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Environmental and Cultural Resources. Total Inventory and Valuation Using ArcView

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Abstract

Scientific forecasts concerning relationships between human and Earth suggest that within a short time span change in physical and productive activities will deplete environmental and cultural resources of the planet causing ecological and economic collapses.

Wise and sustainable use of natural and urban Heritage are required to mitigate impact of human activities on the Earth, than tools for appropriate management and precise assessment are urged.

GIS is a powerful tool to know completely and to use wisely all resources in a given Earth space at different geographic and government levels: country, regional, county or provincial. The key issue is to apply in the real world results of methodological research on systematic basis.

This paper presents a case of operative GIS application in the real world, *i.e.* an Action Case. GIS is developed to manage a Total Inventory or Census (as result of massive field work) including total resources, not only natural but also cultural and historical, in a

regional territory and jurisdiction.

Additionally, GIS is linked to impact assessment tools run by Multi Criteria Evaluation framework and software (MCA), relying on both geographic and inferential evaluation engines (IEE), and making a first cell for a Decision Support System (DSS=GIS+IEE).

Given an area or jurisdiction, Inventory, run actively by GIS and MCA tools, enable users to know all environmental and cultural resources, as well as their potential use and related carrying capacity.

This information is critical for systematic knowledge, sustainable use, collective preservation and public policy.

Case Action is located in Italy where climate-ecological, landscape and cultural goods are strongly linked generating a cultural territory which deserves systematic knowledge and caution in use.

Key Words

Cultural Resources Inventory, Environmental Resource Inventory, Heritage Quality Valuation, Herityval, GIS, WebGIS, Multi Criteria Analysis (MCA), Decision Support System

1. Introduction

Environmental and Cultural Heritage ("Heritage" in the text) such as natural sites, ecological reservoirs, cities of art, historic towns, cultural artifacts and works of art, are getting new importance for economic sustainable development and social activities. At present time there is an increasing positive trend toward treasuring Heritage for recreation, education, health, tourism, employment.

For planning ahead actions for Heritage revitalization and related economic development, data are a key issue as well as critical decision tools for both private and collective actors. Basic quantitative and ordinal information about size, dimension and quality of Heritage are strongly relevant. The solution is a Total Inventory or Census of Heritage named "heritus", that should be "exhaustive, topographical and thematic" according to Guidance of Council of Europe Heritage Department (CE, 2001).

There is a further key issue in Heritage protection, conservation and treasuring: the judgement of relative value of entities before protection. It may be performed by the mean of some of the many and various valuation approaches, methods, techniques set up from 1960 starting from the New Urban Economics (Lichfield, 1960; Rothenberg, 1964, 1967, 1968) and New Appraisal (Forte, 1977), then developed at the end of the eighties in the inter-disciplinary field of Heritage Quality Valuation, *i.e.* "herityval" (Mattia, 1983; Rizzo, 1983, 1989; Fusco Girard, 1987; Nijkamp, 1988; Lichfield, 1989; Massimo, 1990).

2. Summary of the Main Contents

The paper contains part of outcomes of a broader research and tries to address two issues: the state of the art of Heritage geographic knowledge or Total Inventory, *i.e.* Total Census or "heritus", better performed by Taxonomies as well as Geographic Information System (GIS) tools; a further key element of research such as the systematic link between GIS and inferential valuation approaches or engines to assess resource characteristics or qualities, *i.e.* Heritage Quality Valuation or "herityval". Going further, the structured knowledge may be posted on the web, giving to the huge cultural patrimony a virtual world wide accessibility that can be managed by state of the art web tools generating a WebGIS approach named "heritweb".
Then, the methodological structure to help Heritage conservation and treasuring is based upon the three pillars of census, valuation, communication, *i.e.* upon the three specialized approaches: "heritus", "herityval", heritweb". Also, the paper presents a Case Study (preview in: Massimo, 2002; Mollica, Massimo, Musolino, 2000) concerning:

- total Census of total Heritage, or "heritus", of <u>all</u> environmental and cultural resources in a sub-regional area of Calabria, the Southeast region of continental Italy;

- a deep focus on knowledge of a specific category of cultural resources such as historic settlement or historic towns and villages, named "historic centres", based upon ancient demographic statistics and historic cartography; the latter have been surprisingly discovered in archives and compared to present data of modern population and housing census;

- a specific key GIS procedure in cartography overlay to understand the urban form evolution from 18th century to now, detecting the real originary boundary of old towns and villages to date;

- qualitative multi-dimensional Heritage Quality Valuation, or "herityval", concerning appraisal of historic centre characteristics and p<u>otential</u> (cultural, tourism, employment);
- experience of managerial training program for local youngs, in the framework of a regional strategy for firm\job creation to foster local growth by treasuring Heritage by the mean of historic centre rehabilitation: it may be of utmost importance to encourage setting up of revitalization actions, cultural tourism activities, management and entrepreneurial ideas.

3. Heritus. Total Inventory of Heritage Entities in Cultural Districts

Cornerstones of cultural conservation and treasuring actions should be, first of all, a comprehensive detection, description, registration, classification and, this is the big new, comparative qualitative valuation of all entities. This heavy field work, significantly supported by GIS, is the "exhaustive, topographical and thematic inventory" recommanded by the Council of Europe (2001). It has been named Total Inventory or Total Census or "heritus". It is an updated technique that leads to systematic knowledge of Heritage, behind and above the roster in the state National Register of enlisted entities or properties. Relevant difference between official roster and "heritus" is that the former enlists only the registered masterpieces, instead the latter attempts to detect all relevant resources existing and localized in the territory.

The complete knowledge helps to understand reciprocal relationships and connections among all resources, based upon real networks by road or immaterial social hierarchy. Old Dioceses and historic Court boundaries are very useful in the investigation that leads to detect the influence area of dominant towns and villages, *i.e.* "Territorial Units" assumed as historic as well as today Cultural Districts. The latter are key spatial level for conservation of all environmental and cultural entities existing into a sub-regional area.
According to state and European directions, a precise resource Taxonomy is set up and implemented for "heritus" which categories are the followings: environmental, including geological, biological, landscape, areas of prominent naturality and bio-diversity; archaeological, including pre-classic, classic, medieval, post-medieval, relicts of old industry facilities; urban, including historic centres, pre-modern foundations or settlement of new towns, intact vernacular villages; architectural, including civil buildings, churches, castles, old small factories, other entities; antropological and immaterial such as linguistic islands and traditions; visual and aesthetic as panoramas, vistas and belvedere; works of art and their museums; archives and old libraries.

Cultural Districts may be the adequate area of research, planning, management, government action, and they may also be an optimal geographic boundary where some different actors, stakeholders, stockholders, local governments may interact and cooperate by setting nonprofit organization or task-agency or managment groups ruled by private spirit to perform a collective mission. The goal is to treasure and preserve Heritage, which may be an important leverage for modern "bottom up" local growth.

Productive actions in managment, conservation and marketing of Heritage should be undertaken to:
- transform un-known or un-used environmental and cultural entities (existing but not yet available), or properties, or assetts (defined in the precise Heritage Taxonomy) in environmental and cultural resources (available) by discovering, supplying and communicating them in the market even by web tools;
- then, transform them in environmental and cultural goods (available and enjoyed) by conservation and making them easily accessible to demand, fruition and beneficiaries, also even by web tools;
- then, transform goods in environmental and cultural services (enjoyed overtime), perpetuating their existence and by managing demand and visitors into limits of carrying capacity.

In other words, at the beginning there are cultural artefacts, things, deposits, properties belonging to nature, bio-ecology and past. They exist but are unknown and not available. Human process of cultural and environmental valuation or "herityval" (O'Riordan, 1971; Ashworth and Goodall, 1986, 1990; Ashworth and Voogd, 1986; Caballer, 1992) recognizes and then transforms them in potential cultural and environmental resources available to society fruition. Because entities are not reproducible, conservation must be managed to maintain Heritage not just as goods for one shot consumption but for perpetual service production for present and future generations.

Below there is a description of process for the transformation of things in resources, then in goods and then in services.

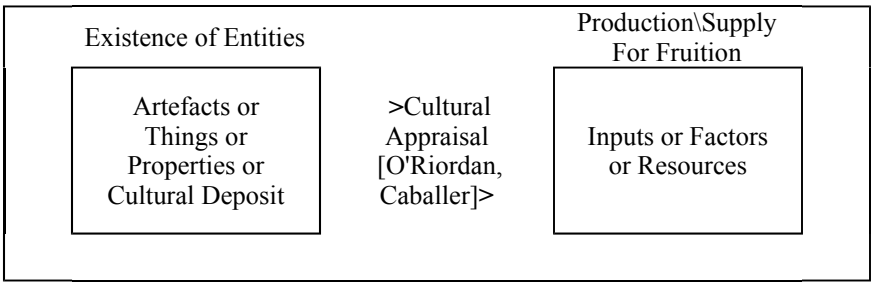


Table 1. From Cultural Things or Properties to Cultural Inputs or Resources

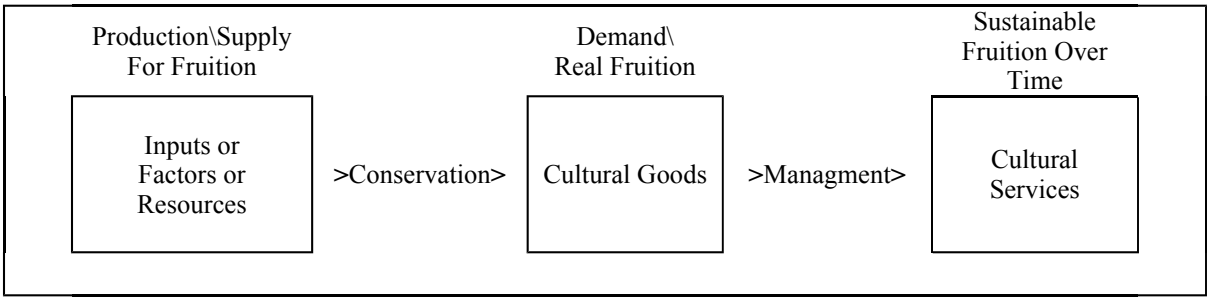


Table 2. From Cultural Inputs or Resources to Cultural Goods and Service

4. Herityval. Heritage Quality Valuation

A further key characteristics of the new inventory methodology is the structural link with Heritage Quality Valuation, or "herityval", at different spatial level of each category and of each single entity, performed by multiattribute qualitative appraisal. It is of utmost importance to set strategies and actions for conservation and economic revitalization.

Research focuses on a new operative-logic tool of the conservation strategy, *i.e.* a new engine of the ordinal, hierarchical, economic assessment of both actual and potential qualitative characteristics of Heritage. It applies on both cases, for each single entity as well as for each complete category of Taxonomy. "Herityval" reveals the quality and value embodied in each entity using one of the many approaches available for ordinal assessment.

It is relevant and innovative to elaborate an interface (through appropriate links) between information system and assessment methods of the intrinsic quality of entities. This link between census ("heritus") and valuation ("herityval") relies on the following methodological structure:

- "heritus" produces the analytical territorial georeferenced knowledge of entities, categories and total patrimony;
- valuation or "herityval" produces inferential probabilistic estimate of potentiality for treasuring of goods, single or associated in its own category;
- the synthesis, between numerical knowledge and probabilistic estimate of treasuring potentialities, *i.e.* quantity and quality, helps to create strategies by making choices among different alternatives.

Strategies can be set up by the mean of cultural itineraries ("a list of places on a route") as tools that can produce benefits by enlarging the use of resources networks located in large areas such as historic Counties, natural parks, thematic parks, Cultural Districts.

