

It is important to underline how all the interventions which are to take place on the landscape will need to be preceded by agreements that are to be stipulated between each single Region and the Ministry for the elaboration of a landscape plan. The aim is to smooth out any possible incomprehension or differences of opinion between the two agencies. This will allow the safeguarding of the landscape and its valorisation to be effected on the basis of a common agreement.

The aim of the work to be carried out in the coastal areas of Molise is to define a methodology for the definition of the objectives for the quality of the landscape with the intention of contributing to the development of new landscape plans. The aim being to set up a system of territorial survey based upon a GIS, which has been created with that specific aim in mind. This work will also be proposed to the trans-frontier countries bearing in mind the differences due to divergent competence between the agencies responsible for the safeguarding of the landscape. Consequently, in **Figure 8**, you can see the chart that will be used for the definitions of these objectives. They will be distinguished in *general aims* and *specific aims*. The general aim consists in the control of the dynamics of transformation through indicators distinguished for each single resource system which have already been identified (see **Figure 5**), and which highlight the relationship between the conditions of the landscape within each area identified as well as its territorial context. It also indicates the impact which some components have had on the environment and the definition of a scheme of potential quality objects.

The specific aims will be defined through an analysis of the qualitative and quantitative individual elements identified previously for each territorial area and will be the basis for the definition of interventions or any works of conservation on the territory, of compatible development or re-qualification of the territory which would be considered necessary for each situation.



Figure 8 Landscape Quality Aims Definition (D. Cialdea 2005)

5. An Approach To The Landscape Planning Procedure

The approach used in drawing up a landscape plan is based upon the importance of environmental planning in the initial stage of the plan itself. This allows the assessment of any consequences the proposals presented by the plan may have in causing changes in territorial use.

The plan takes into account general objectives, the safeguarding of the environment, and the protection of nature, the defence of the soil and the continuation of the agricultural activity, keeping in mind a necessary differentiation due to interactions with other land use. All this is particularly important in a Region like Molise where agricultural activity is of primary importance notwithstanding the difficulties linked to the diverse land situations ^[25].

The aims of the new landscape plans are based on the importance of defining the local landscapes that are to be safeguarded. This is to be understood as the desire to appreciate and attribute value to the resources and the economy of the territory. The landscape plan is, therefore, an indispensable tool for the evaluation of sustainable land development. It is also a source of innovation.

The Regions that have already drawn up such plans have concentrated on certain key areas. The Region of Emilia-Romagna ^[26] emphasises the importance of the agreements made between the central State authorities and the Regional administrations. It also emphasises the need to clarify the meaning of 'landscape' bearing in mind the New Code as well as the principles established by the European Convention on Landscapes ^[27]. It states the necessity of coordinating the planning tools used in the process.

Some basic criteria must be respected, such as the fact that the plans should be based on 'a full collaboration in defining aims and criteria for the purposes of safeguarding and re-integrating the values inherent in landscapes, while aiming at a sustainable development of the territory'. The ruling is the natural consequence of jurisprudential indications on the issue of the relationship between agencies finalized towards the application of Para.9 of the Constitution. (It is also a consequence) of the new institutional structure based on the modification of Chapter V, part II, of the Constitution, in particular Para.114.

The debate over the definition of landscape is based on the divergent views of the concept expressed in the new Code and the European Convention. The former defines landscape as 'homogenous parts of territory deriving from the interaction between nature and human activity', while the latter defines landscape as 'that area which must in its entirety be safeguarded to retain its distinctive characteristics'. As far as coordination between the various planning tools is concerned, it is maintained that, "Landscape planning provisions are to be immediately cogent for the planning tools of Local Councils, Metropolitan Cities, and Provincial Administrative areas. They must also have priority over conflicting provisions that may be present in urban plans; landscape planning provisions also have precedence over the provisions of planning acts" ^[26].

Some areas, such as the Province of Bolzano ^[28], attribute major significance to agricultural aspects of the landscape: "The particular features of our rural landscape are due to the traditional farming methods which are respectful of nature and have been used for centuries by our farmers. The role of agriculture and forestry goes well beyond the production of foodstuffs and primary materials. Careful land use offers a higher standard of living and is increasingly important with respect to the unilateral increase in production at the expense of ecological well-being." Provincial Administration regulations pay attention to areas of cultivation, in particular shrubby areas, semi-mountainous areas, or areas where *malgas* are situated (Alpine shepherd huts), must integrate with the provisions made for the valorisation of the ecological-landscape of meadows, and pasturelands for intensive exploitation or cultivation of fruit.

Landscape plans, however, follow the same logic as planning in general, even if this approach has been criticized, "the Code, despite having a wide range of programming methodologies available, has preferred to adopt the urban planning approach by making use of zoning, prescription, and in the methods of putting things into effect" ^[29].

As a probable counterweight to the regulations of the prescriptive system of current-day landscape plans, the drawing up of new landscape plans follows the territorial planning method (based upon the importance of identifying the transformations of territorial land use). This should render these plans more objective and not so dependent on discretionary restrictive norms.

It would have been better however, if landscape plans were to be more respectful of the particular aspects of each territorial area and the drawing up of these plans could have been entrusted to suitable agencies such as the Provincial administrations to which legislation has granted the right to manage environmental issues. Provincial administrations should "together with local authorities and the needs of the local population, draw up provincial landscape plans of the various land patrimonies as foreseen by Para.134 of the code and to consider these as necessary aspects of the provincial plans. These must

then be contained in the urban plans through planning agreements. In many regional legislations (e.g. in Lombardy) provincial planning includes the contents and effects of provincial landscape plans.” [30]. Another possibly interesting approach might be to define landscape planning according to territorial areas as is used in Basin Plans where the functionality of different areas is taken into account. This would be better than adopting a single regional plan that does not take into account the specific realities of different land areas for which it should provide guidance on safeguarding and development [31]. Another thing to be considered regards the territorial area of the programme subject of this research; the coastal areas where two different environmental systems interact – the land and water environments. It is a particular situation where different productive activities are involved. Consequently, this aspect has been highlighted in the identification of the values of this area of the landscape of Molise [32]. Of particular importance is the definition of the procedure for the putting into effect of the plan that must be supported by agreements between the agencies and administrative institutions involved. This procedure should be aimed at creating concerted action. In the following **Figure 9**, a procedure is described for the new landscape plan that we intend to follow during the course of this research.

