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Historical hydraulic exploitation in the hillside of Sierra de Carrascoy, surroundings of the Torre de Inchola (Alhama de Murcia, Spain): the ‘Caño de Barracón’ and the ‘Caño de Inchola’

INTRODUCTION AND CONTEXTUALISATION

The Guadalentín and Segura river valleys represent the paradigm of agricultural development, the historical evolution of which has been inextricably linked to both a constantly growing water culture and the political and social changes in circumstances affecting the territory. This is an area in which the adaptation of human beings to the environment and the use of the available resources has made it possible to overcome the conditions imposed by the various natural and human constraints.

By this, the population established since ancient times in this area, as well as carrying out efficient and extensive exploitation of the rivers flows passing through the valley, also possessed and used water from the surrounding mountains; resources present in springs and in the subsoil of the ravines and watercourses.

The hydraulic structures analysed are located on the shaded or windward side of the western foothills of the Sierra de Carrascoy; precisely at the location where the foothills leading to the initial reliefs of the mountainous area. In particular, the site on which the structures were built is adjacent to the Torre Inchola, a little more than one kilometre to the east of the hamlet Los Ventorillos and a few kilometres to the south of Inchola; a territory within the boundaries of the district called La Costera, belonging to the municipality of Alhama de Murcia (Región de Murcia, Spain) and whose distance to the town centre is barely ten kilometres.

The watchtower of Inchola was built on a small rise on the right bank of the *rambla* Tía Pareta, to take advantage

of the difference in height and thereby ensure a favourable position of surveillance of the fertile plain of the Guadalentín, which is connected to other look-out buildings. This fortified construction, together with Alhama Castle (XI-XII) (BAÑOS, 2006), is one of the many fortifications of similar characteristics constructed on the edges of this alluvial plain; the number of these is significant in mountain areas of the Sierra de Carrascoy. This defensive system, built at different historical times to protect the fertile lands along the Guadalentín river, formed a connecting link between Murcia and Lorca; one of the most important roads in the Murcia area. This historically important link allowed communication between the coastline and the hinterland, without the need to over the higher reliefs, unlike the case of the Puerto de la Cadena, apart from being the natural axis of communication between Murcia and Andalucía.

KNOWN WATER GALLERIES ON THE SHADED SIDE OF THE SIERRA DE CARRASCOY

A significant number of water galleries, some of which have been known since historical times, have been listed in the Sierra de Carrascoy. However, to date most of the identified areas are concentrated in the windward area, especially in the eastern sector, probably coinciding with the populated territory from earlier periods. On the contrary, there are hardly any studies focused on the western sector, although the existence of a small number of systems for capturing and channelling water using the characteristics analysed are known.

On the other hand, as regards the area on the leeward side in the rain shadow with a south/ south-east orientation, where the effect of the sun is greater, the vegetation is less dense and there is lower moisture content. This is the focus of a little known study of several systems of this type: la Fuente del Alacrán, located in the area of Los Brianes in the town and municipality of Corvera, Murcia (CASTEJÓN and RABAL, 2018), and the Fuente de La Murta, situated in the *rambla* near the district of La Murta, also under the municipal administration of Corvera (CASTEJÓN and RABAL, 2019).

In any event, there is a proven supply of water resources from springs which gives rise to a certain degree of independence concerning the typical river water supply, which, in the case of the Guadalentín or Segura rivers, may be fatal in times of flood. In these situations, the valley floor, and especially the banks adjacent to the river courses, are affected by the floods, making it more difficult to repopulate them, although in turn, the land benefits from the substantial input of nutrients transported with the floods when the water recedes; particular features specific to the condition of a flood event.

WATER INFRASTRUCTURE IN THE VICINITY OF TORRE DE INCHOLA

Three systems were built in an area around the ‘defensive building’ or Torre de Inchola, and parts of their structures and pathways are still visible. These works, known as ‘Caño del Barracón’ and ‘Caño de Inchola’ are similar to the hydraulic complexes described above and were used, together with subsidiaries, bringing together and driving their flows through pipelines, underground and surface, to various reservoirs, in this case, four. In any event, they constitute exceptional models for the use and optimisation of resources on the hillside of the Sierra de Carrascoy, which, in addition to supplying the population of its surroundings and the livestock that could be grazed in these areas, served to encourage the agricultural use of La Costera. These gave rise to an agricultural space of just over 6.5 ha. at an otherwise unreachable height from the Guadalentín river, and these parcels of land were still in use in the early decades of the 20th century.

