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# A social analysis of irrigation in Al-Andalus: Nazari Granada (13<sup>th</sup>-15<sup>th</sup> centuries)

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## Abstract

This paper concerns the outer urban area of the town of Granada in the Nasrid period (13th–15th centuries). Most agricultural land was irrigated because of the characteristic drought of the Mediterranean climate, and also because of the needs of certain crops which had been brought by the Arabs from monsoon climates. Water distribution followed patterns that were not only hydrographical and topographical but also social. In this way, social structure was reflected in land irrigation, and even its evolution can be seen in the way in which this distribution changes. It evolved from a family criterion to a topographic one, and finally to the buying and selling of allotted times independent of the land itself. Furthermore, the example of one of the *acequias* in this irrigated land shows that the allotted times coincided with the Islamic prayer schedule, so that the Moslem call to prayer served also to divide the day for the peasant workers.

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*Keywords:* Al-Andalus; Nazari kingdom; Irrigation systems

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## Introduction

The aim of this work is to describe Islamic society at the end of the Middle Ages by analysing its agricultural areas. The environs of Granada, the capital of the last muslim kingdom of the Iberian peninsula, were chosen in order to contrast urban life with that of the *alquerías* (villages) near the city. It should be noted that the Nazari kingdom of Granada succeeded al-Andalus and thus was an Islamic entity in every way. There is a certain tendency in Spanish historiography to imply that Islamisation was a superficial phenomenon, different to that which occurred in other parts of the Islamic world, with a certain continuity between pre-islamic Spain and Moslem Spain. Garcia de Cortazar wrote:

The dominant tendency was to emphasise the supposed continuity between pre-Islamic Hispania and al-Andalus; without reaching the extremes proposed by Sanchez Albornoz, it is clear that a certain structural analogy was accepted between Moslem and Christian society. Even authors such as Barbero and Vigil, so perceptive in their analysis of the start of feudalism, contributed some way to this tendency.<sup>1</sup>

P.Guichard also commented on the way that feudal structures were present in Al-Andalus:

Nobody denies that there were important differences regarding religion, language, cultural level and economic development. However, their influence is minimized and there is a tendency to accept a great continuity of civilization between pre-Islamic Hispania and al-Andalus and a certain structural analogy between Moslem and Christian society in the Iberian Peninsula based on a geographical, ethnical and sociological substrate of identical origin. This leads to a description of Moslem society in al-Andalus, especially when dealing with rural society, which employs western terminology and concepts (lords, castles, tenant farmers, domains etc) with the meanings, which these terms acquired in the classic feudal context.<sup>2</sup>

Against this trend, Guichard's work (1976) opened up a new line of investigation. In al-Andalus he studied Andalusian society, concluding that the existence of tribal structures had an important political role until at least the tenth century.<sup>3</sup> After this date they may still have had some social influence, although not necessarily in the power system. In his work, the analysis of family and kinship, both in the East and the West (as contrasting elements in each world) is fundamental. In the former the

<sup>1</sup> J. A. García de Cortázar y Ruiz de Aguirre, 'Organización social del espacio: propuestas de reflexión y análisis histórico de sus unidades en la España medieval', *Studia Historica*, VI (1988), 195-236 at 213.

<sup>2</sup> P. Guichard, 'El problema de la existencia de estructuras de tipo "feudal" en la sociedad de al-Andalus. (El ejemplo de la región valenciana)', in: *Estructuras feudales y feudalismo en el mundo mediterráneo (siglos X-XIII)* (Barcelona, 1984), 117-45 at 117-18.

<sup>3</sup> P. Guichard, *Al-Andalus. Estructura antropológica de una sociedad islámica en Occidente* (Barcelona, 1976).

family group is extensive and affiliations are established through the male line, whereas in the latter, the family is nuclear and the parental bond is bilateral. In the Iberian peninsula the two forms seem to exist in opposition, the former in al-Andalus and the latter in the Christian kingdoms. The eastern structures came into general use in the Iberian peninsula because of the dominant position of the Arabs and an Islamisation which was more or less complete by the time of the Caliphate.<sup>4</sup>

Manuel Acién, in his analysis of this thesis, pointed out that several social formations were present in the Iberian peninsula during the early middle ages: the tribal formation of the Arab Berber conquerors and the feudal formation of the Visigoths. In the tenth century the process of Islamisation triumphed and represented the consolidation of a tributary society.<sup>5</sup> Due to a lack of information, it is not possible to follow the development of this Moslem society in the peninsula. However, in his second thesis (1991), Guichard suggested the possibility of a change with respect to the first period of al-Andalus. This could be seen in the predominance of local over parental ties in the *alquerías* of eastern Spain during the middle of the thirteenth century at the time of the Christian conquest. However, little is known of the changes that took place in rural areas. Consequently the aim of this study is to provide some of this information. Since the Nazari kingdom marked the end of al-Andalus it should be easier to observe the evolutionary process.

With regard to the definition of Islamic society as a social formation, there has been a tendency not to differentiate between that and the feudal formation.<sup>6</sup> However, there has also been another trend to qualify it as tributary-mercantile. This classification first appears in Samir Amin with reference to Arab society in general (1974).<sup>7</sup> He states that local capitalism did not develop here due to the absence of one of the necessary conditions, the proletarianisation of the workforce, which occurred in Europe after feudalism. In 1975, in a study of Islamic society in the Iberian peninsula, Reyna Pastor again uses the concept of tributary-mercantile to refer to it: 'Without being included in this structure and without following its dynamics, al-Andalus is falsely portrayed as having had historic autonomy'.<sup>8</sup>

In a recent study, Eduardo Manzano includes al-Andalus within the tributary societies as a result of his analysis of the work of Guichard, Barcelo and Acién. He thus recognises that 'the generic characterisation of al-Andalus as a tributary social formation contrasts greatly with western medieval societies'.<sup>9</sup> Some of the characteristics of this social function were the strength of the peasant communities,

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<sup>4</sup> P. Guichard, 'Los Árabes sí que invadieron España. Las estructuras sociales de la España musulmana', in: P. Guichard, *Estudios sobre Historia Medieval* (Valencia, 1987), 27-71.

<sup>5</sup> M. Acién Almansa, *Entre el feudalismo y el Islam. Umar b. Hafsun en los historiadores, en las fuentes y en la Historia* (Jaén, 1994).

<sup>6</sup> A. Barbero y M. Vigil, *La formación del feudalismo en la Península Ibérica* (Madrid, 1978).

<sup>7</sup> S. Amin, *El desarrollo desigual. Ensayo sobre las formaciones sociales del capitalismo periférico* (Barcelona, 1974).

<sup>8</sup> R. Pastor De Togneri, *Del Islam al Cristianismo. En las fronteras de dos formaciones económico-sociales: Toledo, siglos XI-XIII* (Barcelona, 1975), 11.