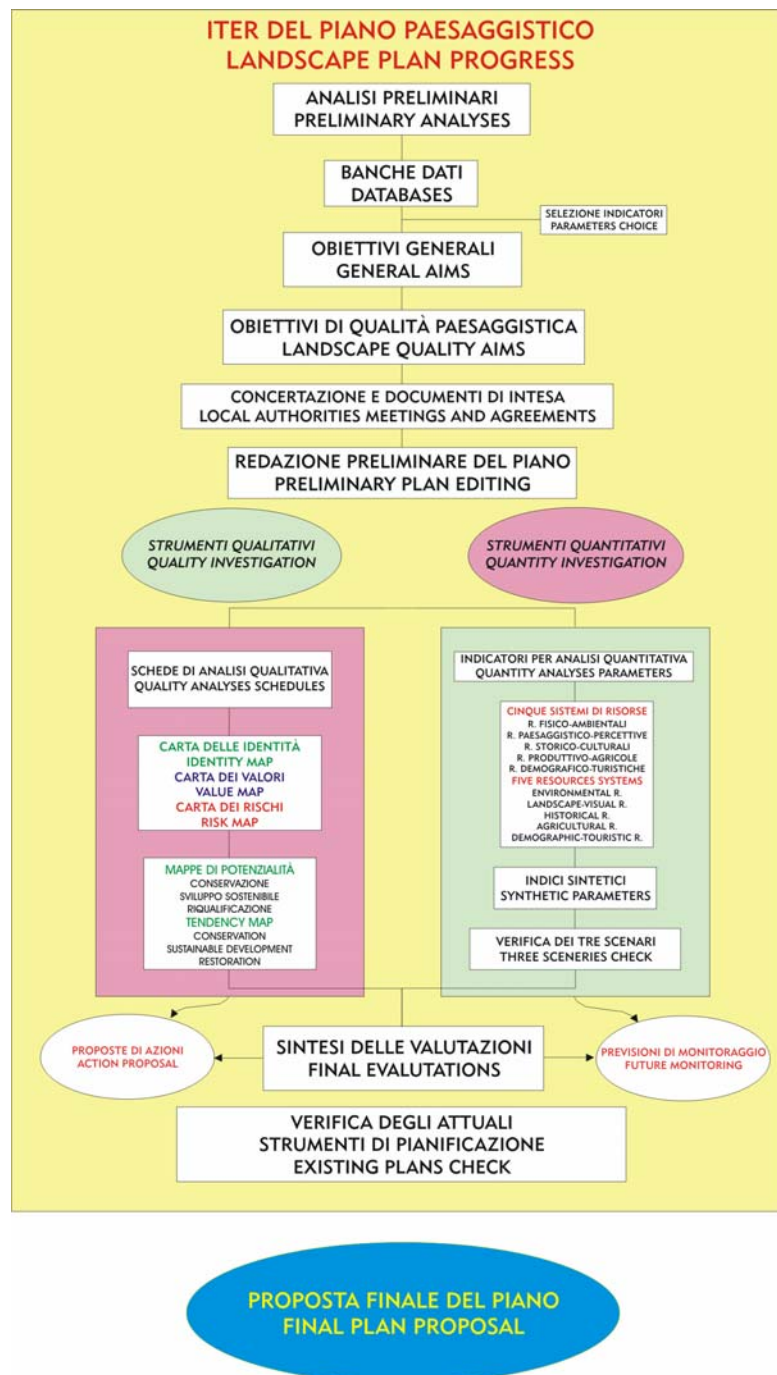


Figure 9 Landscape Plan Progress (D. Cialdea 2005)

It contains the basic elements that will be the guidelines for the procedure of the new landscape plan. It contains a global strategic vision of the territory and an understanding of its diverse components. A preliminary analysis will be necessary for the definition of the territorial areas under examination. A database will also be set up based on existing information as well as on specific data according to the aims of the programme.

Having defined the general objectives for the territorial areas, we will define the objectives of a quality landscape. These will be the basis for the definition of the activities proposed in the plan itself, (land conservation, sustainable development, and land re-evaluation). The preliminary drawing up of the plan, which includes agreements with local agencies, will be carried out on the basis of the above-mentioned qualitative and quantitative analysis.

Therefore, on the one hand we have the definitions of the land potentiality maps, these are a tool for territorial survey aimed at defining the particular nature of a land area. While on the other, a setting up of the indicators defined based on the five resource systems (as elements which have the task of both monitoring the current situation and to check the consequences of the actions proposed in the plan)

(Figure 10).

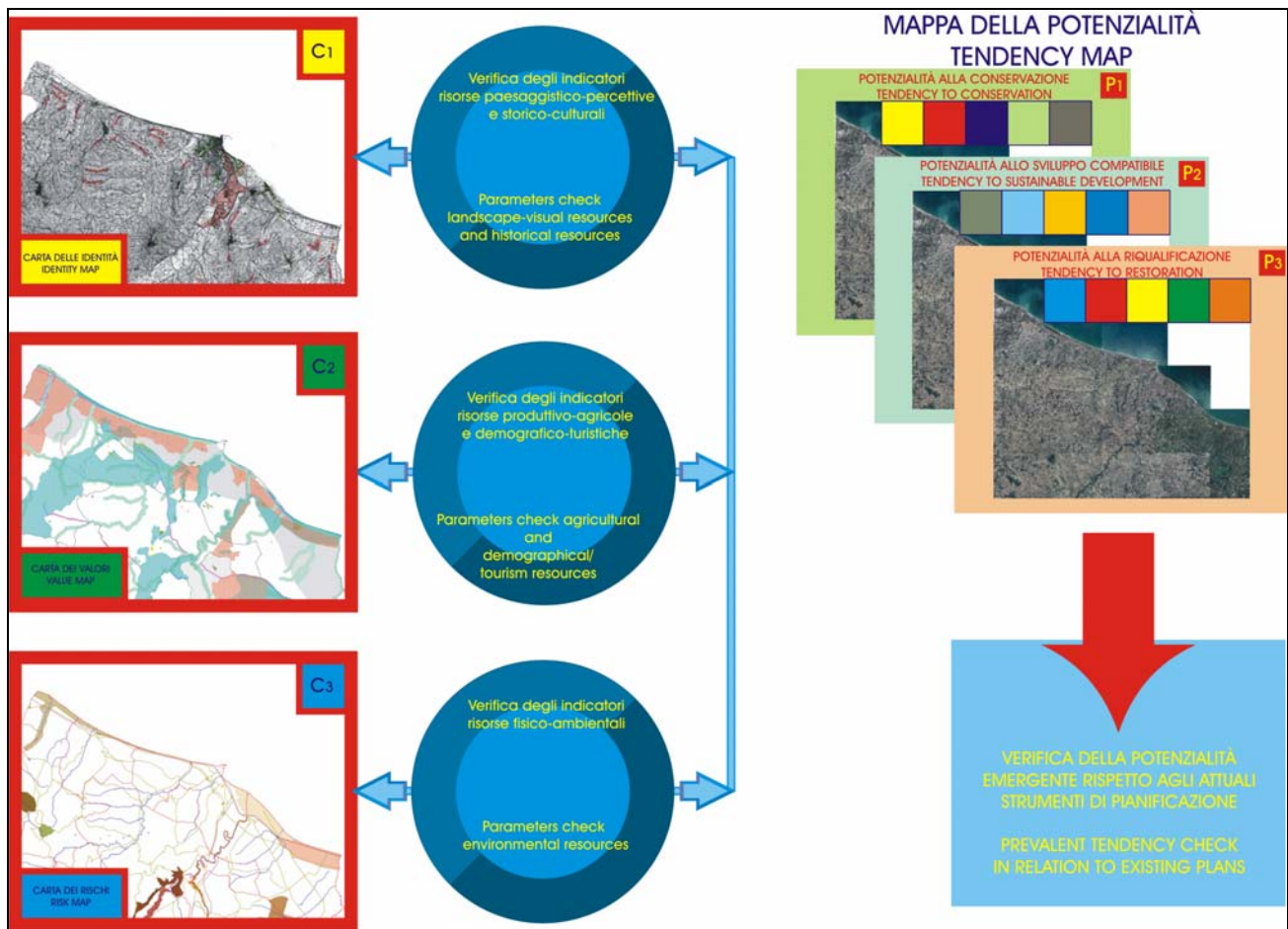


Figure 10 Tendency Map (D. Cialdea 2005)

