

Irrigation and Rural Conflict in Medieval Iberia

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Two vital elements for agriculture and human subsistence, fertile soil and water, are largely scarce in the east and south of the Iberian Peninsula, as throughout the Mediterranean basin. Especially crucial is the shortage of water: water for consumption and water for converting the arid soils of the region in arable land. This water scarcity is characteristic of the Mediterranean climate, which concentrates all the rainfalls in a few moments of the year (fig. 1). In the eastern part of Spain not only it rains very little –between 400 and 500 mm of annual average, although in some areas it does not even reach the 200 mm–, but when it rains, usually in the month of October, it does in torrents, because of the phenomenon known as “cold drop”. Therefore, as catastrophic are the dryness and the lack of rainfall as the heavy rains, the shortage and the excess of water. So, while in the wet Europe the human epic in the Middle Ages was, as Georges Duby, the fight against the vegetation, against the wood, in the Mediterranean Europe it was the fight against the water, against its irregularity, against the lack of it, against its excess or against its unhealthy presence in the marshes and in the wetlands along the coast. To do this, peasants have historically acted with intelligence and tenacity. They have designed and developed irrigation techniques and a complex network of channels in order to tame the water, to get the maximum benefit of the scarce water resources available and to use them in agriculture, on the one hand, and to drain and reclaim the swamps and wetlands, on the other.

Without irrigation, in some regions, agriculture would be virtually impossible and, with it, the same human presence. In others, however, irrigation has made it possible to intensify agriculture and increase the productivity of the land, with much higher yields than those of the dry land. While in medieval Europe the average yields of cereals were of 1:4, that is, four grains collected from one sown, in the irrigated lands in the Middle East or in the Egypt fertilized by the Nile they amounted to ten from one. Some estimates even propose to twenty from one for

lower Mesopotamia and, in more modern times, to between twenty to forty from one for the irrigated fields in the region of Valencia in the eighteenth century.

In Spain, water management and irrigation date back to Roman times and even beyond. However, we still know very poorly the irrigation in both periods. Until the seventies of the twentieth century, the general opinion among historians and geographers was that the irrigation systems clearly had a Roman origin, although developed and expanded later by the Muslims who arrived in the Iberian Peninsula in the eighth century. Behind this idea was the prejudice that Muslims could not have been able to create a hydraulic culture so important, that their expertise and their technical civilization was far below the mastery of the Romans. As was the case in other domains –philosophical, scientific and technical– where the Arabs had been limited to be simple transmitters of the knowledge of the classical antiquity, even in the field of irrigation they would be limited simply to implement the Roman know-how and techniques. There were many more prejudices, such as the superiority of the orthogonal design –the geometric regularity– of the Roman *centuriatio* on the irregular distribution of the plots of land in al-Andalus, which adapted to the forms and inclinations of the terrain, to the conditionings of the physical environment. The *centuriatio*, on the contrary, not only imposed to the physical environment, and tamed it, but it reflected an egalitarian social structure (the division of the territory between citizens), the product of a unifying purpose of the public, run by the firm authority and by the rational rigor of the state. It was the beneficial action of this, along with the commitment of an enterprising colonial population, what would result in a rational, geometric and harmonious landscape. That would be disfigured and replaced by the Arab conquerors that came to the Peninsula in the eighth century.

In response, the Orientalists, anthropologists and archaeologists of the last thirty years, in particular the so-called hydraulic archaeology and authors such as Thomas Glick, Pierre Guichard and Miquel Barceló have insisted in the Muslim origins of the hydraulic spaces and systems of Mediterranean Spain, called *Sharq al-Andalus* in Arabic. But even among those who support this hypothesis of a Muslim origin there are notable differences. There are those that relate the development of the irrigation with the political power, with the state, either during