<sup>9</sup> E. Manzano Moreno, 'Relaciones sociales en sociedades precapitalistas: una crítica al concepto de "modo de producción"', *Hispania*, LVIII/3, 200 (1998), 881-913.

the collection of surplus in the form of a tribute (tax) of the rent (lease), and the absence of feudal lords. He also points out that the contact between these groups and the State was made without intermediaries, and that the city was their form of expression since the mechanisms of domination characteristic of the feudal system were absent. However, bearing in mind Haldon's definition of the tributary form of production, the differences between Andalusian society and western feudal society are less important when considering feudalism in the former.<sup>10</sup> Since these two societies were in conflict in the Iberian peninsula during almost the whole of the middle ages, it is not easy to analyse its different manifestations, especially as they originate from similar societies.

The problem is of high theoretical complexity, and it is not the aim of this study, which is limited to discussing the main assumptions regarding the history of Moslem Spain. In the case of the kingdom of Granada - the last link in the chain of Islamic presence in the Iberian Peninsula - the conclusions regarding the type of society are those which are currently dominant, that is, it is considered to be a tributary-mercantile society.<sup>11</sup> The scope of this study does not permit discussion of the presence of a feudal class.

### **Irrigation in Al-Andalus**

The cultivated areas of Nazari Granada were generally irrigated, and for that reason it is useful to examine the origin and importance of this type of agriculture. Over the last few decades artificial irrigation and its social implications have been widely debated by historians. This was also of interest to local historians and scholars, especially in the nineteenth century. Both Valencia and Granada, two of the most important regions with the longest Islamic presence (until the middle of the thirteenth century, and up to the end of the fifteenth century respectively), have been the subject of study. One of the most interesting aspects of historical analysis is the creation of these irrigated areas. In 1957 Wittfogel published *Oriental despotism: A comparative study of total power*,<sup>12</sup> in which he attributed the origin of irrigation to the State, not only in the Near East but also in al-Andalus and even in America. Thomas F. Glick, in *Irrigation and Society in Medieval Valencia*,<sup>13</sup> suggested that the State intervened when certain climatic and fluvial conditions were present, such as in arid or semi-arid regions with large rivers which had to be controlled, for example in Mesopotamia and Egypt. Furthermore, even in these cases he underlined the importance of the social base in the development of hydraulic systems: for example, in resolving irrigation conflicts between farmers at a local level. In the Iberian peninsula he attributed the generalisation of irrigation to the Islamic period, arguing

<sup>10</sup> J. Haldon, *The State and the tributary mode of production* (London, 1993).

<sup>11</sup> A. Malpica Cuello, 'La última feudalización medieval: el reino de Granada' in: *VI Curs d'Estiu Comtat d'Urgel. El temps i l'espai del feudalisme* (Balaguer, 11-13 julio del 2001) in press.

<sup>12</sup> K. A. Wittfogel, *Oriental despotism: A comparative study of total power* (Yale, 1957).

<sup>13</sup> T. F. Glick, *Irrigation and society in medieval Valencia* (Massachusetts, 1970).

that Roman agricultural lands were only irrigated under extreme climatic conditions, such as the arid regions of Mauritania and Numidia. The techniques of water collection, piping and storage had fundamentally urban objectives and were not aimed at improving agricultural yield.

In 1983, the work of Andrew M. Watson on the spread of Islamic agriculture from east to west, including the identification of plants from tropical and subtropical regions, some of which reached al-Andalus, had a considerable impact.<sup>14</sup> For the first time it was argued that the spread of irrigation during the Moslem period was related to the requirements of certain foreign crops brought by the Arabs to areas with a mediterranean climate, characterised by a period of summer drought. In 1981 Pierre Guichard and André Bazzana, in their studies of eastern al-Andalus, related the Andalusian communities to the development of irrigated cultivation.<sup>15</sup> Many of these communities were originally the result of Arab or Berber tribal groups settling in the area and, even as late as the years preceding the Christian conquest, were characterised by their autonomous management of the land with respect to the State. Consequently the spread of irrigation can be considered as a local solution applied by these communities and not the State. The attribution of irrigation to communities, which initially had a tribal-clan character, is an idea developed mainly by Miquel Barceló. For him, a key factor is the independence of these communities in the management of their cultivated areas, due to the absence of feudal lords who would have influenced the choice of crops through their demands for rent.<sup>16</sup> This, according to the author, led to cultivation of multiple crops including those which were neither easy to store nor to sell. More recently, Antonio Malpica has discussed the relationship between this type of agriculture and the location of the settlements. From the Caliphal period (10th century) onwards there was a tendency to settle in more accessible areas with better conditions for irrigated cultivation. The topography of many of these *alquerías* reflects this preference for irrigated areas, in that they are situated immediately above, but outside, the settlements, so as not to interfere with the hydraulic system. He also argued that the generalisation of irrigation led to an increase in agricultural production, some of which was stored in very different ways, as shown in the chapters on the conservation of these crops in the treatises on agronomy. Another part of the crop was destined for sale both

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<sup>14</sup> A. M. Watson, *Agricultural innovation in the early Islamic world. The diffusion of crops and farming techniques, 700-1100* (Cambridge, 1983).

<sup>15</sup> A. Bazzana and P. Guichard, 'Irrigation et société dans l'Espagne orientale au moyen âge', in: *L'Homme et l'eau en méditerranée et au proche orient* (Lyon, 1981), 115-40.

<sup>16</sup> M. Barceló, 'Vespres de feudals. La societat de sharq al-Andalus just abans de la conquesta catalana', in: *España. Al-Andalus. Sefarad: Síntesis y nuevas perspectivas*, ed. F. Mailló Salgado (Salamanca, 1988), 99-112. M. Barceló, 'El diseño de espacios irrigados en al-Andalus: un enunciado de principios generales', in *Actas del I Coloquio de Historia y medio físico. El agua en zonas áridas: Arqueología e Historia*, 2 vols (Almería, 1989), vol. I, 15-51.

locally and in the city, particularly during the Nazari period, through wide-ranging commercial networks controlled by Italian traders and, in particular, the Genoese.<sup>17</sup>

In order to understand the importance of irrigation in the Iberian peninsula it should be remembered that its widespread use forms a milestone in Roman agriculture. This was based on plants from the Mediterranean ecosystem: the olive, the vine and certain cereals such as wheat and barley, which did not require artificial irrigation for their development. Irrigation in the Roman world was reserved especially for market gardens, which benefited from the excess water from nearby houses. Under this system, the summer was a period of inactivity in the rural environment since the majority of the crops were harvested earlier (cereals) or later (grapes and olives).<sup>18</sup> With the Islamic conquest this would soon change.

Moslem expansion also resulted in the spread of tropical and sub-tropical plants from east to west, and the majority of these required a warm and humid environment. In the part of the Iberian peninsula governed by a mediterranean climate, heat is guaranteed during the summer. However, this is not the case with rain, which falls in the autumn and, to a lesser extent, in the spring. The adaptation of these plants involved the incorporation of both new and old techniques for supplying water. Summer became just another part of the working agricultural year. Irrigation also served to improve the yield of the crops, which until then were not irrigated, such as cereals and olives, and guaranteed or improved the yield of crops previously dependent on the weather. This new agricultural technique made water the principle fertiliser, to such an extent that animal manure was hardly needed. This does not mean that it did not exist, rather that there was no association between livestock and agriculture, typical of the feudal system, and poultry and vegetable fertilisers were much more important.<sup>19</sup> The mixture of areas for crops also facilitated the creation of new plant species through grafting. Irrigation resulted in the cultivation of multiple crops, which grew and bore fruit at different times. This led to a change to the previous system in which harvest times were firmly established.

