

## **CURRENT FUNCTIONALITY "SOURCE THE MINE". LORCA (REGION OF MURCIA)**

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### **1. INTRODUCTION: A SUSTAINABLE ENVIRONMENT SYSTEM IN SEMIARID.**

The horizontal galleries, traditional systems groundwater delivery of waters, consisting of a mine with a gentle slope and one or more vertical wells connected to the surface for ventilation and construction process, (GIL MESEGUER *et al.*, 1993), has been used for centuries to capture water and use it for drinking, irrigation, power generation, etc.

Within the scope of Southeast Peninsular, in the Region of Murcia, one of the areas with the highest concentration of these systems is the Campo Alto de Lorca, territory with limited surface water resources. In this article, we try to explain the main features of this place and especially highlight the importance of the system current gallery la Fuente la Mina in the district of La Paca.

The importance of traditional water resource us system lies in the recent request of its flow by the Community Irrigation "Campo Alto de Lorca" for irrigation of numerous plots. In nearby areas also remain functional Avilés galleries and Zarzadilla of Totana, using its waters for human supply, irrigation and laundries uses. In the case at hand, the locals claim that its waters help mitigate drought this community of irrigators, traditionally supplied with groundwater resources, nowadays overexploited.

The hydraulic technique of horizontal well seems to go back approximately 5000 years in the Middle East, expanding over time to other parts of the world (HERMOSILLA PLA *et al.*, 2008). In Spain, one of the areas with the highest concentration of these systems is given territory on the shores of the Mediterranean (LÓPEZ-CAMACHO CAMACHO *et al.*, 2005), space characterized by having scarce surface water resources. Many of these galleries are made aware by *Steppe* group studies (Studies Planning, Landscape and Heritage) led by HERMOSILLA PLA; and peninsular Southeast, thanks to the work of the group of researchers coordinated by Professor GIL MESEGUER, Department of Geography, University of Murcia; territory where these systems are called "galleries with skylight".

### **2. PURPOSE AND METHOD OF STUDY**

As the basis of this study, we have taken major bibliographic references related to this type of construction, in relation to existing systems in this territory (LÓPEZ FERNÁNDEZ, 2009). It has been practiced a historical review of this achievement through archival documentation, studies by Confederacion Hidrográfica of Segura (CHS) and extensive fieldwork to observe their main characteristics, both qualitative and quantitative (location, type of construction, appraisals, development and use of its water, etc.). Data collection, along with interviews with locals and irrigators, have enabled the possibility of knowing the evolution of this system and its current use.

The operation of this gallery is an important issue within the hydraulic heritage of the area as it makes possible a sustainable and traditional water supply to a space conditioned by a marked water deficit.

### 3. MAIN CHARACTERISTICS OF STUDY AREA

The study area is located north of the town of Lorca, in the district of La Paca. Other neighbouring counties are Coy, Avilés, Zarcilla, Zarzadilla of Totana and Culebrina, with a total area of 405.75 km<sup>2</sup>. In all this space have been located and studied many systems of horizontal well (Lopez Fernandez, 2009; GIL MESEGUER et al., 2006).

In this context, the gallery of La Mina is located in limestone Castillico elevation (775 m.), in a space formerly used for mineral exploitation and known as Minas of San Juan. The starting point of water (pithead) has an altitude of 680 meters. The UTM coordinates of this use are X: 599944.91 Y: 4192244.76 (Datum ETRS 89).

### 4. ELEMENTS OF HYDRAULIC HERITAGE IN THE HIGH COUNTRY OF LORCA

Furthermore System Source Mine, which we address below, the high districts of Lorca has many traditional buildings that highlight the culture of water present in the territory. Part of this hydraulic assembly infrastructures are galleries, mines, pipes, basins, sinks, wells, troughs, etc., located in different parts of the country. Undoubtedly, it is one of the areas of the Region of Murcia with the highest concentration of wits related hydraulic heritage (Gomez ESPÍN et al., 2012). The source of Coy, laundry of Singla, galleries Venta de Osete, Zarcilla, Zarzadilla of Totana, Torralba, San Ricardo, the Pozos of the Fuente of Avilés or the system discussed here are an example of comprehensive utilization by the human being of scarce resources.

Most of the horizontal wells in this environment functioned in the early twentieth century. The latest proven construction is San Ricardo. However, Zarzadilla of Totana was already working in the late eighteenth century. Oldest seems to be the system Torralba, also near Zúñiga, listed in Roman times (GREY MARTINEZ *et al.*, 2002). But it is also of great importance to this territory the gallery of Ojos de Luchena.

### 5. THE GALLERY "THE MINE" IN THE COUNCIL OF LA PACA

In this way, the existence of traditional water delivery systems with limited but continuous flow is an extremely important fact, because of its usefulness as its heritage value. Since the mid-eighties of the twentieth century in the Campo Alto de Lorca, water for irrigation comes from own resources of the aquifer Don Gonzalo-La Umbria, through deep drilling. But in the last 10-15 years and especially in the period 2013-2014 exploitation has increased due to drought. However, despite the closeness, the flow of the gallery La Mina remains more or less stable, which indicates membership in an aquifer of reduced extension but independent.

This achievement is the birth of aquifer called by the Geological Survey of Spain as Mingrano-Rincón, formed by Triassic dolomites and limestone in Germanic facies, which emerge with greater thickness in the Cerro del Sordo and Cerro de Mingrano, and lesser extent in the Cerro de la Viña and Mina San Juan.

The system is composed of a pierced gallery on the ground, with a height of two meters, and a small central canal where the water goes through. It also has two ports, 15 and 60 meters from the mine entrance respectively.

Before the flow was led through a pipe sections presenting opencast mine and others, to join the waters of the gallery Ojos de Luchena. Both flows were used for (Irrigation Irrigation Union City of Lorca). Previously, these waters were also used to operate the mills of La Maquina and La Casica both banks of the river bed of Turrilla in Zarcilla de Ramos.

Due to the drought period during the years 2013-2014 in most of peninsular Southeast and mainly in the Region of Murcia, the irrigation community Campo Alto de Lorca has asked CHS to use of this spring a volume of 250,000 m<sup>3</sup> / year.

## **6. CONCLUSIONS**

On the territory of the high districts of Lorca, the scarcity of water resources has focused on the community of Campo Alto irrigation community to resort to a traditional gallery system continued, enlightening a minimum flow, around 11 litres, but over recent years to maintain the water supply to agricultural and / or integrated pig farms. Continuity in the outcrop of this qanat indicates membership in an independent local aquifer, which is sustainable if its current operating system is respected.

During the field work has shown that this system of gallery with skylights remains functional, taking the waters by underground pipeline from the mine entrance and out into a ditch opencast 1,660 meters away downstream. The gauging point controlled by the OPH is in the same channel, 420 feet below, a altimetric elevation 649 meters.

This system is another example of the actual resources use that these kinds of traditional hydraulic mills can keep offering to supply, in this case, irrigation and livestock facilities. Belonging to an aquifer untapped, though of small size, to continue the work of cleaning and maintenance of the gallery, the qanats La Mina is an example of sustainability in the use and exploitation of water.