the years of Umayyad “despotic” power (I say “despotic” in reference to the notion of “Oriental despotism” of Wittfogel), or during the political decentralization following the collapse of the Caliphate. The idea of a close relationship between the formation of the new states *Taifa* and the overall economic development has been supported by authors such as Lucie Bolans and David Wasserstein, who speak of an agricultural or green revolution in the eleventh century, linked to the introduction of new plants, to the agronomical experimentation, to the spread of the irrigated agriculture, and to the development of the cities. The great *huertas* (irrigated lands), mainly located in close proximity to large urban centers, such as Valencia, Mallorca and Murcia, would have been created on the initiative of the cities, for their own supply and for an agricultural production primarily oriented towards the market. By contrast, other authors deny the initiative of the central government and the cities, emphasizing instead the role of rural communities in the construction of irrigated areas, on the basis of the place-names, the hydraulic archeology and the morphology of the agrarian spaces. Stressing also the importance of migratory processes in the transmission of the plants and the agricultural techniques, in particular the settlers came from North Africa, bringing with them the irrigation systems from the Maghreb. In fact, 85 % of the 161 irrigated areas identified in the island of Mallorca had an extension of less than 2 hectares, and only two had more than 10 hectares. A surface so tiny that it can hardly be explained with reference to a type of despotic power (Figs. 16-17-18). But one thing is these small irrigated spaces, peasant clearly, and another thing the great suburban *huertas*, of thousands of hectares. To explain their creation, these authors consider that the great *huertas* are the result of the juxtaposition or integration of small irrigated areas, designed and managed by rural communities, and that it was the *huertas* who have created and facilitated the development of the cities, and not the opposite.

However, in recent years some archaeological finds and new studies have shed new light on the Roman irrigation. Up to the mid-eighties, thirty years ago, historians of technology argued that irrigation was rare in Greece and Italy, where the arable land and non-irrigated crops dominated, and that the aqueducts and other water pipelines were more related to the supply of drinking water and for the baths, than to the agriculture. If the ancient irrigation has been neglected by

archaeologists, it is mainly due to the vulnerability of the material remains of the hydraulic landscape. But as the archaeologists have begun to seriously study these remains, impressive water management systems have begun to emerge. From Greece to central-western and southern Italy or to Roman North Africa. These works ensure that the topic is still alive and will be subject to further contributions and revisions in the coming years.

Meanwhile, some recent findings seem to confirm the existence in Roman times, in much of the dry Spain, from the valley of Ebro to the south and east, of different irrigation systems, either individuals and on small-scale or networks of medium or large size and run by sole owners or by more complex irrigation communities. In this session, we are not so concerned either in the strictly technical aspects of these systems or in the continuity of the Roman hydraulic installations up to the Muslim period, as in the fact that forms of social organization of irrigation traditionally attributed to the Islamic societies have been documented for Roman times. For example, the proportional distribution of water according to the amount of land or the autonomy of the irrigation communities with respect to provincial or municipal authorities, to which they only came in the case of conflicts between irrigators of different cities, two traits considered by some authors as of Oriental origin and that would have been introduced into Spain by the Muslims, but that are already clearly documented in Roman legal texts. Our knowledge of Roman irrigation is very weak because of the fragility of its material infrastructures, but it is not without significance that some of the texts that have survived are related to conflicts over water and to negotiation, arbitration and resolution of these conflicts.

In fact, it is not surprising that the documents held, both for Roman as for Moorish times are arbitral sentences, agreements and legal decisions that put an end to conflicts over the use and management of water in agriculture. Some authors restrict the cultivation of land in al-Andalus to irrigated agriculture. In an environment as dry and arid as the south and east of the Iberian Peninsula, only irrigation would allow the practice of agriculture. And to the extent that irrigation was primarily a peasant initiative, of rural communities autonomously organized beyond the walls and the influence of the cities, it was very small irrigated areas of a few hectares (less than one to six or seven), fed by water from pits, wells, springs and

natural sources, and located next to the settlement. The image that a hypothetical aerial view of this agricultural landscape would offer would be that of a series of small green stains, the *huertas*, right next to the villages, they located at the highest points to make more room for irrigation, separated from each other by extensive interstices of dry and uncultivated land.

