

To create conditions for sustainable development the problem should be considered in its totality, its complexity and its own dynamics. It is necessary to study the different aspects of the reality and the effects of interactions of various factors. That leads to systemic approach: the models, although generalized, are very useful in process of optimization of decision making and action support (including common action of experts, local stakeholders and managers) promoting system development in regions of the national parks.

5.6. WebGIS as a solution supporting Sound Tourism

Beata Hejmanowska, Wojciech Drzewiecki , Dep. of Photogrammetry and Remote Sensing Informatics, AGH University of Science and Technology

Computer applications for development of regional tourism can provide information about a region (audio/video presentation, accommodation possibilities etc.), help in planning a stay and support movement around a region. Some of them, like educational systems, are applied during teaching activities in the Department of Computer Science AGH – UST Kraków, Poland [Kozłak J. et. all 2005].

Geographical Information System is readily applied in computer systems supporting regional tourism. GIS is the abbreviation for Geographic Information System. GIS are special-purpose digital databases in which a common spatial coordinate system is the primary means of reference. GIS contain subsystems for: 1) data input; 2) data storage, retrieval, and representation; 3) data management, transformation, and analysis; and 4) data reporting and product generation. It is useful to view GIS as a process rather than a thing. A GIS supports data collection, analysis, and decision making and is far more than a software or hardware product. [<http://www.colorado.edu/geography/gcraft/gloss/glossary.html>]

Data in GIS are gathered as layers describing different issue: hydrology, forest, DTM, temperature, real estate, routes, railway etc. Raster or vector models of the real world are used. Connection between spatial data (maps) and descriptive attributes is characteristic for GIS. The main advantage of the GIS environment is a possibility to perform analysis concerning both spatial location and attributes.

Input data to GIS can originate from maps (digitalization), airborne and satellite imagery (orthomaps generation), in situ measurements of the coordinates (GPS) and environmental parameters (chemical, biological, physical) measurements. Cartography, photogrammetry and remote sensing are the branches supplying spatial data to GIS database.

The most conscious use of GIS methodology is applying it to decision support. Generally decision process can be considered as normative or descriptive process. We, as representative of engineering science, are usually concentrated on normative decision process where one aims to optimal decision. A risk factor is always present in the decision process. The risk level can be considered and modelled in GIS as well.

Applying of the GIS as decision support system relies on modeling using more or less sophisticated analysis based on elementary analysis like for example SQL query of attribute or elementary spatial analysis (eg. buffering or intersection).

Usually at the beginning of GIS analysis the problem is defined. Then GIS database is reviewed to state whether it is complete for the issue. Then analysis is composed from elementary GIS analysis available in GIS system. Finally result of analysis is graphically presented and different variants are prepared as well.

Tasks in Cinque Terre Park

In Cinque Terre Park some example of GIS database focused on tourist information was elaborated. The following materials were collected:

- topographic maps,
- ASTER satellite data: imagery and DTM,
- descriptive information about paths and Points of Interests (supplied by Parco).

Fields works:

During or field work we have also made video and pictures for later panoramic modelling at interesting areas (eg. sanctuaries or viewpoints).

GIS technology used

Intergraph package GeoMedia was applied for GIS generation and Web GIS publishing. The software is designed for specialists who work with GIS projects. The interface created with usability in mind has the look and feel of a standard Windows application. The GeoMedia software provides tools for capture, edit and maintenance spatial data. GeoMedia's data server technology provides integration of the graphical and descriptive data. It is also possible direct access to all major GIS/CAD data formats and to standard relational databases.

GeoMedia WebMap is a Web-based map visualization and analysis tool that provides real-time links to GIS data warehouses. Simple interface navigate the user through large quantities of information. One can query a database and required information is display on a map or click on the map feature and see selected database information about that chosen map feature in a attribute table. Each feature in the map is linked to its attribute information, enabling the user to see a report about that feature.

Data preparation

The scanned topographic map of the Cinque Terre Region and ASTER False Colour Composit Image were georegistered in UTM 32 coordinate system. The existing paths and Points of Interest were digitized on the topographic map. Then additional descriptive information and pictures or movies were input to the GIS database and finally all data were published in the Internet.

System requirements

The Cinque Terre WebMap can be viewed from the following address:
<http://149.156.193.7/parco5terre>

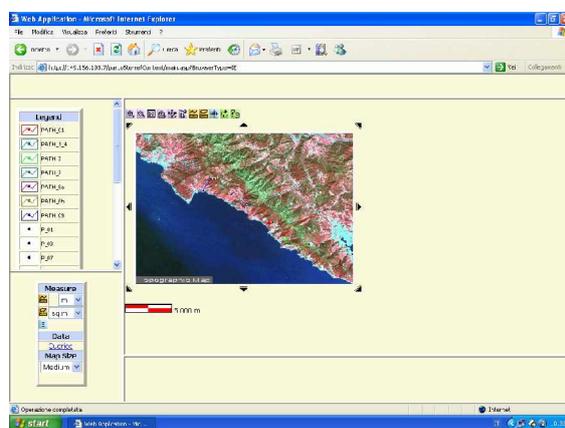
The following components and plug-ins are needed for proper visualisation: ActiveX, Java, QuickTime and AcrobatReader.

