

Village Federations.
Institutional Diversity and Polycentric Governance in
Northern Spain
(Navarre, 14th-20 centuries)¹

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Abstract: The aim of this paper is to contribute to the analysis of nested governance of common-pool resources from a long-term perspective. Our main research questions are: How was nesting articulated in pre-industrial societies? Which were their advantages and risks? To answer them, we analyse two historical case studies of nested regimes. In particular, the Valley of Roncal and the Sierra of Lokiz, both of them situated in Navarre, northern Spain, arranged across several levels the management and use of grazing pastures and forests already by the 14th century.

Keywords: Common-Property Institutions, Nesting, Multi-Level Governance.

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INTRODUCTION

Among Ostrom's design principles (E. Ostrom, 1990), institutional nesting appears as one of the least explored ones. Despite its acknowledgement as one of the building blocks contributing to the sustainable management of common-pool resources, the amount of works devoted to its study pales in comparison with the number of analyses focusing on, for example, sanctioning or collective-choice arrangements. Because of the lack of developing of this design principle, its interpretation has been matter of confusion. Ostrom seems to refer exclusively to vertical linkages, but some authors, such as Agrawal, could interpret that "the eighth [design principle] covers more complexly organized cases such as federated systems" (Agrawal, 2002: 49), whilst others propose "generalize principle 8 to include both horizontal and vertical linkages because they may accomplish similar functions" (Cox, Arnold and Villamayor, 2010). Some authors have pointed to the relative simplicity of the common-pool resources and common-property regimes originally analyzed by Ostrom and her colleagues as the main reason behind this lack of in-depth analysis (Armitage, 2008). In the last years, however, growing recognition of the complexity of socio-ecological systems seems to be putting the study of more sophisticated institutional arrangements for the management of common-pool resources back in the research agenda. Notions such as 'cross scale interactions', 'multi-level governance' or 'multi-layered institutions', echoing first insights on nesting, are now becoming buzzwords among commons' scholars (Berkes, 2002; Marshall, 2008; Poteete, 2012). From the historian's point of view, however, one concern remains: most of these new analyses focus on contemporary common-pool institutions, hence preventing the deployment of a long-term perspective.

The aim of this paper is to contribute to fill this gap. To do that, we present two historical case studies of cross scale regimes for the management of common-pool resources. Pre-industrial Europe was rich in the collective management of natural resources (De Moor, 2008). In particular, the Valley of Roncal and the Sierra of Lokiz, both of them situated in Navarre, northern Spain, arranged across several levels the

management and use of grazing pastures and forests already by the 14th century. The study of both governance regimes allows us to provide some preliminary answers to our research questions: How was nesting or multi-level institutions articulated in pre-industrial societies? Which were the factors which gave rise to this particular institutional arrangement? Which were their advantages and risks?

The paper is organized as follows. In the first section, we present a brief literature review of the notions of nesting, cross scale and multi-level institutions, paying attention to the advantages and limitations of these institutional arrangements. In section 2 we describe the physical and sociological features of the Valley of Roncal and the Sierra of Lokiz, devoting sections 3 and 4, respectively, to describe its governance systems. Section 5 discusses our historical evidence. Section 6 concludes.

1. NESTING, CROSS SCALE AND MULTI-LEVEL INSTITUTIONS. CONCEPT, BENEFITS AND LIMITATIONS.

The origins of Elinor Ostrom's intellectual endeavor are found in the concept of polycentric governance. Contrasting with the extended view that regarded the existence of a single, large, all-encompassing decision-making node (to which all the executive units were linked in a sort of hierarchical coordination) as the most efficient way of arranging the provision of public services in metropolitan areas, Vicent Ostrom *et al.* (1961) stressed how multiple decision-making units (public agencies, private firms) and the relationships established between them (competitive, contractual, cooperative) could result in coherent and predictable interactions. Subsequent research showed that polycentricity not only could be consistent in its functioning but, what is more important, efficient in its outcomes (V. Ostrom, 1962; E. Ostrom, 1976, E. Ostrom, 2010).

This case for decentralization in the management of economic resources gained greater momentum with the subsequent publication of *Governing the Commons*. Elinor Ostrom's merit lies in having pointed to a third way to check environmental degradation problems, a way which, in opposition to the dichotomic market/central government view (Samuelson, 1954; Gordon, 1954; Alchian and Demsetz, 1973; Coase, 1960; Hardin, 1968), built upon the ability of individuals to solve their common problems in a

decentralized and collective fashion (common-property regimes). According to Ostrom, under certain institutional settings, users themselves can develop operational rules effective enough as to successfully alter individual incentives, mitigate free-riding and promote the sustainable use of common-pool resources (E. Ostrom, 1990). The institutional context in which the set of specific rules which defines a particular successful, robust common-property regime is embedded would be characterized by eight ‘design principles’ (E. Ostrom, 1990). These principles, now widely known among commons’ scholars, would combine to check the free-riding inclinations of the resource users. The last ‘design principle’ formulated by Ostrom is the one on ‘nested enterprises’. This goes as follows: *‘appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities [of resources that are parts of larger systems] are organized in multiple layers of nested enterprises’* (Ostrom, 1990, p. 90). Nesting, according to Ostrom, presumes the existence a set of enterprises and their configuration in several layers.

Despite its preeminence in Ostrom’s work, the concept of nesting, however, does not originate from it. The idea of an informal institutional arrangement characterized by the existence of different types of units at different levels dates back to Barkun’s *Law without Sanctions* (1968). Barkun refers to the notion of nesting when he writes on *“nested” groups, large units that encompass small units, like so many Chinese boxes [...] The systems are indeed nested’* (Barkun, 1968, p. 17). Either informal or formalized, one of the most relevant features of nesting in these first formulations would be the existence of certain ‘nesting constraints’: *‘the behavior of units in subsystems will be affected by the structure of the system within which the subsystem is nested’* (Aggarwal, 1981, p. 62-63).

These seminal formulations underlie more contemporary conceptual developments (Armitage, 2008; Poteete, 2012). In the opinion of Armitage (2008), original insights on commons governance were mainly built on the analyses of simple community-based management systems and single-resource management regimes. Commons governance, however, is more frequently a complex, multiple-use system problem (Steins and Edwards, 1999), embedded in a ‘multi-level world’ and exposed to ‘multi-level challenges’ (Armitage, 2008; Berkes, 2006). In this context, the need for ‘multi-level governance institutions’, involving a greater attention to horizontal and vertical linkages

as well as to learning functions, would be critical. Among the main features of this multi-level governance, three specific attributes echo original formulations of polycentric and nested governance: multi-layered (organizational structures with multiple, relatively independent centres), interactive (mutually influencing relationships between two or more actors or components) and networked (networks of actors across scales) (Armitage, 2008).

Under which circumstances is it possible, then, to expect the formation of several layers of nested enterprises for the governance of common-pool resources? Beyond the definition of this ‘design principle’, Ostrom does not elaborate under which specific features of the common-pool resource the presence of nested enterprises may contribute to the robustness of the common-property regime. Contrasting with the previous principles, the ‘nested enterprises’ one does assume, however, that the common-pool resource, rather than a closed system on its own, is embedded in a larger one (Niamir-Fuller, 1998). The existence of some kind of interdependence with the other components of the larger system would then explain the distribution of governance tasks between different layers rather than their concentration in one of them. In subsequent work, Ostrom does explicitly refer to the size of the common-pool resource and the interdependent relations among smaller units as the rationale for nesting (E. Ostrom, 2009).

The benefits associated with multiple levels of institutions seem then to be related with increased possibilities for learning, adaptation and coordination (Hooghe and Marks, 2003). According to Marshall (2008), the advantages of nested governance can be approached from both a ‘collective action’ and a ‘robustness’ perspective. The collective action approach stresses nesting as a way of mitigating the free-riding problems so characteristic of large groups. As originally stressed by Olson (1965), large groups are exposed to important problems to pursue their joint interests in a collective way. In smaller groups, however, the presence of ‘selective incentives’ makes much more likely the emergence and persistence of collective action. One of the solutions suggested by Olson for large groups was precisely their re-arrangement as a sort of federation of smaller groups. Pre-existing trust within smaller groups of members would make possible an earlier formation of the lower-level units, with the nested governance progressively emerging in a bottom-up sequence. As Marshall puts it, the multi-level

governance of large groups would be then *'the eventual result of larger, more inclusive organizational units emerging from, and then 'nesting'[...], smaller, more exclusive units that manage to self-organize sooner. Smaller organizations thus become part of a more inclusive system without giving up their essential autonomy'* (Marshall, 2005, p. 47). The robustness approach, on the other hand, highlights the benefits that nested governance may present for the resilience of complex socio-ecological systems. The higher decentralization of decision-making across several levels which characterizes nested governance increases access to local knowledge, enables better feedback on the performance of rules and strengthens legitimacy (Marshall, 2008). This may result both in a better adaptation of the rules to the local conditions and in an easier implementation as a consequence of lower enforcement costs. Additionally, the existence of higher levels allows dealing with problems that may exceed the capacity of the lower units. Even overlapping and redundancy, rather than being considered only inefficient duplications, can also contribute to robustness. In Ostrom's words, *'when small systems fail, there are large systems to call upon – and vice versa'* (Ostrom, 1999, p. 528).