This picture nevertheless presents some problems. Firstly, it is not clear that all agriculture in al-Andalus was irrigated and that the dryland was not cultivated, apart from being used, such as the marshes, as pasture for livestock. Secondly, it is an overly and timeless picture, developed primarily by anthropologists (Guichard). Is it valid for the first centuries of Muslim rule, from 8th to 10th century, when cities were not yet developed, or also for the last centuries, from the eleventh to the thirteenth, when al-Andalus already had large urban centers apart of Cordoba? And thirdly and most of all, this picture only refers to small hydraulic systems, small irrigated spaces created and maintained by rural communities; but what about the great *huertas* of thousands of hectares, located next to urban centers, or about the large irrigation systems with several irrigation ditches, affecting several rural communities and in which conflicts over the use and allocation of water continuously originated between them? Some authors seek the genesis of these large hydraulic units not on a creation *ex novo*, from the construction of dams on flowing rivers, but on the integration into a single, comprehensive system of small irrigated areas preexistent, fed by natural springs or watercourses minor. It is what Joan Mateu suggest for the fertile plain of the Xúquer River; Joan Mateu, Joan Marco and Enric Guinot for the *huerta* of Valencia, and Sonia Gutiérrez for that of Alicante. By contrast, that of Elche would have been created, according to Rafael Azuar, contemporaneously with the foundation of the city, at the end of the Caliphate (early eleventh century). Whether by integrating preexisting small irrigated areas of peasant creation or by initiative of cities, especially since the rise of the eleventh century, both by urban landlords or directly by the state, the result was the creation of large irrigated spaces in the fertile plains of the coast, of thousands of hectares, while smaller units were confined to the mountainous interior. Moreover, the difference between peasant and urban irrigation was not just in size, but also that while the former was intended primarily to secure agriculture and subsistence, the second was more oriented to the market. In any case, once the

irrigation system involved several communities or even a city, the conflict between them was almost inevitable, especially in times of water shortage.

It is not without significance that one of the few documents in Arabic that have been preserved prior to the Christian conquest is the resolution of an irrigation conflict. It is the sentence passed in 1223 by a *qadi* (judge) on the dispute that had stood for over twenty years the communities of Torox and Qars by the use of a ditch derived from Palencia River. In fact, rather than a judicial decision seems an agreement between both communities sealed by the authority of the judge. The problem affected the distribution of water from the ditch and consisted of the stone dividing the water into two equal parts with exact precision was broken. Both villages decided to repair the stone, so that each has access to two and a half rows (the row is the unit of measurement of the water). Three and a half centuries later, the conflict reemerged for the same reason and in the new trial was argued the 1223 agreement, which was translated from Arabic into Castilian in Madrid in 1576.

In Muslim times the performance of these agreements was guaranteed by the cooperation between rural communities and by the direct relationship between them and the State, without the intermediary of any feudal power, unlike in the Christian-feudal society, and any quarrel for the use of the waters was determined by the *qadi*. Not only the ditches and the design and management of the entire hydraulic system were the work of the rural communities themselves, but the potential sources of discord, caused primarily by the distribution of the water in times of scarcity, were resolved by new agreements of cooperation. Moreover, and contrary also to feudal Europe, there were no municipal boundaries nor any kind of jurisdictional borders slicing up the territory and the productive space, and hindering the overall management of the entire hydraulic network. By contrast, after the Christian conquest, in the second third of the thirteenth century, the new feudal system could no longer ensure the cohesion of the hydraulic spaces. It is true that, despite the break in the composition of the settlement and in the forms of social and political organization, there was continuity in the technical means and in the human settlement, based on the continuity in the uses of the water. The Christian conquerors and settlers seized, extended and perfected irrigation sys-

tems inherited from the Muslims, and with them the quarrels for waters use, mainly between upstream and downstream irrigators. But at the same time, the political fragmentation introduced by the mosaic of domains in which the former administrative unit was split, involved serious attacks on the integrity of the network.

Feudalism in the dry lands of Iberia, as generally in the Mediterranean ecosystem, is characterized by its avidity of water: irrigation represents a significant increase in the land productivity, and this, for the lords, meant higher rents and, for the peasants, more abundant harvests, and with them, more marketable surplus after the lordly extraction. And that to which the holders of the lordships and also the vassals aspired was to maximize the profits of irrigation in their territory, to extend the area of irrigation and to increase their water supply, although that attempts against the customary rules of the allotment of the hydric resources and affects the overall balance of the irrigation systems. Nobody looked beyond the borderline of his own community, although that could seriously harm the interests and rights of other users, usually downstream. Hence the high level of conflict between neighboring lords and between rural communities, witnessed by the numerous lawsuits registered since the late thirteenth century, a few decades after the conquest, only provisionally closed by arbitral sentences that were questioned since they were enacted and that immediately demanded a new agreement between the parties. Hence also the continuous interventions of the Crown, urged to ensure the strength of the judicial resolutions.