One of the most difficult tasks is to order this economic activity chronologically. Written sources clearly document it from the tenth century, but before this date references are scarce. One of the latter is the work of the Grenadine Abd al-Mālik Ibn Habīb (790-852/853), the *Mujtasar fil-Tibb* (Compendium of Medicine), which details the medical and pharmacological knowledge acquired on his journeys to the East.<sup>20</sup> He mentions some of the plants and products he obtained there, and may

<sup>17</sup> A. Malpica Cuello, 'Relaciones entre el medio físico y los campos de cultivo en el reino de Granada antes y después de la conquista castellana (siglos XIII a XVI)', in *Tomás Quesada Quesada. Homenaje* (Granada, 1998), 417-434. A. Malpica Cuello, 'Il traffico commerciale nel mondo mediterraneo occidentale alla fine del medioevo: il regno di Granada', in *Aspetti ed attualità del potere marittimo in Mediterraneo nei secoli XII-XVI*, ed. P. Alberini (Roma, 1999), 351-81.

<sup>18</sup> A. M. Watson, 'Innovaciones agrícolas en el mundo islámico', in: *La caña de azúcar en el mediterráneo. Actas del Segundo Seminario Internacional sobre la caña de azúcar* (Granada, 1991), at 11.

<sup>19</sup> A. M. Watson, 'Livestock in the agriculture of muslim Spain: was farming "integrated"? and why does it matter?', in: *Coloquio Homenaje a Pierre Guichard. Veinte años de al-Andalus* (Granada-Valencia, 1996).

<sup>20</sup> Ibn Nābīb, *Mujtasar fil-Tibb (Compendio de Medicina)*, ed. and trans. C. Alvarez de Morales y F. Girón Irueste (Madrid, 1992).

have brought to al-Andalus, such as the aubergine, sugar, Chinese cinnamon, cumin from Kirman, Arabic rubber and the banana. In the ninth century Ibn al-Faqīh mentions cotton,<sup>21</sup> one of the oriental plants that spread following the Arab-Berber invasion. However, in the tenth century information becomes more abundant, showing that the new agriculture was becoming more established in this part of the Moslem world. Thus, for example, in the first half of the tenth century, al-Rāzī includes a description of al-Andalus by administrative districts (*kura/s*) in which some of the new plants are mentioned: cotton in Seville and sugar cane and oranges in Ilbīra (the ancient territory of Granada).<sup>22</sup> The introduction of these plants generally took place in the south due to the warmer climate. Another of the most relevant sources for the analysis of the new crops and their associated economic activities is the *Calendar of Cordoba*.<sup>23</sup> This was intended especially for fiscal purposes, and compiled harvest times and related industries by lunar months. It reveals that sowing and harvest times varied throughout the year. This would have made the control of taxes difficult for the State, and would thus have resulted in more autonomy for the peasants. Amongst the new crops were the lemon (*uttrunj*), rice (*arūz*), the aubergine (*bādinjān*), sugar cane (*qasab al-sukkar*), cotton (*al-qutum*), the banana (*al-mawz*) and the oriental cucumber (*qiththā al-shāmī*). There is also an anonymous treatise on agronomy, apparently from the same period, which also mentions the bitter orange (*naranj*) and spinach (*isbinākh*).<sup>24</sup> Between the thirteenth and fourteenth centuries the study of agriculture flourished, as shown by the quantity and quality of works dedicated to it. Schools of agronomy appeared under the protection of Taifa, Almohad and Nazari kings, first in Toledo, later in Seville, and finally in Granada.<sup>25</sup>

As previously mentioned, a current line of historic thought, represented basically by Guichard, Barceló, Glick and Malpica, relates these irrigated areas to *alquerías* whose inhabitants were originally joined by family ties. In some cases, such as in the settlements of eastern al-Andalus, it might be supposed that they were founded by tribal clans. They were connected to the State through Islamic taxation, which was sometimes imposed collectively on the community and later distributed by the Council of Elders of each community. This council appears to have had real responsibilities, as shown by its presence in documents concerning the handing over of *alquerías* to King Jaime I. Guichard has pointed out that this was a relatively low-level militarised society in which the authorities (*hākīm* or governor, *wazīr* or bailiff)

<sup>21</sup> Ibn Khurrādādhbih, Ibn al-Faqīh al-Hamadhāni and Ibn Rustih, *Description du Maghreb et de l'Europe au III<sup>e</sup> IX<sup>e</sup>*. *Extraits du 'Kitāb al-Masālik wa'l-Mamālik', du 'Kitāb al-Buldān' et du 'Kitāb al-A'lāq an-nafīsa'*, ed. and trans. M. Hadj-Sadok (Algiers, 1949), 53.

<sup>22</sup> Al-Rāzī, *Crónica del moro rasis*, ed. D. Catalán and M. S. de Andrés (Madrid, 1974), 23-4.

<sup>23</sup> *Le Calendrier de Cordoue*, ed. and trans. C. Pellat, (Leiden, 1961).

<sup>24</sup> *Kitāb fī tartīb awqāt al-girāsa wal-magrūsāt. Un tratado agrícola andalusí anónimo*, ed. and trans. A. C. López López (Madrid, 1990).

<sup>25</sup> E. García Sánchez, 'La agronomía en al-Andalus', in: *El Legado científico de al-Andalus* (Barcelona, 1992), 145-155.



had a public function, rather than a privatised one, as was the case in a feudal society.<sup>26</sup> This is illustrated by the geographical mobility of the agents, who were frequently removed from office, and by the fact that their signatures on treaties with the Christians appear next to those of the Elders (*shuyūkh* or *vells*) although they do not appear to have had more power than the latter. Andalusian society during the mid thirteenth century was very different from the Catalan-Aragonese, which is considered feudal.

Some authors have suggested that this vision of the rural world of al-Andalus is too idyllic, and that no historical evolution is visible in it, contrary to that observed in the Christian kingdoms.<sup>27</sup> Furthermore, as Guichard recognises in his latest work, the relationship that the *alquerías* developed with the State (or, in effect, the city) has been, until now, one of the least defined aspects. On the other hand, a certain change can be seen in the Islamic settlements of the early period, which are characterised as tribal-clan. There is no relationship between the names of the inhabitants and those of the rural centres of population. This means that the founders of these *alquerías* were not the same as the later inhabitants: that is, they did not belong to the same tribal-clan unit. The relationship between them seems to have been due more to their being neighbours than to family ties. Furthermore, in the few studies of land ownership it can be seen that this was distributed unequally, although small- and medium-scale landowners were important. The study of six *alquerías* in the Huerta de Murcia in the mid thirteenth century (comprising only 7.5% of this area)<sup>28</sup> gave the following results:

| Size in <i>tahullas</i> [ha. = 1 hectare] | no. of owners | area cultivated |
|---|---------------|-----------------|
| From 0.21 to 6.75 (0.023-0.75 ha.)        | 75%           | 40%             |
| From 6.75 to 9 (0.75-1 ha.)               | 10%           | 10%             |
| More than 9 (+1 ha.)                      | 15%           | 50%             |