The concluding proposal of the plan will be the verification of the planning tools and the summarizing of the potentialities proposed for the area under examination.

The system proposed in the plan is based upon making use of both territorial surveys by identification methodology and monitoring of the indicators. The two survey systems must be read together because the indicator element must always be integrated with the qualitative evaluation which has a precise reference to the territorial context under examination.

6. Hypothesis for a SEA applied to the landscape plan

To date the studies undertaken for the Strategic Environmental Assessment (SEA) of the territorial plans have been examined as interesting methodological supports.

The 2001/42/EC Directive, approved by the European Commission on the 27th June 2001 ^[33], regards the assessment of the effects that tools defining the future structure of the territory, that is plans and programmes, may have on the environment. The aim set out in the Directive is “to anticipate to the planning stage research on the conditions of environmental sustainability within the choices of the plan”. ^[34]

Thus, the evaluations invoked are to be applied to the plans and programmes that might have a significant impact on the environment. They have been developed according to sectors, viz. agriculture, forestry, fishing, energy, industry, transport, management of waste, and water management, telecommunications, tourism, territorial planning, and land use (see Para. 3 of the Directive).

In Italy, SEA procedures have been developed within programming: for instance, at the end of 2002 the Molise administrative Region has already drawn up the New Drafting for ex ante Environmental Evaluation of its Regional Operative Framework ^[5].

The issue of the SEA for planning is more difficult. Some interesting experimental applications of SEA for planning have been made in some Regions. These Regions had already included this procedure in their local laws. Some local Agencies have also drawn up a SEA, as, for example, the Provincial Administration of Milan. This administration has developed the Strategic Environmental Assessment (SEA) of the PTCP ^[35]. Similarly, the Provincial Administration of Bologna has drawn up a document for the VALSAT (an Assessment of Environmental and Land Sustainability of the Plans - AELSP) ^[36]. Furthermore, the VAS has been applied to the programmes for the 2006 winter Olympics to be held in Turin ^[37], and studies have been drawn up for its application to the PRGC ^[38].

Essentially then, we would like to emphasize the growing importance of issues of an environmental nature in planning. Starting from the planning stage through to the application of Environmental Impact Assessment (EIA) procedures, the concept has been extended to large scale development planning. This includes recognizing the importance of the “quantity level” of land transformation through the application of suitable indicators. The Strategic Environmental Assessment (SEA), as an aid to decision making for planners, is based on a simulation of alternative development scenarios.

We should, however, stress that the procedure of Strategic Environmental Assessment (SEA) is an interesting methodology, but conveys a different approach from the procedure for ex-ante and ex-post planning evaluation developed for a financial program, such as the Regional Operative Framework. In the case explored in this paper, a new landscape plan is to be drafted and it is not possible to develop a SEA to a pre-existing plan. We focus on the actions for quality landscape development/maintenance that the landscape plan should contain. We believe, therefore, that this would be a good method of verification of the plan itself from the point of view of landscape quality of the territory being studied. This includes attention of any possible consequences it might have on the environment ^[39].

In fact the 2001/42/EC directive prescribes that considerations regarding environmental impact should become an integral part of decision making and planning processes ^[40]. This means that planning choices must be coherent with any delicate landscape and environmental problems which emerge from overall knowledge of a given situation. In this sense, a possible approach to the development of a SEA for the landscape plan is that it be articulated on the basis of the application, to the above cited directive, of a preliminary phase of evaluation leading to the identification of policies for each landscape. At the present time, evaluation is understood to be the moment in which the “values” or “critical states” are identified: a process which compares the positive and negative elements from all spheres.

It should be made clear that the process of evaluation to be developed will only be able to consider itself based on the prescriptions of the directive 2001/42 EC if it satisfies certain minimum requisites. In particular the drawing up of an Environmental Report ER and its communication and evaluation. The ER document is the focal point for the entire procedure: The evaluation of the admissibility of project actions, the monitoring of the putting into effect of such actions and, in many cases, the management of eventual studies on the environmental conformity (which are now also linked to the SEA) of the tools used for these actions must all be undertaken with respect to the ER.

According to the Italian law ^[41], a decree has been recently promulgated with respect to the protection of the environment ^[42]. A part of this act refers to the reception of the mandatory regulation stated by the directive 2001/42/CE, regarding the procedures for strategic environmental assessment.

Several points are worthy of note, as reported in table 1.

In the specific case of a possible activation of the SEA procedure regarding the landscape plan, there is no doubt that such a planning tool must be subjected to SEA procedures: it falls well within the ambit of established applications. In fact, according to the decree n. 152, the landscape plan on regional territory should be subjected to the SEA as:

1. it regards the territorial planning sector;

2. it provides points of references for the approval, authorization, localization and realization of works and interventions, the projects for which are subject to environmental impact assessment according to the norms in force.

Decree parts	Contents
Sect. 4, clause 2	[SEA]...“is predisposed in such a way as to guarantee that the effects on the environment deriving from the realization of said plans and programmes are taken into consideration during their formulation and prior to their approval.”
Sect. 4, clause 3	“the procedure for strategic environmental assessment constitutes, for the plans and programmes subjected to such assessment, an integral part of the normal procedure of adoption and approval. The measures for approval that are adopted without the prescribed strategic environmental assessment are to be considered null.”
Sect. 5, clause 1, letter a	by SEA it is intended “the elaboration of a report concerning the environmental impact determined by the realisation of a specific plan or programme to be adopted or approved, the carrying out of consultations, the assessment of the environmental report and of the results of the consultations undertaken during the decisional process for the approval of a plan or programme and the making available of information regarding the decision taken.”
Sect. 5, clause 1, letter m	The SEA procedure is concluded by the issuing of a judgement regarding environmental compatibility, that is “the act with which the competent body concludes the procedure of strategic environmental assessment [...]”
Sect. 5, clause 1, letter p	by consultation it is intended “ all forms of participation, including direct, of other administrations and the public involved in the collection and assessment of data and information which constitutes the cognitive picture needed in order to express an opinion regarding the environmental compatibility of a specific plan or programme or of a particular project;”
Sect. 22, clause 2.	until the regional and provincial regulations become effective, of which in clause 1 [regarding the regulation of the SEA procedures], only the provisions in part two of the present decree will be applied

Table 1 The Italian Decree n. 152 with respect to SEA: contents analysis

The indications contained in the scheme for the decree on the formulation of the ER are particularly useful, both in the general part and in the more specific articles.