A) THE CAÑO DEL BARRACÓN SYSTEMS

The material evidence reveals the presence of two different irrigation ditches, distinguished as ‘upper Caño’

and ‘lower Caño’, to facilitate their analysis at the present stage. These could hardly be filled by the same underground water collection and storage identified on the left bank of the Tía Pereta *rambla*. According to that statement, each of the irrigation ditches should have had a different starting point. This assumption is based on careful observation of the site, as well as on the analysis of the dimensions of each infrastructure. In this way, it has been demonstrated that both cases should have a different source for supplying the flow of water; that of the lower Caño can be associated with the gallery or qanat, while that of the upper Caño, for the time being, is not known.

On the one hand, the source for the upper Caño may be from the surface runoff water from rainwater recovered at ground level by the irrigation ditch. However, this theory is somewhat unlikely to take account of the characteristics of the structure of the water pipe, since it has been established that the infrastructure for the catchment of turbid water is usually a channel into a land-drain created by the topographical conditions of the area.

The second scenario is linked to the existence of the birth of the Inchola in the vicinity (215 m) of the remains under examination. It has therefore been argued that the aforementioned upper Caño was, in fact, able to channel the water out of this spring during an early historical period. However, if that were the case, this solution would make it necessary to bypass a significant topographical incline, using an underground gallery, the existence of which does not exist, nor is there any trace of it.

The third and final hypothesis considers the rich waters of the Tía Pereta *rambla*, which is confirmed by its use for the lower Caño. However, to determine whether it is likely that the upper Caño was also supplied would require a second mined channel to capture the underwater waters; nevertheless, there is no evidence to support this claim.

Lower Caño

This hydraulic complex is made up of a water mine or qanat excavated on the left bank of the Tía Pereta *rambla*, used as a point of access to an underground infrastructure. This consists of a covered pipeline of 230 m (280 m to the old reservoir), in sections such as a filter gallery and other pipes, including caños or irrigation ditches. This finally reaches a reservoir located at 225 m from the location of the above-mentioned vertical entrance, connected to the interior of the system.

Thus, there is a considerable distance from the complex with regard to the construction of the water reser-

voir, coordinates (X:646107,95;Y:4189027,13), which has a depth of 6.20 m in relation to the base of the gallery and a diameter of 0.60 m. The second element is the gallery itself: a flat bottom with platforms and a domed roof, excavated and reinforced with masonry, which has approximate dimensions of 1.60 m in height and 0.60 m in width. On the other hand, according to the images obtained inside the gallery, the origin of the subsurface collection and storage seems to lie a dozen metres upstream of the point where the vertical access is located. The aqueduct emerges on the right bank of the *rambla* in the form of a covered irrigation channel which carries the water to a reservoir: totalling around 200 m of a canal built in masonry work that is covered in two ways: by ceramic tiles and by rocks infilled with gravel. In this case, at some points, securing the base of the channel has required the implementation of a large wall of masonry in order to avoid potential collapse given its proximity to the riverbed. This ravine, during times of intense rainfall, floods and becomes a huge stream.

Finally, the reservoir which receives the water from the mine is located in the north-west (X:645.956;Y:4189160) of the Torre Inchola: a 200 m² receptacle (20 m long by 10 m wide), which is known as the 'Balsa Nueva'. A previous one of 300 m² was located 50 m to the north-west of the 'Balsa Nueva' and also served to store the collected water. Given this last statement, the old reservoir had to lose its functionality at the time of the building of the new one, or maybe the deficiencies of the former were the motivation of the subsequent construction. What is true, is that the great reservoir that can be observed today was built on a more primitive version.

It should also be added that, despite the fact that a large part of the infrastructure is damaged, the gallery still picks up water and carries it by a channel to a deposit, which, according to the interviews conducted, is in the possession of a single owner who uses it for the irrigation of part of his land at the bottom of the investigated site.

Upper Caño

In this case, the hydraulic system is, according to the physical evidence found, made up of a covered irrigation channel and a reservoir. Although it is clear that there should have been a collection and storage point, the location and characteristics of this are unknown, which possibly precludes a common origin with the lower Caño.

Within the covered irrigation channel, two construction phases can be observed, differentiated by the conglomerate used. In the first, the channel itself was con-

structed (14 cm wide by 11 cm high and walls of 12 cm on each side), which has very fine plaster on the internal and upper walls. During the second phase, the domed roof was completed using overlapping tiles (2 cm thick, 44 cm long and 18 cm wide) and subsequently finished with large diameter gravel, which resulted in a channel height of 17 cm. At some points, traces of overlapping fragments used in the construction of the coating on the upper part of the channel can be identified. At present, the visible part of the channel has a length of approximately 100 m, and a width of approximately 50 cm, although it is clear that a significant part of it is not known since the actual source for this water system is so far uncertain. Moreover, as a special and relevant factor, it is worth mentioning the engravings on almost all of the visible plasterwork, especially on the upper surface.