In short, while irrigation in the Muslim society was fundamentally intended to make agriculture possible and to ensure the subsistence of the rural communities – except in the suburban *huertas*, whose production was directed to the market–, in the new Christian society post conquest irrigation was primarily aimed at the increase of crops, both to generate higher rents and higher marketable surplus, in which both lords and peasants were interested. The former Muslim lands were confiscated from his previous owners and spread to the new Christian lords and settlers, which fragmented the territory, erected municipal and lordly boundaries and threatened the integrity of the old hydraulic networks. Everyone wanted more water, even at the expense of their neighbours and to the detriment of the whole system. And so while in Muslim rural society the design and overall management

of irrigation systems corresponded to a community organization and based on both tribal solidarities and direct relationship of the rural communities to the state, without the intermediation of seigniorial powers, the feudal conquest represented not only the fragmentation and privatization of the territory, but also the implementation of these intermediate powers, erected in rents extractors and that, besides the land, tried also to appropriate the waters that made their domains more profitable. But water, as the complex infrastructure and strict regulation of its use in the Islamic period evidenced well, was scarce, and the struggle for its control, for its hoarding, could only generate a high level of conflict which seriously threatened the delicate balance in the distribution of the flow and even the integrity of the hydraulic networks.

The continuity of these beyond the conquest had contributed to perpetuating in the new feudal society some of the community traits that had kept them during the Islamic period. Among them, the existence of irrigation communities at a supra local level, above the different towns and villages, each held by a different lord. And with them, a whole system of resources allocation –with shifts and batches of water–, of obligations –cleaning and maintenance of the network– and of conflicts resolution. However, among the Christian peasant communities, the same germs of discord that led lords to face each other for the appropriation and use of resources always scarce, reproduced. Both lords and peasants shared a common interest in improving their water supply in order to extend the irrigated area and increase the agricultural productivity, and still encourage planting new speculative crops, such as rice, sugar and mulberry, in an economy increasingly dominated by the market. But this improvement in the own provision of water could not be done but at the expense of the others. And so, to the traditional conflicts over the distribution of water in times of drought and over the contribution to the maintenance of the system, were now added conflicts derived of the aggravation of the hydraulic particularism, spurred by the combined and mutually reinforced effect of both feudal rent and commercial profit. Every village, every manor, aspired to their hydraulic autonomy, to take all the water they want, and if community obstacles prevented it, to build their own channel and their private network. The disputes between neighbouring communities were inevitable, and not only by water.

Like the study of irrigation, also that of rural communities has progressed significantly in recent years. Far from being presented as a homogenous and stable mass, rural communities are perceived today more dynamically, subject to profound internal transformations, derived from both their own rates of growth and the influence of external factors, especially the lordship and the town. More than an egalitarian and harmonious world, characterized only by the solidarity and cooperation among its members, the rural community was also the scene of a progressive internal differentiation that led to the stratification of the peasantry and the intra-local conflict.

Rural communities were, first of all, communities of residents, a group of families united by ties of neighbourliness and solidarity based on the shared residence in the same village and the shared ownership of the local territory, who had woven a complex web of alliances and oppositions. It was also a community of parishioners who share the same parish and even, or especially, a community of vassals, peasants who depend on a common lordship. Historians have long studied and discussed on the respective precedence of the grouped settlement, the parish church and the castle in the configuration of the rural communities, as well as the chronology of their appearance, shortly after the year one thousand. But while in the whole of Western Europe all these elements were intermingling and mutually reinforcing in a long secular process, in the eastern and southern Iberia, where their genesis begins with the Christian conquest of the thirteenth-century, their implementation was much faster and immediate, urged by the repopulation and the lordly structuration of the territory. Valencian, Majorcan or Andalusian communities, framed from their origin within a new social system, are therefore of new and recent formation, and not maintain any element of continuity with those of the Muslim period, except, and not always, the physical coincidence in the location of population centres.

From the beginning, therefore, there were striking internal differences in the new rural communities formed from mid-thirteenth century. Cultural and even linguistic differences, because the new settlers came from very different regions, from the north of the peninsula but also from beyond the Pyrenees; and social and economic differences, because not all the immigrants received the same endowment of land.