In sect. 5, letter l, the ER is defined as “a technical-scientific study which identifies, describes and assesses the significant effects which the realization of a particular project would have on the environment, as well as describing reasonable alternatives to adopt in consideration of the effects and the territorial ambit of the plan or programme.”

In fact, the use of indicators for the identification, description and assessment of the consequences for the environment may be interpreted as an opportune strategy for providing the ER with the requested scientific characteristics. However, the provision cited above leaves enough room for interpretation of what are suitable methods for guiding the creation of an ER.

Sect. 9 and Annex I refer in detail to the contents of the ER, although in substance they do not contain anything new in respect to the correspondent European regulation conveyed in Annex I of the 2001/42/EC directive on the SEA. It is interesting to note that the use of Annex I is optional and advised but not obligatory.

On the contrary, it is notable that according to sect. 9, clause 4 “the proponent [of the plan or programme affected by SEA] has the option of activating a preliminary phase with the aim of defining, in discussion with the competent authorities, the information which should be provided in the environmental report. The content of this comma combines with that of the successive comma, on the basis of which “other authorities [...] interested in the effects on the environment caused by the application of the plan [...] must be consulted at the moment when the decision is made regarding the quantity of information to be included in the ER and its level of detail.

As provided by the last two sections, the contents of the ER can, or rather should be “negotiated” by the interested parties and in accord with the agency responsible for the management of the SEA procedures. In the case of the landscape plan, the ER to be drawn up should be formulated in collaboration with the various council departments (in particular those for Education, Cultural Assets, Sport and Entertainment), the assessment agency and local bodies on all levels of government.

7. Environmental Report (ER) and indicators' choice

It is not possible to individualize a single method for the development of the ER. However, the ER results as being constructed, discussed and managed by means of using a set of indicators.

A possible methodology consists in identifying for each indicator thresholds values that correspond to levels such as “minimum”, “maximum”, “admissible” to be referred to a variety of performance intensities

of the landscape-environmental system. In this way, it is possible to map out the complex and specific level of environmental quality for each landscape system.

The indicators must be constructed on the basis of available information.

In our case study, the information regarding the landscape system is organised into the five systems already mentioned. Plan's prescriptions are based usually on the same information being expressed in a concise form with reference to homogeneous geographical areas. The indicators may be formulated as well on the basis of the five systems mentioned; and synthetic indexes may be drawn from complex information, and linked to the distribution of the homogeneous geographical areas.

Accordingly, a system of indicators may constitute the main starting point toward the formulation of complex measures of landscape-environmental performance. It also constitutes the main methodological reference for the formulation of an Environmental Report, with respect to the identification of points of excellence and weakness within the regional territory. Consequently the ER based on the indicators as described above and consistent with the prescriptions of the EC directive regarding the SEA.

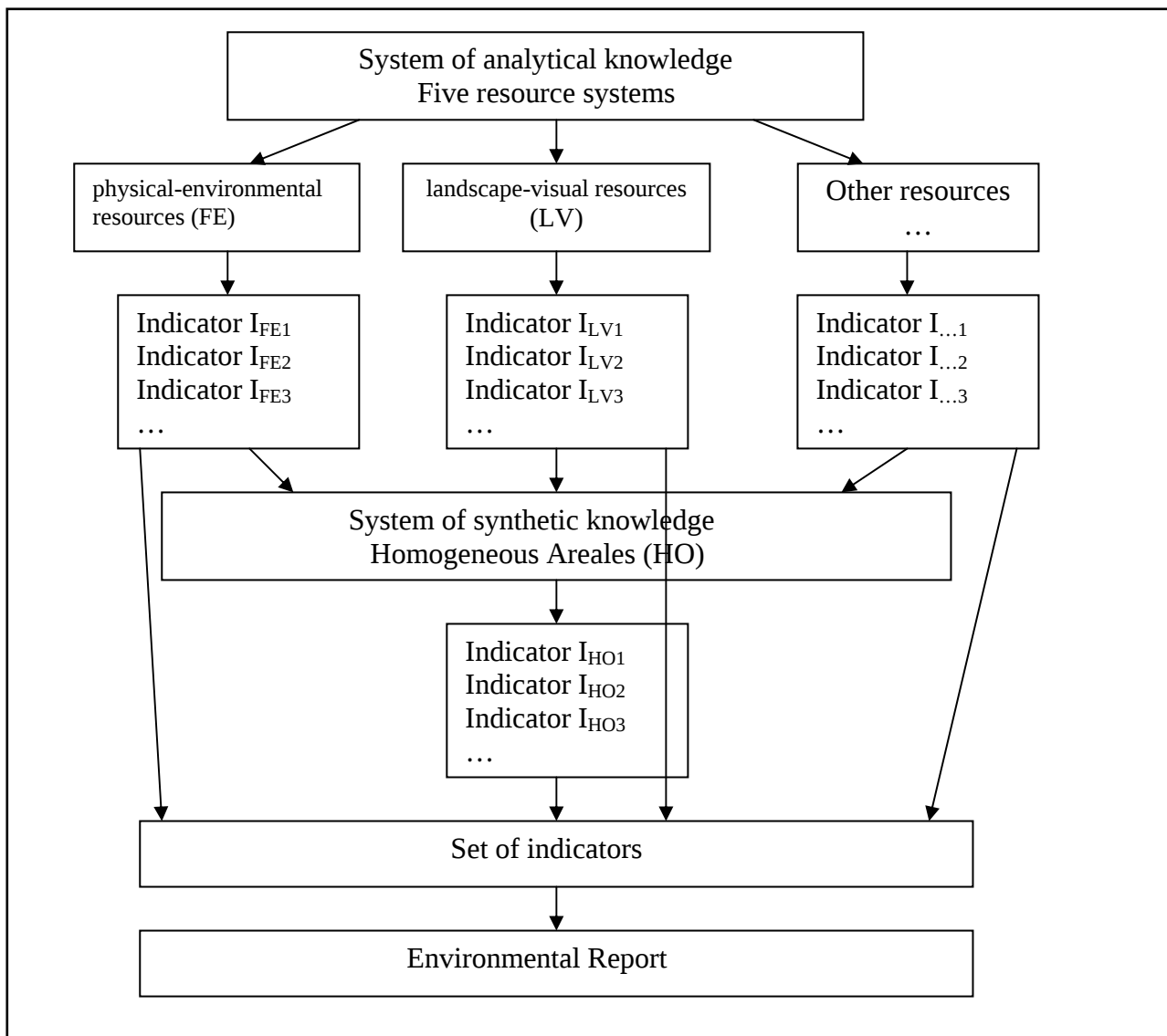


Figure 11 Plan for the formulation of indicators for the Environmental Report (De Montis A. 2005)

The system of indicators illustrated in **Figure 11** makes it possible to:

1. render the handling of analytical and concise information easier and communicable in a direct manner;
2. undertake the “measurement” of territories’ complex landscape-environmental quality;
3. offer a precise system for comparison between landscape-environmental quality and the actions proposed by the plan;

4. help to render explicit, transparent, direct and easily transmittable the comparison between the policies, actions and prescriptions of the plan (APP) and the landscape-environmental components involved in the regional territory (LEC);

5. make the compatibility of the (APP) with the (LEC) easily transmittable and assessable on the part of the local community.

