

WINDMILLS IN ANDALUSIA: NEW TOOLS FOR THEIR VALORIZATION

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Windmills, as a part of the vernacular, preindustrial and agricultural heritage, present a high cultural value as a manifestation of economic and social development and expression of identity of many territories. They also have a special meaning as a resource capable of generating wealth, becoming potential for tourism and thus it revalue rural areas which take in to these constructions. So, because of true protagonist of heritage is in fact the territory, territorial scale needs to be understood, protected and managed.

The present research aims to create a new methodology to obtain milling routes which allow to put in value one of agricultural industrial heritage most deep-rooted in the history of agricultural technology: the windmills. Specifically, this paper is mainly based on a valuation methodology of the landscape and other variables obtained generating milling routes represented by a Geographic Information Systems (GIS). In particular, the aim is to offer a new tool that promotes rural development in those municipalities where these devices are located due to its intrinsic characteristics they match those most deprived areas as well financially as in terms of population.

Regarding the methodology, the landscape assessment is the key parameter in the research presented in this paper. This is taken as the methodology proposed by Professor Dr. Ignacio Cañas Guerrero at the Technical University of Madrid about assessment of landscape. Thanks to it, it has been quantitatively detailing what is the natural quality of the landscapes in which these wind devices are located, putting into practice the proposal of quantification *in situ*.

This methodology is about to divide the landscape into three attributes: physical, psychological and artistic. In turn, each attribute is divided into a series of descriptors that are formed by working variables, so that the variables are assigned a tabulated value at the moment when the field work is being performed *in situ*. The result is that physical attributes are composed of 11 descriptors that host 33 variables, artistic attributes for 3 with 9 variables and psychological attributes for 2 descriptors with a total of 5 variables.

After completing the fieldwork with data collection at different observation points, it is obtained a score of final landscape value ranging from 0 to 100 that will deal with a specific landscape quality that is tabulated in determined value ranges.

Consequently, thanks to formulas by the method, it is obtained the quantitative value that relates to a quantitative value of the landscape tabulated according to the score: 'Degraded' for values between 0 to 20, 'Poor' for values between 20 to 32, 'Moderate' between 32 to 44, 'Good' with values between 44 to 56, 'Notable' between 56 to 68, 'Very Good' with values between 68 to 80, and 'Excellent' for values between 80 to 100.

It is noteworthy that the method is sensitive to small changes in the landscape that are reflected in the final score. However, for some variables is necessary to use the information collected *in situ* and complete with mapping information available and other information in the literature, such as wealth, economical, historical and social, among others.

Although there are related works to an approach to one of the objectives of this research work, this paper shows a new methodology for transferring the GIS results to Internet, promoting their dissemination.

To set milling routes two variables have been considered: the first variable requires windmills that can be visited satisfy a number of features such as integrity of the building and its machinery, landscape quality of the environment where they are located or access, among others. However, it is required to achieve a minimum grade of landscape assessment of 'Good' to be considered as a windmill of the proposed route.

The second variable is the distance between windmills. The transport that allows more distance traveled is the car, and therefore will be easier to find a greater number of windmills, because of its buffer is the largest. For this scenario has been considered a path whose distance does not exceed 48 kilometers, with an area of influence of each windmill has 8 kilometer of radius, thinking that the maximum number of mills visited are 6 and using publicly owned roads in good condition for displacement, avoiding the gravel roads.

Based on this information, the milling routes have been disseminated on Internet. To do this, one of the most popular tools for the multimedia dissemination on Internet is the environment that generates Flash type applications, with a platform that is supported by most operating systems of the new generation phone (Smartphone) and PDA (Personal Digital Assistant), achieving a satisfactory experience for the user.

Regarding to milling routes, the information provided is the ability to navigate through an orthophotography where it appears milling route tracing, supplemented with a photo gallery where are collected the most representative of each windmill that belongs to the milling route consulted.

In the province of Almería, it is proposed a single car route through the Natural Park Cabo de Gata, which provides pathway-based pictures with plains, small mountain ranges and geomorphological wealth, in a desolate, arid, desert and poor anthropized territory. Localities that are integrated in this itinerary are Fernán Pérez, Las Negras, Los Escullos, Pozo de los Frailes and San José. In addition, many of these mills that have been registered Natural Park in the General Catalog of Andalusian Historical Heritage.

In Fernán Pérez rises up the windmill of Manuel Gil from where there is a landscape with a landscape quality of 'Moderate' after *in situ* assessment, with a total of 39.50 points, and

in Las Negras site is located in the 'De Abajo' windmill, being the value obtained from this observation point 'Notable' with a total of 58.25 points.

Also, 'Los Roperos' windmill is located near the town of Los Escullos, and from there the landscape valuation obtained is 'Very Good' with a total of 74.50 points.

Finally, the mill located in the town of Pozo de los Frailes provides an assessment of 'Good' with a total of 51.25 points and also in the municipality of San José, is located on 'The hill of Genoveses' windmill, which gets a quality 'Good' with a total of 48.50 points.

