

Project Ager Mellariensis: Archaeology to Improve The Competitiveness of The Urban and Rural Areas of The Alto Guadiato (Córdoba-Spain)

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✓ **KEYWORDS:** Landscape, Archaeology, Remote Sensing, rural competitiveness, Mellaria, Alto Guadiato.

◆ **ABSTRACT**

Archaeology can improve the competitiveness of rural and urban areas because History have the power of stimulate the feel of people with their past. That's the main aim of Project Ager Mellariensis. Feel to know and develop. Feel and knowledge to improve the social and business capacities of the cultural heritage of the county of Alto Guadiato.

Our project aim monitoring the Landscape and study the principals sites on this county to improve tourist networks and elevate the relationship between the local habitants and their historical sites.

1. The ancient city of Mellaria.

Established in the LII mile of the Roman road from Córdoba to Augusta Emerita, Mellaria is the only Roman city that exists in the current administrative border between the Spanish regions of Andalusia and Extremadura (Fig. 1).

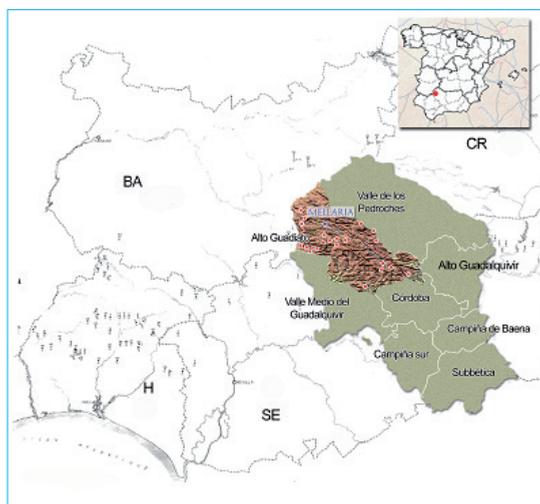


Fig. 1. Situation of Mellaria and Ager Mellariensis. Alto Guadiato-Córdoba-Spain (Composed by Giuseppe Palmieri for Project Ager Mellariensis).

In ancient times this territory was known as Beturia Turdula, according to Pliny the Elder (Plin., *Nat. Hist.*, III., 13) and Strabo (Strab., *Geog.*, III, 1, 6), and was a part of the great pre Roman region of Turdetania. This region, according to Strabo, was the most cultured and advanced area of all Iberia. Mellaria, which belonged to the jurisdiction of Córdoba, must have been a “nobilis” city, according to Pliny. It had a territory of more than 2000 km², with very rich mineral deposits and agricultural environments. Mellaria had as nearby cities in the region of Beturia: Arsa, Mirobriga, Regina, Sosintigi and Sisapone.

Of Mellaria, until the beginning of this project, we only knew his location. Now, thanks to the activities of this project, we know perfectly his extension (Fig. 2).



Fig. 2. Ager Mellariensis. Archaeological site of the city of Mellaria. “Cerro Masatrigo” near Fuente Obejuna-Alto Guadiato (By Antonio Monterroso Checa for Project Ager Mellariensis. Founded by MINECO).

2. The current social situation of the region of Alto Guadiato.

The mining industrialization in the second half of the 19th century by French motivation, which lasted until a few years ago, was focused mostly on coal mining. Today there is no open mine and all the mining and metals industry has disappeared. The Alto Guadiato is one of the regions with a highest unemployment rate in Europe; especially young unemployment, which is needed to offer an appropriate qualification.

For too long it has been evading the wealth of this region. Private and public companies took advantage of it until total crisis entered and caused it disappearance. They left not training or

alternative. Changing the agricultural benefits of the land for the exploitation of coal, evading the control of their resources to private capital, neglecting self-development and lack of technical and technological training to develop, are the situations that are arising from this erroneous development strategy. Situations that today must be improved.

Consequently, the area has to reinvent itself completely and return to the surface of the earth. Therefore, smart specialization strategy integrated within the European Programme RIS3 by the Local Action Group of Alto Guadiato attends the *Dehesa*, i.e. the Environment. No coal again. Now this attends, as in ancient times, to the possibilities of exploitation of the land, their livestock, agriculture and river environment with new crops, new companies and new landscapes. Guadiato is slowly reborn, and there, in that intelligent use of the Environment, is where our Mellaria project is inserted; we want to connect the heritage, scientific knowledge and cultural and tourist articulation within the “Dehesa”.

It is therefore a socio-estate project to face a human challenge: to help improve the social, entrepreneurial and educational situation of this region through its archaeological and natural heritage. Then, this project has a collaboration and effective transfer between a research centre and the productive sector through the activities developed by the University of Córdoba and the LAG of Alto Guadiato. We all understand the *ager Mellariensis* (Alto Guadiato Córdoba) as a fundamental and strategic resource for the (new) region.

This social challenge requires multidisciplinary collaboration of various scientific and technological agents. What defines the actions to run is not, therefore, the sector or discipline in which the agents responsible for the execution are classified: is the social challenge of global improvement. Therefore, the ultimate goal of this project is to provide medium and long term obtaining social returns, including those resulting from the improved competitiveness of the productive fabric.