The progress of the SEA depends on the early development of the ER, since the stage of plan's drawing up. The ER could be formulated with the explicit aim at relating the "measures" to each homogeneous area of the landscape-environment; in this way it is possible to identify the values and critical states. Such elements constitute the main reference points for the assessment of the quality of each homogeneous area. The formulation process described above should therefore consent the parallel development both of documents for the plan and for the SEA, with particular attention for the ER.

The complex quality of each homogeneous area must be assessed with respect to each individual indicator and the set of indicators as a whole. Information regarding each indicator should be suitably related to a specific area. In general it should be possible to recall the information relating to the indicators at any time: the metadata should always be available in an immediately comprehensible form. An example is given in table 2.

In this way, the SEA provides a method for the formulation of the APP already recognised as admissible and compatible, according to the provisions of the 2001/42 EC directive.

Code	Meaning	Objective	Admissibility level	Mathematical expression	Direction of preference	Geographical reference	Source

Table 2 Indicators – description of the metadata

The development of the SEA *ex-ante* for the definition of the APP involves the identification of the territory's landscape-environmental system. This means that for each area the actions are conceived as compatible with landscape-environmental sensitivities. This implies that the APP are stated in such a way as to induce only modifications that are compatible with the landscape-environmental components. The indicators permit the static description of the quality level of a specific environmental system at a certain moment: for example, the level of urban quality in a particular area of a specific landscape, at early stages of the landscape plan preparation. However, they also permit the dynamic screening of the processes, according to the variation of the quality level with respect to its thresholds values.

The same reasoning is valid for the ER: at plan adoption, this document provides a detailed illustration of the state of the landscape and the environment. However, the set of indicators provides planners with a powerful instrument to support monitoring territorial transformation subsequent to the approval of the plan. In fact, the ER highlights all possible critical effects that the landscape plan produces on the environment and identifies the actions that would suitably attenuate its negative effects.

Clearly, the ER constitutes a fundamental document for the assessment of territorial transformations that have occurred and the policies formulated by the plan in its time. For this reason it appears as an important tool for the verification of the efficiency of the plan with respect to the modifications that it has permitted to be obtained.

In this sense, the ER may reveal to be an ideal support to the SEA *ex post* of the plan.

Likewise, it may become a reference document for a hypothetical administrative body responsible of the control and monitoring of territorial transformations.

Again, the use of the same indicators adopted for the SEA *ex ante* makes it easier to handle the entire monitoring process of these transformations and above all, renders the procedure open to collaboration on the part of the public. The "communicative soul" of such a process is evident, since also a non-expert auditory can easily interpret the critical values of the indicators as "evidence" of the state of the landscape.

The complexity of such activities as the provision of information, preliminary proceedings, consultation and the many others connected to SEA procedures necessitates the establishment of purposely assessment organizations constituted by experts in the assessment of territorial planning and management schemes. The SEA together with the Environmental Impact Assessment (EIA) and environmental certification should be included among the procedures under the control of such an organization, which has already been instituted by many Italian regions.

In effect, the institution of organisations of this type has been undertaken by other regional administrations in relationship to the formulation of a new regional urban planning law. Basilicata, for example, has established a Urban Assessment Nucleus. Emilia Romagna has an office dedicated to the management of ValSAT procedures. In Sardinia's case, the process of setting up an agency has begun with the institution of the S.A.V.I. service at the department for environmental protection.

Clearly the activities of this administrative body must be linked into those of the structures in charge of monitoring territorial transformation. The assessment agency and the Observatory undertake their analyses and comparisons using a spatial data structure, which is organised and available thanks to a unique regional geographic information system (RGIS). In this way, homogeneity of assessment is guaranteed by the presence of only one certified source of data.

To conclude, the importance of the environmental report, which has been shown to be fundamental for the drafting of the plan's SEA, has been deliberately emphasized. The methodologies used for the formulation of an ER can be applied by us, above all, to the definition of those indicators that are of use in monitoring the effects of a plan.

Discussion remains open regarding the validation of approaches to landscape planning in other countries. For this reason documents relating to land use and landscape protection, either in force or in preparation, are being collected in order to create the necessary conditions for a common definition of quality landscape objectives and the valorisation of the landscape.

On the whole it has been shown that these countries are also heading towards a concept of the landscape which now includes the possibility of territorial development, whereas previously the landscape was seen simply as an environmental asset to be protected.

The next stage of this research foresees the completion of the first phase of investigations into the various territorial realities and the definition of a computerised data collection system.

In this phase the definition of the minimum requirement level for such information will be decisive, in order that the model for territorial investigation, which aims to define the landscape quality of the territorial areas under consideration, can be applied, notwithstanding the different conditions existing in the countries that are partners in the project.

The final aim remains the definition of a model which is able to guarantee high level management, the improvement of the quality of the various environmental components and sustainable use of the territory. All of which must occur in respect of the objectives set out in the INTERREG III A programme, which "intends to activate joint strategies for sustainable territorial development on both sides of the Adriatic"; just as is often highlighted by the Programming Complement, the objective we have proposed to ourselves is the creation of a strong link with the cross-border countries in order to achieve optimum coordination of the available resources.

Notes

1) see Fabbri. 1997, *L'Attrazione della Costa: cause ed effetti. Il Caso del Medio Adriatico*, Bologna, Patron Editore, p.140 on. Rigotti F., Rotondi G., 1990, *Il Molise Costiero. Momenti Umani ed Economici*, Padova, Grafica Lithoservice, p.65 on. Petrocelli E. 1984, *Il Divenire del Paesaggio Molisano*, Firenze, Edizioni Enne.

2) see for Croatia; *Croazia. Guide d'Europa*, 2004, TCI. *Croazia. La Costa e le Isole*, 2003, Dumont. *Croazia*. 2002, Le Guide Mondadori.

3) see for Albania: Ministry of Food and Agriculture, National Strategy for Socio-Economic Development; <http://countrystudies.us/albania/>; <http://www.keshhilliministrave.al>.