But nesting, however, involves also limitations which may compromise the sustainable management of the common-pool resource (Poteete, 2012). Coordination and accountability problems appear as the most important ones. Reaching agreements across institutions becomes more difficult as the number of institutions increases, eventually leading to deadlock and 'joint decision traps' (Scharpf, 1988). Similarly, institutions either may fail to acknowledge each other or may be very much aware of each other. Whatever the case – inattention to blind spots or straightforward competition –, the outcome may be overlapping in the decisions and actions taken by several levels. Finally, accountability may present important challenges when several institutional levels are involved. The election of certain membership criteria can prevent certain stakeholders from having a say in the decision-making process. Additionally, the involvement of more than one level can make difficult to assign responsibilities for the achievement of certain outcomes.

So, the question remains open. In what circumstances could several communities articulate themselves as a nested or networked institution? Why some villages do adopt multi-layered structures and others do not? From a social constructivist approach, Steins and Edwards characterize common pool resources by its multiple and conflicting uses,

and criticize the tendency to focus on ‘internal’ factors contributing to collective management, thereby disregarding external factors influencing stakeholders’ decisions. For them, the social actors’ choice would “be influenced by (1) networks of social relations and sociotechnical networks; (2) the meaning that is attributed to the collective management system; (3) perceptions of the wider environment in which the collective action process is embedded; and (4) social experience” (Stein and Edwards, 1999). In a similar way, Bonnie McCay emphasizes the importance of ‘situation’ and ‘context’ through the notion of “situated or embedded rational choice”. According to that, choices “are embedded in situations or contexts that structure the preferences people have, the knowledge available to them, its quality and levels of uncertainty, the risks they face, the resources to which they have access, the people with whom interact, and more, including the institutions – norms, rules, values, organisations, and patterns of behaviour- that frame and structure their lives” (McCay, 2002: 363). For her, it is risk and its perception by human groups that explain the emergence of CPR institutions. The response to the perception of scarcity would be the exclusion of other from using the resource and this raises the likelihood of conflict. The development of institutions, creating it *ex novo* or adapting those that already exist, could be a way to conflict management. She concludes: “It is tempting to suggest that institutions for managing the commons are more likely to be ones that had their genesis in situations of conflicting claims to common-pool resources than ones that came about in situations in which people became aware of depletion or degradation *per se*” (McCay, 2002: 370). This approach fits well with Robert Wade’s one. He understands corporate village as a social response to scarcity and risk. In his scheme, corporate organization is found where commons situations (potentially subject to crowding, depletion and degradation) have become commons dilemmas, that is to say, “where joint use and subtractive benefits are coupled with scarcity and where in consequence joint users start to interfere with each other’s use. Here the private costs resulting from private behavior, without collective organization, are relatively high, and may exceed the cost of organization” (Wade, 1994: 184). If we differentiate emergence from maintenance, we could propose the conflict as the central factor for the building of a complex cross scale institution in a process with an internal facet (rival individual and collective users according or accepting a “muddling through” solution) and an external one (the king or his representative performing the role of arbitrator). Once established the agreement, the

council could function “as a stability seeking, risk avoiding organization” (Wade, 1994).

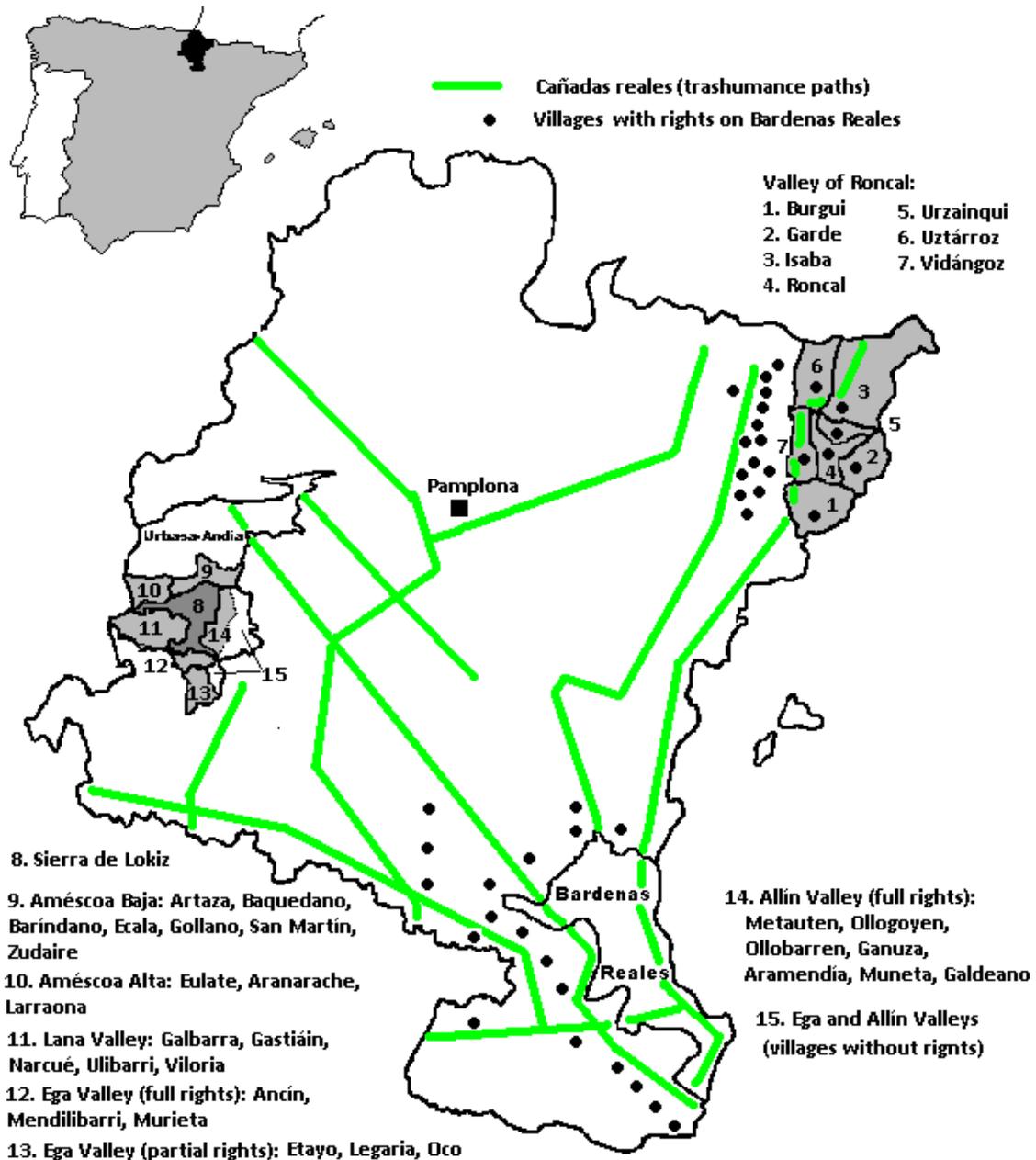
2. ENVIRONMENTAL CONDITIONS AND ATRIBUTES OF THE COMMUNITY: THE VALLEY OF RONCAL AND THE SIERRA DE LOKIZ

The Valley of Roncal is located in the northeastern corner of the region of Navarre, Spain, bounded by the French border to the north, by the region of Aragon to the east and south, and by the Valley of Salazar to the west (see Map 1). The river Esca flows southwards along the Valley, from the higher areas (villages of Uztarroz and Isaba, with the peak *Mesa de los Tres Reyes*, 2424 meters above the sea level, being the maximum) towards lower altitudes (village of Burgui in the south, 630 meters). Given this difference in height, the northern part of the valley is characterized by a subalpine climate whereas in the south climatic conditions are closer to a submediterranean type. The dominant vegetation encompasses pine, fir and chestnut trees as well as beechs and oaks.

For several centuries, the economy of the valley has showed the main features of a mixed agricultural system, with natural resources being subjected to two main uses: pastures for cattle and sheep as well as land for subsistence agriculture. Their bio-physical conditions (size, shape) must have made considerably difficult the exclusion of users. Additionally, fencing must have resulted expensive. Whatever the specific reason, the fact is that most of these resources presented typical features of common-pool resources, therefore requiring a particular property regime.

Over time, livestock breeding and subsistence agriculture activities were arranged around a complex set of land uses. Sheep breeding had a migrating nature, with flocks moving to different pastures throughout the year. In summer time, flocks from all the villages of the valley could graze in the higher altitude levels of the mountains (*puertos rasos*). Similarly, in each village, large areas for cultivation (*panificados*) were open for common grazing once the harvest had been collected, generally between Saint Bartholomew’s (August 24th) and Saint Martin’s Days (November 11th). During the winter, flocks stayed in the Bardenas Reales, a Crown wasteland south from the valley shared by several entities, one of them being the valley of Roncal. Besides these

summer and winter grazing areas, other pasture areas also existed. The extension of agricultural land left in fallow was available for grazing throughout the whole year. In the surroundings of the villages, pastures under the administration of the village authorities, closed to grazing by the valley's livestock between Michaelmas (29th September) and the beginning of May (*casalencos*), as well as pastures under the administration of the villages, which could be leased out between August and November-January (*vedados*), were available.



