

pca

european journal of
postclassical archaeologies

Volume 4
May 2014



SAP
Società
Archeologica

pca

europaean journal of
postclassicalarchaeologies

volume 4/2014

SAP Società Archeologica s.r.l.

Mantova 2014



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DESIGN

Paolo Vedovetto

PUBLISHER

SAP Società Archeologica s.r.l.
Viale Risorgimento 14 - 46100 Mantova
www.archeologica.it

PRINTED BY

Tecnografica Rossi, Via I maggio, Sandrigo (VI)

Authorised by Mantua court no. 4/2011 of April 8, 2011

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Mountainous landscape domestication. Management of non-cultivated productive areas in Sierra Nevada (Granada-Almeria, Spain)

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Sierra Nevada is a high mountainous landscape under anthropic influence since ancient times. Despite its characteristics, the main production trend has been intensive irrigation agriculture. However, the complexity of the resources management and utilization system includes not only water management but also an intensive cattle raising activity and land forest utilization, as well as mining exploitation. During the 8th century the major landscape transformation will be triggered by the arrival of the Arabs and Berbers, and it has kept its general layout thanks to the stability of the hydraulic systems.

Keywords: Sierra Nevada, hydraulic systems, livestock, peasant logics, *alquería*¹

La Sierra Nevada è un territorio montuoso che, sin dai tempi antichi, ha visto la presenza umana. Nonostante le sue caratteristiche, la principale produzione è stata l'agricoltura irrigua. Tuttavia, la complessità nella gestione delle risorse coinvolge non solo il sistema irriguo, ma anche l'allevamento intensivo, lo sfruttamento dell'incolto e quello minerario. Durante l'VIII secolo, la più grande trasformazione è stata causata dall'arrivo di Arabi e dei Berberi, e la persistenza del sistema si deve alla stabilità dei sistemi idraulici.

Parole chiave: Sierra Nevada, sistemi irrigui, allevamento, logiche agricole, *alquería*

1. Introduction

It is a complicated matter to talk about non-cultivated lands in Sierra Nevada, not only because of the lack of feasible data from written sources and scientific scrutiny but, overall, because it is a very anthropized mountain range. Indeed, we are dealing with a traditionally exploited land, from its high peaks to its base, formed by the Guadalfeo and

¹ *Alquería*: named designated to small rural communities during al-Andalus period.

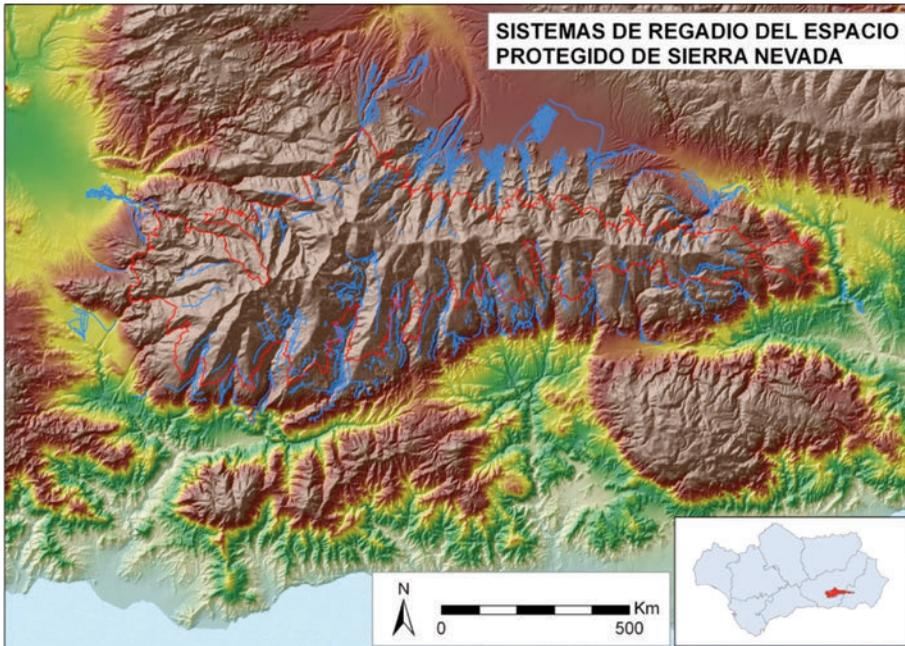


Fig. 1. Sierra Nevada with the irrigation ditches documented until now.

Andarax Rivers in the south, the altiplano planes in the north, and the *Vega* in the west. The utilization of different resources has been shaping a territory which nowadays constitutes a protected natural landscape as National Park and UNESCO Biosphere Reserve, and intended to be claimed as World Heritage Reserve.

The first issue arising to the observer is the fact that, traditionally, the main economic activity has been intensive irrigation agriculture (fig. 1). It is indeed a mountain range zone – including high mountainous landscape – where mineral resources are concentrated, although the most important production trend has not been mining, neither cattle raising. This fact does not imply that mining and livestock farming are not important activities together with land and forest utilization, but -under a historical framework –, they all have been relegated within the system resource utilization. Most of these activities have been lost during the second half of the 20th century, as modernization processes have been infiltrating, as well as the crisis of the peasant way of life which has been dramatically transformed, losing part of its framework of logical thinking and the knowledge associated with it.

It is very complicated to distinguish among different activities, not only because of an excessively marked specialization as result of a social

division of labor, but also because the most part of these activities are interconnected with production cycles that allow the use of the raw material and energy without any waste (Toledo Manzur 1993). There is no – by example – a spatial separation so obvious so it could be perceived *a priori*, despite the existence of zones of intensive irrigation or high mountain range zones. There are indeed zones exclusively dedicated to agricultural activities such as the *Vega*², and other zones focused on livestock farming, such as the *borreguiles* or high mountain meadows. But even in these cases, there is a necessary interconnection, so we could talk about a perfect symbiosis among these activities, together with other uses of land and forest. These equilibria, nonetheless, were partially broken in moments of social rupture or crisis such as the feudal Castilian conquest, the confiscation during 19th century, or, more evidently, the current modernization processes.

Generically, we could say that cultivation zones are located from the range of 1.400 meters downwards. Above this level and reaching at least 2.000 meters, land was used between spring and summer to grow potato, beans, rye or barley. Numerous families would move from the nearest *cortijos*³ during these seasons, although these activities were more restricted in the north slope of Sierra Nevada due to different climatic conditions. Livestock would be moved through an ascending route during the beginning of the spring and with more intensity, during summer. Animals – property of Alpujarra transhumant peasants practicing intermittent exploitation – would move by themselves looking for greener pastures from lower levels to Sierra Nevada peaks, during summertime. These same pastures were visited by foreign cattle from neighboring cities such as Guadix or Almería, but also from more distant places such as Córdoba o Jaén.

The complex traditional system of soil and water management, thermal gradient, isolation and humidity, vegetation and fauna, besides mining exploitation, has been the result of a long co-evolutionary process. The mountain range – and particularly the high mountain range – has conditioned the ways of exploitation and adaptation to the environment, which are largely impacted by the different altitudinal levels with different vocations. Such altitudinal differences have been already pointed out back in the 50's (20th century) by the Swiss anthropologist and archeologist J.C. Spahni (1983, pp. 92-97). This author, accustomed to the mountainous landscape, emphasized the fact that “habitants of Alpujarra, de-

² Vega (la): local name for an alluvial plain, usually irrigated and intensively cultivated.

³ Cortijo: local name designated to a farmhouse.