However, some other *alquerías* show greater equality among the owners, as in the case of the inhabitants of Bihuadah and Benabia in which the wealthiest landowners did not own more than 10 *tahullas* (1.11 ha.). Furthermore, in the latter almost 60 owners had 5 *tahullas* (0.55 ha.) while fewer than 10 had between 5 (0.55 ha.) and 10 *tahullas* (1.11 ha.). The recreational lands or *reales*, typical of the urban elite, do not account for large areas and are only found in four of the *alquerías* studied. Five of the *reales* were between 1.75 (0.19 ha.) and 6 *tahullas* (0.66 ha.) and the other three between 10 (1.11 ha.) and 18.12. On the other hand, the owners of the *reales* also had farms, which in six cases were of medium size (between 6 and 11.5 *tahullas*, that is 0.66 ha. and 1.27 ha.), and in two cases could be considered large (between 16 and 57 *tahullas*, that is 1.77 ha. and 6.33 ha.).<sup>29</sup>

<sup>26</sup> P. Guichard, *Les Musulmans de Valence et la reconquête (XI<sup>e</sup>-XIII<sup>e</sup> siècles)*. Damascus, 1991, vol II, pp. 339-343.

<sup>27</sup> García de Cortázar y Ruiz de Aguirre, 'Organización social del espacio', 215-216.

<sup>28</sup> J. Manzano Martínez, 'Aproximación a la estructura de la propiedad musulmana en la tierra en la Huerta de Murcia (siglo XIII)', in: *Castrum, 5. Archéologie des espaces agraires méditerranéens au moyen âge* (Madrid, 1999), 61-75 at 68-9.

<sup>29</sup> J. Manzano Martínez, 'Aproximación a la estructura', 74.



An *alquería* was a rural settlement, generally unfortified and with its own land, which was divided into various parts with different uses and legal status.<sup>30</sup> Next to the inhabited core was the *mamlūka* or appropriated land, which was generally irrigated. The rest of the land was *mubāha* or unappropriated and was divided into two parts: *harīm* and *mawāt*. The former was a communal space used for grazing and the collection of wood, firewood, coal, wild fruits, etc. Access was frequently granted to the inhabitants of nearby *alquerías*. This was possible due to the relatively low numbers of livestock, at least when compared with after the Castilian conquest. In a crisis, for example during a drought, the community tended to protect this part of their livelihood by closing the *harīm*. The unappropriated land or *mawāt* could be cultivated, but if left abandoned for more than three years, this privilege was lost. In addition, it could not be sold. It was normally not irrigated although it occasionally received excess water from the irrigated land. It was, in effect, a kind of *res nullius*, which separated the different inhabited areas. The land was not so much the property of the State but of the public treasury of the Moslems (*Bayt al-Māl al-Muslimīn*) although the former sometimes acted as its administrator. While, for the *hanafī* legal tradition, State authorisation was required for its appropriation, the *Mālikī* legal tradition, prevalent in al-Andalus, did not consider it indispensable. This method of organising the space of the *alquería*, not only belongs to legal literature, but was actually applied in the Nazari kingdom.

The irrigated land was the most important and was often the only cultivated land in the *alquería*. When this was the case, the inhabited area was usually immediately above the irrigated plots which were generally organised in a series of terraces so as not to interfere with the irrigation system. Above the inhabited area was wooded hillside, which was generally thinned to provide access for livestock, mediterranean woodland being especially dense and thorny. At times this area was cleared completely to open up non-irrigated land for cultivation in times of hardship. Irrigated and non-irrigated land could also be differentiated by their social representation in the *alquería*. While most inhabitants owned some irrigated land, few had plots in the non-irrigated area, which confirms the importance of the former. In a coastal town like Almuñecar 15.8% of landowners only had vines, that is, non-irrigated land, while 25.12% owned both types of land. In some of the *alquerías* of the *vega* (fertile plain) of Granada, such as Chauchina, 20% owned non-irrigated land. In another case this figure was as low as 16%. It is interesting to note, at least in the case studied, which was similar to that in Almuñecar, that the non-irrigated land was generally in the hands of those who did not own irrigated land. Those who owned both were usually small landowners. Thus 72% of these with up to 7 *marjales* (up to 0.36 ha.) of irrigated land also owned 75% of the non-irrigated land.<sup>31</sup> The wealthiest inhabitants, with a significant number of plots in the *vega*,<sup>32</sup> showed little interest in the non-irrigated land. This may be due to the fact that this *mawāt* or

<sup>30</sup> Y. Linant De Bellefonds, 'Un problème de sociologie juridique. Les terres "communes" en pays d'islam', *Studia Islamica*, X (1959), 111-36.

<sup>31</sup> 1 *marjal* is 522.22 square metres; 19.26 *marjals* are 1 hectare.

<sup>32</sup> *Vega* is every irrigated area, but it refers also to the *vega* in the region of Granada.

unappropriated land could be freely occupied as long as it was cultivated. If this were the case in the whole kingdom of Granada, it could be called free non-irrigated land.

On the other hand, the irrigated land was held in genuine ownership with no time limit and could be sold. This type of land shows that there were appreciable economic and social differences within the *alquerías* and towns. For example, in Almuñecar, 70% owned up to 7 *marjals* (0.36 ha.) and were the owners of 30% of the *vega*, 20% (with between 7 and 20 *marjals*, that is 0.36 ha. to 1.04 ha.) owned 35%, and the prosperous 10% (with between 20 and 60 *marjals*, that is 1.04 ha. to 3.13 ha.) owned the remaining 35%. Therefore, there were significant numbers of small landowners. Furthermore, the properties of the wealthiest were dispersed throughout the cultivated areas. This suggests that although there were economic differences within society, these did not result in the possession of homogenous properties by those highest in the social scale. On the other hand, there must have been a workforce composed of the poorest landowners who could supplement their income by working for the wealthiest as tenants or hired hands. However, the majority of the inhabitants of this coastal town (*madīna*) were small landowners. Although no other examples have been studied by analysing land ownership as a whole, due to a lack of relevant documents, the situation was similar in the other villages studied, in that ownership of small areas of land predominated. Unfortunately definite conclusions cannot be reached without further study. It is possible that, in the areas surrounding the large Nazari cities of Granada, Málaga and Almería, there were greater differences between landowners compared with the villages. Nonetheless, as will be seen in the case of Madīna Garnāta, the *almunías* or recreational lands, typical of the wealthy urban classes, were not as extensive as might be expected for this late period and for a zone so influenced by the city.

### **The city of Nazari Granada and its surrounding area**

Given that the Arabic documentation relating to the study of the Nazari kingdom is virtually non-existent, it is difficult to study such an important aspect of rural life as the distribution of water and land from a direct source. It has often been necessary to use documentation compiled just after the Castilian conquest to reconstruct rural life as it was before the conquest. In a few cases in this documentation, particularly when related to lawsuits about irrigation and irrigation boundaries, some parties contributed older written proofs, sometimes from Islamic times, later translated into Castilian.