Map 1. Situation of Valley of Roncal and Sierra of Lokiz in the network of trashumance main paths (*cañadas reales*), Navarre, Spain.

Cultivation of vegetables and fruits took place in individual orchards (*huertas*). Cultivation of grain, on the other hand, seems to have taken place in an open field fashion (*panificado*). Land for grain cultivation was divided two parts with one of them being cultivated one year and the other, uncultivated, used as grazing land. The following year the part previously cultivated laid fallow and vice versa. The area of the *panificado*, in turn, comprised multiple individual landholdings where the village neighbors, under the rotation schedule set by the Valley authorities, cultivated wheat (marginally also barley and oats). In 1612, the area for cultivation represented around 7% of the overall area of the valley (Idoate, 1977).² In order to feed and support the oxen, mares and horses used to work the land, grazing fields (*boyerales, saisas*) also existed (Orduna, 2011: 151).

Table 1. Population size and composition in the Valley of Roncal, 1786.

Village	Altitude	Population	Noble	Clergy	Farmer	Labourer	Servant	Craftmen	R
Burgui	629	526	71	7	82	0	11	15	0.35
Garde	751	428	75	9	2	0	18	12	0.27
Isaba	813	832	132	11	20	24	90	21	0.36
Roncal	727	506	76	8	4	14	43	11	0.31
Urzainqui	728	401	72	5	9	4	50	7	0.37
Uztárróz	870	593	95	8	8	0	46	6	0.27
Vidángoz	791	338	52	4	9	16	13	7	0.30
<i>Mean</i>	<i>758</i>	<i>518</i>	<i>82</i>	<i>7</i>	<i>19</i>	<i>8</i>	<i>39</i>	<i>11</i>	<i>0.32</i>
		<i>100</i>	<i>15.8</i>	<i>1.3</i>	<i>3.7</i>	<i>1.5</i>	<i>7.5</i>	<i>2.1</i>	

R= Activity ratio (the sum of the professional labels divided by total population). This ratio serves for testing the consistency of the source data.

Source: INE (1991), *Censo de 1787 "Floridablanca". V. Comunidades Autónomas Pirenaicas*, Madrid, pp.4467-4547.

The population of the seven villages, located (except Burgui) over 700 meters over sea level, ranges from 338 inhabitants (Vidángoz) to 832 (Isaba) according to the 1786 Census. Many of the households enjoyed the status of nobles, although their way of life depended on agricultural work and sheep breeding. There were also several peasant

² There were *panificados* in each of the seven villages of the valley, except in Burgui, which, according to the Valley's regulations from 1750, was allowed to cultivate all the land under its jurisdiction without any further division. For their part, it also seems that the villages of Isaba and Uztarroz were not subjected to the rotative cultivation established by the Valley's authorities, being able to cultivate their fields every year in a consecutive fashion.

families (mainly in the southern village, Burgui, and the bigger one, Isaba) of plebeian status (*labrador*), as well as some casual labourers (*jornalero*) and a number of servants living in the houses of their masters (*criado*) or working as shepherds (*pastor*). A few families dedicated to craft and trade and some clergymen complete the social composition of these villages. So, the three aspects highlighted by those who advocate a positive role for communities in resource management –small size, homogeneous social structure and shared norms- could be recognized here, but we have to consider also the existence of clear social divisions related to status, occupation and wealth, and the presence of multiple interests and actors (Agrawal and Gibson, 1999).

Our second case study is the forest Sierra de Lokiz in the central-west edge of Navarre. This is a ridge outside the Pyrenees, formed during the Alpine folding and covered by limestones, calcarenites and marls. With an average altitude of 975 metres above sea level (maximum of 1253 m), Sierra de Lokiz is an elongated plateau extending westwards, exposing its high rocky cliffs on the south side. It is bounded and enclosed by the river Ega to the south and by two of its tributaries, Urederra and Uyarra rivers, to the east and the north. Recently integrated into the Natura 2000 network, the information officer assigned to the LIC ES2200022 “Sierra de Lokiz” an area of 12,600 hectares, of which 3,347 are currently the autonomous administrative entity known as the Board (*Junta*) of the Sierra de Santiago de Lokiz. The dominant vegetation is holm-oak, which represents almost 40% of the land, followed by beech, 19%, and pubescent oak, 12%. The remaining land is occupied by the thicket of box, juniper, oak, thyme and herbaceous plants. Over time the population of the villages around the forest have made use of the pastures (grass and acorn) with their livestock and have cut wood and timber for their homes. During the 19th century the extraction of marketable resources like charcoal, timber and tannin increased.

The Community of the Sierra de Lokiz encompasses a total of twenty-five villages, which are organised, in turn, in five different valleys: High Améscoa, Low Améscoa, Allín, Ega and Lana. These five valleys differ in terms of the number of villages encompassed. Lana valley has five villages, High Améscoa has three, Low Améscoa has eight (one of them without rights in Lokiz), Allín has sixteen (seven of them with rights in the Sierra and nine without any participation), and Ega valley has nine (three

with full rights in the mountain, three with use rights in a limited part of it, and three without access).

Table 2. Population size and composition in the five valleys of Lokiz, 1786.

Village	Altit.	Pop.	Noble	Clergy	Farmer	Labourer	Servant	Craftmen	R
1. Artaza	660	114	1	1	20	0	6	0	0.25
1. Baquedano	654	155	7	2	33	0	2	2	0.30
1. Baríndano	567	86	4	1	15	0	3	0	0.27
1. Ecala	640	122	3	1	22	0	2	2	0.25
1. Gollano	600	79	12	2	11	0	3	0	0.35
1. San Martín	680	178	6	2	32	0	6	3	0.28
1. Zudaire	576	179	2	1	27	0	3	8	0.23
2. Aranarache	785	110	18	3	0	0	16	0	0.34
2. Eulate	733	304	50	4	2	0	12	6	0.24
2. Larraona	774	153	32	3	0	0	9	0	0.29
3. Galbarra	587	89	12	2	2	0	2	4	0.25
3. Gastiáin	670	180	30	1	0	0	5	4	0.22
3. Narcué	688	92	14	1	14	0	4	2	0.38
3. Ulibarri	687	77	12	1	12	0	5	0	0.39
3. Vitoria	615	145	21	1	29	0	3	1	0.38
4. Ancín	482	156	0	1	19	0	11	1	0.21
4. Mendilibarri	505	26	0	1	4	0	1	0	0.23
4. Murieta	465	258	0	1	40	0	11	20	0.28
4*. Etayo	595	187	3	3	45	0	18	4	0.39
4*. Legaria	480	243	11	2	30	0	23	12	0.32
4*. Oco	502	50	4	1	12	0	2	1	0.40
5. Metauten	533	66	6	1	9	0	3	4	0.35
5. Ollogoyen	600	81	3	1	10	0	4	5	0.28
5. Ollobarren	572	74	1	1	9	5	1	0	0.23
5. Ganuza	593	105	5	1	14	0	1	6	0.26
5. Aramendía	560	97	0	1	19	0	4	0	0.25
5. Muneta	560	55	0	1	10	0	2	0	0.24
5. Galdeano	548	195	4	2	24	0	0	0	0.15
<i>Mean</i>	<i>604</i>	<i>131</i>	<i>9</i>	<i>1</i>	<i>17</i>	<i>0</i>	<i>6</i>	<i>3</i>	<i>0.27</i>
		<i>100</i>	<i>6.9</i>	<i>0.8</i>	<i>13.0</i>	<i>0</i>	<i>4.6</i>	<i>2.3</i>	

1= Améscoa Baja Valley. 2= Améscoa Alta Valley. 3= Lana Valley. 4= Ega Valley (full rights). 4*= Ega Valley (parcial rights over southside of the forest: Sarza la Baja). 5= Allín Valley (full rights)

Source: INE (1991), *Censo de 1787 "Floridablanca". V. Comunidades Autónomas Pirenaicas*, Madrid, pp.4467-4547.

Although in 1786 population density was higher in the valleys around Sierra de Lokiz (15.29 inhabitants per square kilometer) than in the Valley of Roncal (8.74 inh./km²), village size was here lower, ranging from 26 (Mendilibarri) to 304 (Eulate). Social composition was more homogeneous, despite the presence of a large number of families of noble status in the valleys of High Améscoa and Lana. This is a domain of independent peasant, with labor markets in which casual laborers are virtually absent and other occupations different from agriculture only appears in a few villages.