In the province of Huelva are several locations with windmills that are embedded in beautiful surroundings of the region of Western Andévalo where prioritize scrub and broad plains, predominantly agricultural area with low population density and it is in crisis about traditional economic sectors.

The towns that make up the milling route proposed over Huelva province are: El Almendro, Villanueva de los Castillejos, San Silvestre de Guzmán, El Granado and Sanlúcar de Gadiana. For this region two milling 'walk' routes and one 'by car' routes have been proposed. 'Walk' routes comprise, on the one hand, the visit of different windmills from localities El Almendro and Villanueva de los Castillejos and, secondly, the windmills that stand in the town of San Silvestre of Guzman.

In the first 'walk' milling route will visit the two windmills that are raised on the Cabezo Pie Castillo in El Almendro (the windmill of José Gómez García and Pie Cabezo Castillo windmill) and Zahurdón windmill in Villanueva de los Castillejos. Taking the windmills as observation points for assessing landscape quality are obtained different results: from Cabezo Pie Castillo landscape assessment is 'Very Good', with a total of 73.37 points, while the Zahurdón windmill, a quality of 'Good' has been obtained, with a total of 54.75 points.

The second 'walk' milling route runs through the small town of San Silvestre de Guzmán which are elevated three mills: Vilán, Tía Juana Correa and Juan Francisco Cantero. The results in terms of landscape assessment from three viewpoints presented are 'Very Good' for Vilán windmill, with a total of 73.75 points. From Tía Juana Correa windmill is 'Notable', with a total of 66.25 points and, finally, from Juan Francisco Cantero windmill landscape quality is 'Notable' with a total of 65.50 points.

The proposed route 'by car' covers the towns of El Granado and Sanlúcar de Gadiana. In El Granado stand two windmills: La Solana and El Santo. The landscape quality obtained from the La Solana windmill is 'Very Good' with a total of 74 points, coinciding with the windmill of El Santo, with a total of 75 points. In Sanlúcar de Gadiana, on a high hill near the river Gadiana and border with Portugal, stand two windmills that offer as result of landscape valuation 'Very Good' with a total of 79 points.

Moreover, in the province of Cadiz and specifically in the town of Vejer de la Frontera, belonging Cadiz-Strait coastline, a single 'walk' milling route is proposed that runs the six examples that are raised in this municipality: Santa Ines, Marquez, Buenavista or Morillo, San Jose, San Francisco and San Antonio (the last three stationed in the neighborhood of San Miguel, Las Tres Aves Marias property). They are all oriented to Brena Natural Park and marshes of Barbate, populated area that has several varieties of trees such as pines, oaks and wild olives.

On the one hand, The results obtained on these observation points have been of 'Very Good' for Santa Inés windmill with a total of 76.50 points, 'Excellent' for Marquez windmill

and 'Excellent' also with a total of 92.50 points for the Buenavista windmill. On the other hand, for those stationed on the Las Tres Aves Marias property, landscape quality is 'Very Good' with a total of 68 points.

The large majority of the windmills are located in small towns in rural areas that lack a sustainable socio-economic activity due to the neglect and decay of traditional agricultural activities where the production of raw materials, especially food, were the primary economic are the base of these locations.

Decades ago, life in these rural areas revolved around the field being exploited to the maximum productivity, but with the arrival of new and innovative machinery and industries, these municipalities suffered a serious decline, their fields were deserted and abandoned and their people left to large urban centers to search of new opportunities. Still, there are clear examples of a neat balance between nature and farming activities which testifies to the fundamental value of the history and identity of those lands.

Several rural areas that are presented in this study and they have been created over a slow historical process, which has been compiled a rich landscape and heritage, a strong identity that is reflected in its customs and traditions and in its architecture, traditional architecture.

Today it is being lived a process of revaluation of rural areas becoming tourist destinations that make visitors avoid the monotony and stress causing large cities. This insight into 'the rural' has led to a further development, inversion and protection of the rural world, recovering the importance of territory lost in recent decades, without ignoring the key element in this process, which is the sustainability understood as a new necessary dimension of rural development.

Sustainability is a concept that was defined in the Brundtland Report of the World Commission on Environment and Development in 1987 to alleviate among other problems, the vulnerability and environmental poverty. It says that sustainability is '*development that meets present needs without compromising the ability of future generations to meet their own needs ...*'. Thus, sustainability is the basic tool in any social ambit and it is necessary for a substantial change as well economic and tourism as environmental.

As can be seen, they are involved in rural development search, a socioeconomic improvement not only based on the promotion of the heritage, but betting on sustainable resources and beneficial to the territory without losing social memory, target rural development in the different regions.