The choice of the Heritage Quality Valuation or "herityval" methods is possible thanks to many strucured approaches available in the scientific literature since 1960 (for historical surveys see: Albers, 1988; Lichfield, 1998; Massimo, 1990; Nijkamp, Coccossis, 1995; Nijkamp, Bal, Medda, 1998).
The culture of the "herityval", derived from the New Urban Economics (Lichfield, 1960; Rothenberg, 1964) spreads from the sixties and seventies thanks to several pioneers and forerunners such as Crompton and Lichfield (1962), Perloff (1968), Ward (1968), Forte (1968, 1977), Rizzo (1972), Melhorn and Keller (1979). These scholars belonged to different scientific and cultural contexts and their contributions built up a prominent inter-disciplinary field that is the Heritage Quality Valuation.

Many further contributions have been devoloped in the eighties (Albers, 1987; Fusco Girard, 1987; Hinloopen, 1985; Hinloopen, Nijkamp and Rietveld, 1983; Hinloopen and Nijkamp, 1986; Israels and Keller, 1986; Kalman, 1980; Lichfield, 1989; Nijkamp, 1981, 1988; Rietveld, 1980; Rizzo, 1983, 1989, 1990; Voogd, 1983; Williams, Kellogg and Gilbert, 1983) and they have been syntetized in prestigeous international manual (Coccosis and Nijkamp, 1995). At the end of the ninenties other methodological contributions have been applicated in complex areas (Maciocco, Marchi, 2000; Massimo, 2001; Mollica, 1995, 1997; Mollica, Massimo, Musolino, 2000; Massimo and Vescio, 2000a, 2000b).

The availability of so many tools makes it possible the ordinal valuation of the Heritage quality and potentialities. The technical application opens the door of the new operative field: complex assessment and value judgement, in ordinal terms, about characteristisc, relevance and quality of each patrimony entity by the mean of "herityval" techniques, as European directions say:

> "The study of building types has progressed and **desirability of making judgements of relative value** before [...] protection has grown fashionable [...]" (CE, 2001, p. 28)

The "herityval" ability is not given for granted. It is not possible to give an immediate answer to questions about real and relative quality of artifacts, because it is necessary to have an assessment capacity and inferential ability to express value judgements, which do not lead to deterministic or mechanic solutions. Skills, background education, competence, training, genius and ability in assessment are needed ("Evaluation is an art", Rothenberg). Technical tools are the engines for ordinal and cardinal probabilistic estimation. It is possible to call them Inferential Evaluation Engines ("IEE" in the text) belonging to fields of (among others) Economics of Environmental-Cultural and Project Valuation. Then, to obtain valutative results, data are elaborated by experts with probabilistic and fuzzy skills. These conceptual skills are defined as inferential evaluation attitude (or "art").

Heritage Quality Valuation ("herityval") tools or IEE constitute a separated world from the GIS of Resources Taxonomy. One goal of the research is the construction, with compatible programs, of an interface between GIS and "herityval" engines (Batty, Densham, 1996; Jankowsky, 1995; Lagran, 1993; Malczewski, 1996; Thill, 1999; Scholten, Stilwell, 1990). There is no question about the imperative to know deeply and evaluate Heritage in its quality. The problem is the availability and manageability of approaches, methods, tools, rank scales and, specially, valuation criteria (IIUE, 1985). A specific typology and generation of approaches have been developed: the Multi Criteria Analysis or MCA (Nijkamp, 1979; Nijkamp, Bel and Medda, 1999) have been extensively experimented to assess (Cerreta and De Toro, 1999; Ferretti, 1995; Massimo, 1990; Nijkamp and Finco, 1999; Finco, 2000) the quality of architectural Heritage from urban, aesthetic, artistic points of view. Implementation is feaseable through general criteria, specific indicators, rank orders and reference to key experimentations (Cerreta and De Toro, 1999; Nijkamp, Bell and Medda, 1999; Nijkamp and Finco, 1999).

MCA, when use appropriate valuation criteria, make it possible to comparetively estimate, for sub-regional clusters of goods: embodied value; level of quality; historical, aesthetic, architectonic, urban characteristics; intervention priorities in each single entity related to decay, seismic risk, conservation, costs.

To support the private, collective and public decisions, the outcome is a rank order of the Heritage entities, about which is of major qualitative importance, as well as of greater intervention priority.

5. Heritweb. Heritage on world wide web

Research pursues the goal to lower the barrier of access to knowledge, and to transfer the Heritage GIS and linked MCA to a potential Internet site in order to answer on line the growing demand of Heritage fruition and also to widen the number of users.

It has been defined a WebGIS project, or "heritweb", through advanced technologies that allow an easy pouring of the GIS contents into Internet. It is a modular way to answer the differential and potential needs of the different targets of communication, *i.e.* the various typologies of future potential users of Heritage.

The potential users could virtually decide, staying at home in every part of the world, their own itineraries and tours, waiting to practice them at most appropriate time. The innovative WebGIS contains different levels, or layers, of the originary GIS information to answer properly and variously to the different questions related to the different requests. This is because WebGIS is oriented to help the interaction between structured levels of GIS information and potential users.

Information is about the whole cultural quality of a territory as well as other important levels of information: services for fruition; transportation network; foreseeable related times of transfert according to the information given by the responsible subjects; tourist accomodation and indigenous catering; general costs.

The interaction users-WebGIS allows a self-construction not only of the journeys, but also of knowledge programs, scientific research strategies, educational tours and itineraries, making possible the exchange and the potential market between demand and supply.

The result is an innovative flow of information as well as scientific knowledge which can finally foster virtuos effects in sub-regional areas, stemming from their own territorial resources. Local communities may effectively:

- treasure their own patrimony;
- fearlessly open themselves to the global market;
- start up economic activities;
- create income flows stemming, induced and eased by WebGIS communication, from the cultural patrimony and uncontaminated eco-system;
- self-financed Heritage maintenance and conservation from income produced by sustainable use.

"Heritus" eased by geographic engines (GIS), valutative approaches (IEE) and communicative tools (WebGIS) constitutes a strong and promising system for

GIS + IEE + WebGIS = System Prototype

the future local development because:

- optimizes a first important factor, *i.e.* information;
- manages a second fundamental factor *i.e.* multi-level communication toward different potential world-wide targets and users;
- shortens the distance between high-value localized resources and potential users from all over the world.

6. GIS and Multi Criteria Infrastructures

The software for "heritus" is ArcView 8.1, ArcIMS and MapObject related to MsAccess®.

The link between different engines is a quite complex product which connects, through appropriate and specific computer programming, the different and separate worlds of geography and valuation, *i.e.* "two engines, the first representative, the other inferential, creating a GIS-IEE system, in paticular an ArcView 8.1-MCA system, or prototype for Decision Support System (DSS)".

The specific software for multi criteria valuation of Heritage is a proprietor software of Free University of Amsterdam (Hinloopen, 1985; Hinloopen, Nijkamp, Rietvelt, 1983; Hinloopen, Nijkamp, 1986) named Dominant Regime Method 2 (DRM) which use has been permitted. It structures the variables useful for the "herityval" in an ordinal and multicriterial approach which makes possible to derive the rank order of each entity in the whole patrimony. Also, it is a way to use systematically the results of the valuation expert activities.

To supply an interactive link between GIS and the world of the ordinal inferential valuation, research produces, as specific output, a connection prototype: a multi criteria valuation index of the Heritage cultural quality of each entity named GISmc index or CSGISmc.

Availability of software infrastructure made easier: the census of all existing environmental and cultural resources; their organization in a Taxonomy of categories accepted by the majority of private or governamental actors at international and local level; the management of all categorial data by powerful GIS tools; the link between GIS, valuation and communication tools in only one system.

7. Case Study and Focus on the Historic Centres

Taxonomy is a key factor to optimize knowledge, protection, economic treasuring. The "heritus" methodology devoted to perform a Total Inventory has been implemented in a sub-regional area of Calabria, the Southeast of continental Italy. Total Census has been an "exhaustive, topographic, thematic" inventory of all cultural and natural resorces, with special attention to historic towns and villages. An heavy field work has been performed and over 3.000 of environmental and cultural entities (instead of the few hundreds enlisted in National Register) have been detected, identified according to Cultural Taxonomy and furtherly georeferenced by GIS ArcView 8.1, therefore structured in two data bases, the first internal to GIS, the second associated and performed by MSAccess®.

Given the enormous number of entities, research focuses on the category of urban resources, specifically on the sub-category of historic centres. The starting point is the pre-modern urban structure of the region of Calabria in the turn from the 18th to 19th century. Spatial and demographic evolution is addressed by heavy archive research that led to the surprising discovery of historical unknown cartography compiled in 1828, including several associated tables of civil statistics. It contains an astonishing wealth of detailed information that makes possible a precise picture of regional settlement at that time. The impressive volume of the spatial and numerical data made this special historical cartography

one of the

forerunners GIS of human history

before the existence of electric power and computers. It is named "Carta del Regno delle Due Sicilie" that may be considered an *ante litteram* and forerunner GIS because it is an astonishing synthesis of the first modern civil statistics and scientific cartography of the interested area. It was thoroughly compiled by the researcher Giovan Battista Marzolla from 1828 to 1831, updated in 1852, and now it makes possible the deep knowledge specified below.Very analytical scientific data on inhabitants enables to build demographic trends of pre-modern towns and villages and to identify historical Court Districts that should be assumed today as boundaries of present time Cultural Districts.
To deeper the research, the Case Study implements the experimentation of "herityval" approach, *i.e.* of Heritage Quality Valuation procedures. In fact, in the second part of the research, one of the Cultural Districts of the region is chosen and its historic centres are valuated with regard to urban Heritage quality and maintenance status, by "herityval" approaches. Valuation is performed by an expert panel of historians, conservationists, economists, managers and applying Delphi Technique for opinion elicitation, and the cited ordinal statistic software of Dominant Regime Method for Multi Criteria Analysis. The outcome is the list of centres with rank order which is syntesis of: urban Heritage quality; tourism potentialities, conservation status, hierarchy of intervention needs.
These results are in the GIS Figures and are offered to general public as a first preliminary information helping implementation of local strategies for conservation and revitalization of historic urban structure, *i e.* of historic centres inserted in today towns and villages.

8. The Area of Study

Historic centres in Calabria region are generally the oldest part of today towns and villages of small dimension. They have often strong cultural, territorial, landscape and environmental features, even if prominent, outstanding and famous monuments within them are rare. Some important problems still stand and arise in the region, such as the physical constraints of a mountain land and the absence of co-ordination in conservation decentralized actions.
The most important objective of conservation strategies at regional and local levels, is to support people and institutions in overcoming obstacles which since now made unfeasible and ineffective the revitalization of region's historic centres and architectural Heritage. One well clear obstacle is the radical absence of quantitative and qualitative information, than the difficulty in scientific understanding of dimension and dynamics of Heritage treasuring whole sector. Historic information and knowledge about resources are strongly relevant to set priorities in revitalization strategies, especially when town settlement is high peculiar in the region.
The research implements a study of spatial characteristics of the regional settlement by the examination of the cited unknown historical cartography, demography and statistics. It detects the historic centres and their connecting institution, the Districts, linking during the past some closer settlements in sub-regional clusters. Inside some of these historic Districts, an expert panel performs analyses concerning the relationship between urban quality and potential for development of cultural and environmental tourism, as well as firm creation. It would be an operational answer to "desiderability of making judgement of resource relative value before protection and treasuring actions" (CE, 2001).

The assessment detected the lack of management skill and entrepreneur spirit in implementing regional and local strategies of historic centres renewal and revitalization. A managerial training experience has been established up to: address this issue; treasure the research experience; use it to overcome the problem setting clear goals. The main goal is to stimulate the youngs in creating activities and getting job opportunities supplied by the regional huge urban Heritage, environmental capital, cultural patrimony. The focus is the simulation of micro-firms creation for cultural and tourism activity enterprises, with the help and the support of a tutoring nonprofit organization specialized in firm and job creation.