3. PROPERTY REGIME AND INSTITUTIONS IN THE VALLEY OF RONCAL

In the Valley of Roncal rights over each land use, rather than concentrated on a single entity, were distributed between three different levels: the neighbors, the village and the valley (Table 3). According to the terminology of Schlager and Ostrom (1992), individual neighbors, in most cases, were only ‘authorized users’, enjoying only access and withdrawal rights in pastures and cultivated land. Only regarding their orchards and houses, neighbors could be considered ‘owners’ and, even in these cases, they were still subjected to certain limitations by the Valley authorities if they wanted to sell them to foreigners. For their part, regulation of the use patterns and transformation of the resource system (management rights) as well as the decision powers regarding who was entitled to access and use the resources (exclusion rights) were assigned to higher authorities and, therefore, decided either in a collective way by an assembly of neighbors or, at least, individually by a singular authority always subjected to control by the community. As we indicate below, there seems to have been a legislative overlapping regarding both the protection of the different land uses and the organization of the monitoring and enforcement system between the villages and the valley. Whether this could be an inefficient situation or not is something we deal with in the next lines. Whatever the case was, the Valley did retain the faculty to establish the criteria to be fulfilled in order to become a neighbor of the valley. This faculty could be interpreted as the manifestation of an ultimate, more general, last-resort exclusion right applying to all cases.

The functioning of this common-property regime rested upon two main institutions: the valley authorities and the villages. Additionally, local stockbreeders' guilds could also have performed a significant role in the governance of this socio-ecological system.

Table 3. Distribution of property rights in the Valley of Roncal.

	LAND USE	DESCRIPTION	ACCESS AND WITHDRAWAL	MANAGEMENT AND EXCLUSION	GENERAL EXCLUSION	ALIENATION
<i>Inside Dezmarios (village Districts)</i>	GRAZING LAND					
	<i>Saisas</i>	Sunny grazing areas for oxen	Village neighbors	Village Valley	Valley	Crown
	<i>Boyerales</i>	Grazing areas for oxen and cattle	Village neighbors	Village Valley	Valley	Crown
	<i>Casalencos</i>	Grazing areas for sheep in the surroundings of the village	Valley neighbors (open season)	Village Valley	Valley	Crown
	<i>Vedados</i>	Grazing areas for cattle which could be leased out in summer to cattle farmers.	Village neighbors	Village Valley	Valley	Crown
	<i>Panificado (open season)</i>	Areas for cultivation left in fallow every one year as well as cultivated areas after the harvest	Village neighbors	Village Valley	Valley	Crown
	CULTIVATED LAND					
	<i>Panificado (closed season)</i>	Cultivated land in a rotative fashion	Village neighbors	Village	Valley	Crown
	<i>Huertas</i>	Orchards for the cultivation of vegetables and fruit trees	Village neighbor	Village Neighbor	Valley	Village neighbor + Valley
	DWELLINGS					
<i>Casa</i>	House where the neighbors lived with his family	Village neighbor	Village neighbor	Valley	Village neighbor + Valley	
<i>Outside Dezmarios</i>	GRAZING LAND					
	<i>Deques</i>	Uncultivated meadows for sheep grazing	Valley neighbors and foreign neighbors	Valley	Valley	Crown
<i>Puertos rasos</i>	Summer pastures for sheep grazing located in higher altitude levels, exceptionally leased out in summer.	Valley neighbors and foreign neighbors (upon fee payment)	Valley	Valley	Crown	

In comparison with the village level, the valley institutions seem to have been characterized by limited development and a high degree of subsidiarity. The first

document revealing the existence of a *universitas* [*unibersidad*] encompassing the seven villages of the valley dates from 1345 (Idoate, 1977). The so-called ‘Contract of the Union of the Valley and Regime of Cultivated Lands’ (*Contrato de la Unión del Valle y Régimen de Panificados*) was signed by around fifty representatives from all the villages in order to find a solution to the conflicts between migrating stockbreeding and agricultural activity. The emergence of the valley level seems then to have been the result of the need to regulate important interdependences between the economic activities upon which the livelihood of the valley inhabitants depended.

The valley lacked both executive and jurisdictional bodies. Similarly, an own monitoring system was absent. Only a sort of legislative structure, the General Board of the Valley (*Junta General del Valle*), seems to have been in place. During the year, four ordinary Board meetings were held at fixed dates, as well as extraordinary meetings in case it was needed.³ Each village of the valley seems to have appointed a number of representatives (*junteros*) who were in charge of attending these meetings. The decision powers of the valley, according to its regulations, seem to have extended over several matters. Apart from regulating the structure and functioning of the villages’ monitoring and enforcement system (number of guards per village, form of appointment and duties of guards, duties of assessors), the most important set of rules agreed at the valley level concerned neighborhood status and protection of economic resources. Regarding natural resources, valley regulations are explicit when they state that their main aim is ‘*the protection of fruits and grain fields*’. In this sense, the majority of the rules agreed at the valley level were aimed at establishing when and how the different land uses could be accessed and exploited. The Board of the Valley decided when summer pastures at the higher altitudes (*puertos rasos*) should be open for common grazing. Rules on grain fields (*panificados*) forbade access to them by both native or foreign livestock (cows, sheep, pigs) during the closed season (except in the case of the cattle which was used to work the land), indicated when the fields had to be open for common grazing, and limited the quantity and sort of livestock which could access the fields during the common grazing season. Rules on pastures (i.e. *vedados*, *boyerales*, *casalencos*) similarly forbade access by livestock during the closed season. Regarding

³ The ordinary meetings (*juntas de tabla*) used to take place four times a year: the Corpus Christi’s Day (8th June), Saint Julian’s Day (14th July), Saint Bartholomew’s Day (24th August) and Christmas’ Day (December 25th). It was at the meeting held at Saint Bartholomew’s Day when the opening of the cultivated lands for common grazing was decided.

neighborhood, the valley shaped a sort of ‘closed community’ to which only those paterfamilias dwelling in their own houses with their families and paying their tributes could obtain the neighborhood status.

Villages, contrasting with the valley-level governance, did present a more developed model of governance and management. The assembly of neighbors (*concejo de vecinos*) was the legislative and consultative body of the community. As its name indicates, it was made up by the neighbors (*vecinos*) of the village, with the criteria for obtaining the neighborhood status being decided, as just indicated, at the valley-level. The main competence of the assembly was the adoption and reform of the village regulations.⁴ The mayor (*alcalde*) and councilors (*regidores*) were in charge of the executive and jurisdictional functions. Their tasks were performed at the shadow of the assembly of neighbors, which seems to have retained a relevant grip on their attributes and powers.⁵ The mayor was in charge of the solution of conflicts among the users themselves or between the users and the officials and, besides this, he seems to have been also responsible for summoning the assembly of neighbors, chairing it and appointing the councilors. For their part, the councilors assumed the bulk of the executive functions. Among other duties, they were mainly responsible for the appointment and monitoring of the guards and the assessors, ordering the surveillance and demarcation of the village district and specifying fines in case they had not been indicated in the regulations.

The governance system of the village relied upon a number of officials in order to monitor and enforce the compliance of the rules. Among those, the guards (*guardas, bailes*) and the assessors (*apreciadores*) were the most important. Both officials were appointed by the councilors, appointing, in turn, their own deputies. It seems that these appointments extended only for one year, which probably favored a high rotation among the neighbors. The guards were in charge of patrolling, in a weekly basis, the district under their responsibility in order to detect illegal grazing, informing about the illegal activities to the field owners and assessors, collecting the penalties from the

⁴ Problems associated with direct participation by neighbors must have usually forced the appointment of a smaller committee (probably of about ten neighbors) to perform this task. After the committee had established or modified the regulations, they were submitted back to the assembly for its reading and ratification.

⁵ On one hand, their duties as well as the attributes of their charges (appointment, criteria for eligibility, salary, vacancy periods) were indicated, frequently in a very detailed manner, in the village regulations established by the assembly. On the other, although the regulations do not say anything about this, it was probably the assembly the body responsible for the appointment of these positions.

trespassers, and reporting the village about the payment of those penalties. For their part, the assessors were responsible for the assessing of the damages caused on the fields by the trespassers and their booking in the village books.