Donations of the lands confiscated from Muslims and granted to Christian settlers are recorded in the so-called *Llibre del Repartiment* (Distribution Book, 1237-38 and 1248-49) and in the population charters of the new rural communities, along with the rights and obligations of their inhabitants. The size of these donations, which ranged from 3 ha to 36 ha, depending on the social (and military) status of the settlers (infantryman / cavalryman; peasants, artisans, merchants, knights, nobles), shaped from the start holdings very unequal and a clear hierarchy within the rural communities. In fact, legal documents distinguish between the *probi homines*, to whom it seems that the legal incarnation and the government of the community were reserved, and the other inhabitants. Actually the *probi homines* constituted the oligarchy representing and leading the community, the upper layer and a closed group which is only accessed by wealth and status. They were the ones who possessed the best land, who leased manor rents, church tithes, mills, town and royal taxes, who occupied the positions of the local power and who were rooted from more time in the community. Studies on the longevity of the family lineages show that the oldest families were those of the village elite, with several *generations* residing in the community, whereas the poorest were those of more recent settlement. No wonder the former had more children and, therefore, a wider kinship (more families bearing the same name), because the wealth of their households influenced profoundly the number of children who survived into adulthood.

This internal differentiation and stratification accentuated in the last two centuries of the Middle Ages, as shown by land registries and other tax sources, and because both the hereditary system, which imposed the sharing out of the family patrimony among all the children, including the girls, and the land market, very active right from the start, from the first days of colonization. Inheritance and the market cyclically fragmented and dispersed family patrimonies. But at the same time the market acted as a regulating mechanism by facilitating the formation of new holdings and correcting the dispersal caused by the hereditary partitioning. What's more, the market allowed the peasant not only to buy plots nearer and sell ones farther away, but also to try to achieve a sought-after productive diversification, adding to the cereal base vines, olives and other crops.

In any case, we are not facing rural communities acting only under Chayanovian patterns, and the combined action of the hereditary system and the land market, among other factors, resulted in a greater polarization within the peasantry. In some communities, as Carcaixent in 1474, the peasants with less than 3 ha, including those who had none, made up a third of the total holdings, but as a group they hardly represented more than 4 % of the productive space. On the other hand, the farms with more than 9 ha, also a third of the total, absorbed almost two-thirds of the cultivated land. In between, the medium-sized ones came to a third both of the total of holdings and of the total land cultivated. However, in other communities closest to urban centres stratification was even more marked: over three-quarters of the agrarian holdings in the municipal territory of Alzira were by the end of the 15th century smaller than 5 ha, and even in some hamlets the percentage rose to 83 %. Those with holdings above 10 ha and among whom the peasant elite was drawn, represented only about 10 %. This top stratum of the peasantry was also the one that hired his less endowed neighbours as wage earners in the strong moments of the agricultural cycle, who hired the children of the latter as servants and who provided them with money if necessary, acting as lenders not much or not only because of economic profit, but because with the credit they reinforced their patronage over their poorer neighbours and folded the dependence of the indebted peasants. While we know best today the inequalities and internal differences cleaving rural communities, we know still insufficiently not only the conflict and violence within them, and their causes, but also the way in which the members of the community organized themselves in vertical factions formed by relatives, neighbours and supporters, often their own debtors.

Rural communities thus were far from egalitarian societies, much less harmonious and without conflict. But alongside the divisions and tensions, there were also other factors encouraging cohesion, cooperation and solidarity. Firstly, the parish church that united in the same faith and the same liturgy known by everyone, the immigrants arrived from different European regions and with different languages, but always within the Christian geography. In the early days of the colonization, the bell tower had been not only a counterpoint to the minaret and the prayer of the muezzin, but a familiar element to settlers, just as the churchyard would become a place of memory and roots where lay the remains of ancestors. Other

factor of interrelation and cohesion was the community territory and its defence, in particular their resources, their woods, pastures, waters and in general their common lands. And even the resistance and opposition to the lord, both in a legal and peaceful way, through the courts, and resorting to violence in the few moments of armed confrontation.

In the rural world, conflict, through legal or violent means, and intra- or inter-community, was continuous. Internal conflicts, among rival factions or families, and external conflicts, against the lord and against other communities. These disputes were indeed a source of discord and confrontation, but also of unity and cohesion, above the internal differences and facing the external enemy. In these cases, it used to be the peasant elite, the upper ranks of the village community, who led the latter in its fight with the neighbouring village or with its own lord, acting as representatives, paying the litigation costs and attorney's salaries, and in cases of armed conflict captaining the community against its enemies. Conflicts and all that entailed – how they were dealt with, negotiated and resolved – were a powerful element of cohesion and articulation of rural communities above the internal divisions and inequalities. However, historians have focused primarily on those confronting lords and peasants, so we know much less than those confronting peasants themselves, within the same community or between neighbouring communities.