Between rural spaces where even windmills stand in the province of Almería, belonging to the region of Níjar, it is found Fernán Pérez where it stands Manuel Gil windmill; in Las Negras presents Arriba and Abajo windmills which only have the tower remains; in Los Escullos the windmill has been conditioned like a house; in El Pozo de los Frailes is a windmill with the same name; in San José, is the Collado de los Genoveses windmill in perfect condition because of it was intervened like the ones mentioned above, except the Arriba and the Ropero windmills, thanks to an action program carried out by the Departments of Environment and Culture of the Andalusian Government, for the restoration and consolidation of Cabo de Gata windmills in 2007-2008.

In the province of Almería, all these windmills are located in small towns in rural areas that do not add up to a total of more than 2,500 people. For a long time, the residents of these areas worked their land because 80% was devoted to cereal crops and many emigrated left

the country due to lack of socioeconomic opportunities. Today, most of the population is living in the area, thanks to tourism or the new agriculture crops under plastic.

These municipalities belong to the Cabo de Gata-Níjar Natural Park, specially protected area for its ecological, environmental, cultural and landscape values. In this area, traditional rural buildings were associated with primary activities, such as wells, cisterns and mills, both water and wind, which rise between its vast fields and they are clear examples of how man has exploited the resources that the area offered interacting by the best way with nature.

In the province of Huelva, windmill historical heritage is the reference in the whole region of Western Andalucía where important examples of these wind devices survive. In the municipality of El Almendro are two windmills in Cerro Pie de Castillo. In the nearby town of Villanueva de los Castillejos stands Zahurdón windmill; in San Silvestre de Guzmán, Vilán, Tia Juana and Juan Francisco Cantero Correa windmills; in El Granado, La Solana windmill seems to protect the small town next to El Santo windmill, the other end thereof, and in Sanlúcar de Gadiana has two copies on a hill from where there are some beautiful views of the river Guadiana and Portugal.

All these towns survived decades ago thanks to agricultural exploitation, forestry and hunting practice. Subsequently, it was decided to address the lack of resources to new horizons and new agricultural economic expectations related to rural tourism.

As complementary initiatives to proposed milling routes are conducting some cultural programs where the windmill itself and its surroundings are the stars of the event. Thus, in the case of El Granado, the August festivities are located in the environment of the Solana windmill as ideal representative of the municipality where it can be seen part of the region of Western Andalucía, combining ethnographic tradition, cultural, anthropological and landscape.

In the province of Cadiz, and specifically in the town of Vejer de la Frontera (District of La Janda), six windmills are erected which four of them municipally owned and last two are privately owned. In the neighborhood of San Miguel, the windmills are located in San Jose, San Francisco and San Antonio windmills, all of them in good condition and intervened by the Department of Culture in 2000. At windmills hill are presented the Santa Inés and Morillo Marquez windmills, whose show some spectacular views of the region the Natural Park of La Brena and marshes of Barbate.

Also, as complementary activities to milling routes in the town of Vejer de la Frontera a Cultural Association 'Use the Donkeys' was created, which promotes appreciation of architecture or landscape and memory retrieval in the municipality through donkey routes. Moreover, in the same site where the windmills are located on the grounds of the Las Tres Aves Marias a few years ago an Interpretation Wind Centre was built, but remains closed today.

The town of Vejer de la Frontera has a population of 12,854 people (according to the Institute of Statistics and Cartography of Andalusia for 2011) of whose today largely agropastoral activities, exploitation of the commons (called Hazas de la Suerte) and tourist activities are lived. Before, they were devoted to the cultivation of cereal until the decade of the 60s and 70s, where most of the rural areas there were social, economic and technological changes, such as the mechanization of agricultural activities, migration to Northern Spain and Europe leading to an abandonment of the fields and traditional buildings.

Today, those windmills that have survived over the decades, they are part of a broad repertoire of vernacular architecture that provide or may provide, new expectations and cultural or touristic resources to the regions where interlock.

Thanks to research conducted and presented in this paper, has developed a methodology for creating milling routes and its dissemination on Internet whose primary variables have been conservation status and access to them that includes the landscape assessment and the distance between them, which determines the type of 'walk' or 'car' routes. Therefore, it has a dual purpose: firstly, to present these tools to specialized reader and secondly, to spread these initiatives to a general audience, leading a possible increasing in rural development from sustainability.

In addition, all municipalities in milling routes proposed in this research, they are involved in rural landscape and environmental policies, as pillars of sustainable development that benefit the different territories committing to renewable energy and being the future of generations coming, combining tradition and modernity.

There are several programs that integrate citizens with their own good and their environment but never sufficient for full valorization. Most of the examples presented in this paper have been interventions by the Department of Culture of the Andalusian Government but they do not play a role to make that construction remains active and open to their residents, because the main recipient of wealth management is the person who lives 'in' or 'near' of this heritage, which is who should appreciate the heritage and ultimately, they have to protect and conserve it in order to keep the alive story of their municipality.

Thus, this research has helped to know these buildings a little more, to promote social awareness of their values and propose some tourist routes for visiting. But above all, because of the important thing is to talk about development models must take into account the role as active that have rural development groups in Andalusia, just very focused on this vernacular heritage, often considered minor from government instances.