9. Case Study. Quantitative Analysis of Historic Urban Settlement in Calabria Region

Historic urban settlements in Calabria region have been damaged many times in severe manner, or destroyed, by seismic events.
The last terrifying events were the earthquakes in 1618 and 1783, that changed the shape of the territory. After these dates in the previous century, the rebuilt historic settlement structure remained almost unchanged, but only enlarged by the shocking spreading out of buildings and infrastructure constructions in plain and coast areas. All these new non-housing and housing constructions enlarged the quantity of built space per capita but did not grow the quality of living, neither the liveability.
Strong trend in society toward re-use of urban historic Heritage at both global and local level has been produced by multiple concerns about un-sustainability of modern settlement features with regard to: quality of living and urban liveability; enjoyable level of urban space; conservation of environment; pleasentness of housing.
Regional and local communities are trying to translate this treasuring trend in operational behavior. As analyzed before, to do this, the first requirement is the information unavailable before the present research. In the specific case of Calabria the information and data have been drawn from documents and historic cartography to overcome the information lack. Then, the research was set to fill this gap and its implementation made possible the above cited discovering of an almost unknown, or unintended, document.

10. Case Study Results 1: Historic Urban Structure from 1828 to 1991

The discovery of a surprising wealth of data source made possible, for the first time in the region, to know, on the basis of scientific information, the historic urban settlement structure of Calabria, as well as the population dynamic from 1828 to 1991 not just at the aggregate level of municipality boundaries, but in the great unaspected detail of each historic centre, even if very small and marginal in the regional space.

There is the scientific basis to detect which villages have objective historic roots and to distinguish them from part of towns grew up in more recent period, often as a consequence of periodical infrastructure and road construction, such as:
- the coast railways after Italy unification, at the end of 19th century;
- the marsh drainage and national land reclamation, in the early 20th century;
- the construction of highways and coast state road system in the second post-war period.

The majority of centres existing in 1828, as documented by the pioneer and *ante litteram* GIS of Marzolla, are today in severe demographic depression. A comparison to census data makes it possible to single out the following typologies of the population trend in historic centres and Cultural Districts of Calabria:

- completely uninhabitated (ghost villages);
- almost uninhabited;
- population decrease after Second War;
- stable or increasing population from 1828 to 1991.

This knowledge has two consequences. First, each centre can be identified with a specific economic and demographic trend, not just on the basis of formal and morphological dynamic. Second, this information helps the research in measuring the intervention finalized to stop the total economic decline and the demographic decrease.
To formulate intervention proposals, data should be worked out to meet two needs: information about the old state District at sub-regional level in which centres are connected and networked; in the boundary of the singled District, a deeper comparative analysis for each village and town of the urban and architectural characteristics, to know relative-comparative values embodied as well as hierarchy of resources that can be mobilized for revitalization goal.

For the first need, the Marzolla information help again and give data on the precise boundaries in which centres have been connected each other over history for economic, trade, infrastructural, institutional, religious relationships. The

regional space, or territory, has been organized in sub-regional Districts that are the decentralized structures of the state. Old state Districts are sub-divided in smaller cultural areas called Circondario. New data processing give an unaspected further hint: depopulation occurs in different types not only at village level but also at District level. Three preliminary District typologies have been detected.

First. There are sub-regional areas of old state Districts with dramatic delay in economic performances, characterized by un-inhabitated and abandoned territories, that have the trade off of an almost uncontaminated environment. Often, historic centres are ghost villages, although their urban and architectural historic features are intact. Some intuitions for intervention derive from the above information: environmentally intact land and abandoned historic centres are potential resources for bio-agriculture and for green and cultural tourism activities, if additional data about architecture and facilities in the villages will be provided. One case of the above typology is the Circondario of Area Grecanica, in the old state District of Reggio Calabria. The treasuring action logo might be:

"from ghost to host villages".

Second. There are sub-regional areas of old state Districts on coast with important modern tourism activity. The pressure by entrepreneurs and households is very high in asking for further urban spreading out and to build tourism facilities. This is a threat for coast environment. To pursue a sustainable economic development and eco-tourism, intervention may foster the re-use of depopulated coast historic small centres and fishermen shelters to be organized and equipped as host villages. One case of the above typology is the beautiful Circondario of Tropea called “beach of gods”, in the old state District of Vibo Valentia.

Third . There are sub-regional areas of old state District in central areas where some economic activities and locations are concentrated. Open land is scarce and urban spreading out, for housing and industrial facilities, is always a strong competitor of residual agriculture activities and forest territories. In this case, housing service may be located in historic centres closely surrounding dominant town, instead of new housing build up. This choice might save intensive agriculture and residue open land. One case of the above typology is the old state District of Nicastro, named Lamezia Terme at the present time.

11. Today Heritage Quality Valuation by Multi Criteria Analysis

To meet the second need, a Multi Criteria Analysis have been performed inside sub-regional clusters of villages, to understand characteristics, features, values, tourism potential about each single centre in a relative hierarchical form, and to grasp possible future re-uses in a scientific rank order. Also a degree of physical and functional conservation indexes has been investigated to be used in grasping the needs for intervention and then to set up the combined final rank order of both value and priorities.

If criteria are well conceived, selected, defined and managed, the cited MCA give an understanding about values, conservation, and interrelated needs for intervention ranking of each analyzed center in the comparative framework of sub-regional Districts. To evaluate comparatively historic centers at hands, some criteria, belonging to cited specific experiences of urban evaluation (Nijkamp, 1988; Fusco Girard, 1992; Massimo, 1995, 1997, 2002; Fusco Girard and Nijkamp, 1997; Massimo and Vescio, 2000a, 2000b), in “herityval” framework, are proposed. Some for settlement scenario: geographic position; space; block dimension. Some for architectural scenario: construction; style; fronts; interiors; and last, monumental characters or number of located monuments. GIS tools strongly helped in data collection, geographic referencing and to manage data in valuation procedure.

a1. Position

Features are: positive and harmonic relationship between settlement site and town; aesthetic landscape outcome of global construction or 'cityscape'; territorial accessibility. More harmonic urban panorama and aesthetic cityscape results, higher scores are assigned to classify each historic centre under scrutiny.

a2. Urban settlement structure

Features are: harmonic relationship between streets, squares, open land; symbolic elements. More harmonic the existing proportions, higher scores are assigned to each analyzed centre.

a3. Dimension of urban blocks
Features are: originary and present length and width of urban blocks; relation among all blocks; special positive attention to smaller dimensions that should be better than larger ones. Smaller or more proportional originary and present blocks, higher scores are assigned.

b1. Construction or building characteristics
Features are: originality of building system and technologies. Valuation of: original constructive quality, classification of elements by technical quality ranks, link to provenance site\locality. More physical quality\solidity as well as permanence of original materials, higher scores are assigned.

b2. Original characteristics
Features are: architectural, aesthetic and linguistic specific qualities; their permanence and integrity in the building versus compromission of them operated by men over time. Score are proportional to integrity: more integrity, higher scores are assigned.

b3. Fronts
Features are: building fronts on public and collective spaces such as streets, squares, vistas, belvedere; level of proportions, surface, aesthetic, materials and colors. Better quality and integration with front spaces, then higher the assigned scores to the center under scrutiny.

b4. Interiors
Features are: analysis of ground floor level to understand the key elements of centre urban morphology; permanence of original functions, destinations and forms. Better original character conservation, higher scores are assigned to the center under scrutiny.

b5. Monuments inside centre
Features are: number and density of monuments recognized by people\folks opinions or experts or landmark official register; buildings having artistic features and historical interests. Higher the number of monumental buildings, higher score are assigned to the centre.

The criteria have been applied by panelist experts that visited the centres and expressed their scores in an individual matrices, without any communication neither information to other assessors. They followed the tested methodology of the cited MCA specific approaches, namely the second version of the Dominant Regime Method (DRM) set up by Hinloopen and Nijkamp (Hinloopen, Nijkamp, Rietveld, 1983; Hinloopen, 1985).
For the first experiment a choice has been made, excluding evaluations based upon perceptive criteria or visual indexes (Sekler, 1989; Steiniz, Roger, 1968; Tempesta, Crivellaro, 1999) because too complex for available experts and for time planned.
All scores assigned by each assessor to each criterion for each centre, checked and summed up by Delphi Tecnique, produced the multi dimensional table of MCA-DRM, namely the Qualitative Effect Matrix. It has been processed to understand latent relationships and detect latent implicit variables of reality, relying upon robust ordinal qualitative statistics (Hinloopen, Nijkamp, 1986), experimented methodology (Coccossis, Nijkamp, 1995; Fusco Girard, Nijkamp, 1997) and specific Case Studies applied in the same region (Massimo, 1990, 1995, 1997, 2002; Massimo and Vescio, 2000a, 2000b).

12. Case Study Results 2: Analysis of Urban Quality in Greek Cultural District

Following the DRM methodology, a Case Study has been developed in one of the detected Cultural Districts singled out in the previous part of the research. The Case concerns a network of villages and focuses on the valuation of quality of this settlement, with explicit references to: features and characteristics of each urban resources; relative values embodied at spatial and buildings scale; hierarchy and ranking of centers. For this specific task, in the general framework of urban morphology studies (Lynch, 1960, 1962, 1974, 1981) adequate tools such as MCA (Fusco Girard, Nijkamp, 1997; Cerreta, De Toro, 1999; Ferretti, 1995; Nijkamp, Finco, 1999) have been applied, with some references to previous Case

Studies.
The chosen sub-regional area is the historic island of Greek language and tradition, now called Greek Cultural District in the research. Given a relevant tourism demand (Banca d'Italia, 2000), there is a very huge pressure by entrepreneurs and households to build tourism facilities and holiday housing buildings, and this is a permanent threat for coast environment. Instead, the re-use of coast and rural historic villages and light transportation system may be a key alternative *versus* new urban spreading out and further landscape contamination. The point is to set up a hierarchical or ranking evaluation of all historic villages available. This enables decision makers to know the comparative values and to figure out the re-use of resources for a sustainable tourism that should be compatible with coast environment conservation.

In the Case Study, urban quality of villages and towns is appraised implementing DRM technique and using a specific file. Each assessor of expert panel filled one of these for each centre with specification of quantitative and qualitative data and features. Each criterion is assessed and expressed in ordinal qualitative terms by all panelist or assessors. The collection of all jugments makes the table of valuation called

Qualitative Effect Matrix

Data have been processed by MCA-DRM software, (Hinloopen, 1985; Hinloopen, Nijkamp, 1986; Hinloopen, Nijkamp, Rietveld, 1983), and the rank order of villages is produced and provided for decision in planning, management and political arena. Outcomes of the research are in the GIS Figures.

The several rounds of DRM are performed giving different weight to group of criteria. Three scenarios are set: Neutral Scenario, giving the same importance to all criteria; Settlement Scenario, giving higher weight to territorial criteria; Architectural Scenario, giving higher importance to urban architecture criteria. Results and outcomes in the GIS Figures seem to be coherent, constant and robust.

13. Management Training Program for Firm Creation in Cultural Tourism Activity

The assessment procedures detected the lack of managerial skill and entrepreneurial spirit in implementing regional and local strategies of historic centres renewal, revitalization and sustainable tourism use.

To address this issue, treasure the experience, overcome start up problems, a one year managerial training experience has been established up. The main goal is to stimulate young people in getting job opportunities supplied by the regional huge urban Heritage, environmental capital, cultural patrimony. The focus is to encourage the creation and setting up of micro-firms for cultural and tourism activity. Program relies upon the help and the support of a tutoring nonprofit organization for firm, enterprise and job creation.

The program is based upon some key education units:
- proficiency in basic tools of cultural and environmental ("eco-cultural" in the text) tourism management;
- systematic knowledge of environmental and cultural Heritage;
- skill in Heritage economics, project evaluation, Heritage Quality Valuation or "herityval";
- direct involvement in job and firm creation for cultural-tourism activity and enterprises.

