Open Access to Historical Information for Landscape Analysis in an SDI Framework

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ABSTRACT

The paper illustrates the potentials of geospatial data to access a historical digital atlas for landscape analysis and territorial government. The experience of a historical geo-portal, the “Atl@nte dei Catasti Storici,” in the management of geo-referenced and non-geo-referenced maps—ancient cadastral and topographic maps of the Lombardy Region—can be considered a case study with common aspects to many European regions with an extensive cartographic heritage. The development of downstream Web-based services enables integration with other data sources (current maps, satellite and Unmanned Aerial Vehicle [UAV] airborne photogrammetry, and multi-spectral images and derived products). This provides new scenarios for retrieving geospatial knowledge in support of more sustainable management and governance of the territory.

Keywords: Downstream Services, Geospatial Web Services, Historic Cartography, Landscape, Multispectral Images, On Site Data Collection, Satellite Data, Spatial Data Infrastructure (SDI)

INTRODUCTION

The European Landscape Convention established the necessity for European countries “to integrate landscape into its regional and town planning policies and in its cultural, environmental, agricultural, social and economic policies” (European Council, 2000). Guidance on the assessment of the impacts of the projects is progressively enhancing the use of integrated instruments to support different stages of the projects (Scottish Natural Heritage...
EIA Handbook, 2011). Analysis of the territorial transformation is increasingly relying on services based on geospatial and space-based information, creating a progressive demand of data sets and service providers and resulting in an extensive availability of this information. The main objective of the geoportal Atl@nte is to fully integrate historical data within geospatial information into decision-making processes, address the government of territory by public authorities (PAs), and support professionals in urban and territorial planning practice.

The open source platform (http://www.atlantestoricolombardia.it) “Atl@nte dei Catasti Storici e delle Carte Topografiche della Lombardia” (Atlas of Historical Cadastres and Topographic maps of Lombardy), is a project funded by Fondazione Cariplo that aims to implement a geo-portal for the management of historical geo-referenced maps at territorial-regional and cadastral-local scales. The advanced Spatial Data Infrastructure (SDI) of the Lombardy Region (one of the most developed among European regions) gives a lot of perspective on the evolution of these kinds of services (Craglia & Campagna, 2010) in view of multi-scale territorial dimension and technological progress.

From the technological point of view, the geo-portal Web service architecture has been designed in order to support the request for data and services, progressively distinguished in many aspects such as time-scale or frequency, resolution or territorial extension, and query of geospatial functionalities. In particular Web Map Services (WMS) and Web Feature Services (WFS) are developed in order to provide dynamic interaction with the end user and to respond to his or her exact requests, thus guaranteeing context-aware downstream services. An approach based on information harmonization has been considered, acting upon the global synthesis level of spatial and satellite data, along with in-situ data collection, for local detailed analysis. Integration of historic maps with other data sources—such as satellite data and multi-spectral images, airborne photogrammetry, mobile-mapping vehicles (UAV), and laser scans, in order to provide new scenarios for retrieving geospatial knowledge of territory—are examined here. The sustainable management of the built environment and landscape, especially in the case of “vulnerable and sensible areas,” can benefit from open access to a historical atlas so as to identify aspects of agricultural biodiversity, water resources, secondary channel networks, and riparian areas that are consenting to enhance and protect them, as illustrated by the examples of this paper.

The potentials of Atl@nte as a planning instrument are here discussed, together with critical aspects and barriers that occur when responding to multiple demands of end users in the field of landscape analysis and management. The progressive implementation of different spatial data sources has underlined the necessity of improving WPS in order to support adaptive context-aware processing that the end users need.

THE ATL@NTE WEB GEO-PORTAL: SPATIAL DATA MANAGEMENT OF TEMPORAL MAP SERIES

In order to support the spatial data management of temporal map series, the structure of the Atl@as geo-portal has been based on two main geo-referenced levels of analysis, strictly integrated among each other through the services developed (Figure 1):

1. The level of territorial scale, i.e. regional domain;
2. The local scale, i.e. municipality domain.

Methodological indications are progressively involving historical maps as significant sources of information for landscape analysis and management of territorial transformation (Scassozzi, 2008). In many European regions and countries, historical maps that represent a territory on a small scale but with a huge level of detail and precious qualitative information are available and are progressively being digitalized and published via the Web. However,
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