4) see AA.VV., 2004, *L'Evoluzione della Geografia*, Roma, Mondogis p.125 on

5) Environmental Authority for Structural Funds of the Region of Molise, 2000-2006, Outline of Community Support for the Italian Regions 2000-2006, Regional Operative Programme, *Nuova stesura della valutazione ex ante ambientale*, Campobasso, December 2002

6) The INfrastructure for SPatial InfoRmation in Europe initiative (INSPIRE). Proposal for a Directive of the European Parliament and of the Council establishing an infrastructure for spatial information in the Community (INSPIRE).

7) Metadata are information on sets of data such as: who conducted the survey, what methodology was used, what system of coordinates was used,, what quality controls were carried out, the size of the, territory from which the data was obtained, etc.

8) The Directive has the following subdivisions: Chapter I General Provisions; Chapter II Metadata; Chapter III Interoperability of spatial data sets and services; Chapter IV Network services; Chapter V Data-sharing and re-use; Chapter VI Coordination and complementary measures; Chapter VII Final provisions and three attachments. Annex i spatial data themes referred to in articles 9(a), 13(1) and 14(a) attachment I thematic categories of territorial data as at Article.9, letter a); Article 13, paragraph 1 and Article 14, letter a). Annex ii - spatial data themes referred to in Articles 9(a), 13(1) and 14(b), attachment II thematic categories of territorial data as at Article 9, letter a); Article 13 paragraph 1 and 14, letter b). Annex iii - spatial data themes referred to in in articles 9(b) and 14(b) attachment III thematic categories of territorial data as at Articles 9, letter b) and 14, letter b).

9) Located in Ispra (Italy) the Joint Research Centre (JRC) is the General Directorate (DG) of the European Commission that exclusively serves the European Union. Its role is to sustain EU policy by supplying an independent scientific and technical reference service to the Commission, the European Parliament, the Council and the Member States – with the general objective of contributing to sustainable development policies.

The CCR coordinates and contributes to many community networks which link industries, universities and national institutes of the member States; in its laboratories, it also carries out studies and experiments on behalf of European institutions. The CCR also participates in projects with a number of member States and collaborates with non-European and World organizations in scientific and legal fields.

10) In 2003 the Commission has estimated a cost of 90 to 135 million euros (for all of the member States) for the creation and maintenance of INSPIRE. A notable expenditure which, however, should allow a saving of between 675 and 1050 million euros a year in environmental benefits and consequently is to be considered a highly beneficial expenditure without even taking into account the positive effects in all the other sectors in which an economic benefits will be obtained.

11) The protection of nature and the protected areas present complex problems that range from environmental management and planning to the socio-economic aspects that involve numerous organizations of different types, interest groups and individuals with different cultural or technical backgrounds.

Many of these problems are linked to the geographical component of the information. However, the use of GIS technology (Geographical Information Systems) is often limited due to lack of reciprocal knowledge and communication between the GIS experts and those who are to be the ultimate users of the system-

One of the aims of Nature-GIS is, therefore, to reduce this lack of communication by calling together experts from different fields and allowing them to apply GIS potential in this fundamental area.

All this is made possible by the creation of a pan-European network, the NATURE-GIS group, which brings together different organizations and people who have an interest in the Geographical Information field and GIS in relation to the protected areas.

Nature-GIS will be able to remedy these aspects by identifying the specific needs of the authorities responsible for the protection of the environment. These authorities often have difficulty in trying to maintain a balance between spatial planning, rural development, and the conservation of nature. At the same time, Nature-GIS will be able to assist them in examining possible eventual problems and solutions within a national and pan-European context.

You can consult <http://www.gisig.it>

12) Issued by GISIG – Geographical Information Systems International Group

The themes of SDIC NatureGIS ARE: Public access to Geographic Information regarding protected areas and nature conservation with the aim of offering the stakeholders support for the improvement and rationalisation of the flow of geo-information and communication; An approach, from the point of view of GIS, aimed at grouping and rationalising the efforts made by the operators and competent organisations to identify the specific needs of the authorities commissioned with nature protection; The use of interdisciplinary methods to promote collaboration between experts in different fields and to offer the final user an aid in the use of the GIS for protected areas

From NATURE-GIS group (original participants) are: GISIG – Geographical Information Systems International Group (IT); University of Aberdeen (UK); University of Evora (PT); Cemagref (FR); Regione Piemonte (IT); Tarnium Sarl (FR); University Joseph Fourier (FR); Euronatur (DE); University of Girona (ES); Lulea University of Technology (SE); URSIT Ltd (BG); University of Cyprus (CY); VUGTK - Research Institute of Geodesy, Topography and Cartography (CZ); Estonian Environment Information Center (EE); University of West Hungary (HU); Jagiellonian University (PL); University of Zilina (SK).

Other Members of NATURE-GIS to support the SDIC are: United Nations Environment Programme – Mediterranean Action Plan UNEP/MAP; ICRAM – Istituto Centrale per la Ricerca scientifica e tecnologica Applicata al Mare (IT) ; German Aerospace Center (DLR) / German Remote Sensing Data Center (DFD) (DE) ; Institute of Spatial and Cadastral Systems (PL) ; CRA - Istituto di Sperimentazione per la Pioppicoltura (IT) ; Federal Environment Agency (AT) ; Parco Naturale Alpi Marittime (IT) ; Forest Reserve Sihlwald (CH) ; Swiss National Park (CH) ; Regione Liguria (IT) ; Regione Emilia-Romagna (IT) ; Provincia Autonoma di Trento (IT) ; Provincia di Bologna (IT) ; **University of Molise (IT)** ; Salzburg University (AT) ; Università del Piemonte Orientale (IT) ; FEEM – Fondazione Eni Enrico Mattei (IT) ; M. Benedetti Cartografia&SIT (IT) ; Eurimage Spa (IT) ; Hanseatic Nature Development Company (DE) ; GEOTER (FR) ; EPSILON INTERNATIONAL SA (GR) ; SADL KULeuven R&D (BE).

13) Issued by ICCOPS and GISIG.

The themes of SDIC GI-CLAN are: Access to coastal information (improvement of access and data sharing for coastal planners and managers as regards the Geographical Information necessary for the drawing up and realisation of integrated Coastal management programmes) and Scientific approach (raise the scientific weight of the analyses and coastal planning, in particular as regards the coastal landscape, facilitating access to useful data regarding the natural and anthropological aspects which characterise the landscape itself).