The program provides education, applied experiences and benchmarks to train local young people in managerial skills. Fundamental courses are the following.

Fundamentals of Eco-tourism Management
Introductory management skill. Computer, internet, e.commerce and "heritweb". Basics of strategic communication and public relations. Methodology for Heritage detection. Heritage accounting and valuation. GIS basics.

Environmental and Cultural Resources Knowledge

Principles, methodology and techniques for resources and Heritage census or "heritus". Landscape, natural, ecological resources. Cultural resources. Mobile, artistic and historic resources. Conservation principles and techniques. Resources management and planning. Environmental and cultural itineraries and tourism.

Environmental and Cultural Economics

General and environmental economics. Introductory ecological economics. Economics of project evaluation and appraisal. Multi Criteria Analysis of Heritage Quality Valuation or "herityval".

Resources Management in Eco-cultural Tourism

Strategic management eco-cultural tourism. Activities, firms, enterprises and job creation in conservation and eco-cultural tourism. The substance: quality supply. Quality supply management. Marketing management. Strategic communication. Firm and human resources management. Cultural activity and facility management.

The program experience has had positive results and proved that, basic quantitative historic knowledge ("heritus") and Heritage Quality Valuation ("herityval") are very important for conservation, economic revitalization and Heritage management. In the future, training program might address the management of resources fostering the creation of revitalization strategies and the implementation of entrepreneur ideas, new eco-cultural firms, sustainable tourism activities.