This whole system of assembly, mayor, councilors, guards and assessors was subordinated to the protection of the agricultural resources of the village, in particular the orchards, and cultivated and grazing fields. Most of the village regulations, except the set of rules related to the organization and functioning of the village authorities, consisted precisely of prohibitions limiting access to these resources. The main concern was trespassing, in most cases with livestock. Rules on grain fields (*sembrados*, *panificados*) forbade accessing the fields with livestock (sheep, cows, goats, pigs) during the closed season, and only some exceptions (i.e. cattle used for agricultural tasks such as sowing or threshing) are envisaged. Rules on grazing areas (*saisas*, *boyerales*, *vedados*, *casalencos*), similarly, punished access by cows, goats and sheep during the closed season.⁶

The analysis of the rules at the levels of the village and the valley leads to a puzzling realization. Access to and use of the natural resources of the community (e.g. *sembrados*, *panificados*, *vedados*, *boyerales*, *casalencos*) as well as the organization and functioning of the monitoring and enforcement mechanisms (guards and assessors) were regulated at both levels. It existed an evident legislative overlapping regarding the main objective of this whole institutional arrangement: how to protect the natural resources on which the livelihood of the community depended on. For now, two explanations can be suggested. On the one hand, this situation might reflect an evident lack of coordination between to levels. Both the village and the valley could have understood that regulating how and when access to natural resources should take place within their sphere of action. Therefore, similar rules would have been passed at both levels, creating an evident legislative conflict. The existence of institutional linkages between both levels (i.e. the General Board of the Valley comprised representatives or *junteros* appointed by each village; the regulations of the Valley were agreed by an assembly of village representatives or *diputados electos* every few years) runs, however,

⁶ Human trespassing (i.e. to illegally cut down trees, to steal vegetables, to walk through the sown fields) for its part, is also punished; the relative few number of rules dealing with it suggest, however, that the main concern were the damages caused by the livestock.

against the interpretation of inefficient legislative duplication. Given the long life of this institutional arrangement, in case of having existed inefficient duplications, one should expect them to have decreased over time, giving rise progressively to a much more tuned labour division, with each level regulating different matters. One alternative explanation, on the contrary, would be to understand the valley-level regulations as an ‘amplification’ of the village-level ones. Given the migrating nature of sheep breeding, neighbors of one village, especially stockbreeders, had to be aware of the rules prevailing in the other villages of the valley in which, eventually, they could cause damages. In those land uses comprised within the *dezmarios* or villages districts (i.e. *vedados*, *boyerales*, *casalencos*), the competences to decide about who could access the resources and how and when use them would have been primarily assigned to the village level, which would have regulated on these matters (assembly of neighbors) and enforced the rules (mayor, councilors and guards). In those land uses outside the *dezmarios* (i.e. *puertos rasos*, *deques*, *comunidades del Valle*), valley authorities decided over management and exclusion. But, in any case, regulation on these same matters at the valley level would have remained as a way of extending the effectiveness of the village’s regulation beyond the village scope.

Within the village boundaries we also find stockbreeder’s guilds (*ligallos*, *mestas* or *cofradías de ganaderos*), private organizations which had, as their main purpose, the protection of the livestock owned by its members. However, the analysis of their regulations seems to indicate that they performed also certain functions regarding the protection of the rest of the resources.

The legislative body of the guild was the general assembly of stockbreeders (*capítulo general de ganaderos*). The jurisdictional and executive powers, for their part, were in the hands of the mayors of the guild (*alcalde del ligallo*) and the prosecutors (*procuradores*, *avisadores* or *acusadores*). The two mayors of the guild were in charge of settling all the conflicts that could arise among the stockbreeders and the shepherds as well as levying and collecting the fines. The two prosecutors, for their part were under the orders of the mayors. Its main function was reporting the offenses against the guild’s regulations.

Regarding the role of the stockbreeders' guild in the economy of the villages and the Valley, it could be possible to interpret these private organizations as a group of interest within the village in order to further the common interests of the large cattle farmers, particularly regarding the preservation of both the livestock itself and good grazing. In fact, the regulations clearly state that their main goal is '*the good maintenance of the livestock*'. In that sense, most of the rules of the guild's regulations deal with access and use of infrastructure (how to shelter the livestock in the corrals in the summer grazing areas), cattle health (how to proceed in case of animal contagion) and labour relationships (shepherds' obligations and prohibitions in the performance of their job, relationships with the sheepshearers). On the other hand, however, the regulations of the guilds also reflect a certain, although less important, concern about the negative externalities that indiscriminate stockbreeding could cause. Compulsory membership and the existence of a subordination of the guild to the village level (i.e. the sentences of the mayors of the guild could be revised by the mayor of the village) seem to point to its nature as a mechanism for controlling harmful stockbreeders' behaviour.⁷ The prohibition of driving livestock into the cultivated grain fields or concealing the damages caused, the rules aimed at the diligent guarding of the livestock by the shepherds as well as the regulation of the use of the summer pastures (flock limits per corral, exclusion of foreign livestock, random distribution of grazing areas among flocks) suggest then the existence among the stockbreeders of a long-term, dynamic view rather than the prevalence of short-sighted interests.

4. PROPERTY REGIME AND INSTITUTIONS IN SIERRA DE LOKIZ.

In the case of the valleys around the Sierra de Lokiz, property rights compose an intricate puzzle. According to the categorization by Schlager and Ostrom (1992), and leaving apart operational rights, the villages enjoyed the right to regulate internal use patterns and to transform the resource by making improvements (management) as well as the right to determine who could access the resource and how that right might be transferred (exclusion). They also could sell for a short time the withdrawal of some resources (mainly acorn), including sometimes the right to monitor and punish (i.e. the

⁷ Neighbors with a minimum number of sheep or other '*small goods*' ('*ganado menudo*') were forced to join the guild. Additionally, since the only motives for leaving the guild envisaged by the regulations are death, old age and poverty of the members, it is easy to conclude that membership was regarded as a matter for life.

leaser could put a guard), but this did not imply necessarily alienation. Since these villages had almost all the rights, except perpetual alienation, we can consider them not owners but proprietors (Schlager and Ostrom, 1992).

Table 4. Distribution of property rights in the Sierra of Lokiz.

Territory	Property rights	Valleys				
		H.Améscoa	L.Améscoa	Allín	Ega	Lana
LOKIZ (Community of Five Valleys)	Operational level: - Access - Withdrawal Collective-choice level: - Management - Exclusion	Aranarache Eulate Larraona	Artaza Baquedano Barindano Ecala Gollano San Martín Zudaire	Aramendía Galdeano Muneta Ganuzá Metauten Ollobarren Ollogoyen	Ancín Mendilibarri Murieta	Galbarra Gastiáin Narcué Ulibarri Viloria
LOW SARZA (south edge of Lokiz)	Access Withdrawal Exclusion				Legaria	
	Access Withdrawal				Etayo Oco	
LIMITACIONES	Access Withdrawal Management Exclusion	<p><i>Limitaciones</i> owned by one village: Aranarache; Eulate; Larraona; Barindano; Galdeano; Metauten; Ollogoyen; Ancín; Mendilibarri; Murieta; Galbarra; Gastiáin; Narcué; Ulibarri; Viloria.</p> <p><i>Limitaciones</i> shared by two or more villages: Low Améscoa valley; Galdeano and Low Améscoa valley; Galdeano, Muneta and Aramendía; Metauten, Ganuzá, Ollogoyen and Ganuzá</p>				
	Operational	Community of Five Valleys				
FACEROS (* cited in the document of 1357)	Operational Management Exclusion	[Gastiáin-Zúñiga]* [Gastiáin-Galbarra-Narcué]* [Galbarra-Viloria-Ulibarri]* [Galbarra-Ancín]* [Viloria-Ulibarri]* [Narcué-Galbarra]* [Metauten-Murieta]* [Ancín-Legaria-Murieta] [Larraona-Aranarache] [Larraona-Contrasta]				
	None	Community of Five Valleys				
FACERO n° 26 [Contrasta-Sierra de Lokiz]	Operational Management Exclusion	Community of Five Valleys and the village of Contrasta (Álava)				
LOKIZ (including SARZA) & LIMITACIONES	None		Urra	Amillano Arbeiza Artabia Arteaga Eulz Echavarri Larrión Zubielqui Zufia	Abaigar Olejua Learza	

From the mid-fourteenth century onwards, the use of the forest and pastoral resources took place within a complex institutional framework. Although the exploitation of the

resources of the Sierra had been carried out customarily by the villages since earlier times, it is in 1357 when this use was recognized by the Crown, which awarded the five counties an official document (known as the '*Apeo y Concordia de Lokiz*') certifying their property rights in the Sierra. Most of the text described the boundaries of the CPR in a very precise way. Then it established the boundaries of the so-called *limitaciones* (literally 'edges') of the villages. These were forest and pasture areas over which each of the villages had special rights at the operational and collective-choice levels (*propios y dehesas*). The rights granted to each village in these areas consisted of monitoring, arresting and punishing, establishing or removing temporary bans, exploiting resources such as water, herbs and acorns with their livestock and harvesting wood and timber. The text identifies nineteen *limitaciones*. Fifteen are individual for fifteen different villages (see table 4) and four are collective (one for Low Améscoa, one for the four villages of western Allín, one for the three villages of eastern Allín, and the last one shared by Galdeano and Low Améscoa). In eight of these *limitaciones* the exclusion right of the villages is only temporal, mainly from Michaelmas (September 29th) to Saint Andrew's Day (November 30th) or to Christmas Day (December 25th), in order to reserve the acorn for the proprietor. Other sentences from 1434, 1555, 1588 and 1688 ratified the operational rights (access and withdrawal) of Legaria, Oco and Etayo (Ega valley) in the south side of the forest, known as Sarza-la-Baja. This operational right included the right of Legaria to put a guard to monitor Sarza and to fine. Finally, the document from 1357 refers also to a third category of common lands, known as *facero*, not included in Lokiz and the *limitaciones*. The text indicates eleven *faceros*, lands shared by two or more villages in which the community of the five valleys had not any access rights. Most of them are located in the western side of the forest (seven in the Valley of Lana) and still exist nowadays. There is another *facero* not indicated in the text which was the object of a new arbitral sentence in 1540. This is an area of 273 hectares shared by the community of the Sierra de Lokiz and Contrasta, a village located in the north-western corner of the forest, in the kingdom of Castile. In short, the result of this complex definition of the CPR (common property regime) is then a mosaic of shared lands and territorial exceptions, in which the villages or groups of villages, not the individuals or the householders, are the entitled subjects.