There are 30 partners in the SDIC GI-CLAN: ICCOPS – Landscape, Natural and Cultural Heritage Observatory (IT); GISIG – Geographical Information Systems International Group (IT); UNEP/MAP Priority Action Programme, Regional Activity Centre (HR); The Blue Plan (FR); APAT Agency for the Protection of the Environment and for the Technical Services (IT); ENEA Agency for the New Technologies, the Energy and the Environment (IT); CNR-IMATI National Research Council-Institute for applied mathematics and information technologies (IT); IFREMER - French Research Institute for Exploitation of the Sea (FR); CEMAGREF - Agricultural and environmental engineering research (FR); ICRAM – National Institute for Scientific and Technological Research applied to the Sea (IT); Centro Internazionale Città d'Acqua / International Centre Cities on Water (IT); Liguria Regional Government (IT); Municipality of Genova (IT); IGP – Portuguese Geographical Institute (PT); FEEM Fondazione ENI Enrico Mattei (IT); EURIMAGE – Multi-Mission Satellite Data (IT); AMGA Mediterranean Gas and Water Society (IT); Epsilon International sa (GR); Hyperspectral Data International (CA); **University of Molise Region (IT)**; University of Genova (IT); University of Seville (ES); University of

Cantabria (ES); University of Nice – Sophia Antipolis (FR); University of Algarve (PT); New University of Lisbon (PT); University of Vilnius (LT); University of Cagliari (IT); University of Evora (PT).

14) "The current state of landscape regulation does not consent the use of widely shared operative methods and tools" from Clementi A. (edit.), 2002, *Interpretazioni di Paesaggio*, Roma, Meltemi editore, p.15.

15) Statute 1 June 1939, n. 1089, *Tutela delle cose di interesse artistico o storico*, Published in the Gazzetta Ufficiale 30 June 1939, n.184.

16) Statute 29 June 1939, n. 1497, *Protezione delle Bellezze Naturali*, Published in the Gazzetta Ufficiale 30 June 1939, n.151.

17) Statute 8 August 1985 n. 431 published in the Gazzetta Ufficiale 22.8.85 Converted into Law with amendments to statute law 27 June 1985 n. 321, containing urgent regulations for the safeguarding of the areas of particular environmental interest.

18) Regional Law 1 December 1989 n. 24 Disciplina dei Piani Territoriali Paesistico-Ambientali.

19) Statute 29/10/1999, n. 490: Testo Unico delle Disposizioni Legislative in Materia di Beni Culturali ed Ambientali.

20) Statute Law 22 January 2004, n. 42, containing the "Code of Cultural Patrimony and of the Landscape", Article 10 Law of 6 July 2002, n. 137 (in the Gazzetta Ufficiale 24 February 2004).

21) According to the Minister Urbani: "more than 60 years from the Bottai Decree 1939 on art patrimony and natural beauty patrimony, the Code of Cultural Patrimony, for the first time, has tried to update and create a new system. A system that is not just a compilation - as exemplified by the Testo Unico of 1999, of the norms dealing with national cultural patrimony. Respect for the traditional approach in the regulation of our patrimony, has not been allowed to become an obstacle for the introduction of important reforms of each institute. New models of management and valorisation have been introduced which are better able to combine a modern view of cultural patrimony with the priority need for the safeguarding of the same. Cultural patrimony is now regarded as a resource. As far as the landscape is concerned, a Copernican revolution has taken place, which will allow us to go beyond the administrative difficulties created by the conflict between regional and local regulations dealing with territorial planning. A planning and management of the landscape more in harmony with territorial reality has been achieved. At the same time it safeguards the extraordinary characteristics of the Italian landscape as part of the identity of the nation". Consult the Dossier 16 January 2004, New Code of Cultural Patrimony and Landscapes and the changes it introduces at http://www.governo.it/GovernoInforma/Dossier/beni_culturali_paesaggistici/nota_stamp.html.

22) From: http://www.bap.beniculturali.it/attività/tutela_paes/pianificazione.htm1.

23) see Cialdea D. 1996, *Il Molise, Una Realtà in Crescita. Aree Protette e Attività Agricole*, Milano, Franco Angeli, p. 103-121.

24) The new landscape plan in the Code of Cultural Patrimony and Landscapes (art. 143) is so defined:

1. Based on natural and historical characteristics and in relation to the importance and integrity of the values of the landscape, the plan divides the territory into homogenous areas, from areas of high quality landscape areas to areas that are seriously compromised or degraded.

2. According to the different levels of landscape values attributed, the plan applies to each area corresponding objectives of quality landscaping. The objectives of quality landscapes foresee:

a) The maintenance of the characteristics, the constitutive elements, and the morphologies taking into account architectonic typologies as well as construction techniques and materials;

b) The prevision of lines of urban development and building compatible with the different levels of values attributed. These elements are not to diminish the landscape value of the territory, and are to pay particular attention to the safeguarding of sites included in UNESCO's World Heritage list as well as to agricultural areas.

c) The retrieving and re-qualification of real estate and of those areas under monitoring due to being compromised or degraded, with a view to re-integrating the pre-existing values and create new landscape values which are coherent and fully integrated with the latter.

3. The landscape plan has descriptive, regulatory, and a suggestions for planning content. It is structured into the following phases:

a) A survey will be made of the entire territory through an analysis of its historical, natural, and aesthetic characteristics and their inter-relationship; this will lead to a definition of the landscape values to be safeguarded, retrieved, re-qualified and valorised;

b) An analysis of the dynamics of transformation of the territory through an identification of the risk factors and of the elements of vulnerability of the landscape, a comparison with the other decrees of programming, of planning, and of soil defence;

c) An identification of the landscape areas and the relative landscape quality aims,

d) Definitions of general and operative regulations for the safeguarding and use of the territory included in the areas identified;

e) Creation of measures for the conservation of the aspects which most significantly co note the areas safeguarded by law, and, where necessary, the creation of management criteria and interventions for the valorisation of the landscape real estate.

f) Identification of the interventions to be applied for the retrieval and re-qualification of the areas notably compromised or degraded.

g) Identification of the measures necessary for the correct application of any territorial transformation within the landscape context, these measures must be the reference point for any interventions or investments whose aim is the sustainable development of the areas in question;

h) Identification, according to statute article 134, Para. c), of eventual categories of real estate or of areas different from those indicated at articles 136 and 142, to which should be applied specific safeguarding and utilisation measures.

25) For a description of agricultural activities see: Cialdea D. 1996, *Il Molise, Una Realtà in Crescita. Aree Protette e Attività Agricole*, Milano, Franco Angeli editore. Presentation by Giovanni Cannata. Preface Flavio Fucci 408 pp.

26) Region of Emilia Romagna, Regional Council General Management Office for Territorial Programming and Systems of Mobility. Memorandum of the Director General for Territorial Programming and Systems of Mobility 12/05/2004 Prime Indicazioni Operative sull'applicazione del Decreto Legislativo 22 January 2004, n. 42 ; see- "Codice dei Beni Culturali e del Paesaggio, ai sensi dell'articolo 10 della legge 6 luglio 2002, n.137"; "Its contents are already in line with the regulations foreseen by the Agreement signed by the Region of Emilia Romagna on 9 October 2003 with the Ministry for Goods and Cultural Activities and the Local Autonomous Associations of the region. Their aim is the reorganisation of the management of the safeguarding of the landscape in the region. Note the indications of the Agreement as far as the application of the innovations established by the Code are concerned; in particular relative to the kinds of cooperation between Agencies as well as the methods of evaluation and authorization relative to the landscape."