Figure 01. Italy, South macroregion: Calabria region

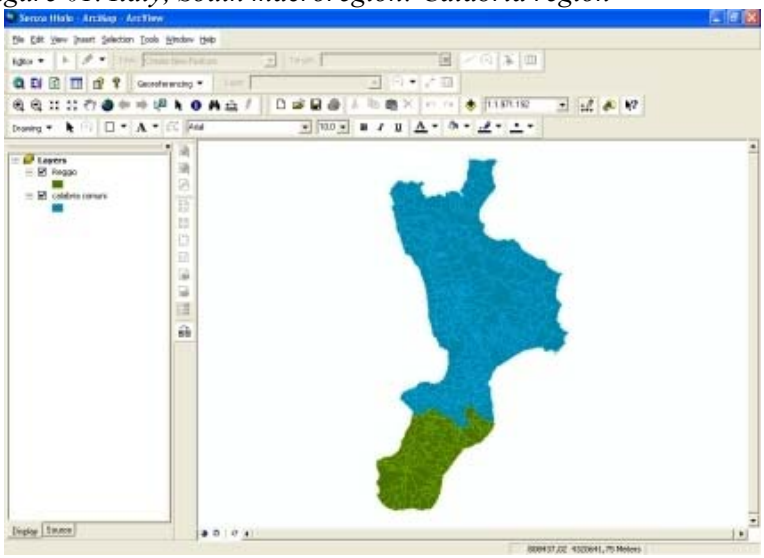


Figure 02. Calabria region: Reggio Calabria province

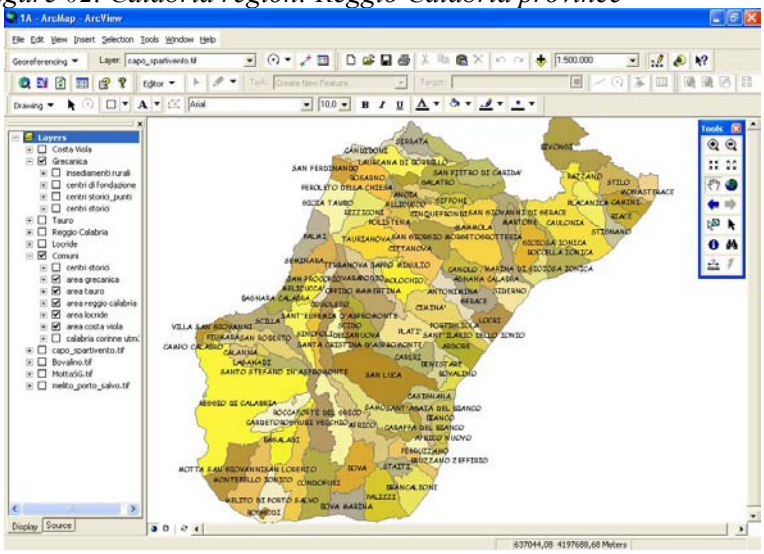


Figure 03. Provincial Resources Inventory (PRI). Environmental entities

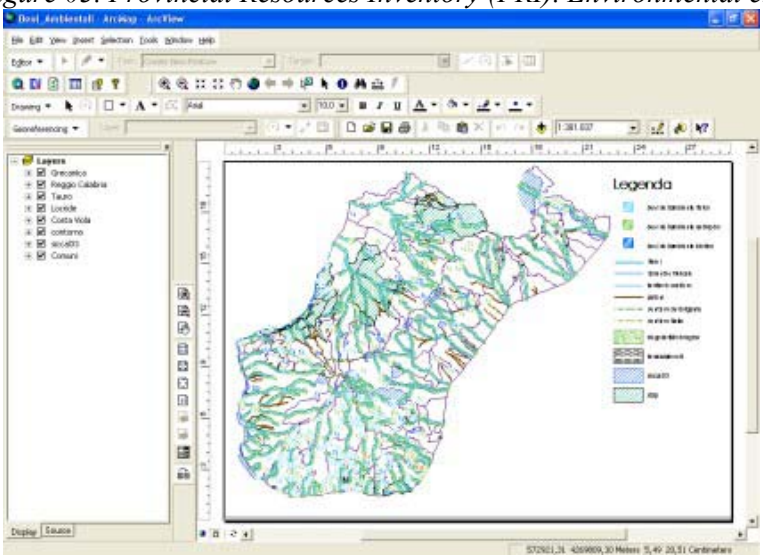


Figure 04. PRI. Archaeological entities

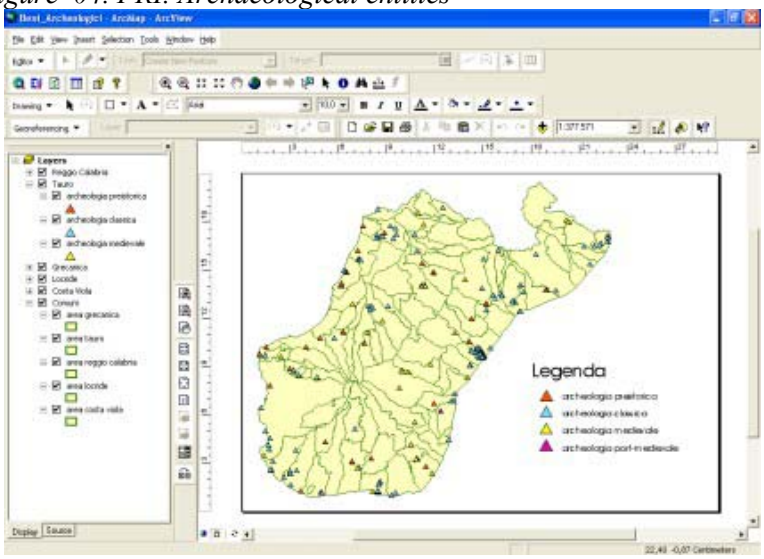


Figure 05. PRI. Urban entities: historic centres, new towns, vernacular villages

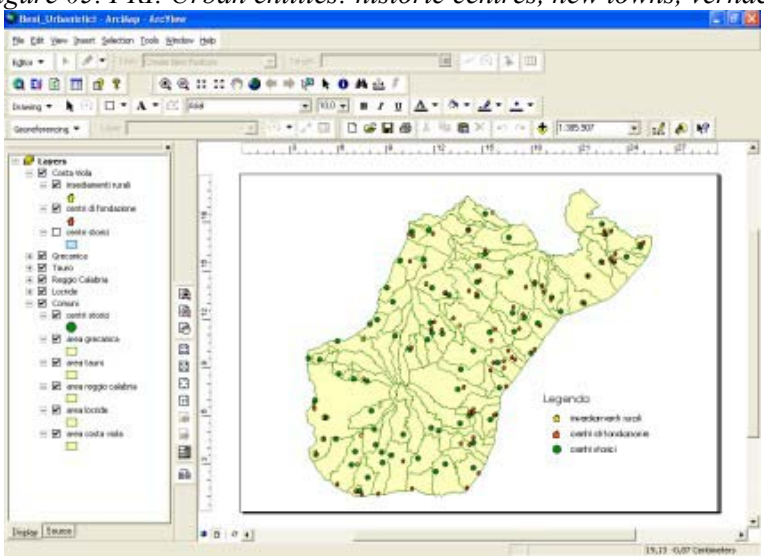


Figure 06. PRI. Architectural entities: civil buildings or palaces

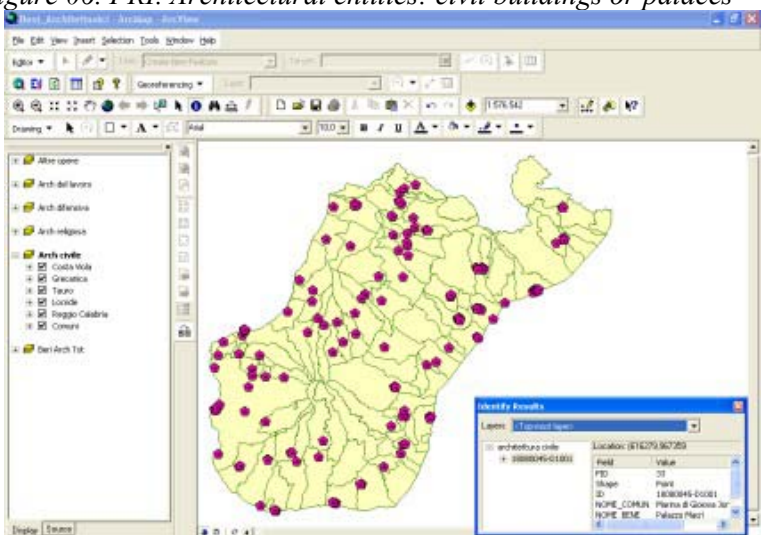


Figure 07. PRI. Architectural entities: churces, monasteries, chapels

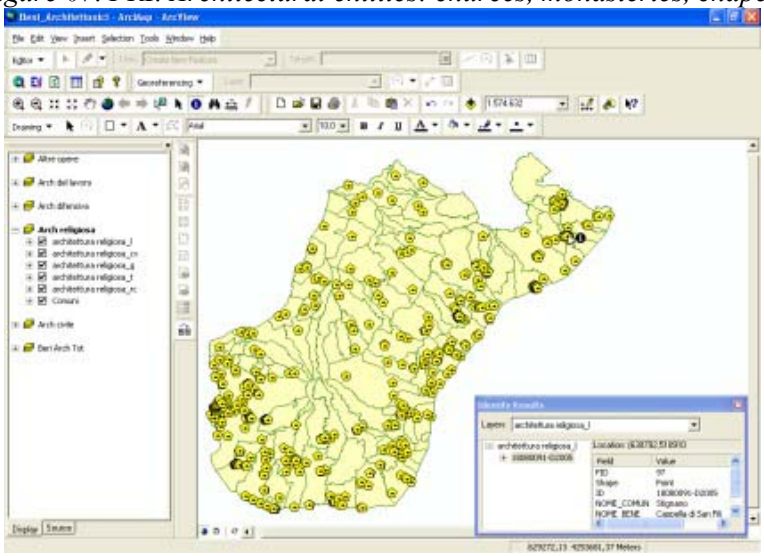


Figure 08. PRI. Architectural entities: castles, towers, town walls

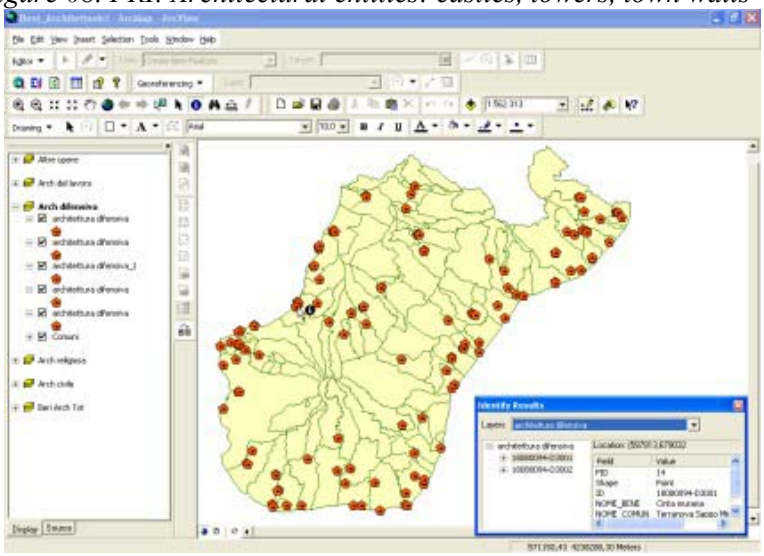


Figure 09. PRI. Architectural entities: historic small factories

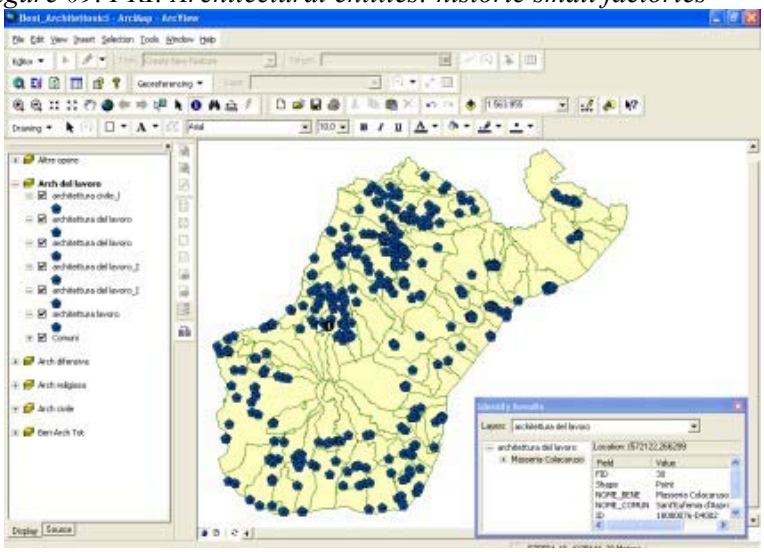


Figure 10. PRI. Architectural entities: others

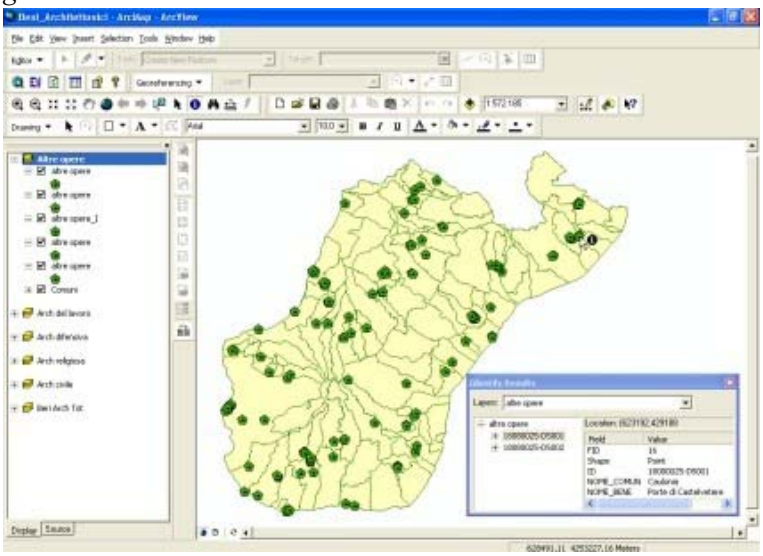


Figure 11. PRI. Total architectural entities

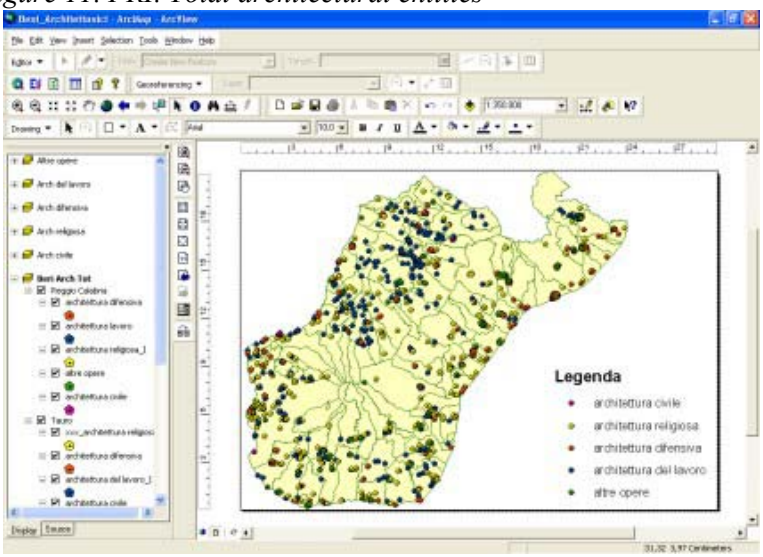


Figure 12. PRI. Landscape, panorama and visual entities

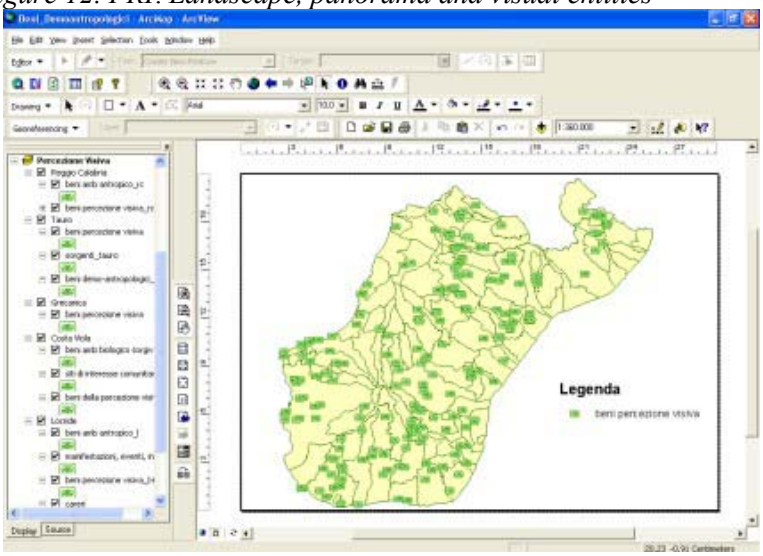


Figure 13. PRI. Works of art and museums

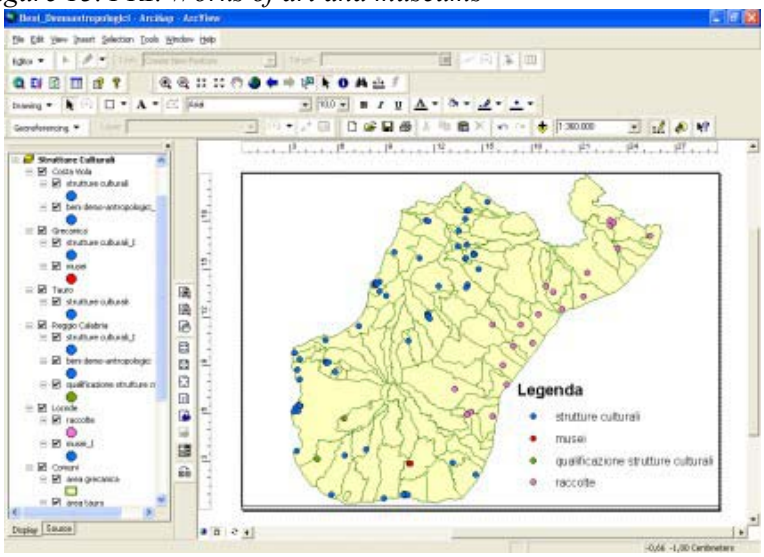


Figure 14. PRI. Ethnic, anthropological and immaterial entities

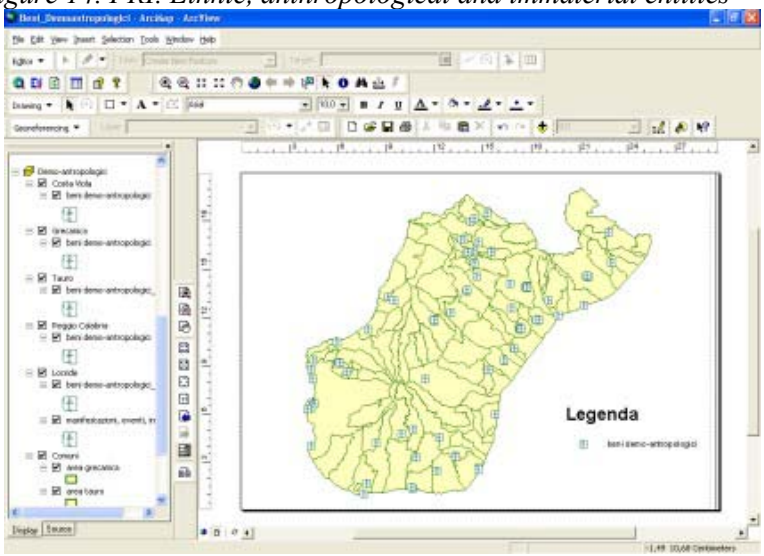


Figure 15. PRI. Total cultural and environmental entities of Reggio Calabria province

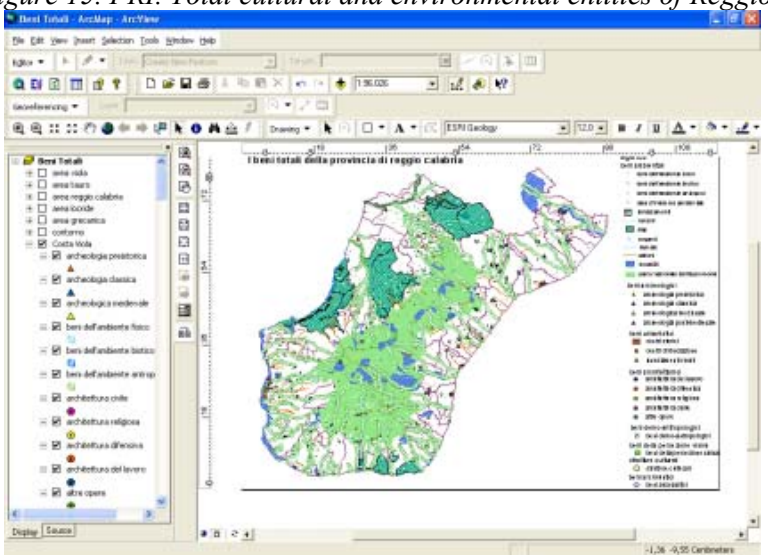


Figure 16. The B. Marzolla unbelievable forerunner GIS, Kindom of Two Sicilies, 1828