As was often the case, conflicts concerning the timetabling of the irrigation system usually arose between two or more population centres, but hardly ever within one village itself. It follows that we know little of how water was distributed within one particular agricultural centre. However, we do have privileged information in this respect from an *alquería* near Nazari Granada called Beiro. We know from later information how the area surrounding the capital of the Nazari kingdom was irrigated using the *acequia* (a system of irrigation channels) of Aynadamar. With data concerning the two principal components of agricultural al-Andalus, water and

land, a social interpretation can be made of these two communities, rural and urban, in the final stage of the Islamic era in the Iberian Peninsula.

In al-Andalus, land that is truly productive is that which has been irrigated. Its productivity is significantly higher than land naturally irrigated, and this is reflected in the price paid for such land. In the years following the Castilian conquest, irrigated land could demand four times the price of non-irrigated land. Thus the two elements, water and land, cannot be considered separately, as they are so closely interrelated. In the *alquería* of Beiro, according to a distribution study in 1334, the allocation of water was divided into eight periods of the day. Half of these were given to family groups and, as was traditional in the Moslem world, these groups descended from one particular male. The other four periods were given to specific individuals who did not belong to any family. This implies a mixed system for the distribution of water, the first relating to the Moslem family groups or clans and the second to distinct individuals. The first is evident in many parts of the Moslem world such as Yemen, the higher Atlas, Rif and Palestine. In Palestine, in the village of Battir for example, an elder (*shaykh*) is in charge of distribution, controlling the water contained in an *alberca* (a water-holding container or tank) and allocating it according to the rights of each family.<sup>33</sup> In another Palestinian town, Artās, the same system is followed, i.e. dividing the water among the clans. This method is facilitated by the fact that the lands normally adjoin each other. In this way the water passes from one plot to the other of the same family, and then onto another family. However it can also function if the plots are dispersed. This can be seen in Berque in the upper Atlas, where despite losses due to evaporation and seepage, given that the water flows some distance from the *acequia* to the points of irrigation, the sharing of water among family groups is maintained.

Logically, as the plots became more and more dispersed, a water distribution system based solely on extended family connections was not viable. At some point the system was changed to one based on topography. In the *alquería* at Beiro half the irrigation shares were allocated to family groups and the rest to individuals. This means that from a certain point the amount of land owned by family clans began to decline. In the first place the question arises as to whether there was once a clan-based inheritance system. Guichard stated that the towns, whose names derived from the name of the head of a family in the area of the Levant of al-Andalus, could be considered as clan centres. There are also names of estates that can be interpreted in the same way. In certain *fatwa/s* recognised by al-Wansharīsi (15th century) there were areas of land occupied by a clan. On the other hand, information from an Arabic source, Ibn Abī Zar, referring to the city of Fez in the ninth century during the reign of Idrīs II, mentions districts of the city and outlying land being distributed among tribal groups.<sup>34</sup> Although we do not know how the land was divided up in the centre, it can be assumed that, as the number of plots of each family increased, each

<sup>33</sup> Y. D. Ron, 'Sistema de manantiales y terrazas irrigadas en las montañas mediterráneas', in: *Agricultura y regadío en al-Andalus. II coloquio historia y medio físico* (Granada, 1996), 383-408 at 393.

<sup>34</sup> Ibn Abī Zar, *Rawd al-qirtās*, trans. Huici Miranda, 2 vols (Valencia, 1964), vol. I, 89-90.

new plot would be adjacent to another, bearing in mind that endogamy was the preferred marriage system in the period.

In various parts of the Islamic world this organisation of agricultural land, reflecting the social structure of a clan system, still exists. One of the best known cases is that of Berque in the upper Atlas. In this area of the Maghreb the clan structure is reflected, not only in the layout of the population centre, which quite often has districts separated by tracts of land, but also in the outlying areas of cultivation. It is possible that a similar method of spatial organisation could have existed in al-Andalus, at least in the areas occupied by the Arabs and the Berbers.

As previously noted, at some point the wealth of the clans began to disintegrate. In the cultivated zones around Nazari cities and *alquerías*, towards the end of the Islamic era in the Peninsula, there were many adjacent plots of land that were owned by different individuals, and therefore not allocated according to the clan-based system. This does not mean that the system had completely disappeared, as there were still areas of land divided up amongst families. The two methods ran parallel, although the clan system was in decline. Towards the end of the Nazari period, a weakening of the family structure can be detected, manifested by the dispersal of its most fundamental asset: land.

The reasons for the fragmentation of the clan-owned lands are numerous. Moslem marriage regulations, with associated dowry payments and inheritance rules, and an increase in the sale and purchase of land, played an important part in the decline of the old system. In addition, this could have been caused by the development of commerce. From a commercial point of view, the most productive irrigated land was of course the most valuable. This would have highlighted the economic differences between family groups and would have led to exogamic unions: that is to say unions between those who were economically equal, rather than between family members.

Thus it can be seen that there was a clan-based system of apportioning land at the *alquería* at Beiro. Next to this, in the territory of Nazari Granada, which is supplied with water from the *acequia* at Aynadamar, there was another system of distributing land and, in particular, water. The fundamental difference between this population centre and that of Beiro is that the allocation of irrigation times was not assigned to family groups, nor even to the land, but were sold independently of those. The explanation lies in changes to the traditional Islamic community, which took place in an environment closely linked to the town and created by urban property owners.

The *acequia* that irrigated the immediate surroundings of Granada was known as *Aynadamar*, a name that came from the Arabic *Ayn al-dam* or fountain of tears, today known as *Fuente Grande*. Its source is situated in a limestone outcrop in the Sierra de la Alfaguara (from the Arabic *al-fawwāra*, which means fountain or spout) some ten kilometres from the capital of the Nazari kingdom, in Alfacar. It is not known for certain when the *acequia* was constructed, although most likely in the Ziri dynasty (11th century) for that was when Granada acquired the status of a city.

The former capital of the Emiral district (8th-10th century) and later the Califal district (10th-11th century), known as Kura of *Ilbīra*, was situated some eleven kilometres west of Granada. Recent excavations at Sombrerete hill (*Atarfe*), where the *madīna Ilbīra* was located, show layers from the Emiral and Califal periods, coinciding with written information dating from the start of the government of Muhammad I (852-886). This city was abandoned in the first half of the eleventh century, when the *sinhaja* Berbers, with the agreement of the city inhabitants, moved the capital to Granada. This was then an inhabited area known from Arabic sources as *hisn Garnāta* and also as *Garnāta al Yahūd* (because a Jewish community lived there).<sup>35</sup> The *Zīrīs* (11th century) provided everything necessary to create an Islamic *madīna*: a fortress, mosques, town walls, and so on. One of the first problems to solve was to find a way of supplying water to the first population nucleus, which was situated on elevated ground on the Albayzin hill close to the Alcazaba Qadīma, or *Vieja* (the old) to distinguish it from the *Nueva* (the new) or Alhambra situated on the hill opposite. Later, in the thirteenth century, another area was developed here, populated by migrants from Denia (Alicante, Spain). A century later a wall was constructed around this area forming the Albayzin suburb. In the Nazari era, and later, after the Castilian conquest, the inhabitants of the Alcazaba and Albayzin owned and controlled the water from Aynadamar, but they shared it with rural communities such as Vīznar.