27) "The European Convention on the Landscape is a document adopted by the Ministers of Culture and the Environment of the Council of Europe on 19 July 2000. The procedures of preparation and definition of the Convention were dealt with by Italy who was host to the opening ceremony for its signing on 20 October 2000, in the prestigious setting of the Salone dei Cinquecento di Palazzo Vecchio in Florence. The Convention was signed by 27 States of the European Community and ratified by ten of these States. It is applied to the entire territory of the States who signed the treaty (article 2). It aims at promoting the adoption of policies of safeguarding, management, and landscape planning among the public authorities. It also wishes organise European cooperation in the policies of this sector. It defines the landscape as a particular part of the territory, as the public perceives it. Its character derives from the action of natural and/or human factors and their interrelationship (Article 1, Para. a); "...it includes land areas, internal waterways and marine areas. It deals with exceptional landscape areas as well as landscapes where daily living is carried out. Degraded landscapes are also dealt with." (Article 2).

From http://www.bap.beniculturali.it/attivita/tutela_paes.htm1

28) See http://www.provinz.bz.it/natur/2801/landschaftplanung/index_i.htm

29) see Paolo Urbani, *La Pianificazione Paesaggistica, Società Toscana degli avvocati amministrativisti. La Disciplina dei Paesaggi nel Codice dei Beni Culturali e del Paesaggio*, Florence 1 July 2004, in http://www3w.pausania.it/numerosedici%5Firenze_pianificazione_paesaggistica.pdf. "We cannot but note a paradox, which is that while the debate between jurists on the results of over sixty-years experience of the application of urban planning indicates a general consensus of failure, (it would be sufficient to cite Cerulli Irelli or Stella Richter), national legislators have continued to apply in toto those same techniques of urban planning and extending them to landscape planning. The application of such an analytical and regulatory tool is due to the reaction to the excessive vagueness of the existing landscape restrictions. These have given excessive discretionary power to the administrator of the sector, who is to oversee the compatibility of the transformations of the landscape with the safeguarding of its value. Consequently, it seemed that the analytical and detailed identification of the admissible transformations of the territory was the best way to reduce that discretionary authority and to link any evaluation procedure to more objective, rather than subjective, parameters."

30) "This becomes all the more necessary to the extent to which even where the regions have drawn up landscape plans, the extent of the planning of those plans is in most cases not inferior to 1:100.000, making unrealistic any effective utilisation and safeguarding of the landscape." From, P.Urbani, see note 20

31) From Roberto Gerundo (see http://areavasta.provincia.salerno.it/av_2003n6e7/editoriale.htm1): "A better and more advanced reform of the landscape would have been the definitive going beyond territorial landscape planning and its stable and regular organic integration with coordinated territorial planning. Competence could have been given to the current intermediary agency and being applicable to the entire provincial administrative area, in such a manner as to cover the entire national territory. Landscape would no longer have been seen as something aesthetic and recoverable by application of partial views and subjective points of view, but seen as part of the territory as a whole: an urban, surrounding city and country landscape; natural and human; agrarian and industrial, made up of plains, hills, and mountains; coastland and internal land areas. A landscape which should be planned following wisely constructed methods so as to improve it everywhere, including the less contaminated areas well as the fragmentally settled areas typical of the last years of the 1900's."

32) From Giovanni Campeol and Tina Zambussi, *Il Piano Paesaggistico Integrato di Panarea* (Isole Eolie, Messina), DAEST Research Series and Conventions n.26: "To study a small island means to have to take into account to distinctly different ecosystems which are nevertheless strongly inter-related to each other. In effect the land system and the ocean system are so intimately linked and interactive that any planning process cannot but take both of them into account; consequently, the final normative indications of this work are directed to both the internal land areas as well as the coastal strip areas." See: <http://brezza.iuav.it/daest/pubblicazioni/R/ventisei.html#danota7>.

33) European Parliament and Council Directive 2001/42/CE, 27 June 2001, dealing with the effects of plans and programmes on the environment, Gazzetta Ufficiale delle Comunità Europee L 197/30 21.7.2001

34) see Polizzy L., *Prime Iniziative del Ministero dell'Ambiente in Relazione alla Direttiva Europea sulla VAS* -in Busca A., Campeol G., 2002, *La Valutazione Ambientale Strategica e la nuova Direttiva Comunitaria*, Reports of the Department of Architecture and Urban Planning of Pescara, Researches/12, Roma, Palombi editore.

35) Apart from the text already cited in note 8, see http://www.provincia.milano.it/pianificazione/htm1/eventi/archivio/vast/doc_vast.htm which contains the documentation relative to the congress held in Milan on 5 and 6 December 2002 on strategic environmental evaluation. The site also contains information on some European experiences.

36) See site http://cst.provincia.bologna.it/ptcp/report_valsat/Valsat/VALSAT_A.pdf in which a report is given from the Provincial Administration of Bologna about VALSAT (Assessment of Environmental Sustainability and Territorial Plans), which follows instructions from Directive 2001/42/Ce on VAS. VALSAT aims at checking the conformity of planning choices to the general objectives of planning and the objectives of the sustainability of territorial development, defined by the general and sector plans and by the community, national, regional and provincial regulations.

- 37) See www.tonno2006.it/uploadaddir/documenti/ambienti/Sintesi.pdf, a dossier that outlines the VAS report for the programme of the winter Olympics in Turin 2006; with the respective D.G.R., and see http://www.regione.piemonte.it/to2006/norme/dwd/pdf/45_2741.pdf.
- 38) See text by M.ZoppiC., (edited), 2005, *Linee Guida per la Valutazione Ambientale Strategica dei PRGC*, Milano, FrancoAngeli/Urbanistica
- 39) see Garano M. Zoppi C., 2003, *La Valutazione Ambientale Strategica nella Pianificazione Territoriale. Nuove Prospettive per la Gestione delle Trasformazioni Urbanistiche*, Roma, Gangemi editore and also Busca A., Campeol G., 2002, *La Valutazione Ambientale Strategica e la Nuova Direttiva Comunitaria*, Reports of the Department of Architecture and Urban Planning of Pescara, Researches/12, Roma, Palombi editore.
- 40) De Montis, A. and De Montis S. 2004. Mandatory and Spontaneous Processes of Impact Assessment: A Comparative Study Referred to Sardinia, Italy. Manuscript LW 04 011. *Agricultural Engineering International: the CIGR Journal of Scientific Research and development (CIGR e-Journal)*, Vol. VI. October 2004, ISSN 1682-1130
- 41) L. N. 308, 15 dicembre 2004.
- 42) Decreto legislativo n. 152 del 3 aprile 2006 "Norme in materia Ambientale", GU n. 88 del 14 aprile 2006, Suppl. Ordinario n. 96.