Figure 17. The B. Marzolla forerunner GIS, Reggio Calabria province, 1828

Figure 18. The B. Marzolla forerunner GIS, Reggio Calabria province, 1852 update

Figure 19. Reggio Calabria province. Historic criminal court boundaries, 1811

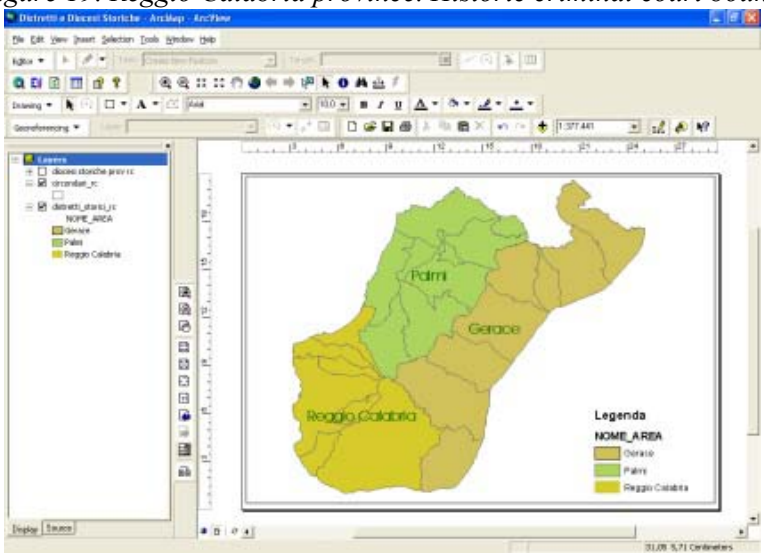


Figure 20. Reggio Calabria province. Historic diocese boundaries, 1811

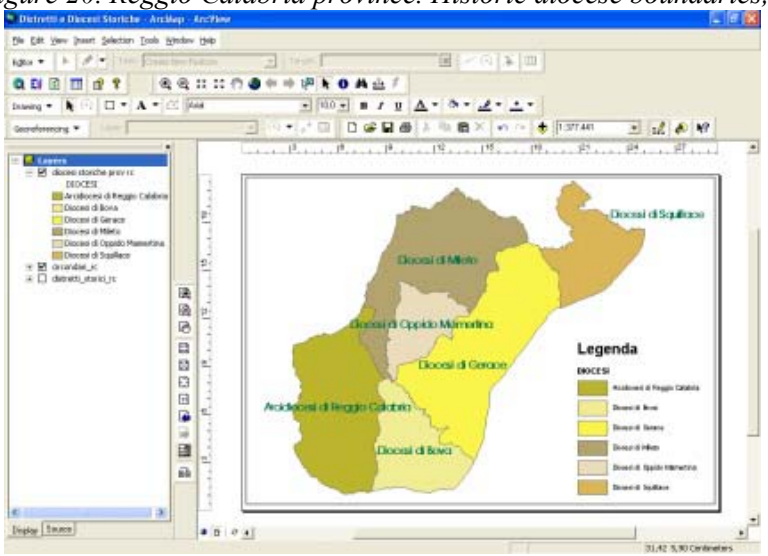


Figure 21. Reggio Calabria province. Proposal for today territorial Cultural Districts boundaries

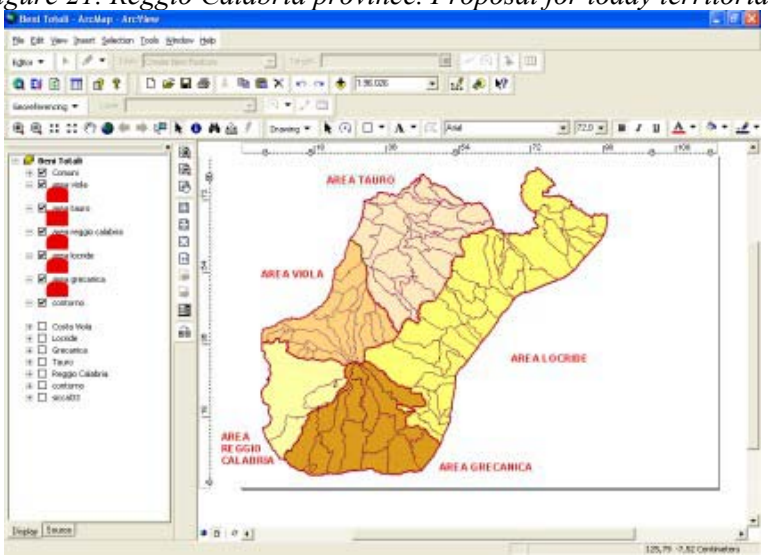


Figure 22. Reggio Calabria province. Subprovincial Greek Cultural District: census geodata

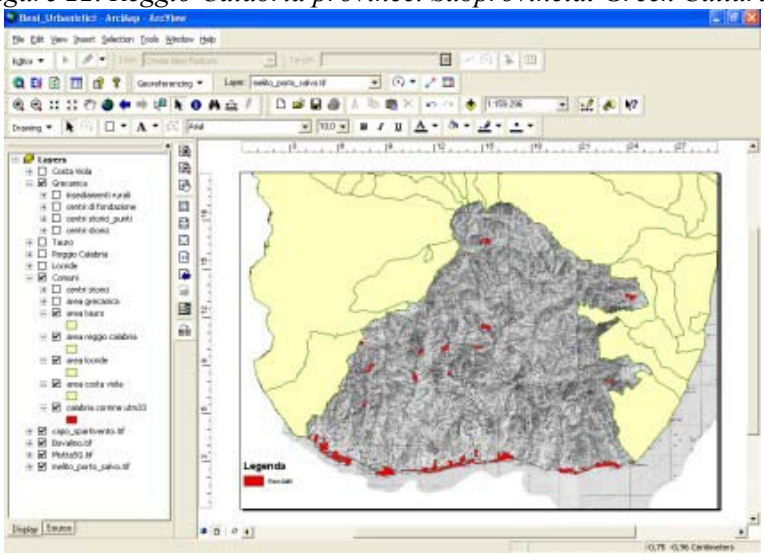


Figure 23. Greek Cultural District. Location of total cultural entities

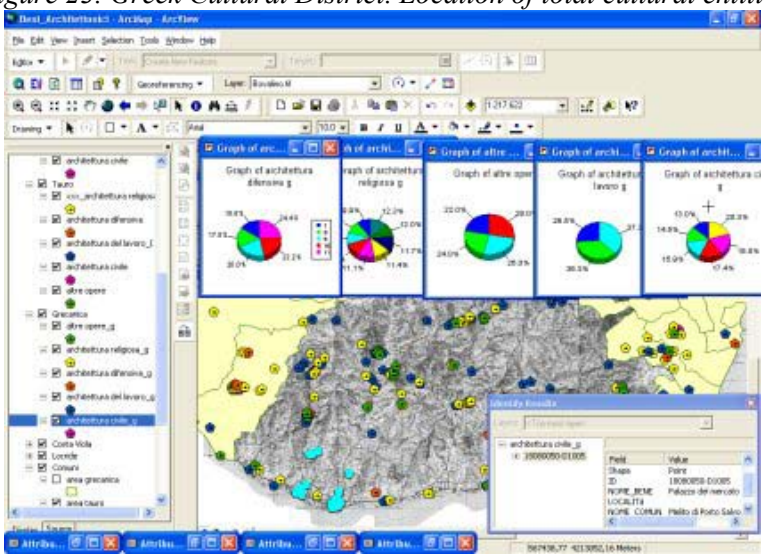


Figure 24. Greek Cultural District. Detection of all historic centres

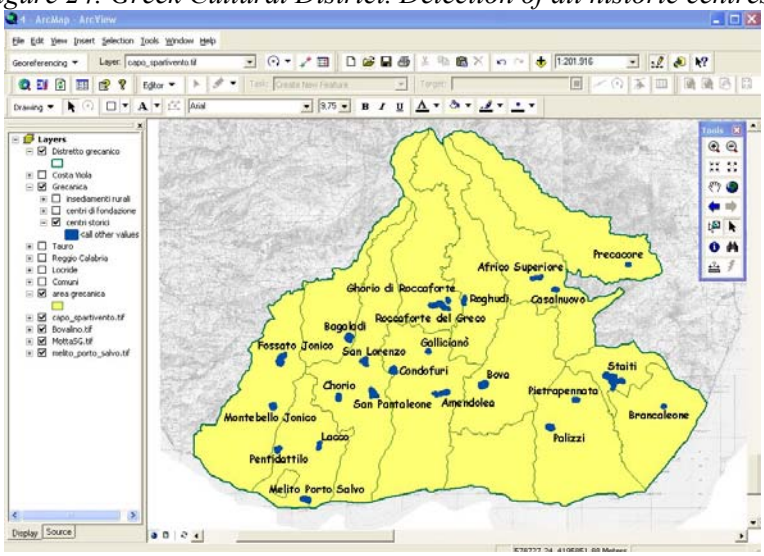


Figure 25. Melito Porto Salvo. Historic maps as basis of knowledge

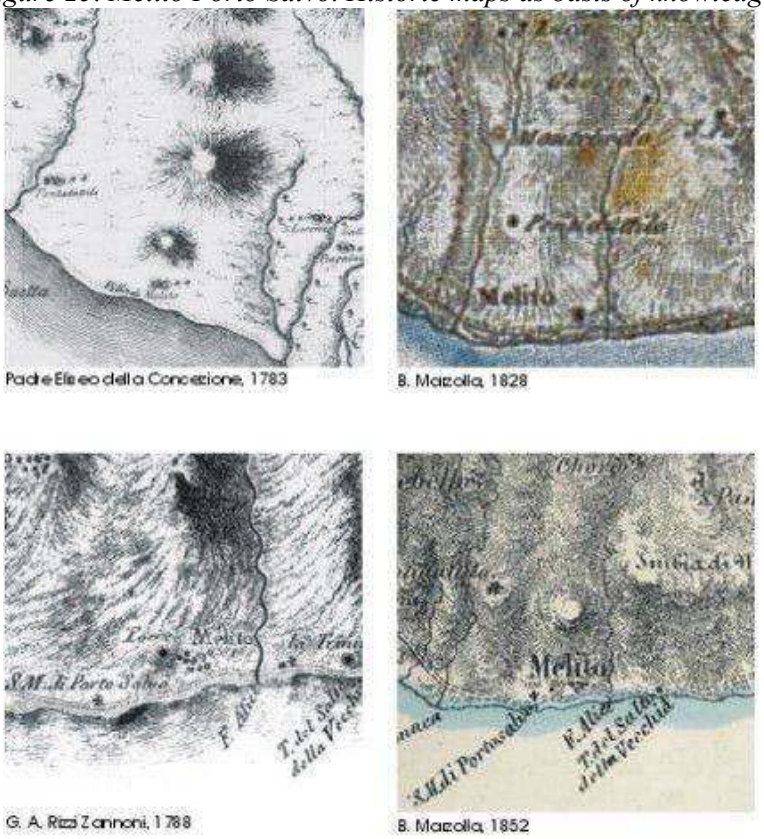


Figure 26. Melito Porto Salvo "Modern" cartography as basis of knowledge

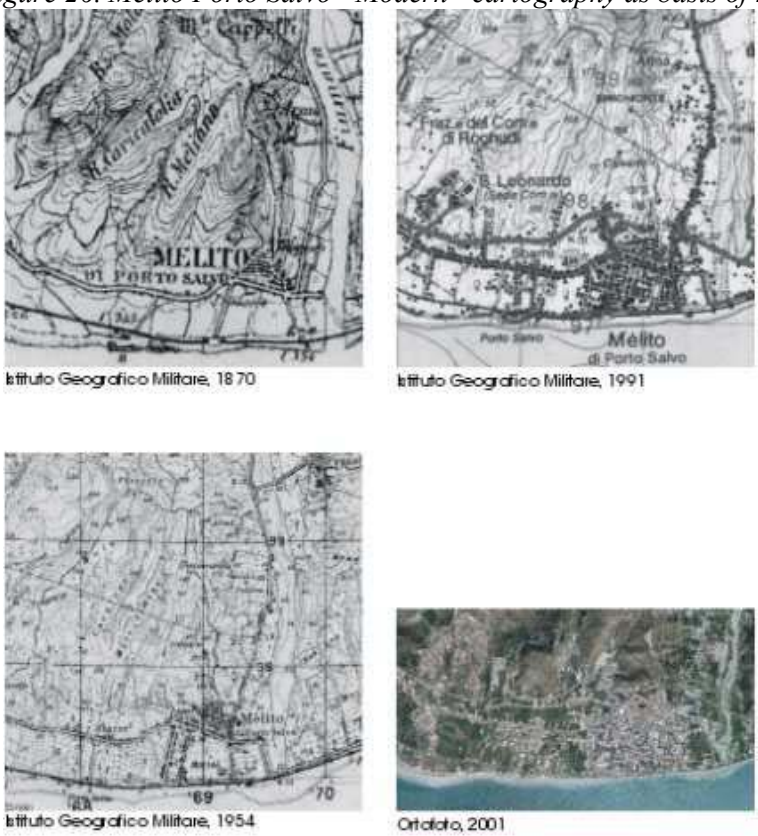


Figure 27. Melito Porto Salvo. Urban area boundary at 1870 (IGM)