There were three categories of individual users: resident full members (*vecinos residentes*), non-member dwellers (*habitantes*) and foreign members (*vecinos foranos*).

The first two lived in the village but they had different status: the *vecinos* had full political rights and were obliged to serve in the village offices, whilst the *habitantes* had limited operational rights (usually they were allowed to withdraw half than a member) and only were obliged to serve in lower offices (e.g. guard, shepherd). Foreign members were of noble condition and enjoyed the same rights than the resident members to the common land but without most of their duties. It is not rare that villages tried to prevent an increase in the number of foreign members.⁸

At the bottom of the institutional arrangements governing the Sierra of Lokiz, the political structure of the village was largely controlled by the community. The basic institution was the assembly of the members (*baçarre* or *batzarre* in Basque, *concejo* in Spanish). The assembly, gathered every year on a specific date (normally Michaelmas) at an accustomed site, elected the officers in charge of the governance of the villages. It had legislative competences over its own district and decided over the territory planning, as the location and timing of seasonal enclosed meadows (*vedados*, *dehesas*) and rotation fields (*panificados*), opening and closing of the village forest (*pasto*) and pastures (*yerbas y aguas*), animal paths (*cañadas*) and stocking density (*cotos*). One of the most repeated rules in the byelaws studied refers to the obligation of the flocks to temporally leave the village district (see table 5). This way grazing pressure on village's pastures was moved outside during the summer to the Sierra de Lokiz or to the Sierra de Urbasa (north of the Améscoa valleys).

The village officers were the juries (*jurados*) and councilors (*regidores*). Usually there were two juries in each village, and in some of them (those in the valleys of Lana and Ega) there were also one or two *regidores*.⁹ The hierarchy between them is not clear. In some cases (Etayo) it seems that councilors were above juries; in other cases (Ancín),

⁸ One village could buy a house with membership right (*vecindad*) in case of selling to a foreigner. Other times, as it was the case of Ecala in 1734, the village could obtain from the Viceroy the privilege to not admit foreign members (AGN, Procesos, 51595). Other cases, as occurred in Murieta 1686, the village could affirm that the condition of member is not linked to a property house (*vecindad solariega*), but to the admission by the village assembly (*vecindad personal*) (AGN, Procesos, 5351). To be admitted, the foreign member had to ask before the assembly, pay a fee and serve a meal (*colación*) (AGN, Procesos, 93572).

⁹ In some villages (Ancín in 1692) juries were appointed following rigorous turn among the neighbours, these juries designating then two persons as councilors. In other cases (Gastiain in 1792) one of the councilors and both juries were appointed by turn among the householders, with then the councilor freely appointing another person as a second councilor. In some other cases (Etayo in 1540 and 1717) outgoing councilors co-opted other two as next councillors, whilst the juries were appointed by turn among householders. AGN, Procesos, 107280, 113096, 175826, 108721

however, juries seem to have had more competences.¹⁰ Whatever the case, they performed two main functions: executive and jurisdictional (to judge and punish small offenses, to establish and remove temporary bans, to inspect the village district and its borders, to order the repairment works, to manage revenues, to custody documents). The assembly also appointed lower-level officials, such as guards (*costieros*, *guardas del rey*) and assessors (*apreciadores*).

Table 5. Forced exit of the sheep flocks from the villages towards the Sierra.

(Dates of exit and return, fine and stint (maximum number of sheep in the village))

Village	Year	From	To	Fine	Stint (heads)
Ancín (Ega)	1692	May 20th	August 8th	1 ram/flock	-
Murieta (Ega)	1686	September 8th	December 24th	2 reales/head	-
Etayo (Ega)	1540	May 20th	August 8th	1 ram/flock	-
Etayo (Ega)	1717	June 1st	August 1st	1 ram/flock	400
Etayo (Ega)	1739	June 1st	October 15th	2 reales/head	600
Gastiáin (Lana)	1792	April 1st	January 1st	0.25 rs/head *	678
Ecala (L.Améscoa)	1789	May 3th	November 30th	3 rs/flock	-
Eulate (H.Améscoa)	1781	April 25th	January 1st	2 rs/flock	-

Sources: AGN, Procesos, 51595, 5351, 93572, 113096, 107280, 175826, 108721, 92537

Above the village level we find the valley authorities. The valleys of Lana, High Améscoa and Low Améscoa had valley mayors (*alcalde ordinario*), who administered justice and dealt with the government, being elected, with variations, by the villages themselves (Lapiente, 1986). The mayor of Low Améscoa had more competences than the others since this valley owned common assets by itself, whereas in the other valleys common lands were only owned by the villages. Jurisdictional powers in the valleys of Allín and Ega, on the contrary, were not exerted by themselves, but by the authority of the close city and market of Estella (*alcalde de mercado de Estella*). However, even in this case, delegates of the villages used to gather every year to arrange their common duties.¹¹

Besides the institutions at the village and valley levels, the Sierra de Lokiz had its own governance institution, the Board of Ten Men (*Junta de Dieces*). According to the 1357

¹⁰ The byelaws of Ancín (1692) determine that one of the juries should be the only person to collect the rents and fines, whereas the other should represent the village in the valley meetings. This last function seems to be made in Etayo (1717) by a *regidor de valle* appointed by the councilors.

¹¹ The office of perpetual mayor of the market of the city of Estella was given in 1631 to the lord Luis de Bertiz in exchange of the customs of five villages in the frontier with Castile (García-Zuñiga, 1996: 93).

document, which first recognized it, this body was responsible for allocating the timber the dwellers of the villages needed to build their houses as well as for verifying the accuracy of the statements made by the village councilors regarding the exclusion of other villages from their *limitaciones* (if the villages had declared that there was acorn harvest a specific year, the livestock of the other villages could not access the *limitación* between Michaelmas and Saint Andrew's Day). They were also responsible for the appointment of the guard (*costiero común*) for the prosecution of offenders and the collection of fines. They also decided the auction of the acorn harvest when the oak and beech had fruit. They expended in the infrastructure improvement (water rafts, roads, country chapel) and visited the limits of the CPR to preserve the stone markers. To fulfill all these functions the governors gathered several times a year: in Michaelmas (September 29th) to present accountings and replace governors, in Saint Simon's Day (October 28th) to auction pastures and manure, in July 25th (Saint Cucuphas and Saint James) to celebrate the patron saint, and in other occasions whenever it could be needed. The incomes and expenses of the Community were checked by ten auditors (*contadores*) appointed every year by the valleys (two auditors per valley). Before 1730 it is also possible to find the appointment of a depositary in charge of the collection of income and the payment of expenses.

The valleys had then indirect control over the Sierra's pastures and resources through their representatives in the Board of the Ten Men. The Board charged an entrance fee on the flocks that made use of the Sierra during summer season. Additionally, the Board decided several times the sale for a whole year of the exploitation of the grass to cover extraordinary expenses. The decisions of the governors, however, were contested by the auditors appointed by the valleys from time to time.¹²

The architecture of this complex institutional network had, then, as starting point the village assembly (*batzarre* or *concejo*) who elected the councilors and juries in charge of the government and management of the village commons. Village delegates participated in the appointment of the valley mayor, if that was the case, and took place, in the case of Améscoa-Baja, in the management of the valley commons. The valley

¹² In 1733 the auditors denounced that the governors "have required to introduce more animals than the thousand heads they were entitled to and [this] has been to the detriment of the stakeholders" (valleys), ordering that "henceforth, the future governors will not dare to such abuse, failing which they will be punished". (Archivo Sierra de Lokiz, book 4)

institution (mayor, council of delegates and neighbours) elected the two persons that were part of the Board of the Ten Men during one year, appointing also the two persons who audited the governors' accounts at the end of their term.

5. ANALYSIS. RONCAL AND LOKIZ AS ROBUST MULTI-LEVEL INSTITUTIONS.

Concerning the CPR itself, both Roncal and Lokiz are mountainous areas. High altitudes, steep slopes and extreme weather conditions, especially in the valley of Roncal, hinder cultivation. The landscape is organized in several layers of vegetation, ranging from riparian vegetation and crops at the bottom, meadows and forests in the slopes, and herbaceous plants at the upper levels.

