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DEGLI STUDI DI BARI
ALDO MORO



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**Biosystems Engineering Addressing
the Human Challenges
of the 21st Century**

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Ministero delle
politiche agricole
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REGIONE PUGLIA





Welcome to the 11th AIIA Conference in Bari, Italy!

I am very pleased to welcome all the participants of the 11th AIIA 2017 Conference, jointly organized by the Italian Society of Agricultural Engineering (AIIA) and the University of Bari Aldo Moro.

The AIIA2017 Conference “Biosystems engineering addressing the human challenges of the 21st century” has a multidisciplinary approach, framed in 10 thematic areas concerning the aspects currently shared by the Agricultural and Biosystems Engineering:

- 1. Cultural heritage preservation and rural landscape protection, planning and management*
- 2. ICT, precision systems and new technologies for land, farm and forestry management*
- 3. Energy, waste and by-products smart use*
- 4. Challenges in water and soil conservation and management*
- 5. Hydrology, debris flow, sediment-large wood connectivity in a changing environment: processes, control and consequences*
- 6. Post harvest, logistics and food chain equipments and structures*
- 7. Organic farming, sustainable plant and livestock production processes and technologies*
- 8. Safety, health, ergonomics, management and standardization for agriculture and forestry machines, equipment and structures*
- 9. Natural resources and environmental systems monitoring and assessment*
- 10. Biosystems engineering at urban and suburban scale*

We received approximately 230 papers from 10 different countries. The Conference consists of three days of scientific paper presentations, including 3 invited lecturers, 135 oral presentations and 92 e-posters.

I am confident that all the papers that will be presented during the oral and poster sessions, along with the relative discussions, will contribute to increase the development and dissemination of Agricultural and Biosystems Engineering. I believe that AIIA2017 will highlight new routes for the cooperation among different research teams.

On behalf of the Organizing Committee, I wish you a fruitful and interesting Conference and a pleasant stay in Bari.

Prof. Giacomo Scarascia-Mugnozza
Convenor Department of Agricultural and Environmental Science
University of Bari “Aldo Moro”, Italy



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Viewpoints and visibility analysis: a case study on the UNESCO site of Langhe-Roero and Monferrato (Piemonte Region)

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Keywords: Visibility analysis, Landscape analysis, UNESCO sites

Summary

The present work is based on the coupling between the visibility analysis based on viewsheds/cumulative viewsheds (binary maps) and the study conducted at a regional level that identifies points that can be considered and that should be preserved.

Visual landscape assessment methods can now exploit the resources that public administrations shares within the open data normative requirements. This implies a further valorisation of the investments done through the creation and update of geographical data.

The scope of this work is not to obtain a static map, but to set out an interactive tool that, based on visibility analyses, can be used to measure the landscape sensitivity of sites. The area named “Vineyard Landscape of Piedmont: Langhe-Roero and Monferrato”, listed as the 50th Italian site in the World Heritage UNESCO list, was identified as a case study, since it is a cultural landscape of exceptional and universal value.

The information provided by this application may be used into the regulatory framework for all the authorization process of new developments in preserved areas.

The objective is to provide technicians and local administrators tools based on objective data for the conservation, preservation and valorization of the landscape on one side, and for the development of economic activities that can promote a sustainable development of such peculiar locations.

1. Introduction

It is well established the fact that new developments impact on the viewing conditions of a landscape. Visibility analyses for the landscape settings have widely been used, especially in rural and forest areas, in order to determine through viewsheds to which extent a portion of a landscape is/can be seen from another point. At the same time, the application of such analyses within the regulatory framework of new developments is not an easy task since it is difficult to determine which are the “viewing points” from which visibility analyses should be performed. Most of the visibility analyses that are currently developed can be defined as “static” and can lead to the two following main drawbacks:

- on the one hand, the simple fact that a land unit “is seen by” (or “can be seen from”, for the reversibility of optical paths) a large number of viewpoints is not in itself particularly significant. A certain land unit can be seen from points with different features, while some viewpoints, like the 6 ones selected by the local administrations as panoramic points have a different value. In other words, the identification of the landscape sensitivity based on only quantitative metrics (larger or smaller visibility) can be seen as a too limited approach.
- on the other hand, many researchers have designed and implemented applications and tools for the landscape values estimation, and nowadays technologies are sufficiently developed to implement analyses based non only on the visibility between points, but also

on the classification of the land units and weighting of portions of visible land as a function of qualitative perceptive indexes and metrics. For example, a portion of territory which is already in some way "disturbed" by elements that somehow mark it and compromise its landscape value, may not be so heavily damaged by new developments that do not involve a particular degradation and, at the same time, guarantee economic activities necessary for the economy development of the territories.

Studies that allow such analyzes are currently being developed by the Authors, even though at this moment they are not yet completed. Instead of immediate use, it is possible to create dedicated GIS tools for dynamic visibility analysis, so that results can be discussed directly in decision-making processes (building commissions, landscape commissions, etc...). Contrarily to the first landscape planning tools that were almost exclusively conservative plans, today a new concept of planning tools, which include transformation, innovation, and therefore necessity of tools is being developed. There is therefore the necessity to integrate the analysis of visibility within the discussion and the analysis, by considering different points of view, realistically taking into account not all "possible" visuals, but only those visuals that are to be privileged, those that are significantly relevant and contains realistic visual simulation of what is proposed.

2. Materials

The PPR (*Piano Paesaggistico Regionale*) of Piedmont identifies 154 landscape viewpoints at a regional level (Figure 1).

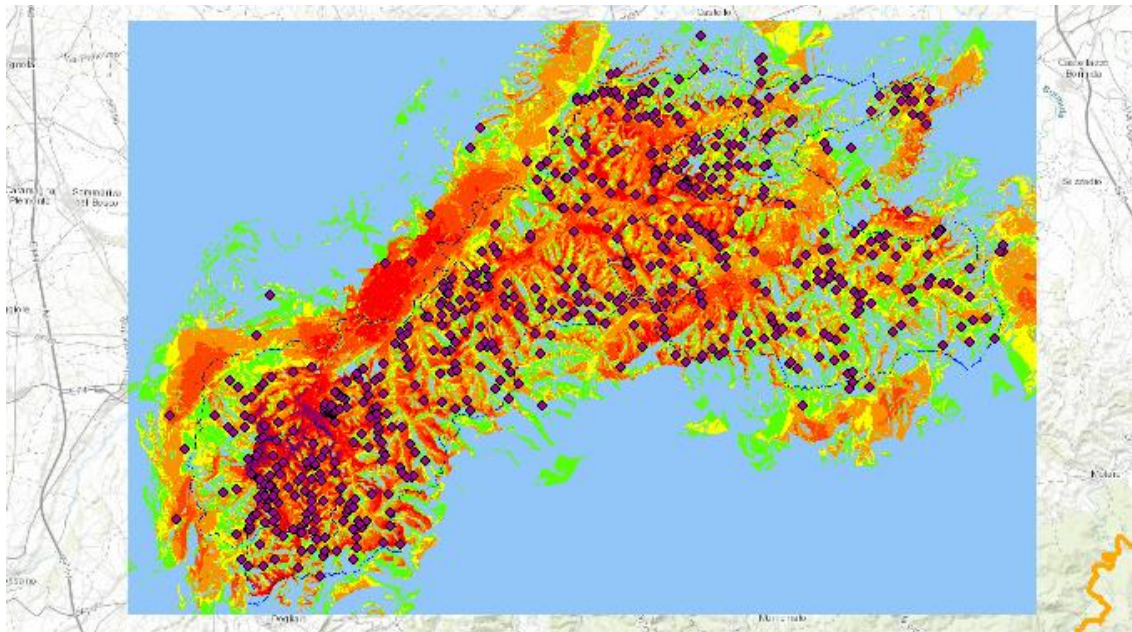


Figure 1: Visual sensitivity map of the Langhe-Roero UNESCO site. Each viewpoint is indicated by the purple dot. Red land units are the ones with the maximum visibility of the viewpoints.