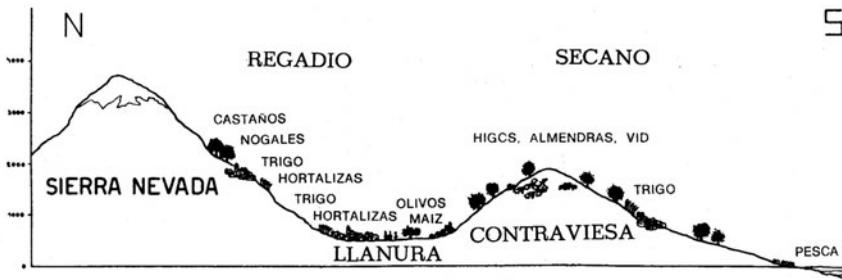


Fig. 2. JC. Spahni scheme for the altitudinal differences in land use (1983, p. 90).

spite the high altitude where most villages dwell, are not strictly *high-lander*, at least not in the same sense we understand in the Alps and in the Pyrenees. The upper boundary of seasonally habitable houses is in the range of 1800-2000 meters. The peasant from Alpujarra has the same duties as the peasant from the plain, although faces more difficulties due to the features of the terrain" (Spahni 1983, p. 89).

The scheme outlined by this author is very intuitive and suggesting (fig. 2), but it fails because of its simplicity. Reality is much more complex, not only from the geographical viewpoint but overall, regarding the peasant strategies of adaptation to the environment and conversely, the adaptation of the environment to their necessities.

As an example of this we will cite a fragment written by the scholar and traveler Antonio Ponz, circa 1754 – but published for the first time in 1798 in the *Mensajero económico y erudito de Granada* –:

"After dawn we perceived the most beautiful compound of vegetables, which without human husbandry spread splendidly over the lands of the cliff, forming an entertaining campaign the corpulent oaks, the serbal trees, the extended apple trees, the pompous mustard, the swollen sweet chestnuts, the hazor, honeysuckle, maxoletos and many others of unknown names; and in the calves of these groves the peasants keep their orchards with many vegetables and plant trees, adding with their crops more beauty to the wild amenity" (Ponz 1991, p. 65)

This text refers to the Guarnón cliff, at the head of Genil River, where the group spend the night, leaving next early morning. It calls powerfully the attention not only on the rich variety of plants but also on the symbiosis with the agriculture and cattle raising activities. Shepherds are the ones who grow their crops in the calves of the wild forest, adding, as the author says, "more beauty to the wild amenity".

This paragraph synthesizes the difficulty to distinguish among activities, as well as non-cultivated ground from cultivated land. The wide variety of trees and shrubs mentioned by A. Ponz are, doubtlessly, exploited for human and animal feeding, besides firewood and a number of necessities. Those lands are cultivated, as noted by the presence of sweet chestnuts and the calves used to grow crops but also to create pasture zones indistinctly. Shepherds themselves grow crops for their own sustainability, at the same time that they take care of the cattle grazing in the high lands, looking for fresh pastures.

To complete the chronicle we will cite again A. Ponz during the same trip; after leaving Guarnón cliff, he headed for Valdeinferno cliff, in whose waters, with hardly a haven to be found "very special trouts can be seen, whose propagation lasts until the ruffle of the Real river. In this ruffle there is a little valley populated by the same grove [of Guarnón cliff] with the same liking, known as *Haza del Real* because in this place the Moorish from Alpujarra grouped to form the resistance against the Christians, such place is unassailable, with no more trenches that its sliced elevation without any spot to climb, and here we can find ruins of the old terraces and irrigation ditches, known as *acequias*⁴, used by the Moors to cultivate these valleys, hillsides and cliffs. In this cuts we can find many caves and deep mines, points of interest, stones o metals, evidence of ancient labor. Now we know that some men, possessed by greed, tried to survey these old mines finding no more than water, although their watered hopes keep them busy, surveying mines in other slopes of the mountain belt" (Ponz 1991, p. 66).

In this case, Haza del Real is located at 2.000 meters. It calls our attention the old age attributed to these structures -built for agricultural activities, partially abandoned or in ruins already in the mid 18th century. We are talking, additionally, of an "unassailable place" as stated by the traveler, although well drained, thanks to the existence of a highland irrigation ditch network and hillside terracing. However, it is also a place inhabited by many trees just like the last cliff he visited. There are many trouts in the backwaters of the ruffles falling from the high peaks. But overall, there are a number of mines, apparently many, dug for prospection purposes or for mineral extraction. At least one of them is a water mine; A. Ponz identifies it as a failed excavation, but is actually one of the fundamental elements to understand the functioning of water management in Sierra Nevada during medieval times.

The utility of these narratives is evident, coming either from writers and naturalists, which since the 18th century, and above all from the

⁴ Acequia: traditional water management system that consists in nets of ditches and channels.

next 19th century, provide innumerable descriptions regarding Sierra Nevada. These are not the only remarkable paragraphs dedicated to the travel of A. Ponz, whom during six days wandered through all the western part of Sierra Nevada, providing us with important data about vegetation, pastures, place names, communication roads, agriculture, livestock farming and mining (metallic and non-metallic).

In this case, the 18th century author gives us a very clear image of a process that started centuries before, arriving partially alive to our days. This process has suffered the fundamental effects of modernization since the second half of the 20th century, marked above all, by the abandonment and simplification, more than by the transformation of such practices.

2. The construction of the mountainous landscape

This process of construction of the landscape and its relation with resources utilization is difficult to be explained, but we believe it can be established, or at least hypothesized in some of its main stages or benchmarks.

We will focus on the important changes detected after the dissolution of structures from the Roman times, which will mark indelibly the Sierra Nevada landscape.

The historic precedents are equally difficult to investigate. There are many clues regarding the presence of human populations since prehistoric times in the Sierra Nevada foothills, especially Argaric societies from the Bronze Age. The evidence is linked to the exploitation of metallic mineral present in the crystalline massif which is the main component of the mountain system. There are numerous deposits of this age, particularly in the northern slope, whose orography is simpler – due to the presence of the plateau – and it has been intensely prospected. The recent discovery of many petroglyphs still unreleased in Huéneja (Northern slope) and Poqueira valley (Southern slope), would corroborate such presence not only in the lowest lands but also in the high lands, probably associated with mining and cattle raising activities. We are in fact in one of the most precocious European regions regarding metal transformation and there is a high chance that human presence involved an early transformation of original forest and mountain zones through the use and generation of highland pastures.

Mining-metallurgic activities will be developed in the peninsular southeast since early ages. In fact, Millares (Almería), is one of the first

places with evidence of metallurgic activities around 3300-2600 BC. Thereafter, during the Late Bronze Age, the Argar Culture (2.300-1.800/1.700 BC) will continue to be one of the main mining-metallurgic centres and its importance and influence will spread throughout most part of the Iberian Peninsula (Domergue 1990, pp. 87-90; Craddock 1993, pp. 305-309).

This activity will continue through Protohistoric Age, during the Iberian Period, although again, data from the southern slope are very scarce. One more time, the link with mining activities seems clear particularly regarding production centers with abundant remains such as Alrután (Jérez del Marquesado), Campo de Marte (Lanteira) or Cardal (Ferreira) (Adroher Auroux *et al.* 2002; Martín Civantos 2007, pp. 244-251).

The romanization of the territory will mark an important transformation in terms of land and resources utilization. Mining activities will decrease until almost disappear during the Imperial times, in favor of other zones of Hispania, much more productive and strategic. In the Northern slope it is well documented (although still on a superficial level) the abandonment of exploitation and the transformation of the Iberian Peninsula. In its place numerous small dwellings will appear, scattered throughout the plateau, linked to the centuriation and creation of a Roman colony in the current city of Guadix. In mountain range is hard to find remains from this period, which does not necessarily mean there was not a forest or pasture land utilization linked to an extensive exploitation which would have to combine agricultural activities with cattle farming. This fact is particularly significant in the southern slope, where the Roman remains are surprisingly scarce so far, and are always concentrated in lower lands, by example in the proximity of Guadalfeo river banks, taking advantage of flat areas such as Órgiva.