Table 6. Evolution of the arable and the livestock in Roncal and Lokiz, 1607-1910

	Valley of Roncal			Five Valleys of Lokiz		
	1613	1817-18	1910	1607-12	1817-18*	1910
Arable (ha)	2,838	1,973	2,952	2,953	4,385	6,262
% over territory	6.8	4.8	7.1	9.3	16.5	19.7
Cattle	1,792	1,203	744	2,617	2,308	3,100
Horses	1,601	835	1,118	1,753	1,638	3,036
Sheeps & goats	103,944	94,140	82,970	20,051	14,464	13,360
Pigs	1,120	377	882	1,167	2,283	4,511
LSU	14,027	11,473	10,376	6,608	6,206	9,120
LSU/km2	33.8	27.7	25.0	20.8	26.7	28.7

* High Améscua data not available for 1818

LSU Livestock Units (cattle =1; horses=0.8; sheeps & goats=0.1; pigs=0.5)

Sources: AGN, Comptos, cj. 32048, 32027, 32028, 32036, 32041. Lana (1999)

Both institutional conglomerates established the resource boundaries in the mid-14th century. Roncal's 1345 'Contract of Union' defined the boundaries of the *panificados* of the seven villages while Lokiz's 1357 award established the borders of the *limitaciones*. In the valley of Roncal, the common property regime encompassed not only the common forest and pastures but also the *panificados*, whose cultivation was regulated by the Valley institution. In the valleys of Lokiz, on the contrary, there was a clear separation between the land common to the five valleys (Lokiz and *limitaciones*), the common land of each village (*prados*, *dehesas*), the lands shared by two or more villages (*faceros*) and the openfields (*panificados*). Regarding users boundaries, individual participation in the system rested upon the condition (or privilege) of *vecino*

(literally, neighbour). Neighborhood was linked either to the possession of a house or could be just personal (with the only requirement, then, of being admitted as such by the assembly).

Concerning the CPI, differentiation between legislative, jurisdictional and executive tasks is helpful. In the valley of Roncal, as already indicated, the village and the valley assembly legislated on similar items, particularly on the *panificados*. In Lokiz, although legislative attributions are also found at the level of the village assembly, the valley assembly and the Sierra de Lokiz assembly; these institutions hardly legislated on the same resources. Jurisdictional powers, for their part, were also exercised at various levels. In Roncal, the sentences of the mayor of the stockbreeder guild could be appealed to the mayor of the village. The differences between individuals and villages and the offenses, for their part, were settled before the General Board of the Valley. In the valleys of Lokiz, on the contrary, gradation is not that clear. Administrative and executive tasks were performed by councilors and juries at the village level, village delegates at the valley level, and governors at the level of the Sierra de Lokiz. These officers were assisted, in turn, by different staff (guards, assessors, secretary, depositary). For Lokiz, it is remarkable the existence of a specific organisation for auditing the management of the governors (*contadores*).

Table 7. Demographic evolution of the valleys, 1366-1852

	Roncal Valley		Five Valleys	
	Households	%	Households	%
1366	221		332	
1427	408	+ 1.01	452	+ 0.51
1553	905	+ 0.63	1125	+ 0.72
1612	928	+ 0.04	1109	- 0.02
1647	856	- 0.23	973	- 0.37
1678	787	- 0.27	969	- 0.01
1725	713	- 0.21	911	- 0.13
1817	665	- 0.08	990	+ 0.09
1852	830	+ 0.63	1261	+ 0.69

Sources: AGN/Comptos, cj.32027, 32028, 32036, 32041, 32048; Carrasco (1973); Idoate (1977); Floristán-Imízcoz (1982b); García-Zúñiga (1996); Yanguas y Miranda (1840)

In both case studies, it is possible to observe, then, a polycentric organization, with different decision-making units legislating and managing the CPR. In both cases, it was a solution for conflicts among users raised at mid 14th century. Certainly, there were differences in the degree of integration: this was higher in Roncal while more limited in

Lokiz. Such a system could be exposed to significant obstacles, so their survival over time seems to be surprising. Main risks could include design or management inefficiencies, conflicts between users as well as the interference of external agents.

First of all, accumulation of inefficiencies resulting from poor institutional design or deficient daily management could have led to the deterioration of the CPR. In this sense, the demographic evolution of both clusters (Table 7) seems to indicate an exhaustion of the production model around the early-17th century. This fact could well support the hypothesis of a malfunctioning of the institutional regime. However, given the strong population growth between the mid-14th century and the early-17th centuries, this also could be interpreted as a demographic impetus leading precisely to the establishment of these institutional arrangements. It could also be that the population level around the late-16th century was the roof of these subsistence societies. The truth is that no CPrR rupture occurred and that the CPIs pervived, adjusting the regulatory framework through passing new ordinances. Regarding the CPR itself, both areas still show diverse and large forests, which seem to run against the depletion hypothesis.

Table 8. Lawsuits at the Royal Courts of Navarre related to Lokiz, 1510-1833

Plaintiff	Defendant								
	Board of Lokiz	Entitled valley	Entitled village	Applicant village	Neighbour	Lord	Official	Foreigner	Total
Board	-	4	4	6	2	3	1	1	21
Entitled valley	2	3	3	1	1	1	0	2	13
Entitled village	8	2	11	0	1	0	0	1	23
Applicant village	6	0	2	0	1	0	0	0	9
Neighbour	3	2	2	0	2	0	1	1	11
Lord	3	0	0	0	0	0	0	0	3
Official	3	1	0	0	0	0	0	0	4
Foreigner	2	0	0	0	1	0	2	1	6
Total	27	12	22	7	8	4	4	6	90

Applicant villages= Legaria, Oco, Etayo

Source: AGN, ARCHIDOC

Secondly, conflicts between decision-making units were almost inevitable. In the case of the Sierra de Lokiz, for example, between 1510 and 1833 ninety lawsuits were brought before the Royal Courts of Navarra. No less than 37 lawsuits confronted the

units involved in its management: general board, valleys and villages. High levels of internal conflict did not result, however, into institutional breakdown. Furthermore, when state intervention threatened institutional persistence during the 19th century, villages mobilized all its resources to preserve the Sierra in common hands. The conflicts can, then, be considered as opportunities for the so-called “muddling through” method of public policy making, by which groups with relatively equal power make institutional changes in small, incremental steps, starting small and cheap (Lindblom, 1959; McCay, 2002). So, far from leading to the breakdown, conflicts could have restored cooperation.

Table 9. Distribution of Cadastral Wealth in the Five Valleys of Lokiz and the Valley of Roncal, according to tax rolls of 1607-1613 and 1850.

Decile	Valley of Roncal		Five Valleys of Lokiz	
	1613	1850	1607-12	1850
91-100	45.26	42.47	42.19	38.70
71-100	72.29	68.72	71.86	70.38
31-70	22.68	24.44	23.35	24.55
0-30	5.03	6.84	4.78	5.08
A) Residents Taxpayers	821	810	1051	1084
B) Households	821	830	1075	1261
A / B (%)	100	97.6	97.8	86.0
Gini coefficient	0.579	0.533	0.567	0.542

Sources: AGN, DFN, boxes 32048, 32027, 32028, 32036, 32041; DFN, boxes 16187-16193.

Thirdly, a relatively powerful internal unit (e.g. a large village such as Isaba in the case of the valley of Roncal) or an external power (e.g. a feudal lord or a powerful city such as Estella in the case of Sierra de Lokiz) could have well captured the ownership of the CPR. It could also have been the state itself, which from the mid-18th century onwards showed a greater interest in the forest resources and, in the 19th century, implemented expropriation policies. None of this, however, happened. The old balance between the villages (in Roncal) or between the villages and the valleys (in Lokiz) were perpetuated through adjustments. This ability to withstand privatization processes could have been linked to the existence of balanced social structure, without great differences of wealth and broader access to land ownership. As can be seen in the table, Gini indices are low for both cases (0.53 and 0.54). Moreover, between the 17th and 19th centuries inequality rates diminished in both cases. This process should be investigated more deeply, but we could propose as a hypothesis that the robustness of the complex common institution

could be a factor driving for a more equal society. At the same time, increasing equality could reinforce the resilience of the system.

6. CONCLUDING REMARKS

The analysis of the cross scale institutional regimes which were in place in the Valley of Roncal and the Sierra of Lokiz from the mid-14th century onwards provides contradictory results. On the one hand, the governance of the common-pool resources in these areas (grazing lands and forests) met most, if not all, ‘design principles’ originally formulated by Elinor Ostrom in 1990. This favourable institutional must undoubtedly explain the robustness showed by those regimes, or at least a great deal of it. On the other, and regarding the distribution of governance tasks across several layers of nested enterprises, some risks, in line with those suggested by the literature on nesting, were identified. Legislative overlapping and internal conflicts among the different units could in particular have led to a progressive deterioration and eventual breakup of the institution. The ability of both regimes to overcome those threats over time suggests, however, that the benefits of the collective exploitation of the resources outweighed their disadvantages. Our result supports the hypothesis of the common complex institutions as ways to deal with risk and to manage conflicts.

LITERATURE CITED

Ackerman, J., 2004. “Co-Governance for Accountability: Beyond ‘Exit’ and ‘Voice’”, *World Development*, 32, 3: 447-463.

Aggarwal, V. K., 1981. *Hanging by a Thread: International Regime Change in the Textile/Apparel System, 1950-1979*. PhD Dissertation. Stanford University.