With regard to conflicts between communities that are what interests us in this panel, the three most important types of dispute were the fixing of the respective territorial limits, the protection of the commons and the struggle for water. Actually, all three types can be summarized into one, the defence of natural resources of the community, and in this defence the peasants were supported by their lord against neighbouring lords and communities. It should be remembered that in Muslim society before the conquest there was no concept of territorial and jurisdictional limit; settlements and productive spaces followed one another or juxtaposed each other with large barren or uncultivated areas between them. Conversely, the feudalization was characterized, among other features, by the privatization of the territory, cultivated or not. And that meant, in the first place, the clarification and delimitation of boundaries between domains and between rural communities, that is, between those who were entitled to the resources of the

territory. The Kingdom of Valencia, the main observatory of my paper, was fragmented into a mosaic of domains, usually of small extent, for the area of a former Muslim town, village or castle. There were no large feudal estates as in Castile and other Iberian kingdoms. As a result, the boundaries of the new lordships, and within them, those of the new rural communities, arbitrarily crossed a wood, a meadow, a river or a canal. And where before there had been cooperation now there had conflict. It was necessary to specify and set these boundaries, which never existed before, and that were vital to guarantee the ownership and use of the natural resources. In fact, the second half of the thirteenth century and the fourteenth are the age of big lawsuits for exact setting these limits. Lawsuits between lords by the limits of their respective dominions, and lawsuits between peasant communities for the same reason.

The definition of the limits of their own territory, however, did not guarantee to the holders of the manor or the inhabitants of the community exclusive enjoyment of natural resources. In Catalonia, for example, the cattle of the inhabitants of Barcelona could graze freely throughout the territory of the Crown, which resulted in numerous lawsuits between lords and the city, in defence of their respective rights and privileges. And the same happened in Aragon, where the lawsuits between the capital and the rest of the kingdom were frequent, because the privilege Zaragoza had to graze freely throughout the country, except in an area reserved in each community to local livestock, called *bovalar*. Contrary to Catalonia and Aragon, the power of the lords was not as strong in the new kingdom of Valencia, where the legal code, the *Furs*, inspired by Roman law, and clearly favourable to the monarchy, extended to all inhabitants of the country the use and enjoyment of natural resources –forests, pastures, waters, quarries, roads–, that should be public and common. This right of use and exploitation, called *empriu* or *aempriu* (from *adimperare*), was strongly questioned by the lords of the kingdom, who were reluctant to let the urban owners of cattle access to their land or to let anyone gather wood or stone without paying nothing in return. And to prevent this, the lords forced all the cattle passing through their territory or who extracted wood, stone or coal, to pay a rate at which they were not legally obliged. And if they refused to pay the fee, the lords took some animal or some other property of the stockbreeder as a pledge. As a reprisal, the city or community from where was the

stockbreeder or the person who had been seized confiscated in turn property of the inhabitants of the manor or community where its people had been reprised. In this way a kind of war of retaliations generated, which could end violently, judicially before the courts or, more often, through an agreement between the parties by arbitral sentence.

Court records are filled with conflicts between the city of Valencia and the neighbouring manors and even with those next to the Guadalaviar River through wood from Aragon descended, who wanted to charge a fee for allowing the passage of logs. The escalation of reprisals sometimes led city of Valencia to mobilizing the urban host and go to the troubling manor. Only the threat or preparations for the mobilization was already enough for the lord yielded and ceased in their demands. Of all the conflicts over commons or over natural resources in general, here we are interested in those that faced neighbouring peasant communities by water uses.

As I mentioned at the beginning of my speech and Horden and Purcell also underline in their very suggestive book, water has some claim to be the most important variable in Mediterranean food production. The need to cope with the accidents of precipitation has stimulated the development of technical strategies to ensure the control and management of the water, a perennial theme in Mediterranean history, and a fertile field for human ingenuity. Orchards and small irrigated spaces can be supplied with water of wells and springs, but large irrigated areas demanded more complex technical solutions. "The replacement of risky uncertainty in the production of staples with assured control has been the purpose of most Mediterranean water technology. This may be sought through an infinite variety of means –from the diversion of natural perennial water resources to the creation of cisterns– and according to all the variables of scale and landscape: relief, altitude, soil type, slope and so on". However, not all was reduced to a technical but also or mainly social and economic issue, as hydraulic works can be very labour- and capital-intensive. And to better understand conflicts on water we should know who and for what designed and created irrigation systems. It is true that water management was more often associated with largely autonomous producers than with great and market-orientated estates belonging to substantial landowners. And in this sense it is also true, as claimed by Beardsley, that "land management unites the household:

water-management unites the community". But along with the traditional irrigators wanting water to enable agriculture and ensure their survival, there were also urban landowners and rich peasants who wanted water to extend the irrigated surface, plant new speculative crops, obtain higher crops and increase profits. And that necessarily led to conflict, because more water than available was needed, and the building of new ditches derived from existent canals did not increase the available flow but altered the traditional system of distribution, with turns and batches scrupulously set. After the conflict, the solution had come through the establishment of new agreements to share the water, improving hydraulic infrastructure, the construction of new ditches and the drainage of the marshes.

I conclude with three particular cases that illustrate the above general remarks.

The first case is that of the Millars River, whose waters supplied four large communities. Hydraulic systems of three of them went back to full Islamic period between the tenth and eleventh centuries, while the fourth was designed and built in the thirteenth century. According to Sergi Selma, at first and also during periods of water abundance, each village took from the river through its corresponding dam all the water needed to irrigate its fields. However, the strong growth of the irrigated area during the second half of the thirteenth century, and especially in the final decades, with subsequent overexploitation, would provoke the insufficiency of water resources in times of scarcity and would raise among the four communities the need to agree which water flow was that each dam could capture. The most disadvantaged in this situation was the town of Borriana, because despite enjoying old rights and primacy, its location on the lowest level provoked it to be the last to take the waters of the river. That made that in lawsuits Borriana was, usually, the complaining party against the other populations. In 1266, for example, the growth of the irrigated area of Castelló, founded a decade before and then living an accelerated expansion, already represented a decline of the traditional rights of Borriana. The rise of conflicts between the four communities led them to seek the mediation of an arbitrator, the infant Peter, uncle of the king and Count of Ribagorça, which in 1347 issued its sentence. According to the text of the agreement, in times of scarcity, water coming down the river would divide into sixty rows or equal parts, to be divided as follows: 14 to Vila-real, 12.5 to Almassora, 14.5 to Castelló and 19 to

Borriana, distributed proportionally to the amount of land that each of the canals watered then. In this case, the term "row" does not correspond to a fixed volumetric value (at the time, the normal volume of the river ranged from 90,000-120,000 l/min., which, if divided by 60, each row represents a flow approximately of 1,500-2,000 l/min.), but a divider which facilitated the allotment. The sentence also provided for cases of extreme drought, which occurred when the flow belonged to Almassora was so scarce that never came to a single row. So the distribution was not done by volumes of water but by hours. Each of the four major canals received all the water for a number of hours, obtained by multiplying by two the number of rows assigned, and so, while showering in one of the ditches the others were dry. Thus, irrigation shifts were one hundred and twenty hours, ie, five full days, during which Vila-real would receive all the water circulating on the river for 28 hours, Almassora for 25, Castelló for 29 and Borriana for 38. In fact, this legislation was to apply only during periods of water shortage. In times of plenty, there was no need to proceed to the partition, since each community could take it needed and there were no problems of insufficient resources. The need for the partition could be requested by any of the four villages, which called for the others that they should come to the splitter. The striking of the case we have just seen is that the allocation set in 1347 has remained virtually intact until today, more than six and a half centuries later. In the picture you can see that the allocation was done according to the amount of irrigated land that each community had expressed in *jovades* (3 ha), establishing a 1 row for 50 *jovades*, ie a row of water could irrigate 150 hectares. Overall, this is an important *huerta* of about 9,000 hectares.

The second case has as its protagonist Xuquer River, the largest river of the kingdom of Valencia. The fact that it was navigable to Alzira, the capital of the region, prevented the construction of large canals derived from permanent dams on the river, so the communities from both sides of the river could only irrigate with water from sources and wells. These were very small spaces, suitable for the small-scale Muslim irrigation, but that soon proved inadequate to the new Christian communities, who tried to draw water from the river, always opposed by Alzira. In 1416, the lords and inhabitants of Albalat, Sueca and Cullera reached an agreement to build a canal from the water from a spring located in the first village. However, while the new canal irrigated a larger space, it was still insufficient, so the three