However, in all Sierra Nevada there are numerous pre-Islamic toponyms which are from obvious Latin origin. Among them there are many of the current villages whose names end with the suffix "-eira", such as Poqueira, Capileira, Pampaneira, Ferreira or Lanteira. Popular tradition has thought of them as consequence of the Castilian repopulation with settlers of Galician origin during 16th century. We know this is not true, among other reasons, because those names existed already during the Andalusian period. They are the result of a previous castilianization and arabization of late vulgar latin, therefore its coincidence with other Romanic languages like the Galician or Portuguese. Its abundance, together with many other toponyms and microtoponyms with the same roots, provides us with evidence of an early "mountain range assault" during a late-antique epoch.

In the context of the dissolution of the Roman structures, the occupation of the mountain range will become common throughout these zones which were unoccupied before (although not necessarily unexploited). This occupation that qualifies as the result of a population flight is linked not only to the social transformation that took place during this period, but also to changes in ways of exploitation of the environment and its resources.

Indeed, among all toponyms named before, there are plenty of them related to Christian faith on one side, or to economic activities regarding mining, metallurgies and cattle farming. In the first instance, we count examples such as Capileira and Capilerilla (from *chapel*) or Monachil (from *monastery*), but also with Arab names from the first Andalusian period referring to Christianity such as Aldeire (*al-dayr*, "monastery"), Kanisa/Quiniçia ("Church") o al-Qasis ("priest"). Some of them, as Aldeire, are repeated many times in different points of Sierra Nevada (Martinez Ruiz 1987).

Regarding production activities we can cite Ferreira and Ferreirola (from *ferrum*), repeated in both slopes of Lanteira (from *argentaira*, *argentum*), and names related to livestock farming such as Poqueira (Buqayra in Arab) or Bacares, referring to the cattle.

Toponymy is very rich in this sense, and is still waiting for further improvement as a tool from a historic perspective. Toponymy finds in fact an important endorsement in the abundance of sites from the Late-Antique and Early Medieval epoch, located only in Sierra Nevada so far. We again use the example of the Northern slope, where only in Ferreira we can document up to twenty sites dated between 5th/6th-10th/11th centuries. All of them show remains of metal foundry, and in some cases the material is abundant. Among them we can cite the reoccupation of protohistorical *oppidum* of El Cardal or the construction of a small rudimentary fortress during 9th century in El Castillejo hill.

It is very likely that livestock farming played an important role for these communities following a long tradition. By means of taking advantage of the pastures during summertime in high altitudes, it is possible that transhumance was a strategy since ancient times. In turn, it is possible that this would have triggered the transformation of mountain zones and forests through techniques as burning and forest land clearing, although this is a fact still waiting to be confirmed.

Another question arising is how this *assault* was produced from a social perspective. The *flight* to the mountains leads us to think of peasant groups coming from bordering, more Romanized zones (such as Guadix, Vega de Granada and the coastline), running away from extension

processes such as colonate, servitude and in general, the generation of dependency ties with the aristocracies. The proliferation of religious centres could lead us to think of this possibility in the frame of the search for refuge zones, as well as the poverty of the structures and cultural material from these settlements, including the re-occupation of proto-historic sites. However, mining activity (specially silver and copper) and the ulterior presence of warlords during the 9th century *fitna*⁵ against the Omeyan State can be explained by the presence of an aristocracy whose control capacity and strength is unknown to us until the Emirate period.

The transformation of the environment will take place doubtlessly with the Arab- Berber conquest in 711. A new era will open, marked by a very different form of territory and resource management, based on the intensification of agricultural production through the extension of hydraulic systems, the introduction of new crops, new systems of mountain aquifer recharge and new strategies of community land and resources management. Among them, the most important will be water. But, as we said before, the result will be a complex exploitation system which will radically transform the mountain range and the peasant lifestyle known until that moment. It will probably be a long process, of several generations, not only due to the enormous scale of the task and energy employed, but also, because of the difficulties of the integration of pre-existent communities in the mountain massif.

We have proof of the settlement of numerous tribal groups of Qaysi and Yemeni origin. With all certainty there were Berbers which have not left track. The revolts of the 9th century mentioned earlier provide us the picture of a populated territory, where different social groups cohabit more or less pacifically.

During the 10th century this integration process is completely conformed, not only from a political viewpoint, with the final victory of the Omeyan state, but also from the social and territorial viewpoint. Its main expression will be the consolidation of organized territories starting from the *alquerías*, i.e. from rural communities managing a territory and constituting taxing units besides being settlements.

The creation of working spaces (over all, the irrigation systems) and the communitarian management of resources will be to our judgment, one of the keys to understand the synthesis, and particularly, the acculturation process that took place during the first centuries of al-Andalus existence.

⁵ Revolt or rebellion.

In such way, during the 10th century Ahmad al-Razi mentions Sierra Nevada as a space developed from the agricultural and dweller viewpoint. Al-Razi cites, among others, the presence of crops such as hazel, walnut, citrus, pomegranate or fig trees (Al-Razi 1974, pp. 23-24, 291). Another contemporary author, Ibn Gālib, highlights this mountain range as a very important place in the production of linen (Ibn Gālib 1955, p. 285).

As we exposed earlier in this article, to our judgment the hydraulic irrigation systems were completely conformed already in this century. We have other evidence, such as the important production of silk channeled through the port of Pechina (Almería) since the 9th century together with other manufactured products (Martín Civantos 2007, p. 483-484).

3. Territorial organization during al-Andalus period

The *alquerías* are organized in *aljamas*, which were the neighboring communities managing a common territory. This territory was divided following the Islamic law, in several parts: the *mamlūka* lands were private property, while *mubāha* lands had a public character. In turn, *mubāha* lands were divided in *mawāt* or “dead lands” and communitarian lands. The first ones could be subject of appropriation by settling and usufruct, with rights of inheritance for the next generation, but without holding ownership of the land, which was communitarian property. The second type of land could be used by the whole *aljama* and none of the neighbors could claim individual rights over them.

The common utilization and land ownership is legislated by the four Quranic schools with slight differences among them. However, in reality, as pointed out by C. Trillo, it is not easy to establish how they are organized and their extension. What is very clear is that these common lands could be used “by any Muslim, since they belong to the Muslim community, which is a concept different from the State, in the same way as the grass growing without being planted cannot be denied to anyone, not even the grass that grows in private land” (Trillo San José 1999, pp. 12-13).

Despite this theoretical community presented by C. Trillo, we know the use of the land by the neighbors of other *alquerías* was subordinated to authorization of the *aljama* owner of the land. That is what happened in a 15th century lawsuit between the villages of Jérez and Lanteira, where it is clearly written: “the people from Al-yantaira (Lanteira) asked to Jérez and Alcazar to let them pasture the two mountains aforementioned. The settlers of Jérez and Alcazar accepted the petition on the grounds of their generosity, neighborliness and proximity to whomever asked: under the condition that the *qādī* would provide tes-

timony by himself that this was not because of justice obligation but because of their generosity, as it has been said, and that them, settlers of Jerez and Alcazar, could impede such pasture whenever they wanted" (González Palencia 1940, p. 348).

This apparent contradiction derives, on one side, from a Prophet's *hadīṭ*: "three things are common to the people: water, grass and fire" (Linant de Bellefonds 1959, p. 120) and, on the other side, from the territoriality of *alquerías*. The picture offered by this lawsuit from the Nasrid period is already late (15th century). We can – nonetheless – suppose that, if the legal terms of the *alquerías* are heirs of a previous tribal organization the absence of a connection with the neighboring *alquerías*, *id est*, with the neighboring tribes is very logical. Territoriality is one of the main characteristics of tribal structure, and their defense against other competing tribes. In the cases where the clans from different tribes are dwelling in the same territories, the organization would be solved in the same way as in the agricultural grounds, which is in fact, the main activity conditioning the whole framework. As pointed out by M. Barceló (1995, p. 247), the water and land sharing would be done through agreements during the design of the irrigation land system. It is very likely that, from that same moment, different groups occupying and transforming the new space would configure a territory recognized as own, centered on the water utilization and in dialectic relationship with their neighbors for the use of its natural resources.