Conclusion statements

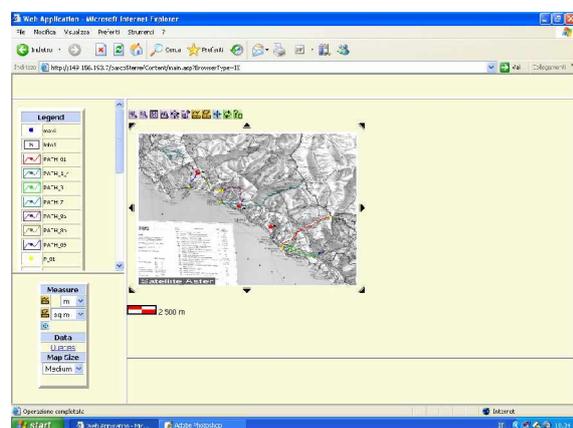
The present Cinque Terre WebMap can be seen as a simple web-based visualisation of the GIS database. It is possible to display chosen paths and Points of Interest having the topographical map or satellite image in the background, to make simple measurements (length, area) and to query by the location on the map to have some additional information (including pictures or movies) displayed. Based on the GIS database it is possible to develop more sophisticated web application - for example giving to the user possibility of the attribute and spatial queries with results shown on the map.

The solution applied for the Cinque Terre Park WebGIS can be implemented in other national parks (or protected areas in general). As input data topographical maps, airborne or satellite images as well as GPS measurements could be used. Any kind of the interesting objects can be put on the map together with attribute data and additional links (eg. pdf files, web pages, images, movies, sounds, etc). Tourist facilities like accommodation places or restaurants can be included as well. WebGIS solution allows the tourists for remote learning about the area of interest in geographical context. The query possibilities (if introduced) are helpful for planning the stay and excursions. GIS database may be accessible for tourists in the Information Points as well. Geomedia Viewer solution could be applied enabling sharing of larger databases with more detailed information and more sophisticated analyses.

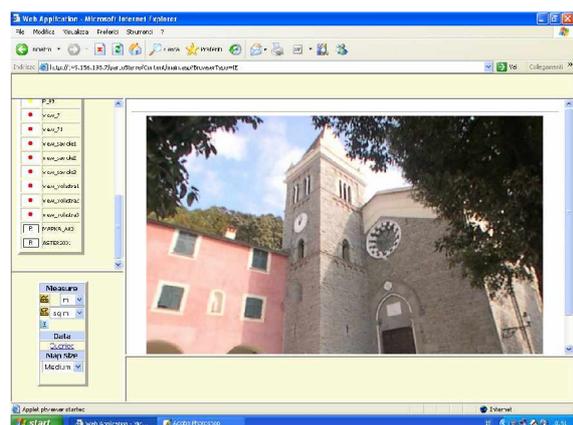
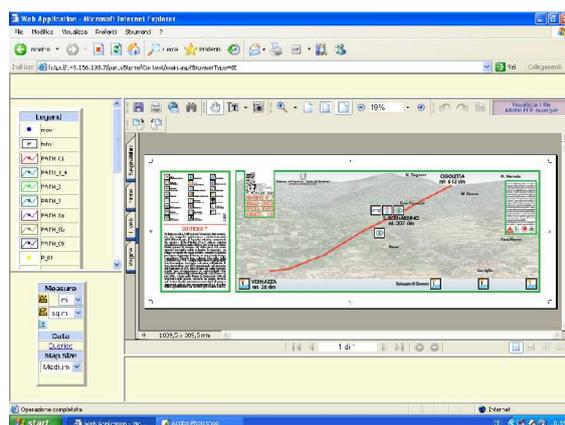
Example screenshots



ASTER FCC satellite image



Paths and points of Interest with topographical map background



Pdf file with detailed information about choosen path

Panoramic image showing choosen sanctuary (Savirole).

Related links

Florek-Paszkowski R., Hejmanowska B., Pyka K. , 2000, - „Accessibility of the Digital Atlas of Krakow Province, Poland as a GIS data through intranet and internet” - Int. Archives of Photogrammetry and Remote sensing XVIII ISPRS Congress , Amsterdam, Holland,
<http://www.fotogrametria.agh.edu.pl/5terra>

Koźlak J. Bieniasz S, Cetnarowicz K, Sulińska I, Wiktor P.2005 “Computer applications which support the development of regional tourism using as an example the „Cinque Terre Park”
<http://www.fotogrametria.agh.edu.pl/5terra>

Polish national parks - http://www.mos.gov.pl/kzpn/ind_gb.htm