communities were allowed to build a canal derived from Xuquer River. Among Albalat and Sueca there was a territory, Campanar, which belonged to the town of Alzira, and as the new canal passed through this territory, demanded that a ditch watered also Campanar. In times of plenty there was no problem, but in times of scarcity the conflict was inevitable. In 1457, "sixty or seventy men from the village of Sueca," says a document of the time, "entered armed the territory of Campanar and silted much of the ditch called Hueta", which was the ditch that watered this territory. In reprisal, a few days later the authorities of the town of Alzira summoned their people to go to Campanar and clog the channel going to Sueca through Campanar, so irrigators of Sueca were left without water. As we see, it is a tumultuous conflict that gathered a crowd of irrigators on both sides, armed and ready to resort to violence. All these conflicts ended when, on leaving without interest the navigability of the river, the king authorized the opening of new ditches and each community could water directly from the river with its own ditch.

The third and final case involves a Xuquer River tributary, the Albaida River, on the right side of the first. The waters of Albaida River allowed the creation of a big hydraulic network that watered more than 3,000 ha in a large territory of more than 14 km. The flow of the Albaida constituted an alternative to the constraints imposed on the Xuquer, but its waters were not as abundant as for use them discretionary. In fact, the river reached quite some bleeding, after having covered fifty kilometers and having fed several ditches. Water shortages forced the rationing, the establishment of agreements between users to make better use of available flow. Agreements not so much to prevent a crisis as to ensure a minimal and balanced access to water.

In the region in question, from the Albaida River out two major and independent ditches, the Algirós channel and the Enova channel, watering the territory of some twenty rural communities. The Algirós channel system reserved nine days to irrigators of the village of Castelló and three days to those of the four villages of the so-called Horta dels Cent. The latter, on the queue of the system, were deprived of water for nine days, but, in return, were guaranteed for three, when the divisors of Castelló were closed to let the batch to the Horta dels Cent. As for Énova channel, first diverted a third of its flow to irrigate the land of Castello that the Algirós ditch

could not cover, through the canal called precisely of the Third. And then divided the remaining water in two batches: three days for the upstream and four for downstream. From Monday, at sunrise, to Thursday at sunrise, it was the shift of the peasants from Manuel, Sant Joan, Faldeta, Torreta, la Pobla Llarga, l'Abat and Berfull, while the rest of the week it was the shift of the upstream communities: Sans, Ènova, Berfull, Tossalet and Rafelguaraf. This tripartite distribution, which still operates today, is documented as early as 1325, when King James II, at the request of irrigators prohibited the construction of mills and the opening of new ditches, so that it does not alter the basic rate of the water distribution, which probably dated back to Moorish times. This royal intervention tried to maintain the hydraulic network inherited from the Muslims against illicit innovations that some individuals had been introduced and which had been the subject of numerous and endless litigation for some time. In 1375 the infant John ordered the execution of a sentence in the quarrel facing the irrigators in the Horta dels Cent with those of Castelló on the waters of Algiros channel. And again in 1389. In 1414, fifty irrigators of the Horta dels Cent denounced those of Castelló before the court of the Governor General. And in 1495 Ferdinand back to remember what had to be the water sharing of the Algirós channel between upstream and downstream irrigators. The same quarrel reproduced over and over again, always posed in the same terms. All these conflicts did nothing but highlight the precarious balance in that the hydraulic network was holding since the same conquest.

The climate of general distrust ended forcing the search of individual solutions on the part of each of the affected, tending to ensure or improve their own water supply, within a horizon that aspired to the ideal of the hydraulic independence. In 1545, the lord of Manuel, a village at the head of the ditch of Enova, made the decision to expand the irrigated area of his manor extending the secondary canal that carried water there, an act that caused a shock in the entire region, as evidenced by the numerous lawsuits preserved. Towards the end of the sixteenth century other villages decided to build their own canals derived from the river. A fact which embodies the new ideal of water control, which replaced the solidary distribution of water resources and its community management, supra-local, of the Muslim ages by the local and manorial particularism finally triumphant in feudal society.

Very brief final conclusions, although some have been advanced in the presentation:

- The basic conflict was established between upstream communities and downstream communities, the latter being the most disadvantaged in times of water shortage.
- Conflicts reinforced community cohesion above internal divisions.
- In general, rural communities tended to be conservative, preferring to maintain the status quo inherited from the Muslims or created in the early days after the conquest, against the innovations that lords urban landowners and even rich peasants wanted introduce, to increase the cultivated surface, improve productivity, plant new and lucrative crops, and obtain higher profits.