This could also be the case in the region of Zenete. The Arab documentation from 1422 states very clearly that "is a very old costume that comes back to these times from ancient times and for many years, and it is known by their ancestors and heard from them and known by themselves that, from immemorial times, the people from each one of the Cenete castles had owned the neighbor mountains next to the castles, with all the forests, prairies and pastures in them, to the north and west from Sulayr⁶ and the Baza Mountain, which is next to them, and all the prairies in the *barranqueras*⁷. The fact that these villages had owned the mentioned goods, alone and without any participation of the neighbors, that they can impede others from taking advantage of these terrains whenever they wanted and seen appropriate, and that nobody has taken advantage together with them, unless they granted permission, or stealthily or by absence of them. This is the old costume in the Cenete castles" (González Palencia 1940, p. 368).

⁶ Sulayr: Arab name designated to Sierra Nevada.

⁷ Barranqueras: Slopes where the water runs.

The sultan of Granada corroborates this in 1451 in a decree where he confirms: “the fact that each castle possesses its own mountains, neighboring to each one of them, the ones whose waters run towards each one, without any possibility of growing apart from this arrangement, neither any *qā'id* disrespecting this contract” (González Palencia 1940, p. 351).

The importance of the control over the mountain derives as presented, by the necessity of controlling the watersheds, and therefore, the heads of the rivers whose waters are used to irrigate agricultural lands. However, hydraulic systems are much more complex and they are not restricted to zones of intensive irrigation, even if they are in the heart of the productivity spaces.

Water runs through diversion ditches on different altitudes. The highest ditches, or *acequias*, are located over 2.000 meters, below the level of the cliffs and meadow peaks. The dams and ditches are made of earth and stone. The ditches run through the hillsides of deep valleys releasing abundant water coming from snowy peaks through the *chortales* or *chorreras*, *id est*, openings in the ditches that filtrate the water, which irrigates the foot of the slopes. This is called *careo*. These ditches only function during winter and spring, sometimes even in June, if the water is abundant (fig. 3).

Its fundamental goal is to filter water soaking the mountain on its superficial levels or more deeply through the system of fractures and faults of the *nevado-filábride complex*, recharging the aquifer which will continue flowing and exuding from the river bases during spring season, when resources are scarce. The springs can be natural sources or water mines artificially excavated. Complementary but equally important, the *chortales* also create artificial grasslands with abundant pastures or plots of arable land to grow spring cereals and other crops.

This complex system was originated during Islamic times. It is difficult however, to establish an exact timeline. As we proved earlier, during the 11th century these *careo* ditches should have already existed in the highest zones of Sierra Nevada. This fact is interpreted from the litigation among the *alquerías* of Lubros (Lugros) and Bartillana during the subsequent century. Original documents date back from 1187, although they refer to rights to the use of water fully consolidated dating at least 100 years before. Inhabitants of Bartillana had stolen water from the upper part from Alhama de Guadix River, belonging to Lubros, through a diversion to the basin of Bernal creek, belonging to Bartillana. Such diversion would have been made thanks to an irrigation ditch (*al-Barraÿū?*), which Bartillana neighbors claimed they have built during “ancient times, next to the cited source” (González Palencia 1940, pp. 321-328).



Fig. 3. *Careo* ditch in Lugros. Alhama de Guadix river. Northern part of Sierra Nevada.

4. The generation of mixed spaces and communal lands

Actually, it is not possible to understand the extension of the intensive irrigation systems located in lower levels without the existence of the *careo* ditches to ensure the artificial irrigation from the high mountain aquifer.

These ditches, in turn, are linked to the creation of pastures and crop zones on higher altitudinal levels of the mountain range. They have a huge impact on the pastures. In fact *careo* means “to graze cattle” and the verb “*carear*” means “to lead the cattle somewhere” or “to take the cattle to graze” according to the dictionary of use of Spanish by María Moliner (2012, p. 180). Shepherds have been, traditionally, the keepers of the system. It’s an almost perfect symbiosis, it could be said so, where the cattle provides abundant organic matter required for the maintenance of the intensive agricultural activity and, of course, a big part of the energy used for transport and hauling.

To a large extent, it could be said that many times there is no clear distinction among livestock and agricultural activities in rural communi-

ties. That is what can be deduced from the available documentation regarding the end of Nasrid dominance and the Moorish period. In the *alquerías* of Sierra Nevada, almost all peasants are cattle owners. As we said before, there are irrigated zones that could be indistinctly used for pasture or crops. There are also agricultural zones, including intensive agriculture zones, used for animal forage. There are watermills -even in modern times- with some of their dentures dedicated exclusively to grinding grain or legume for animal feeding, in order to distinguish it clearly from the grain destined to human consumption.

It is true that there are zones focused exclusively on cattle raising, such as the zones called *borreguiles*, pasture zones in the surroundings of the high mountain lagoons (Castillo Martín 2009) (figs. 4-5). Until a few decades back there was a seasonal habitat in the high – altitudinal level during summer months – destined to livestock grazing or highland crops. These habitats have not been studied neither documented at the moment, but we can again observe the versatile character of spaces mixture.

Such is the case of some highland zones called *secanos*⁸ in documentation immediately posterior to the Castilian conquest. Specifically, in the study conducted by C. Trillo (1994, pp. 259-260) using books of re-deemed goods, called *hábices* (*habus* or *waqf*), and income books from 1496, *secanos* appear very marginally. The same happens in the case of the north slope, in Zenete (Martín Civantos 2007, pp. 491-501). The *secanos* have a very weak representativity throughout the documentation, and their extension is measured in *fanega*⁹ units, instead of *marjales*¹⁰ units, used for extensive irrigation, or they are directly neglected in the texts. On several occasions references are made in the documents -addressing their poor value, or that they are wasteland, or simply that they are destined to livestock grazing. In the case of the Alpujarra, in the southern slope of Sierra Nevada, a part of these *secanos* is located in highland. In Bubión, in the area of the cliffs and *taha*¹¹ of Poqueira, another *secano* is mentioned: “another secano is in the mountain range, next to the snow, boundaries to the alguacil’s¹²” (Trillo San José 1994, pp. 259-260). This is, besides, a non-isolated *secano*, next to others which are alguacil’s property. In some cases it enhances the impression that the categories are mixed up, or that they could have been interchangeable depending on the year. In the documentation it appears

⁸ Not irrigated land.

⁹ Fanega: a measure unit for land surface.

¹⁰ Marjal: a measure unit for land surface.

¹¹ Taha: refers to a district.

¹² Alguacil: bailiff



Figs. 4-5. Alpujarra. Southern part of Sierra Nevada; (left) Culo de Perro lake and *borreguiles*; (right) Siete Lagunas. Cattle and *borreguiles*.

sometimes cited as *eriales*¹³ used to grow grass or barrens “where no one put the plow” (Trillo San José 1994, p. 259). Sometimes the word *mary* appears (or *marge/marje* in its Spanish form), which means “meadow” or “prairie”, a designed name for an irrigation zone, known as *pago*¹⁴. We can find them in Zenete and the Alpujarra, on both sides of Sierra Nevada (Martín Civantos 2007, pp. 199). In some instances we know they are referred to high mountain zones, where only pastures can be found. There are, by example, *marÿ al-sultân*; *marÿ al-sawdân* (Sultan’s Meadow and Negro Meadow). But some other times they are clear *pago* toponyms from the *Vega* such as Yegen, at the taha of Jubiles, where written sources cite “an erial measuring six marjales in the zone of Marje” (Trillo San José 1994, p. 259). But other *pago* lands are called “pagos del Chircal” in many *alquerías*. This is a toponym that comes from the Latin root *Quercus* which, although impossible to distinguish among oaks (*Quercus ilex* and *Quercus rotundifolia*) or, very likely, Pyrenean oaks (*Quercus pyrenaica*), also present in Sierra Nevada.