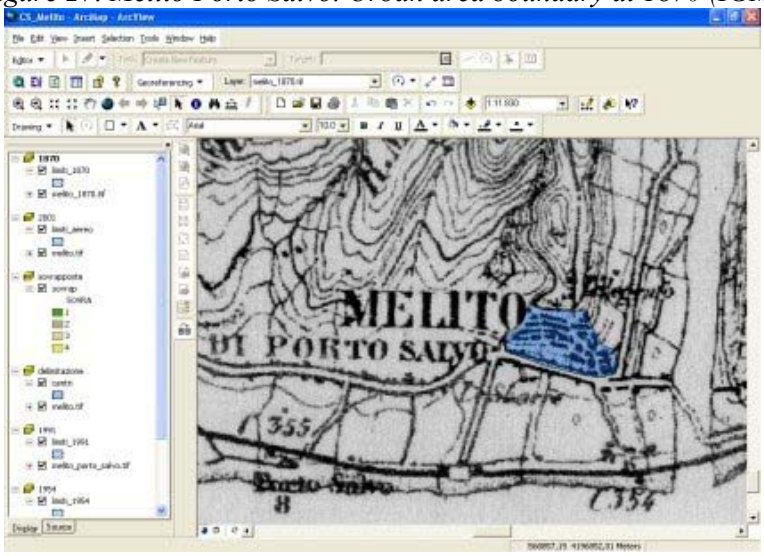


Figure 28. Melito Porto Salvo. Urban area boundary at 1954 (IGM)

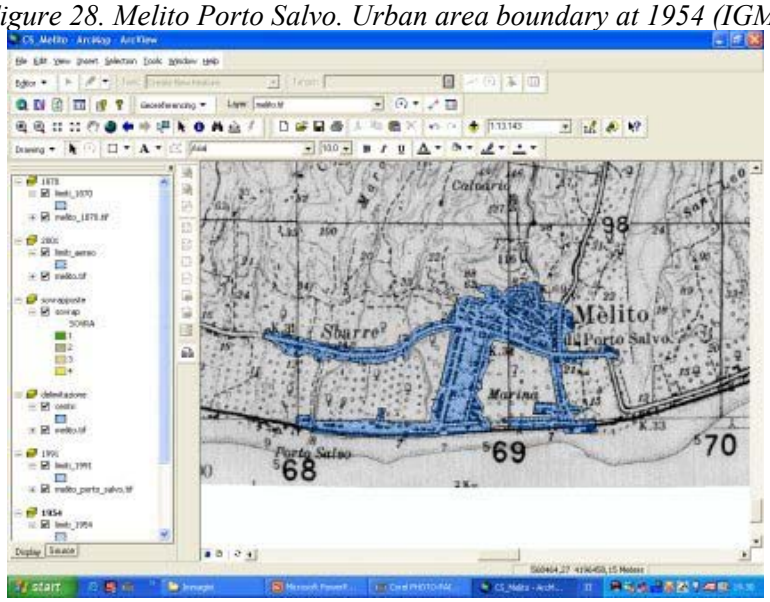


Figure 29. Melito Porto Salvo. Urban area boundary at 1991 (IGMI)

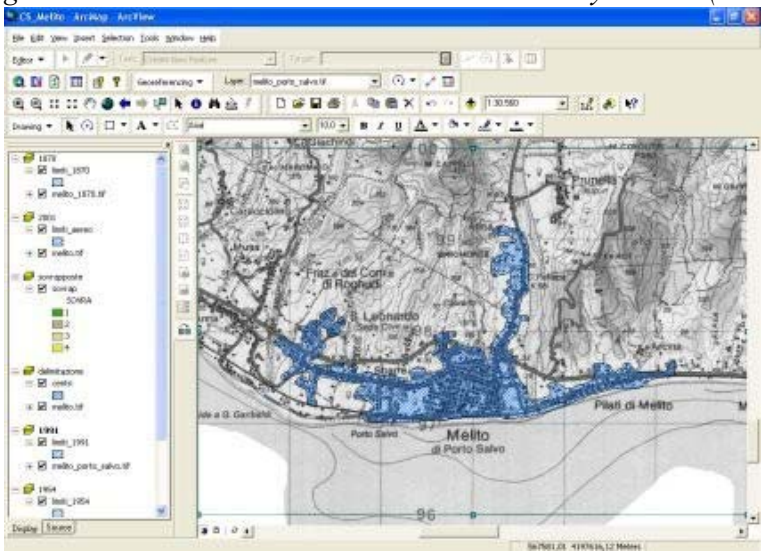


Figure 30. Melito Porto Salvo. Urban area boundaries at 2001

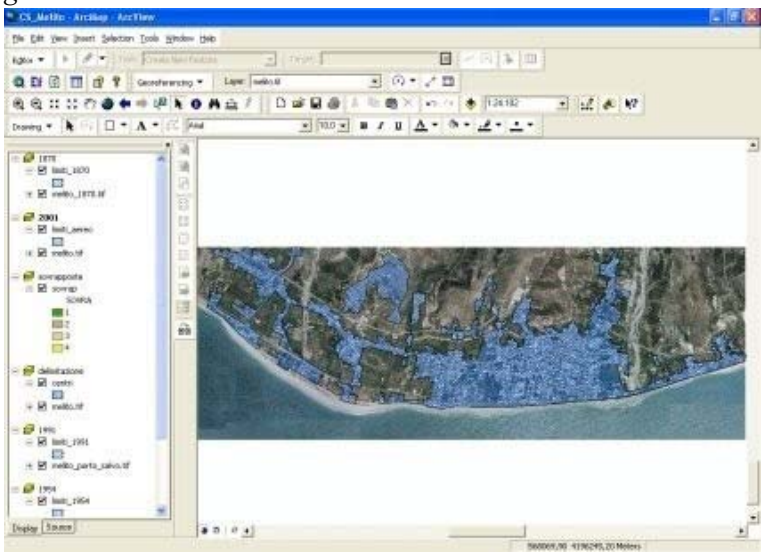


Figure 31. Melito Porto Salvo. Overlays of diacronic urban area boundaries (1870 – 2001)

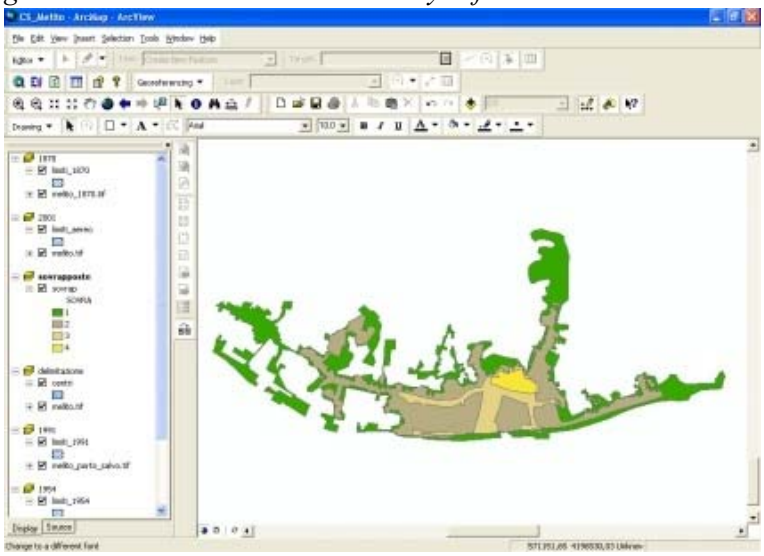


Figure 32. Melito Porto Salvo. Detection of historic centre boundary (1870) on aerial photography (2001)

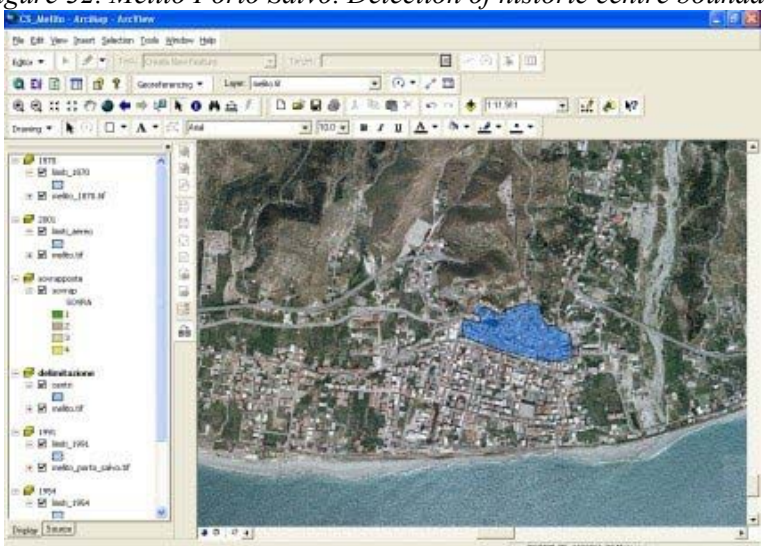


Figure 33. Complex Data Index for historic centre. Three units: GIS; DB; MCA. Unit 1: GIS