Finally, the reservoir which received the water from this channel was located to the north-western of Torre de Inchola (X:645.991; Y:4.189.166); the storage infrastructure, although demolished years ago, was joined to the patio of the Casa del Barracón.

B) THE INCHOLA CAÑO SYSTEMS

The natural spring at the origin of this hydraulic complex is located in the hamlet nearest to the watchtower, 1.7 km from the heart of the inhabited district of Inchola. The source can be found in a cavity or cave (Figure 7), approximately 3 m high by 2 m wide. A masonry wall fitted with a small wooden door was erected providing access to and protection of, the cavity where the water accumulates.

From this point, a covered channel was built; 65 m long, 1.30 m high by 0.55 m wide and depth with platform 0.25 m high by 0.25 m wide (Figure 8). The construction of the channel carried the water from the spring, firstly to a drinking-water spout and secondly to a reservoir. The first element has a commemorative plaque indicating 'R (ción) A (ño) 1960' (Repaired in the Year 1960). The second is a curious deep pool of unknown depth and with an irregular perimeter, similar to a right-angled triangle rectangle, surrounding almost 230 m² (Figure 9). Undoubtedly this structure draws attention to itself as it has adapted to the land on which it was built. Besides, it is necessary to indicate that the drainage point is visible, equipped with a metal sluice gate, just above the plots of land spread out below.

Although part of the channel has now been destroyed, water is still carried through a hose so that the resources

are used. Finally, it should be noted that based on the interviews conducted, it is known that formerly the resources of the Caño de Inchola belonged to 8 owners. These people, in turn, have now distributed their property to their descendants, thus increasing the number of users who are entitled to the benefits of the said waters.

Establishing a precise timeline for the analysed hydraulic constructions is a challenging task given the limited information available. However, different hypotheses are expressed below, based on previous research, fieldwork and interviews.

The first scenario is the one that proposes an Islamic origin of hydraulic constructions considering a co-existence between these and two key elements in the immediate surroundings: the archaeological site called the Loma de Inchola, which is listed as an Islamic medieval centre based on surface-found materials which can be dated no later than the 13th century (RAMÍREZ, 1997), and the Torre de Inchola, whose earliest existence, given by some authors, coincides with the 12th or early 13th century.

The second scenario suggests that during the medieval Christian period it would have been possible to create water infrastructures, as new information has become available dating the construction of the watchtower de Inchola after the conquest of Murcia. In this regard, this statement coincides, in part relating to this defensive building, with the one referred to by Baños (2006) and the collection by López (2005).

The third scenario considers the potential origin of the water channels in modern times around the 16th century. In this sense, once the recapturing had been completed in 1492 with the taking of Granada, and shortly after the Moorish rebellion of the Alpujarras between 1568 and 1571, the construction can be deduced from the contents of the following official document *Real executoria y Concordia original* confirmed by *S. Magd* between *Sr. Marques de los Velez* and the *Concejo, Justicia, Regimiento y Vecinos of Alhama* dated 1592 (MOZAS and VILAR, 1977)

CONCLUSIONS

Overall, the systems are excellent examples of the application of traditional techniques for the collection of

water resources; notably in areas of low rainfall, making use of the springs and sporadic water channels located in the subsurface layer. The detailed study of the characteristics of these complexes makes it possible to recognise features common to those of other known constructions, although each of them has particular attributes that indicate several specific features of interest.

In chronological order, different hypotheses can be made, although this is a very complex task looking at the implementation of those construction and hydraulic techniques over the centuries, as well as the archaeological and historical complexity of the site. However, the suggested proposals open up the possibility of a closer interpretation in future investigations. In the absence of conclusive documentary and archaeological data, the chronological approximation of origin and evolution is, for the moment, merely hypothetical.

Apart from this, the three infrastructures have a clearly similar design: origin or collection point, channelling, storage reservoir and agricultural area. These provide us with classic examples of this type of hydraulic engineering which, although modest in appearance, require enough knowledge and experience to carry out construction to completion. In the case of the Caño del Barracón, the lower Caño begins with a water mine several metres deep and a section with a filter gallery below the rambla. In any case, these correspond to hydraulic constructions of traditional architecture made with local materials in which the resources of the surroundings became components of the works themselves, except for the ceramic tiles which are an element requiring previous manufacture.

In this way, the analysis of this trio of Caños of historical use extends the catalogue of documented hydraulic systems of this kind of typology in the foothills of the Sierra de Carrascoy. In this case on its northern slope, but these examples once again highlight the capacity of the inhabitants of the surroundings to adapt to a territory by taking advantage of the natural resources available. They are therefore vivid records of the past which complement the historical view offered by the Torre de Inchola and the archaeological site of the Loma de Inchola. In the same way, they are as important and worthy of protection, restoration and value, both for their architectural as well as historical, ethnographic and cultural interest.