The same author C. Trillo (1994, p. 260) points out that in some *secanos*, fruit trees can be found which necessarily need irrigation. The explanation according to Trillo would be based on the fact that these trees are located over the parcel margins, probably close to a fountain or stream.

With all certainty it is important to understand this kind of ambiguity or mixture of concepts regarding the land uses and space disposition as part of a complex system of environmental exploitation which posses also a very important adaptation capability or, better said, of resiliency, as a

¹³ Erial: uncultivated land.

¹⁴ Pago: local name designated to those lands that are irrigated in groups.

function of weather variation or storage requirements. We believe that “intermediate” spaces would play an important role in this complex system, which have been poorly studied and have received scarce attention from researchers. We are talking specifically of community-owned lands and zones of eventual irrigation.

We have documented zones of eventual irrigation which are supplied with water only during winter and spring season, when the resource is abundant and the crop requirements are smaller. Its extension is always subject to variation as a function of weather, regarding rainfall, snowfall, insolation and temperature. In the plains from the north slope of Sierra Nevada far from the mountain range domain, these lands are named *el campo*¹⁵. But these lands can also be found in high elevation zones. The *careo* ditches perform this function by creating crop lands in many zones of high elevation, irrigating just some crops such as wheat, rye, potatoes or beans. Other ditches generating spaces of eventual irrigation are located in many lands, mainly of high elevation, named by the inhabitants as *sierra*¹⁶ to distinguish them from the *Vega*. Such is the case of Trevélez or Cañar, to name a couple of examples, but is a common instance, with all certainty.

In Trevelez, we have detected at the Acequia Alta¹⁷ a space, the furthest one from the village, destined for cultivation but does not bear the right of water during summer. When the water flow from the Culo Perro River, which supplies Acequia Alta, is not enough for all the irrigation surface, only the low zone, the one closer to the urban core, has access to an irrigation turn. The differentiation is found in the *Balsa Comun*¹⁸, which accumulates water overnight that will be used to irrigate during the day. Lands located above this *Balsa* are called “la Sierra” while the lands located below are called “la Vega” since they have access to water supply during summer. These sierra lands irrigated eventually were normally used to grow cereal. Throughout all the high level lands are found many *cortijos* where a big part of the inhabitants would move during spring and summer season to take advantage of these crops and pastures. Next to every *cortijos* there are *eras*¹⁹ destined to threshing the cereal.

These *secano* zones of eventual irrigation were fundamental for the peasant communities during the Andalusian period, and with all certainty,

¹⁵ El campo: meaning the countryside or the field.

¹⁶ Sierra: mountain range, mountain chain.

¹⁷ Acequia Alta: high irrigation ditch.

¹⁸ Balsa Comun: common pond.

¹⁹ Era: threshing floor.



Figs. 6-7. Alpujarra; (left) Poqueira Valley; (right) Trevélez Valley.

until the beginning of the liberation and disentailment processes which terminated the communitarian utilization of land in favor of privatization and waged labor from 19th century (Herrera González de Molina *et al.* 2002).

In these zones it is possible to begin the physical identification, in a real spatial framework, those communitarian lands and their uses as a tool for the better understanding of the territorial organization of the *aljamas*, the Andalusian peasant communities, beyond the intensive irrigation spaces. As we stated earlier, the management of these spaces is essential also, in order to understand the functioning of the *alquerías* and the social relations of production occurring within them and regarding external powers, specifically the State. The possibility of having resources, at least in the case of Sierra Nevada, include not only lands of eventual irrigation, but also pasture, mountainous or forest lands, as means of existence for the neighbors of these localities, all these altogether with water management and intensive irrigation agriculture (Martín Civantos 2011).

Many activities and exploitations will be implemented over this area with a mixed character, as we said before (figs. 6-7). We have news -by example, regarding the presence of hives for beekeeping. These hives appear occasionally with the names of lands from the *Vega*, such as Jubiles and Cástaras (Trillo San José 1994, p. 263). We counted 378 beehives owned by Moorish in 6 villages of Zenete during mid XVI century (Martín Civantos 2007, p. 341).

These zones will also be used to collect aromatic and medicinal plants. Al-'Umari during the mid 14th century, points out that in Sierra Nevada all kinds of medicinal autochthonous plants can be found, as well as "drugs of the kind produced in India" (Torres Palomo 1967-1968, p. 76).

During the same century (14th), Ibn al-Jatib the most important chronicler from Nasrid epoch describes Sierra Nevada as it follows:

"It is one of the best known mountains on Earth; it is covered both in winter and summer. It is located south of Granada -about two parasangas²⁰ away from town- and from it 36 rivers run through water gorge giving birth to foothill water sources. Because of this, the air is healthy, water runs everywhere, channeled through the houses. There are plenty of gardens, orchards and trees, and peasants search their pastures motivated by the belief in plants with medicinal virtues. For the same reason, the cold is very intense during winter, freezing the grasses and the liquids and covering their squares with ice for some years...according to certain historian.... and in Sulayr Mountain there is an excellent lavender and gentian which is transported from here to all the country due to its

²⁰ Parasanga: measure unit for distances.

finesse and medicinal effect, which confer it with a curative value similar to the attributed to the Theriaca, known to us thanks to Abu Ya 'far al-Mansur. This mountain also produces marcasite (pyrite), in its different varieties as well as lapislazuli" (Ibn al-Jatib 1901, pp. 14-15; Torres Palomo 1967-1968, pp. 76-77).

Ibn al-Jatib describes a panorama of a mountain intensely occupied and exploited by agricultural, livestock, forestry and mining activities. As we said earlier, this situation must be traced back to the late-antique epoch, when the assault to the mountains is reflected in the villages, their toponyms and some productive activities, particularly mining and metallurgies.

With the arrival of the Arabs during the VIII century, the productivity strategies will be dramatically altered, not only by the creation of hydraulic systems and the extension of irrigation agriculture, but also due to the establishing of *alquerías* and its surroundings, including community-owned lands.

The mining will develop a secondary role, particularly since the repression of the general revolt of the 9th century (known as the *fitna*) and the proclamation of the Omeyan Caliphate at the beginning of 10th century. A process of concentration will be produced, linked to a bigger control of the State over the mining production. The mechanism of this control remains unknown to us as well as the process by which communities would have kept exploiting the mines autonomously as in the case of the Moroccan Atlas (Martín Civantos 2005).

5. Livestock Farming

As we mentioned before, livestock farming will play a fundamental role in Sierra Nevada. It will become essential from the development of irrigation systems, precisely because one of the fundamental requirements for the maintenance of intensive agriculture will be the generation and care of soil fertility. In fact, the separation and traditional antagonism between both activities, it is not useful for us considering the impossibility to develop an intensive agriculture activity without the continuous supply of animal matter for the fertilization of the fields and, conversely, a portion of the irrigation lands traditionally destined to complete the feeding requirements of the livestock, which has been always of great importance.

However, livestock farming is one of the great unknown activities in the history of our territory. In the particular case of the Andalusian period, there is an extended belief that livestock farming was a secondary

activity “for subsistence, whose product was destined to domestic consumption or was sold in local or regional distribution networks. It did not constitute at any given moment important source of richness as in the case of agriculture [...]. If we compare it to the Castilian livestock farming, it was considerably outdated” This image is reinforced in the case of the mountain, where, in spite of its good conditions for livestock farming, it shows a notoriously scarce development not only qualitatively but quantitative. “In the lands of Alpujarra, including the Lecrin Valley, the rights regarding livestock represent approximately 17,2% of the total income, an amount pretty inferior to the amount reached for – by example – agriculture (Trillo San José 1994, pp. 264-265).

In fact, documents from the Andalusian period do not allow us to see at first sight anything clear regarding livestock farming activities. We must search for – as in other instances – documents generated by the Castilians during 16th century, after the conquest. There are at least 7 types of taxes collected over livestock during 1496 and studied by C. Trillo San José (1994). They turn out to be too many for an activity identified as non-important. On the contrary, such sophistication implies precisely a much bigger development than previously thought.