Identify the components of the Roman city and the rest of archaeological sites that exist in their environment is now essential. We use the most advanced technologies in land, air and satellite remote sensing.

3. Some activities of our project

Mellaria is located in the middle of a beautiful field of hay, straw, and other similar crops that allow a good use of aerial photography to improve the structural knowledge of this Roman city.

These surveys provide the use of systematic resources related to aerial photography. In a first stage, we took thermal captures with flights that cover one thousand hectares of land. At the same time, we were taking orthogonal photographs RGB. Both types of pictures were taken in different resolutions and conditions during the year 2013.

The last phase will be focus on a few selected sites using the possibilities of multispectral photography and IR photography captured by UAVs.

Airborne data acquisition (by Quantalab-IAS-CSIC, www.quantalab.ias.csic.es) campaign was

conducted with two sensors mounted simultaneous on board an aircraft (Cessna) flying at 250 m above ground level. The sensors implemented on board were:

- Thermal camera (FLIR SC655; FLIR Systems, Inc.) with a resolution of 640x480 pixels, is equipped with a 13.1-mm f1.3 lens and connected to a computer via USB2.0 protocol. The spectral response was in the range of 8–12 μm . The camera was calibrated in the laboratory (Quantalab; IAS-CSIC, Córdoba, Spain) to obtain radiance values. 5,133 images were acquired, covering an area of 2,350 hectares, divided into two zones 1,310 and 1,040 hectares respectively.

Ortho-rectification and imagery mosaicking were conducted applying Structure from Motion Methods (SfM) obtaining two thermal mosaics in Kelvin degrees with a spatial resolution of (0.37 m/pixel).

- RGB sensor (NIKON D800E). 3,473 images were acquired, covering an area of 2,350 hectares, divided into two zones 1,310 and 1,040 hectares respectively.

Ortho-rectification and imagery mosaicking were conducted as same as described in thermal mosaic, obtaining a very-high resolution ortho-photo and a digital surface model (DSM) with a spatial resolution of (0.036 m/pixel).

Znir Sensing Solutions (www.zetanir.com) developed images mosaic.



Fig. 3. Ager Mellariensis. Acropolis of Mellaria (Ortho-Photo RGB by Quantalab-CSIC and ZNIR for Project Ager Mellariensis. Founded by MINECO).



Fig. 4. Ager Mellariensis. Unknown archaeological site near Belmez-Alto Guadiato (Thermal Ortho-Photo by Quantalab-CSIC and ZNIR for Project Ager Mellariensis. Founded by MINECO).

These techniques, combined with traditional oblique photographs, allow us to have an accurate knowledge of the city that will be improve in two ways. On the one hand, for scientific explorations and, on the other hand, for the application of a future “smart archaeology” mixed with the design of a “smart landscape” concentrated around the city.

The results of the application of aerial photography have developed very much our knowledge in comparison with the input status.

As an example, we didn't know the certain limits of the city two years ago, nor its connection with the ways of communications, water resources or the lead mining nearby, among other components.

Today, we have a design of activities and futures actions for this archaeological site and the rest of archaeological context situated in his historical landscape. Also for the middle Ages, we have developed aerial surveys and archaeological works in the other principal site on this county; the medieval castle of Belmez and his hinterland.

In Belmez also exists thirteen prehistoric monuments that will be integrated in our network.

Therefore, the exploitment of potentialities of the cultural heritage of Alto Guadiato cover then the Prehistoric ages, Antiquity and Middle Ages.



Fig. 5. Ager Mellariensis. Ancient settlement and medieval castle of Belmez-Alto Guadiato (Ortho-Photo RGB by Quantalab-CSIC and ZNIR for Project Ager Mellariensis. Founded by MINECO).

4. Objectives and expected results

For the field of natural heritage and archaeological and emergent heritage, it is necessary scientific knowledge and diagnosis of the preservation state, diseases and threats of the most significant milestones in terms of their potential for cultural and tourist landmarks exploitation.

For the field of competitiveness of crops located in archaeological sites, is intended performing dispersion maps and pathologies of each one of them with the intention of improving crop productivity at the level of small and medium entrepreneurs.

For the area of socialization and education, it is needed generating a platform with sufficient resources for small businesses, and organizations, so they could technologically develop this knowledge base through entrepreneurial activities and promotion.

Finally, for the area of improving the rural environment, we want a full analysis of the resources of the Landscape of Mellaria depending on the priorities of the “Dehesa” Ecosystem and for smart specialization strategy Developed by the LAG-Alto Guadiato.

This research and the generation of social structure, economic, cultural, and ultimately, productive, are anchored on two principles testable structure this project finally:

- National and international level and enable the first scientific progress research.

- Technological applications border and vanguard that make enable the development. The ultimate aim, therefore, is to promote in a global and a comprehensive way, with all institutional, social and economic of the region agents, the research, development and innovation applied to the conservation and sustainability of an important artistic, natural, archaeological, historical and cultural heritage for the contribution to social and economic development of this territory.

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