From at least the eleventh century, the lower, flat, part of the city received its water from another source, an *acequia* running from the right bank of the river Darro called Axares. This supplied the flatter areas around the Aljama mosque. As Granada grew to the east, on the left bank of the river, another *acequia* was needed. The Romayla *acequia* also carried water taken from the right bank but later crossed the river to supply the area to the left or east of the river. In order that the city could continue to grow eastwards, more channels were constructed taking water from the river Genil (Map I).

Due to the fact that the source of the *acequia* of Aynadamar lay some ten kilometres from Granada, its function was not only to supply water to the city but also to the rural areas to the north of *madīna*. However, all evidence suggests that the primary function of the *acequia* was to supply the city, and this was done by filling the *aljibes* (water tanks) in the streets, rather than supplying individual houses or agricultural irrigation, although the *acequia* was obliged to supply water at Vīznar, through which it flowed. It was agreed that Vīznar should receive a quarter of the total volume of water between midday and sunset from April to October, those being the driest months and, when necessary, this could be increased during the rest of the year. It is possible that the rural centre of Vīznar did have access to water before the creation of Granada, and that in fact the *acequia* was much older than previously thought. Other data indicates that due to the far greater volume of water used by

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<sup>35</sup> A. Malpica Cuello, 'Las murallas de Granada', in: *Nuevos paseos por Granada y sus contornos* (Granada, 1992), 67-97 at 74-75. M. Rodríguez De La Zubia, *Los cármenes. Sus huertos-jardines. Antecedentes* (Madrid, 1983), 12-13.



Map I. The city of Granada, taken from *al-'Umarī* (14th century).

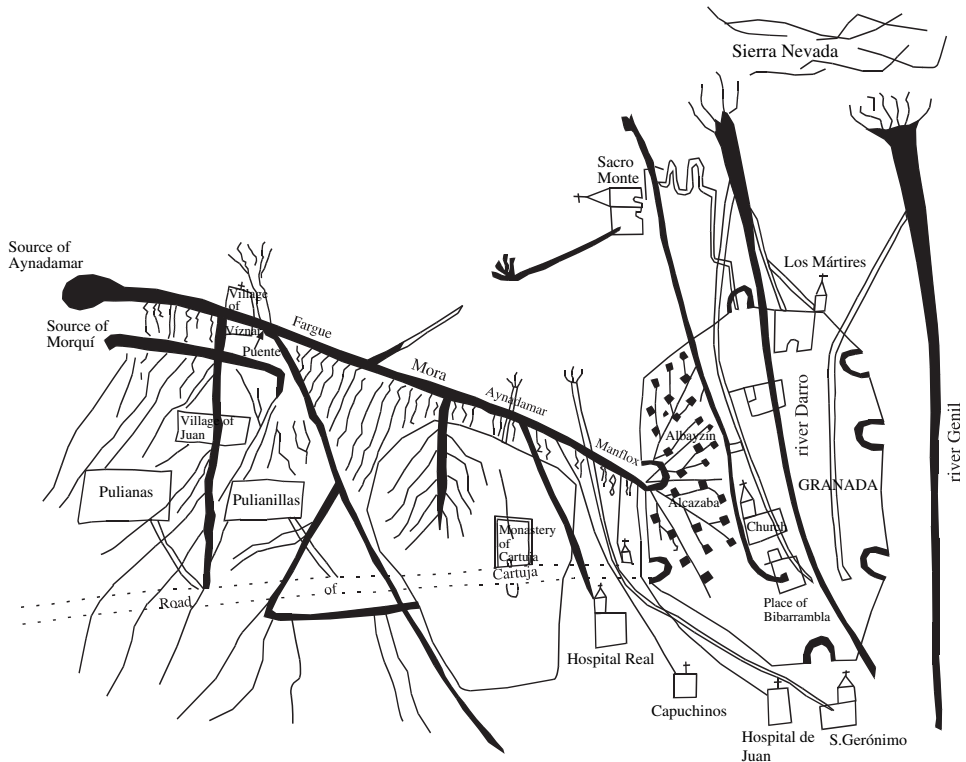
Granada, the *acequia* must have been created initially for the city, but conceded a certain amount of the water to the rural population living by the riverside. One must therefore assume that the people of the *acequia* were not allowed to sell any excess water. Moreover, the rules regarding maintenance, evidence of which came to light after the Castilian conquest but were related to Nazari customs, dictated that the cleaning of the *acequia*, in the stretch that ran from its source to the bridge preceding the *alqueria*, was the responsibility of the city dwellers. They were also responsible for any serious damage due to overflows or other causes, but minor damage and upkeep was the responsibility of the people of Vīznar. The greater involvement of the city in those aspects that guaranteed the functioning of the *acequia* at Aynadamar could have been a way to demonstrate to everyone that the city owned the water, although it was shared with the rural community.

This double function of the *acequia*, rural and urban, meant that its organisation had to avoid any conflict of interest between the two. Generally, arable land was irrigated during the day, and at night water was supplied to the city to fill up the *aljibes*. When examined more closely one can see the logic of this distribution. During the afternoon the water was supplied to the plots of land around Vīznar and the estates of Fargue, Mora, Almachachir, Aynadamar and, closer to the city, of Mafrox. The timetable for water supply depended on the season. In the driest period,

between the feast of St. John (24 June) and 30 September, the land was irrigated between midday and two or three in the afternoon. In the wettest months, between 1 October and 23 June it was between midday and sunset (Map II).

After sunset the water entered the city and filled the cisterns (*aljibes*) throughout the night until dawn. Thus while the people involved in irrigating the land rested, the *acequia* fulfilled its urban function. This occurred every night of the week, but also on Friday morning because Moslem prayers on Fridays at midday were a special celebration and a time of rest. Thus the irrigation time from sunrise to the middle of the afternoon was not used to water the fields, but to fill the cisterns of the city, and when these were full it went to the houses in the Albayzin and the Alcazaba. These houses contained *tinajas* (large clay water containers) or *albercas* (reservoirs), which allowed people to store water themselves without having to go out in the streets. It must be pointed out, however, that whilst the city water tanks had absolute priority over the rural land, individual houses did not. The needs of the rural community had to be satisfied before those of individuals.

Once the cisterns had been filled, a new irrigation period began between first light and the actual appearance of the sun. This was used by the smallholdings in the



Map II. Water channel system of Aynadamar, taken from a drawing in the *Apeo* of 1575.



estate of Machachir. Afterwards, between sunrise and midday, water was allocated to the gardens inside the city and to the outskirts (predominantly in the estate of Mafrox). From midday until mid afternoon the water from the *acequia* could be sold and the money spent on the upkeep of the *adarves* or walls of the city, most probably in the Albayzín and Alcazaba quarters. It is also possible that the profits from the sale of water could have gone towards maintenance of the *acequia*, such as repairs and cleaning. In other more rural areas the local community would have carried out such work. Finally, from three in the afternoon until dusk, water went to the plots north of Granada, as mentioned before (Table I).