L. del Mármol Carvajal mentions in his work *Historia de la rebelión y castigo de los moriscos* the existence of “very beautiful pastures for the livestock...” in Orgiva district. Regarding Ferreira and Poqueira, the author asserts “During summer there are very beautiful pastures for the cattle in these lands, and during winter, because the land is too cold, the cattle is taken to Dalías, or to Motril and Salobreña, which are warmer and template due to the sea air” (Del Mármol Carvajal 1946, pp. 189 and 191). The same could be said of other places mentioned along Sierra Nevada achieving a very different impression regarding the richness of pastures and the livestock that nonetheless, could be interpreted as a potential.

The first news we found about cattle raising appear indirectly in the narrative of the biography of the *shaikh* Abū Marwān al-Yuhanisī, a sufi master born and raised in Ohanes, a village of the Almerian Alpujarra in the 12th century. In one of the passages, which is surprising, his disciple al-Qashtālī tells:

“The history of a sufi, considered an *abdāʿ*²¹, who arrived “from the highest top of the mountain” to visit *shaikh* Abū Marwān, who was praying in the mosque of his village. When he approached him, he introduced himself and asked where he came from, and he replied:

²¹ Sufis occupy the fifth level in their 10 level holy men hierarchy.

“«from the highest place of this mountain»

I asked him:

«How long [have you’ve been living] there?»

He answered:

«For the past seven years»

[Then] I asked him:

«And what do you do to live there, being that place frozen, cold and arid?»”

The man told him how he arrived to al-Andalus from the East – as he was searching for another *shaikh*, at the *alquería* of Turrillas – whom told him:

“«[...] Climb that mountain and stay there until you find God!»

The *sufí* kept saying:

«I welcomed his words and climbed that mountain three years ago, without anybody noticing my presence there; until one day I heard some cattle shepherds talking about you [the *shaikh* Abū Marwān]. I told myself then: This [*shaikh* Abū Marwān must be] one of our own. And [then] I came down to pay a visit».

The man [of the mountain] spent that night at [*shaikh* Abū Marwān’s] home and afterwards, he went back to his place.

The *shaikh* Abū Marwān [kept] telling – God bless him! –:

Later on, another man came to see me; this man lived in Montenegro²² hill, [located] between Ohanes and Alboloduy. [This man] was [living for] three years in that place and did not know the man who lived in the mountain of [Sierra Nevada] neither he knew of his existence, because the places where they came from were seven miles away from each other, approximately. However, [one day] the aforementioned man heard [mention] also the name of the *shaikh* Abū Marwān, and heard two hunters talking about him, [reason by which] he came down to pay him a visit” (Qashtālī 2010, pp. 190-194).

The news turns out to be surprising. Leaving aside the fact of the existence of the two *sufis* – living as hermits in the highest levels of the mountain – the presence of shepherds and hunters in the peaks of Sierra Nevada is mentioned. In fact, in all the biography of al-Yuhanisī it catches the attention, the apparent ease with which the people crossed from one side of the massif to the other side through a number of roads and pass which would take them from Alpujarra to Granada or to Guadix

²² Toponymian appears as *Kudyat Muntanāgr*. As affirmed by the author (note 397), it is identified with Montenegro hill, on the most eastern part of Sierra Nevada, in Almería province, between Ohanes and Alboloduy. It is located at 1711 meters and it is rarely covered by snow, which is where its name comes from.

or Zenete. This was a rather common practice until relatively few years ago, when motorized transport and paved roads substituted the old roads for herdsmen and mules. Most of these roads are still distinguishable and passable, and the oldest villagers still remember using them, a few decades ago.

The same book makes reference to other citation equally striking later on: “[It happened that] the comrades of [*shaikh* Abū Marwān], Lanteira’s villagers, met and took their herds to Sierra Nevada during summer, accompanied by the dervish and declaimers. They brought succulent meals and the *shaikh* was also with them” (Qashtālī 2010, p. 270).

The text describes the inauguration and blessing of the summer pastures, when the herds were taken up to the mountain accompanied by the people of the village, the ascetics, declaimers and al-Yuhanisī himself, who was invited by the villagers of Lanteira, and who crossed from the other side of the mountain to bless these pastures in a kind of pilgrimage.

Next to the livestock farming, the biography of al-Yuhanisī also makes reference to a hunting episode, the oldest one known so far. It is a deer hunting episode, knowing that deer are currently extinct in Sierra Nevada. Oddly enough, it does not take place in the mountain, but in the middle of the orchards, in the irrigated lands:

“... [The *shaikh*] was in Abrucena, with his family and offspring in Ibn Ūdī’s orchards. It was harvest season. Certain day, Abrucena villagers went out to hunt deer and came to ask for his permission.

His family and sons told him:

«We would like, God willing, to descent to the lower side of the orchards to see [the hunting]!»

The *shaikh* replied:

«I think I am going to give you a slain deer at the trunk of that tree».

Less than an hour later a group of villagers extenuated a deer [that they were chasing] and they tied it up to the lowest side of the orchards, [while] the sons and family [of the *shaikh*] were watching. Later on, the group agreed to give [the deer to the *shaikh*] as a present and they put it in the trunk of the tree just like the *shaikh* had predicted – God have mercy upon him! –. [And it happened] as him foretold, without them having to chase or trap [any animal]” (Qashtālī 2010, p. 271)

These references corroborate what has been here presented regarding the nature of the common lands and their utilization. In fact, the neighbors from the *alquerías* will hold the right to use the pastures, the mountain and the hunting in their own terms. With all certainty this capability will enhance the development of the livestock farming, although at the moment it is impossible yet to know what kind of livestock farming, and above all, its magnitude.

The property and land use are also demonstrated in the litigation of the 15th century which took place in the *alquerías* of Jérez-Alcazar and Lanteira, in the Northern slope of Sierra Nevada. The litigation, mentioned earlier in this work (González Palencia 1940, pp. 345-362, 366-368) was about the utilization of the mountain and pastures from the same locality. Among other references, in February 22th of 1422, a statement signed by 145 neighbors, which we have transcribed earlier in this article.

Even so, Lanteira villagers filled a complaint regarding the property of the mountains of Jérez and Alcazar. It seems that this should have happened during 15th century, because in November of 1451, the sultan of Granada issued an order validating the sentence over such mountains and from which a copy is kept, dating from 1473. According to this document, "nobody from Arintayra, whomsoever, can reach the mountain that belongs to Jerez, the cultivated and the non-cultivated land, the parts and all remaining rights. And anyone from the village of Arintayra who dares to trample the rights of the villagers from Jerez, because they are supported by the agreement reached by all the neighbors from the castles of Cenete, establishing that each castle holds ownership over the mountains located in front of them, and whose waters run in their direction, without any right to break this agreement, neither any qā'id can deviate from what is described in this agreement".

Despite the strength of this resolution, "the litigation prolonged, and the hostility escalated until the point they feared bloodshed and deaths from both sides. Someone tried to mediate between them, since God (be praised!) say it is the best in his holy Book, and the qādī of Guadix and his Cenete in that date, Aḥmad b. Muḥammad b. Aḥmad al-Tuḡībī al-Ša'rānī (may God keep his honor and affirm his highness!), in alliance with a group of the good, religious and noble people from Guadix, protected by God, headed towards the two mountains. They toured them completely, examined them carefully and they concluded, after putting all their attention and efforts, that both the mountains belong with legitimate right to the castles of Jerez and Alcazar and the neighbors from Al-yantaira hold not any more right than – as specified by [the people from] Jérez y Alcazar – the right to pass through the road crossing their property and through the places especially designated by them.

The villagers from Al-yantaira asked to the villagers from Jérez y Alcázar for the right to bring their cattle to graze the pastures of the mentioned areas. The villagers from Jerez y Alcazar accessed to the petition, due to their generosity, neighbordom and proximity, for whomsoever ask, under the condition that the aforementioned qādī would provide testimony by himself that they granted these rights due not to reasons

of justice, but to their generosity, as it has been said, and them, the villagers from Jérez y Alcázar, can withhold the rights to their pastures whenever they consider proper”.