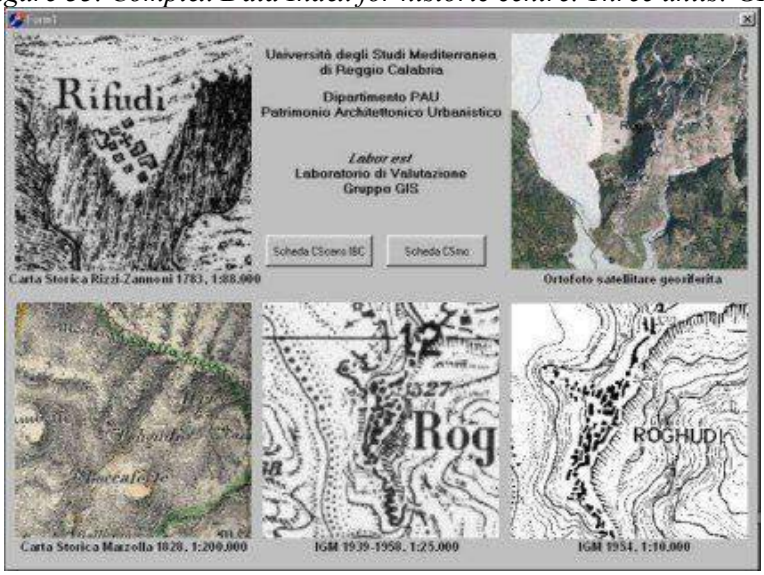


Figure 34. Complex Data Index. Unit 2: DB run by MS Access

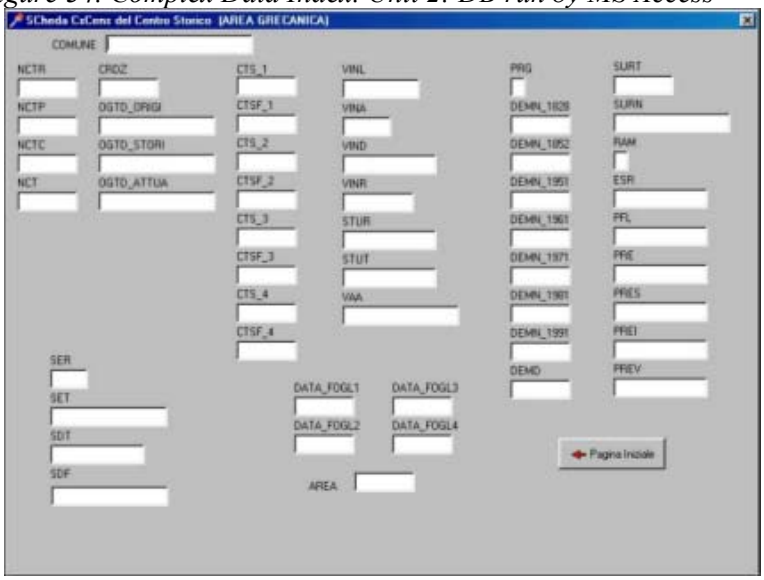


Figure 35. Complex Data Index. Unit 3: valuation run by MCA

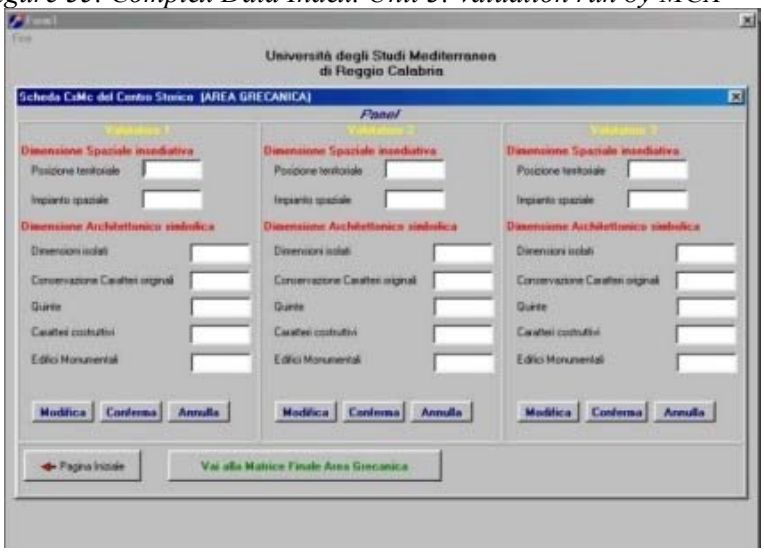


Figure 36. Unit 3: valuation run by MCA. Turistic potentiality valuation by a three assessor pool

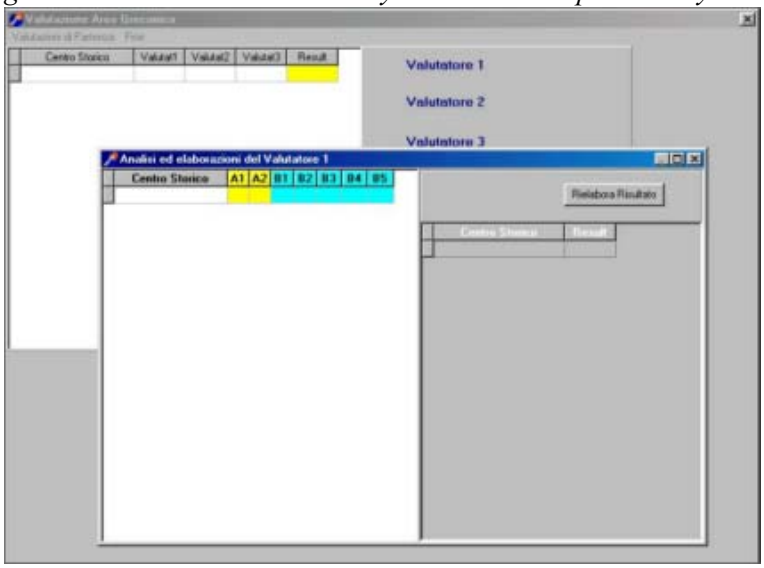
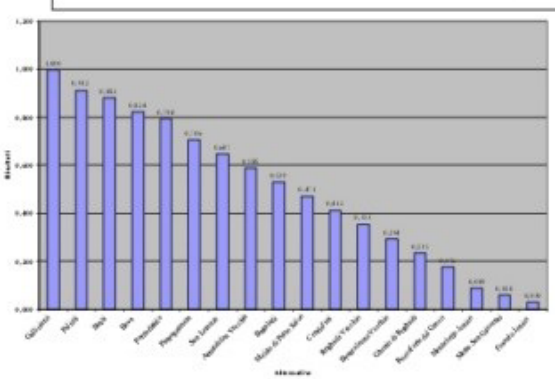


Figure 37. Unit 3: valuation outcome. Rank order of Cultural District historic centres

N.	Esperto 1		Esperto 2		Esperto 3		Risultati	1
1	Gallicciano	1,000	Bova	0,992	Gallicciano	1,000	Gallicciano	1,000
2	Palizzi	0,940	San Lorenzo	0,910	Pentedattile	0,940	Palizzi	0,912
3	Staiti	0,880	Staiti	0,910	Palizzi	0,850	Staiti	0,882
4	Bova	0,794	Pentedattile	0,792	Staiti	0,850	Bova	0,820
5	Pentedattile	0,721	Gallicciano	0,770	Bova	0,770	Pentedattile	0,790
6	Pietrapennata	0,690	Palizzi	0,740	San Lorenzo	0,710	Pietrapennata	0,710
7	San Lorenzo	0,690	Molito di Porto Salvo	0,400	Pietrapennata	0,630	San Lorenzo	0,447
8	Amendolea Vecchia	0,630	Amendolea Vecchia	0,400	Bagaladi	0,400	Amendolea Vecchia	0,590
9	Bagaladi	0,530	Motta San Giovanni	0,550	Condofuri	0,530	Bagaladi	0,530
10	Molito di Porto Salvo	0,410	Bagaladi	0,490	Amendolea	0,470	Molito di Porto Salvo	0,470
11	Condofuri	0,380	Pietrapennata	0,410	Molito di Porto Salvo	0,400	Condofuri	0,410
12	Brancaleone Vecchio	0,300	Roccaforte del Greco	0,350	Glorie di Reghiuli	0,330	Reghiuli Vecchio	0,350
13	Reghiuli Vecchio	0,300	Montebello Jonico	0,250	Reghiuli Vecchio	0,292	Brancaleone Vecchio	0,290
14	Glorie di Reghiuli	0,270	Brancaleone Vecchio	0,230	Brancaleone Vecchio	0,241	Glorie di Reghiuli	0,240
15	Roccaforte del Greco	0,250	Condofuri	0,210	Roccaforte del Greco	0,180	Roccaforte del Greco	0,180
16	Montebello Jonico	0,150	Fossato Jonico	0,134	Motta San Giovanni	0,110	Montebello Jonico	0,090
17	Fossato Jonico	0,040	Reghiuli Vecchio	0,040	Montebello Jonico	0,040	Motta San Giovanni	0,040
18	Motta San Giovanni	0,010	Glorie di Reghiuli	0,000	Fossato Jonico	0,020	Fossato Jonico	0,030



14. Conclusion

There is a positive general trend in society for treasuring and conservation of environmental and urban built Heritage and, specially, of small historic centres and towns of art. Also, these urban resources are getting growing importance in the struggle for growth and development of more delayed regions and areas of Europe (Camagni, 1996; Camagni, Capello and Nijkamp, 1998), consequently the research focuses on just one Category of cultural urban resources: historic centres.
The strategy is to conserve and re-use natural, cultural and urban Heritage and so doing (Massimo, 1998):
- preserve environment and landscape;
- prevent expenses for further settlement and urban spreading out;
- avoid the dis-investment of existing villages and facilities;
- supply housing service in un-contaminated areas;
- supply cultural and recreational services and spaces;
- foster the growth of green and cultural tourism.

The above strategy faces and confronts a preliminary obstacle in the almost complete absence of sytematic data concerning nature, culture and historic settlements. There is no basic scientific information about which present towns and villages have been the settlement of the past that might have today the characteristics, or just at least the roots, of historic centers and the potential to supply historic features and cultural resources and services.

Landscape and spatial planning tools do not have systematic, cartographic and statistical investigation about the documented shape and configuration of the structure of villages and towns in the region at the beginning of the contemporary age, *i.e.* at the turn between the 18th and 19th centuries.
The research and the related Case Study provide three approaches to overcome shortage of data about total resources, their feature and treasuring potentialities:
- “heritus”, or Total Census or Total Inventory of all environmental and cultural resources in a definitive geographic area;
- “herityval”, or ordinal multicriteria valuation approaches (or MCA) for all entities with regard to their realtive and reciprocal cultural quality and maintenance status;
- “heritweb”, or computer infrastructure to supply all this organized information on the web for the world wide fruition of interested people and potential users.

In the Case Study presented “heritus” of historic centers has been made possible thanks to the discovery of unknown and surprising data source named "Carta Geografica del Regno delle Due Sicilie", a sort of forerunner and pioneer geographic information system *ante litteram*, “a GIS before electric power and computers”. It has been thoroughly compiled by the researcher Giovan Battista Marzolla, in the Two Sicilies Kingdom, from 1828 to 1831, updated on 1852, containing a complete scientific information about villages and towns that makes it a Pandora basket of information and old original data.

The source gives information about each urban settlement existing at that time, with the exact amount of residents, according to criteria of modern statistics and urban demography. All that made possible to recognize exactly historic villages and to single out them on the modern cartography and contemporary GIS tools. The amounts of residents at 1828 and 1852 were compared to population census data from 1936 to 1951 and to 1991, making possible the understanding of demographic trend of each village, even the smaller and marginal one. This surprising wealth of information is now supplied by the research to general public and institutions to be used as data base in the framework of cultural and urban conservation strategy.

The source provides also the information about the connection of villages in local networks of functional, trade and institutional relationships. All that made possible to single out precise boundaries of sub-regional cultural areas called Cultural Districts, that describe the shape of local economic areas and systems during history.
This precious information is used as a basis for an important step sub-sequent the singling out of historic village list, *i.e.* the analysis of specific settlement in terms of urban quality, and by the mean of proper tools such as Multi Criteria Analysis. All this in the domain of urban morphologic analysis (Lynch, 1960, 1962, 1972, 1981; Langdon, 1984; Sekler, 1989), and in the more general framework of Heritage Quality Valuation or “herityval” (Coccossis and Nijkamp, 1995). This further step is crucial in the perspective of real conservation intervention because provides very rare hints such as

the hierarchy of values embodied in settlement and priorities of needs for action on rational basis.
Looking at results, the main operative contribution is the possibility to manage a huge amount of data on GIS. It makes much easier to perform the Heritage Quality Valuation by Inferential Evaluation Engines (IEE) linked to the GIS. This is a prototype of a Decision Support System (DSS=IEE+GIS) very important for treasuring environmental and cultural resources in the strategy of sustainable development.
The assessment detected, also, the lack of management skill and entrepreneur spirit in implementing strategies of historic centres renewal and revitalization. To address this issue a managerial training experience has been established, with the main goal to stimulate young people in creating activities to treasure the area huge urban Heritage. The educational focus has been the simulation of micro-firm creation for cultural and tourism activities. It has been one of the cases in South Italy where a training program has been established to answer a specific need detected in the real world. So far, the program has been one of the most attended, by fellows, in its gender in the region. A strong base has been the huge information supplied to fellows by the mean of GIS and the WebGIS Prototype to supply world wide the information on Internet to all interested people and potential future visitors and enjoyers.

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