This organisation of the *acequia* not only took into account where each plot of land was situated, but also a time factor. The timetabling of irrigation slots in the *acequia* of Aynadamar and others around the city and in the surrounding regions, closely followed the rhythm of the Moslem prayers throughout the day. There was a period at the beginning of the day, between first light and sunrise which was associated with the prayers of *fajr* and *subh* (this prayer was not obligatory, but the more religious men did attend it). Then came the period between sunrise and midday, initiated by the prayers of *subh* and of *zuhr*. The signal for this was when the shadow of a man was as long as he was tall. After this, and until the prayers of *al-‘asar*, called by the Christians the *vísperas*, there was another period that finished about two or three o'clock in the afternoon. From then until nightfall, between the prayers of *al-‘asar* and *al-‘isha* (named according to Castilian documents as *alaxia*) there was a final period which finished at nightfall. The essential conclusion to be drawn from this is that irrigation times were linked very closely to the calls to prayer that came throughout the day, so an activity as important to agricultural life in al-Andalus as irrigation, was integrated with the Moslem culture, taking advantage of the prayers as milestones during the day. This is highlighted by the exception made on Fridays, when instead of irrigating the fields the water went to filling the cisterns and individual houses. However my studies have not revealed an irrigation period linked to the prayer of *al-magrrib*, which occurred just after sunset, when the last rays have left the horizon. The absence of documentation relating to this prayer, however, does not in itself mean that this particular time of day was not used to signal the beginning or end of an irrigation period (Table II).

The periods that follow the Moslem prayers were compatible with the subdivisions for those in charge of irrigation, so that between one prayer and the next each farmer could be assured of receiving a certain quantity or a certain period of water. Apart from the irrigation periods being governed by the calls to prayer, some were determined by a sundial. Using the shadow cast by a certain rock or stone, the sundial indicated the start and finish of these periods and thus assured that the volume of water allocated was constant. In the zone irrigated by the *acequia* at Aynadamar, it is believed that the clans did not control the distribution of water, as they did in Beiro. Due to the presence of a number of private landowners, the irrigation method was based on topography, water passing from one adjacent plot to the other. The reason for the fragmentation of land ownership was probably due to the fact that their lands became increasingly dispersed due to dowries, inheritance

Table I  
Irrigation system of the *acequia* Aynadamar in the Nazari period (13th-15th centuries)

|           | From first light to sunrise | From sunrise to midday                       | From midday to afternoon                            | From mid-afternoon to dusk | From dusk to first light  |
|-----------|-----------------------------|--|---|----------------------------|---|
| Monday    | Irrigated land              | Vegetable gardens and houses in the Alcazaba | Irrigated land and the city walls                   | Irrigated land             | Water tanks in the city or if full, sold to maintain the city walls |
| Tuesday   | Irrigated land              |  | Irrigated land and the city walls                   | Irrigated land             | Water tanks in the city or if full, sold to maintain the city walls |
| Wednesday | Irrigated land              |  | Irrigated land and the city walls                   | Irrigated land             | Water tanks in the city or if full, sold to maintain the city walls |
| Thursday  | Irrigated land              |  | Irrigated land and the city walls                   | Irrigated and              | Water tanks in the city or if full, sold to maintain the city walls |
| Friday    | Irrigated land              |  | Water tanks in the city or if full, the city houses | Irrigated land             | Water tanks in the city or if full, sold to maintain the city walls |
| Saturday  | Irrigated land              |  | Irrigated land and the city walls                   | Irrigated land             | Water tanks in the city or if full, sold to maintain the city walls |
| Sunday    | Irrigated land              |  | Irrigated land and the city walls                   | Irrigated land             | Water tanks in the city or if full, sold to maintain the city walls |

and the sale of plots. This is more noticeable in the lands surrounding large cities such as Granada. Here it is also known that some farmers sold their irrigation periods to others. Although it is possible that this also occurred in rural areas, we have documentary evidence for the northern area of Nazari Granada in the form of letters testifying the final transfer by sale, signed in the presence of the *cadi* (judge): the first one of those letters is from 1359.<sup>36</sup> These show clearly that irrigation periods were traded. This system of the sale of water, independent of the land, increased after the Castilian conquest, when a process of concentration of land ownership began and the irrigation periods applicable to this land fell into the hands of a few private individuals. One example of this being the monastery of Cartuja. (Map III).

The existence of this form of water distribution in the Nazari period leads to the conclusion that it was no longer tied to family groups, as in the case of Beiro, nor was it tied necessarily to the land, but that it was possible to transfer water independently. Berque interprets this situation in the area of irrigation as a reflection

<sup>36</sup> M. Espinar Moreno, 'Escrituras Árabes romanceadas sobre la acequia de Ainadamar (siglos XIV-XVI)', *Sharq al-Andalus*, 10-11 (1993-1994), 347-71 at 358-59.

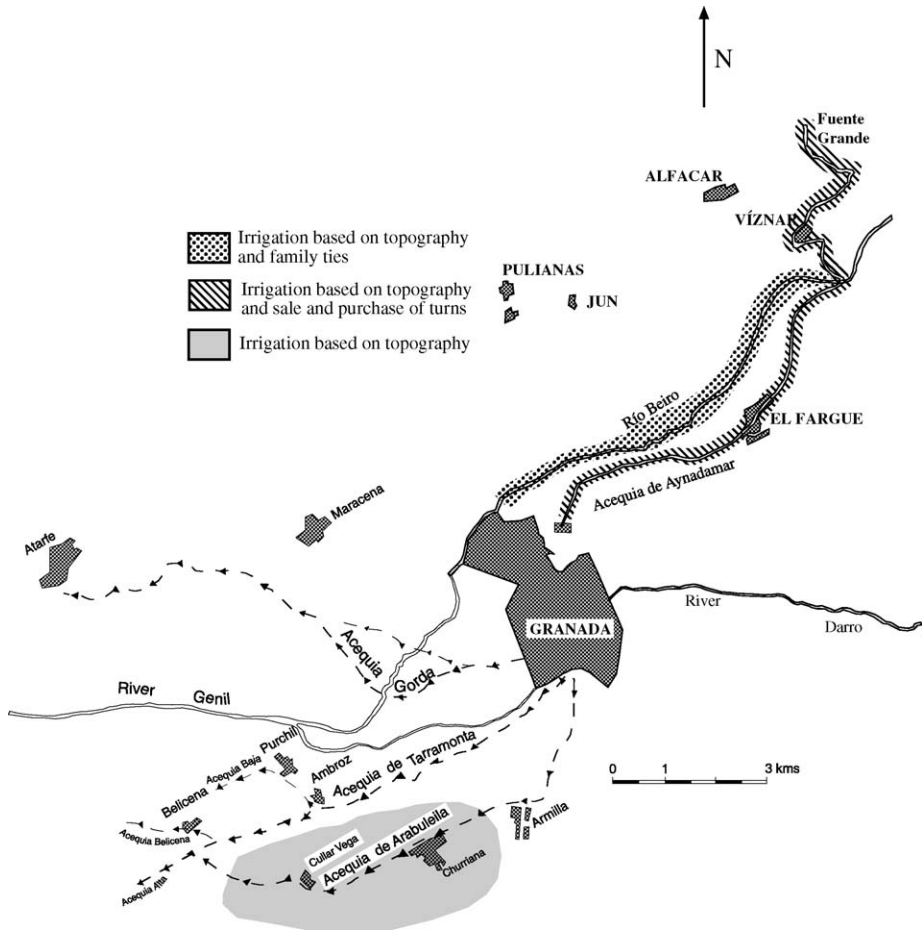
Table II  
Relation between irrigation periods and Islamic prayer times