The allegation and the resolution of the sentence prolonged to the end of the Nasrid period, providing evidence to the existence of *alquería* districts and their autonomous management, including communitarian lands, by its villagers. Furthermore, it shows the importance of the usufruct of non-cultivated lands, particularly the mountain and the pastures, for the production and subsistence of the rural communities from Sierra Nevada.

Hieronymus Münzer, German traveler visiting Granada right after the Castilian conquest, tells us: “Granada possesses high peaks, plateaus and valleys which, due the water scarcity, cannot be irrigated nor can they be inhabited. It has infinite herds of goats, sheep, deer and big oxen. In the mountain there are so many deer, bear, fallow-deer and mainly wild boar, that it seems unreal” (Münzer 1991, p. 107).

L. De Mármol Carvajal report, which we mentioned before, corroborates the traditional opinion regarding cattle farming as a fundamentally transhumant activity. However we have collected, from the same source, information that a great portion of the cattle grazing in Sierra Nevada belonged to the same peasants living in the mountain villages. The documents we have just seen prove it so, as well as the logic derived from the communitarian utilization of a portion of the *alquerías*.

As we said, facing the much extended, traditional belief that agriculture and cattle farming are antagonistic activities, we find a necessary symbiosis between both practices. We must understand them as complementary and, in a good measure, closely subsidiaries from each other. They behave in such way in the case of the *secano* agriculture, with the cattle entering fallow land to graze the stubble, at the same time fertilizing the fields to recover the soil. It is also like that in complex systems where the production of human and animal food is combined, even in lands of intensive irrigation agriculture. Within the peasant logics, production strategies are always more complex than thought at first sight (Toledo Manzur 1993). They are ruled by the necessity for diversification of sources of supplementary matter and energy, and for the completion of the economical and energy cycles to achieve their maximum benefit.

By example, the leaves of some trees, such as the European nettle tree, were used for forage during winter. The *lastonares*²³ of mountainous zones were used to make beds for cattle and thus, finally, return to

²³ Lastonares: grasslands composed by *Stipa iberica*.

the field as fertilizer. Even in the *Vegas* and eventual irrigation zones, an oatfield could be implemented for animal foraging.

However, the tracks left by livestock farming activities over historic time are scarce, and over all, they have never been studied. There are many traceable *majadas*, shelters or stockyards used to keep the herds overnight and to collect manure. Manure cannot be collected when animals are grazing open fields, nor when the herds are transhumant and spent several months far away, that is the reason why the main option is to keep the cattle standing close to the resting zones or close where the animals spend the night, in courtyards or barns. Beds are prepared using straw or coppice bushes which will become manure that later will be fermented before fertilizing the fields.

We also find in the mountain the *cocones*, cups excavated by the peasants in the stone to obtain drinking water. Some of them are connected by small channels to redirect dew water to these cups. There are also several *aljibes*²⁴ linked to livestock farming activities, many of them towards Almería, where lands are more arid (Cara Barrionuevo, Rodríguez López 1989).

The study we conducted on the Northern slope of Sierra Nevada showed how the Moorish from Zenete villages were owners of the cattle (Martín Civantos 2007, pp. 317-341). Every family owned at least one animal, or a small herd. Most of the cattle was stabled and performed only short distance trips, from the plain or from lower lands to the mountain and vice versa. Judging from the documents, the amount of uncultivated land was huge during Andalusian period, on both slopes of the mountain, since not even the eventual irrigation land was completely used. Here we could have seen pastures growing in a landscape very different from what we see today in many places, characterized as *dehesas*²⁵ or cleared mountain, with a mixed utilization, as we have emphasized on several occasions. During summer, as we had seen, cattle climbed up to the highest zones of the massif looking for fresh pastures. These pastures would grow over an extensive zone of the mountain: up to 2000 meters approximately (with variation according to position), the forest should have been cleared in several zones from branches used for firewood or charcoal; starting from there, and over 2500 meters, the *borreguiles*²⁶ are located. Besides the natural grasslands, as we have insisted before, other artificial grassland zones were created through the *careo* water system.

²⁴ Aljibe: water deposit.

²⁵ Dehesas: cleared or opened forest.

²⁶ Borreguiles: humid- snowy grassland zones in highlands.

The territorial management system allowed the maintenance of a considerably big, *cabaña*²⁷ situated at short distance from the population core. There are just a few fragmentary notices providing numerical data. After the Castilian conquest in 1490, some villagers from Jerez stole and sold in Granada 300 heads of large livestock and others of sheep and beasts. The animals belonged to villagers of the same place, and they were grazing in the areas of Güevejar and the Alpujarra (A.H.N. Osuna leg. 1893, piez. 2).

After the conquest of Granada a marquisate will be created on the northern slope of Sierra Nevada. The Marquis of Zenete, will implement a census during 1550 to raise *taxes of Magram*, which agglutinated all taxes previously paid to the Nasrid kings by the villagers. From this census we can extract a very interesting image (A.H.N. Osuna, legs. 1867-8, 1868-1, 1868-2, 1869). Although 60 years had passed since the conquest, the situation does not seem to have changed much when compared to Nasrid times, fundamentally because the Marquises are interested in keeping the *status quo* of exploitation of the vassals. According to what we can read in the documents, there are no large livestock owners, nor any Moorish who owns more than 300 heads at most. All the cattle are composed by ovicaprids, adding the animals used for traction which are not included here. Generally there is no distinction made between sheep and goat, but from the data extracted (when documented) the sheep numbers are usually inferior.

From nine censuses conducted during this period, we have chosen some of the villages as sample population in order to illustrate and corroborate these statements. The results obtained from the counting of all the proprietors are as follows:

Village	Sheep	Goats	Sheep-goats	Total ovicaprids	Cows	Total
Jérez	52	1.535	1.656	3.243	181	3.424
Alquife	36	100	1.555	1.693	2	1.695
La Calahorra	474	283	1.982	2.739	17	2.756
Aldeire	57	1.197	1.444	2.698	97,5	3.065,5
Ferreira	255	375	2.091	2.721	35	2.756
Dólar	365	373	4.393	5.131	14	5.145
Total	1.239	3.863	13.121	18.225	346,5	18.571

Undoubtedly, the most interesting data refers to the animal's ownership. The *cabaña* reaches a considerable volume, but, as we said, there

²⁷ Cabaña: refers to cattle population or livestock.

are no big livestock owners. Nor there is any owner who lives exclusively from livestock farming. In the census, only owners of property subject of taxation have been included. It is very likely that the poor neighbors were no subject of taxation but, in general, and due to the absence of other data, it is possible to establish a direct relationship between proprietary-neighbor²⁸. From the data collected, 63,54% possesses livestock, which implies a very high proportion. That is, from a total of 1251 neighbors, 795 have at least a cow, a goat or a sheep. Most of all are small proprietary: no one possesses more than 4 cows; 42,4% have between one and ten heads of small livestock and 39,8% between eleven and forty. A 16,1% possesses up to one hundred, which is still considered a small herd. Only 2,8%, of 21 owners in total, surpass that number and, of that group, only two reach 300 animals. The biggest herd reaches, exceptionally, 500 heads, property of Gironimo Barzana (A.H.N. Osuna, leg. 18, fol. 157 v).