Agrawal, A., 2002. “Commons Resources and Institutional Sustainability”, in Ostrom, E., Dietz, T., Dolsak, N., Stern, P. C., Stonich, S. and Weber, E. U. (eds.), *The Drama of the Commons*. Washington D.C.: National Academy Press, pp.41-85.

Agrawal, A. and C.C.Gibson, 1999. “Enchantment and disenchantment: The role of community in natural resource conservation”, *World Development*, 27, 4: 629-649.

Alchian, A. and H. Demsetz, 1973. “The Property Rights Paradigm”, *Journal of Economic History*, 33, 1: 16-27.

Alli Aranguren, J.C., 1989. *La Mancomunidad del Valle de Roncal*. Pamplona, Departamento de Presidencia e Interior.

- Armitage, D., 2008.** "Governance and the commons in a multi-level world", *International Journal of the Commons*, 2, 1: 7-32.
- Axelrod, R., 1984.** *The Evolution of Cooperation*. New York: Basic Books.
- Bardhan, P., 2002.** "Decentralization of Governance and Development". *The Journal of Economic Perspectives*, 16, 4: 185-205.
- Barkun, M., 1968.** *Law without Sanctions: Order in Primitive Societies and the World Community*. New Haven, CT: Yale University Press.
- Berkes, F., 2006.** "From Community-Based Resource Management to Complex Systems: The Scale Issues and Marine Commons", *Ecology and Society*, 11, 1: 45.
- Berkes, F., 2002.** "Cross-Scale Institutional Linkages: Perspectives from the Bottom Up", in Ostrom, E., Dietz, T., Dolsak, N., Stern, P. C., Stonich, S. and Weber, E. U. (eds.), *The Drama of the Commons*. Washington D.C.: National Academy Press, pp.293-321.
- Carasatorre, R., 2011.** "Topónimos en torno a la Sierra de Lóquiz", *Textos históricos navarros*. Available at <http://documentanavarra.blogspot.com/>
- Carrasco, J., 1973.** *La población de Navarra en el siglo XIV*. Pamplona : Universidad de Navarra.
- Coase, R., 1960.** "The Problem of Social Cost", *Journal of Law and Economics*, 3, 1: 1-44.
- Cox, M., G.Arnold and S.Villamayor-Tomás, 2010.** "A Review of Design Principles for Community-based Natural Resource Management", *Ecology and Society*, 15, 4: 38. URL: <http://www.ecologyandsociety.org/vol15/iss4/art38/>
- De Moor, T., 2008.** "The Silent Revolution: A new perspective on the emergence of commons, guilds, and other forms of corporate collective action in Western Europe". *The International Review of Social History*, 53, 16: 175-208.
- Estornés Lasa, B., 1927.** *El Valle del Roncal*. Zaragoza: Tip. La Académica
- Floristán Imizcoz, A., 1982b.** "Población de Navarra en el siglo XVI". *Príncipe de Viana*, 43, 165 : 211-262.
- García-Zúñiga, M., 1996.** *Hacienda, población y precios (siglos XVI-XVIII)*. Pamplona : Gobierno de Navarra.
- Gordon, H.S., 1954.** "The Economic Theory of a Common-Property Resource : The Fishery", *Journal of Political Economy*, 62, 2: 124-142.
- Hardin, G., 1968.** "The Tragedy of the Commons", *Science*, 162, 3859: 1243-48.
- Hooghe, L. and G. Marks, 2003.** "Unraveling the Central State, but How? Types of Multi-level Governance", *American Political Science Review*, 97, 2: 233-243.
- Idoate, F., 1977.** *La Comunidad del Valle de Roncal*. Pamplona: Diputación Foral de Navarra
- Lana, J.M., 199.** *El sector agrario navarro (1785-1935). Cultivo, ganadería, propiedad y mercados*. Pamplona: Gobierno de Navarra.
- Lapuente,L., 1986.** "Las instituciones político-administrativas de la Améscoa Baja".

Cuadernos de etnología y etnografía de Navarra, 18, 48: 275-304

Lapuente, L., 1990. *Las Améscoas. Estudio Histórico-Etnográfico* Estella: Junta de Monte de Limitaciones de Las Améscoas Ariztubeltza.

Lapuente, L., 1978. *Sierra de Loquiz*. Pamplona: Diputación Foral de Navarra.

Lapuente, L., 1981. *Las Améscoas*. Pamplona: Diputación Foral de Navarra.

Lindblom, C.E., 1959. “The science of “muddling through”, *Public Administration Review*, 19, 2: 79-88.

Marshall, G. R., 2005. *Economics for Collaborative Environmental Management: Renegotiating the Commons*. London: Earthscan Publications.

Marshall, G. R., 2008. “Nesting, subsidiarity, and community-based environmental governance beyond the local level”, *International Journal of the Commons*, 2, 1: 75-97.

McCay, B., 2002. “Emergence of Institutions for the Commons: Contexts, Situations, and Events”, in Ostrom, E., Dietz, T., Dolsak, N., Stern, P. C., Stonich, S. and Weber, E. U. (eds.), *The Drama of the Commons*, Washington D.C.: National Academy Press, pp.361-402.

Netting, R.McC., 1981. *Balancing on an Alp. Ecological change and continuity in a Swiss mountain community*. Cambridge: Cambridge University Press.

Niamir-Fuller, M., 1998. “The resilience of pastoral herding in Sahelian Africa”, in F.Berkes and C.Folke (eds.), *Linking social and ecological systems. Management practices and social mechanisms for building resilience*, Cambridge: Cambridge University Press, pp.250-284.

Orduna Portús, P.M., 2011. “Vecindad y derecho consuetudinario: análisis de los usos y costumbres comunitarias en el valle de Roncal”, *Cuadernos de Etnología y Etnografía de Navarra*, 86: 147-203.

Olson, M., 1965. *The Logic of Collective Action*. Cambridge, MA: Harvard University Press.

Ostrom, E., 1976. “Size and Performance in a Federal System”, *Publius: The Journal of Federalism*, 6(2): 33-73.

Ostrom, E., 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge, UK: Cambridge University Press.

Ostrom, E., 1999. Coping with tragedies of the commons. *Annual Review of Political Science*, 2: 493-535.

Ostrom, E., 2005. *Understanding Institutional Diversity*. Princeton, NJ: Princeton University Press.

Ostrom, E., 2009. “Design Principles of Robust Property-Rights Institutions: What Have We Learned?” in Gregory, K. and Yu-Hung Hong (eds.), *Property Rights and Land Policies*. Cambridge, MA: Lincoln Institute of Land Policy.

Ostrom, E., 2010. “Beyond Markets and States. Polycentric Governance of Complex Economic Systems”, *American Economic Review*, 100: 1-33

- Ostrom, V., 1962.** “The Political Economy of Water Development”, *American Economic Review*, 52, 2: 450-58.
- Ostrom, V., C. M. Tiebout and R. Warren, 1961.** “The Organization of Government in Metropolitan Areas: A Theoretical Enquiry”, *The American Political Science Review*, 55, 4: 831-42.
- Papadopoulos, Y., 2003.** “Cooperative Forms of Governance: Problems of Democratic Accountability in Complex Environments”, *European Journal of Political Research*, 42, 4: 473-501.
- Poteete, A., 2012.** “Levels, Scales, Linkages, and Other ‘Multiples’ affecting Natural Resources”, *International Journal of the Commons*, 6, 2: 134-150.
- Remón-Aldave, J.L., 2004.** *Valoración de los recursos piscícolas de Navarra: Sierra de Lóquiz E 1:25.000*. Pamplona : Gobierno de Navarra
- Samuelson, P., 1954.** “The Pure Theory of Public Expenditure”, *The Review of Economics and Statistics*, 36, 4: 387-89.
- Scharpf, F., 1988.** “The Joint-Decision Trap. Lessons from German Federalism and European Integration”, *Public Administration*, 66, 3: 239-278.
- Schwendtner García, O., 2007.** “Conservación y planificación selvícola de robledales submediterráneos en la red Natura 2000 desde el punto de vista del gestor forestal. El ejemplo del LIC Sierra de Lokiz (Navarra)”. *Cuadernos de la Sociedad Española de Ciencias Forestales*, 21 :161-172.
- Schlager, E. and E.Ostrom, 1992.** “Property rights regimes and natural resources: a conceptual analysis”, *Land Economics*, 68, 3: 249-262.
- Steins, N.A. and V.M.Edwards, 1999.** “Collective action in Common-Pool Resource Management: The Contribution of a Social Constructivist Perspective to Existing Theory”, *Society & Natural Resources*, 12: 539-557.
- Wade, R., 1994.** *Village Republics. Economic conditions for collective action in South India*. San Francisco: Institute for Contemporary Studies.
- Yanguas y Miranda, J., 1840 [2000].** *Diccionario de Antigüedades del Reino de Navarra* (3 vols). Pamplona : Gobierno de Navarra.
- Young, O., 2002.** “Institutional Interplay: The Environmental Consequences of Cross-Scale Interactions” in Ostrom, E., Dietz, T., Dolsak, N., Stern, P. C., Stonich, S. and Weber, E. U. (eds) *The Drama of the Commons*. Washington, DC: National Academy Press.