| Islamic   | Islamic prayers related to irrigation turns | Irrigation turns             | Irrigated area   |
|-----------|---|------------------------------|--|
| fayr      | From fayr to subh                           | From first light to sunrise  | estate of Machahir   |
| sub       | From subh to zuhr                           | From sunrise to midday       | Vegetable gardens in and around the city (estate of Mafrox)  |
| zuhr      | From zuhr to al-'asar                       | From midday to mid-afternoon | Farmstead of Viznar and cultivated zones within the Granadian boundary (estates of Fargue, Mora, Almachachir, Aynadamar) |
| al-'asar  | From al-'asar to al-'isa'                   | From mid afternoon           | Farmstead of Viznar and cultivated zones within the Granadian boundary (estates of Fargue, Mora, Almachachir, Aynadamar) |
| al-magrib | Unknown to the irrigated turns              |                              |  |
| al-'isa'  | From al-'isa' to fayr                       | From dusk to first light     | Water tanks in the city  |

of the breakdown of the community. Glick, on the other hand, explains the sale of water separated or not from the plots of land it irrigated, by the nature of the water source. He refers to the Syrian system, that is when an irrigated area is supplied by abundantly flowing rivers, where the water, or the right to use water in a timed period, cannot be sold. This can be observed in the market gardens of Damascus, and those in al-Andalus, in Valencia, Murcia, and Castillon. However, when the irrigation depended on fountains, the Yemini system, then the water could be sold on its own, apart from the land. This can be seen in the oases in southern Sahara, and in Elche, Novelda and Lorca in the Iberian Peninsula.<sup>37</sup> It would seem that both factors, social and geographic (hydrographical, climatic, etc.) determined whether water could be sold independently of the land or not.

One of the least known aspects of Nazari society is the nature of their ruling class. Some scholars have had a tendency to identify the conquering Castilian society with that of the defeated. The fact that insufficient studies have been carried out regarding the origin of agricultural ownership in both cases, makes it difficult to draw more definite conclusions here. One fact does stand out, however, and that is that the ownership of land created after the conquest was very different from that which the richer classes enjoyed under Nazari rule. For example, the two *alquerías* of Chauchina and El Jau, in the *vega* of Granada, were bought by one individual,

<sup>37</sup> T. F. Glick, 'Regadío y técnicas hidráulicas en al-Andalus. Su difusión según un eje Este-Oeste', in: *La caña de azúcar en tiempos de los grandes descubrimientos. 1450-1550. Actas del Primer Seminario Internacional* (Granada, 1990), 83-98 at 92.



Map III. Methods of water distribution in the area surrounding Nazari Granada (13th-15th centuries).

resulting in the previous owners becoming workers on what used to be their own land. These differences are also seen in Almuñecar. The richest Nazari landowner owned only a third of the land, which one Rodrigo de Ulloa controlled in the city. He also owned various other properties in the kingdom of Granada. Something similar is seen near Granada, where the richest people from the city owned large areas of uncultivated land (estates). They bought up the land piecemeal, buying several small plots averaging between 6 and 7 *marjals* (0.31 ha. or 0.36 ha.) and ending up with sizeable landholdings. Both Nazari and Castilian sources refer to this area surrounding the city as being home to the richest section of society, living in large elegant mansions with their own area of cultivated land. An analysis of the organisation of the ownership of the land, however, seems to show a completely different reality. Ibn al-Khatīb in *al-Lamha al-badriya* (the middle of the

14th century) mentions the existence of very expensive and productive tracts of land to the north of Granada, some thirty of them owned by the sultan.<sup>38</sup> In his *al-Ihāta fī akhbār Garnāta* he only talks of ‘admirable market gardens’ while the houses are ‘well protected fortresses, crowded mosques, luxurious mansions and solidly constructed houses’ owned by people who had become rich by working for the state administration.<sup>39</sup>

Following these descriptions, it can be assumed that these were large estates (even if this is not explicitly stated), belonging to persons who had prospered thanks to their state offices. A closer study, however, shows that their size was very restricted, and does not justify the author’s terminology. I have been able to gather information from a late source called Apeo which, although written in 1575 and so sometime after the Nazari era, does mention agricultural organisational practices closer to the period of the Nazari kingdom. From this it is evident that the average size of land plots was between 6 and 7 *marjals* (0.31 ha. and 0.36 ha.). In the area around Aynadamar for example, where the greatest concentration of *carmens* or *almunias* (the recreational houses, usually with land) lay, 47 of these occupied an area of 300 *marjals* (15.66 ha.). This means an average of 6.38 *marjals* (0.33 ha.) per *carmen*. Taking into account that some of these possessed very little land, it can be concluded that 50% occupied between 7 and 15 *marjals* (0.36 ha. and 0.78 ha.), while 40% had less than 6 *marjals* (0.31 ha.), and some had as little as 3 *marjals* (0.15 ha.). These dimensions are the more significant if we consider that after the Castilian conquest a process of concentration of ownership of land and water was taking place in favour of the new settlers. Thus the rich inhabitants of the Nazari capital who had *almunias* with land were not, as expected, the principal owners, but had arable land of a size similar to the least favoured villages like Almuñecar.

## Conclusion

The study of the area surrounding Nazari Granada shows that, even as late as the first third of the fourteenth century, there is evidence of what must have been the first irrigation system using a family system as its basis for distributing water. This method of allocating water was related closely to social structure and agricultural space. Later, this distribution of irrigation periods was based more on topography and, still later, water distribution became separated from land distribution, as found in the areas surrounding the city. The system based on family ties can be seen in the farmstead of Beiro, which used the Beiro river to irrigate the land, and the one based on the sale and purchase of periods of water independent of the land is seen in the area to the north of Granada, which used water from the channels of Aynadamar.

<sup>38</sup> Ibn al-Jatīb, *Historia de los Reyes de la Alhambra*, eds. E. Molina and J. M. Casciaro (Granada, 1998), 10-11.

<sup>39</sup> D. Cabanelas, ‘Los cármes de Ainadamar en los poetas Árabes’, *Estudios sobre literatura y arte dedicados al Profesor Emilio Orozco Díaz*, 2 vols (Granada, 1976), vol. 1, 209-19 at 211.

A more detailed analysis of the second method reveals how an *acequia* (irrigation system) was organised, both from an urban and a rural perspective, in the Nazari era. The distribution of water, both for the city and for the fields, required a regulation that avoided disputes, especially in an area where water was scarce. Thus, during the day the water was used for irrigating the fields, and at night it filled the *aljibes* (cisterns) of the city. Irrigation periods were marked by the calls to prayer from the mosque, the simplest way of timetabling the day. Praying and irrigating became two activities perfectly integrated in Islamic culture.

Finally, the lands owned in the Aynadamar district, theoretically by the urban elite, were in fact no bigger than that of the average small landowner in the kingdom of Granada. One interpretation is that the Nazari elite were rich in gold and urban goods; they had well built houses, shops and market gardens in the city, but they were not big landowners. There are reasons to suppose that the Nazari elite owned far less land than the Castilian upper classes who settled in the region after the conquest (1492).

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