Livestock owners during 1550							
Village	Owners census	Goat owners	Sheep owners	Ovi-caprids owners	Total prop. ovicaprids	Cows owners	Total owners livestock
Jérez	330	152	8	42	196	84	210
Alquife	123	19	5	55	79	2	79
Aldeire	225	116	4	47	165	65	172
Calahorra	208	24	11	41	76	15	87
Ferreira	161	48	9	62	119	19	124
Dólar	174	24	18	80	121	4	123
Total	1.251	383	55	327	756	189	795

Villages	Total owners ovi-caprids	1-10 heads		11-40 heads		41-100 heads		101-200 heads		over 200 heads	
		Nº	%	Nº	%	Nº	%	Nº	%	Nº	%
Jérez	196	103	52,5	79	40,3	11	5,6	3	1,5	0	0
Alquife	79	31	39,2	35	44,3	13	16,4	0	0	0	0
Aldeire	165	85	51,5	67	40,6	11	6,66	2	1,2	0	0
La Calahorra	76	28	36,8	26	34,2	18	23,6	3	3,9	1	1,3
Ferreira	119	57	47,8	41	34,4	19	15,9	2	1,6	0	0
Dólar	121	31	26,6	55	45,4	25	20,6	8	6,6	2	1,6
Total	756	335	42,4	303	39,8	97	16,1	18	2,4	3	0,4

²⁸ We have excluded data regarding neighbors of other *alquerías* who own lands in Zenete and women whose role turns out to be very interesting in rural economy.

Our first conclusion drawn from the study of the written sources is that, virtually all the livestock owners are farmers and not ranchers. This fact is not trivial because it means that the main option in a mountainous terrain with plenty of grassland and cleared areas is agriculture. Livestock farming is then configured as an important activity due to the number of heads, although a secondary activity. In fact, it is going to be subsidiary to the agriculture and dependant of it, given that animals are an important food supply as meat and dairies and provide with leather and wool, their main function will be the production of manure for field fertilization. This fact will condition the type of livestock farming developed.

This is the reason behind a choice for minor livestock farming, sheep and goat, since they provide the best manure, the stronger fertilizer after the guano, particularly rich in nitrogen. The normal preference for the goat instead of the sheep is due fundamentally to its greater adaptability and resistance, since it can feed almost from anything. That is why each peasant tries to own a small number of animals but enough to satisfy their needs for organic matter for their fields. Communal property of the grasslands makes this possible, since there are no big proprietors who could buy them through auction or rent. Without this communitarian grassland it would be virtually impossible to practice intensive agriculture. Water and crop rotation are insufficient to fertilize the soil, and in absence of a considerable amount of organic matter, the productivity cannot be maintained. Green fertilizers are just supplementary, and to obtain fertilizers from vegetal sources a huge amount of matter would be needed and a great capacity to transform it, by subjecting it to putrefaction in warm and humid chambers. Thus, as we have repeated before, the presence of animals and their excrements, become fundamental.

Connected to this last statement we also have the topic of bird breeding. It calls our attention the abundant presence of pigeons in Zenete. Pigeons, besides a nutritional supplement, are used because of the manure. Bird manure is the strongest and richest in nutrients, and therefore a good fertilizer for the field. In the *alquerías* we find many pigeon houses in the villages, included in the census of 1550 and subject to taxes. In total "*suman los palomares que ay en algunas de las cassas del dicho marquesado sobre que está cargado el magram dozientos y treynta palomares y medio palomar*" ("the number of dove houses in some of the houses of such Marquisate over which they are built reached 230 and a half": A.H.N. Osuna, leg. 1870-4, f. 126v). The average number of dove houses per village is 29, although they have an irregular distribution. By example, there are 50 pigeon houses in Jérez; 18 in Alquife; 15 in La Calahorra; 25.5 in Aldeire; 23 in Ferreira and 38

in Dólar. Their ownership is also scattered as in the case of livestock, and for the same reason: every peasant tries to produce their own fertilizer in order to guarantee a successful crop and reduction of costs.

To take advantage of the fertilizer it is necessary that the livestock stay close to the village core and, over all that spends part of the day in a barnyard, barn or sheepfold. A bed for the animals will be built, made fundamentally from coppice. Traditionally the grass, thyme, but also the litterfall from sandpaper trees and white poplars, as well as the straw – and in modern times, the beard of corn- were used for animal foraging. In the beds, the manure is strengthened by the animal urine, and it can be collected, piled up and put off in the manure pits. Manure is extinguished in crossroads, larger parts of the roads or next to the patches, where it will remain for some time until is ready. That is the reason why this kind of livestock farming cannot be transhumant; it would not make sense if so. These data coincide in good measure with the studies performed in other zones of the old Kingdom of Granada, particularly in Almería and Málaga (Cara Barrionuevo 2001, pp. 489-492; Ramos Isabela 1998), but there is still a lack of monographic studies regarding this topic.

The livestock should be taken to graze grouped in herds or *dulas*. Thus appears from the information collected in the biography of al-Yuhānisī, perhaps at the beginning of the summer pastures, although it seemed to be a special occasion due to the visit of the holy man. The *dulas* have been maintained in Zenete until not so long ago, with the working livestock. When plowing labor became scarce, the vows were “kept by the *dulero*²⁹, to whom the owners paid a fee, and so they saved time and money [without having to] preparing forage for the barnyard” (Checa 1995, p. 98). During the night the herds could return to the *alquerías* to rest in stables and pens or in the *majadas* in the mountain. In the case of the Alpujarra, the study of J.C. Spanhi reveals that, still in 1950 there were not “herd guardians on wage, since every villager has at least a youngster in the family to perform that task. It can happen, however, that a farmer only has a sheep or a goat. The farmer will give the animal to one of his neighbors, owner of a herd, whom commits to offer as counterpart, a certain amount of milk and wool or the first-born goat brought by his goat” (Spanhi 1983, pp. 101-102).

We do not have records of litigations – during the Andalusian period – between farmers and shepherds due to livestock intrusion in cultivat-

²⁹ Dulero: person in charge of the *dulas*.

ed lands of *Vegas*, perhaps because until the expulsion of the Moors, most of all neighbors are livestock owners, or, a variation of the same thing, that the farmers are owners of the livestock. That is affirmed in 1582 by the governor of Zenete: "...all the moors had livestock, and there was mutual understanding among them and never mistreated to each other and never entered [with the cattle] in fields and vineyards". Conversely, after the repopulation he complains because "*por la visita que avia fecho, ha visto los muchos pleitos que ante su merced abrán pasado y que se asientan por los muchos daños que los ganados y bagages y ganado moreno hacen en los panes, vega, viñas*" ([during] the visit he made, he had seen many litigations that have kept going due to the damages done by the livestock, baggage and dark livestock to the bread, *vega*, vineyards). "And then, in time of the moors the lands of such villages were very well planted with vineyards and trees and orchards very well fenced -with many fruits (...) and everything well kept. Without any neighbor -nor servitude, nor offspring neither with their livestock or baggage, although they were in greater abundance- damaging each other, as it was notorious to all and every one of them" (A.H.N. Osuna, leg. 3123).

Indeed, the changes introduced by the Castilians at the end of XVI century will be reflected in forms of territory and resources management. The implantation of a new society will be accompanied also -of different strategies that will attempt to preserve part of the precedent elements, although it will necessarily imply a different conception that will affect, over all, the common goods and the possibilities for self-management of rural communities.

Acknowledgements

The present study is an outcome of the project "*Estudio de los sistemas históricos de regadío de Sierra Nevada: Un paisaje singular de montaña*" (Study of the Historic Irrigation Systems in Sierra Nevada: a singular mountainous landscape 050/2009), funded by the *Organismo Autónomo de Parques Nacionales* subsidiary of the Ministry of Environment, Rural and Marine Environment and the project "Mediterranean Mountainous Landscapes: an historical approach to cultural heritage based on traditional agrosystems" (MEMOLA), funded by the FP7 project-European Commission.

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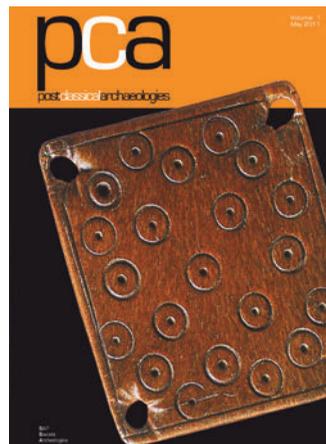
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