On the UNESCO site of Langhe-Roero and Monferrato, in accordance with local mayors, 730 viewpoints were identified. Viewpoints were identified in accordance with the criteria of the Guidelines of PPR, through inspection visits by municipalities, aggregations of municipalities and provinces, so that they have a distribution as homogeneous as possible. As a consequence, a visual sensitivity map was developed (DGR 26-2131 of 21 September 2015). The visual sensitivity classes of the map indicate the number of viewpoints from which it is possible to observe each land unit (25mx25m).

The interest in the viewpoints for the landscape preservation and management is also demonstrated by the fact that a program agreement between Piedmont Region and six municipalities in the UNESCO site for the creation of a network of panoramic views to strengthen the economic and tourist development of the areas involved was signed on April 3rd 2017. This network of viewpoints is seen as a further element of tourist attraction dedicated to the beautiful landscape of Langhe-Roero and Monferrato. For this development, 1,448,600 euros were allocated. Selected areas will be managed, and possibly rebuilt, to have common elements that recognize the network of viewpoints into a sort of path equipped also with multimedia devices.

4. Results and Discussion

On the UNESCO site visibility analyses can be generated from databases, recent and homogeneous, already conforming to the specifications of DM 10/11/2011. These are:

- Level 4 DTM;
- Region 2010 and AGEA 2013 Orthophotos;
- former CRT data bases;
- regional LiDAR data.

Using these data, visualization tools like the reported in Figure 2 can be generated.

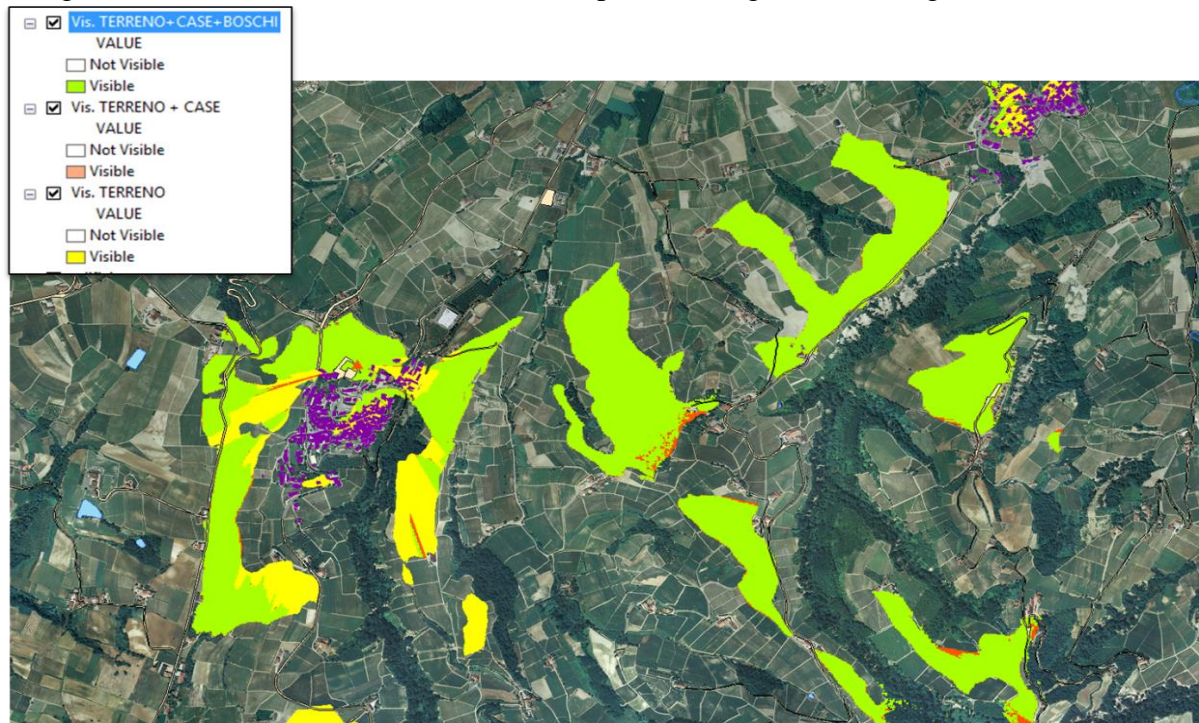


Figure 2: Visibility analysis considering the DTM, the buildings and the forests.

In order to better model the buildings, it may be useful to provide the territory under consideration with photogrammetric captures made with the increasingly common digital oblique aerial cameras (commercially known as Pictometry, MIDAS, ...). At this time, they are not so widespread, but there are already several productions in Italy, namely:

- municipalities with a population of more than 40,000 inhabitants (CGR, 2007-13)
- all urban centers of Sardinia;
- the coast of Calabria.

With such cameras, it is possible to see not only the roof of buildings, but also the facades of the buildings. These may be also used to extract extrinsic properties of the building (for the probable reform of Italian cadastre). With such cameras, it is possible to generate ad hoc data bases for the generation of 3DML models to enhance dynamic visibility analyses.

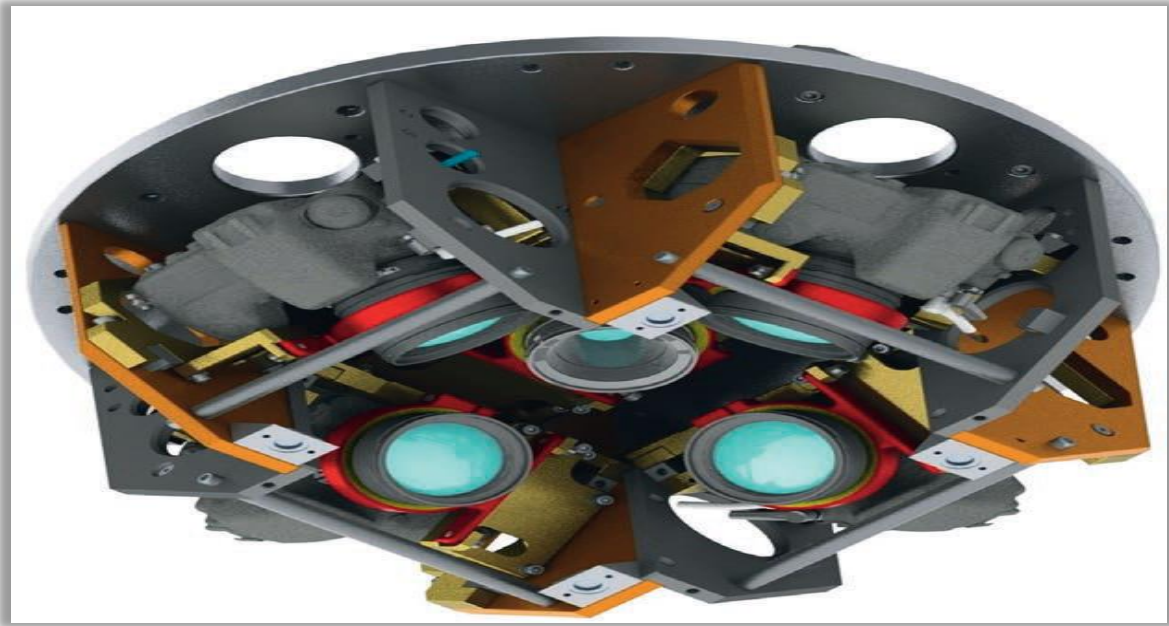


Figure 3: MIDAS oblique aerial camera.

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