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Analysis of the adaptive capacity in water management of the agrarian sector in the Ebro River Basin, Spain

Master Thesis EIP



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Abstract

The agrarian sector has important economic, social and environmental effects in rural areas in Spain. Water is a basic input in the sector and because it is scarce during some periods, water management in the last century has been based on the traditional engineering paradigm. Due to the fact that agriculture is a strategic activity of vital importance for the community and its inherent complexity and uncertainty, the resource management must adapt to future unexpected changes and disturbances. The adaptive management, based on the idea that uncertainty must be confronted and that policies and practices should be based on experimentation and monitoring tasks, is a good alternative to the old management that led the system to a more fragile and dependent situation. One of the objectives of this approach is promoting the ability to adjust and take advantage of disturbances. This ability, known as adaptive capacity, is examined in the dissertation in two regions of the Ebro River Basin in Spain, Catalonia and Navarre, and the two basic levels of water use, the regional policies and the farmers and irrigation communities' practices.

Keywords

Water, adaptive management, adaptive capacity, regional government, irrigation community, farmers.

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Acronyms

- AC: Adaptive Capacity
- ARDM: Agriculture and Rural Development regional Ministry
- DAGA: Ministry of Farming and Food of Navarre
- EA: Ecologic agriculture
- EC: European Comission
- IC: Irrigation Community
- IPCC: Intergovernmental Panel on Climate Change
- MARDC: Ministry of Agriculture and Rural Development of Catalonia
- RDP: Rural Development Program
- WFD: Water Framework Directive

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I. Introduction

Economists disaggregate the capital stock into four different types (Ekins, 1992): manufactured, human, social/organisational and natural capital. The latter is related partially to the manufacturing production and consumption processes but, more significantly, it compromises the life-support functions. Berkes and Folke (1994) divide natural capital components in three: non-renewable resources extracted from ecosystems, renewable resources produced and maintained by ecosystems and environmental services. Thus, natural resources like water are not just economically profitable (Young, 1982) but also socially and environmentally valued goods. In fact, services of ecological services contribute to human welfare, both directly and indirectly (Costanza et al., 1997) and human activity can certainly have an (often negative) effect on the environment (Ekins, 2003). Human activities have affected the ecological cycles and transformations in which the Earth is immersed so much that even climate has and is still changing (Fernández Carrasco, 2002). In the case of Spain, and according to the main conclusions about the impacts of climate change in this country elaborated by the *Oficina española de cambio climático*¹, temperature will probably rise and precipitations will experience a descending trend.

The tendency among the last century has been the use and exploitation of natural resources by humans freely and without limitations. Once demand has exceeded supply and negative consequences have emerged, as it happens in several parts of the world in relation to water or soil, society has started to question how they should be managed. Water is a basic input in Spanish agriculture as it is a scarce resource. Nonetheless, water management and policy have been based, especially during the last century, on a simplistic vision: there has been no attention to the relationship between irrigated lands and water resources and the short and long-term effects of the water policies applied (Martínez and Esteve, 2004). Therefore, policies and institutions were focused on securing supply and promoting the irrigation of land. As a consequence of that, an economic and social development was achieved but, as ecological limits were not considered, several conflicts appeared in relation to water use. In addition, a privilege 'traditional' engineering approach to water management, mainly focused on the investment of large-scale infrastructure, has led towards "lock-ins" and created large societal dependencies on them (Huitema and Meijerink, 2010). The interdependence of infrastructure, rules of practitioners and attitudes of the public stabilize the system and prevent change, "locking-in" the system (Pahl-Wostl, 2005). If a system is trapped in a non-beneficial state and has low potential to change, it has many problems to overcome to a more positive state (Allison and Hobbs, 2004).

Considering irrigation system as a common resource based on water availability and that climate change will affect where, when and how water is available for all uses (Karl et al., 2009), it is necessary that, among others, the resource use can adapt to change (Stern et al., 2002). If not, agriculture areas depending on water availability and quality would collapse in front of changes. Societies, thus, should enhance their response capacity to face future climate impacts that could lie outside their experienced coping range (Tompkins and Adger, 2003). There must be, then, a shift from the "maladaptation" state and overuse

¹ Spanish Climate Change Office

of natural resources in which the water has been managed traditionally (Huitema and Meijerink, 2010). Adaptation is needed due to climate change projected scenarios but also by accepting the high complexity of system management and its inherent uncertainty (Bergh, 1996). In fact, some authors, (Llamas-Madurga, 2008; Naredo, 2006) point out that although specific sectors, citizens and politics in Spain claim that the most important problem is water scarcity, the real problem is the inadequate management of this resource.

Nonetheless, during the last decade, water policy in Spain seems to have reached a turning point (Saurí and del Moral, 2001). The present national water policy, called AGUA, encourages environmental responsibility to “guarantee greater equality, efficiency and sustainability, taking advantage of the best technology available” (MMA, 2012). It seems that we are moving from the old philosophy of “water for everybody at no cost” to a more contested and complex hydraulic paradigm. Old beliefs like water transfers and territorial solidarity² lost importance in water policy in front of new ideas and objectives like demand management and environmental needs (Saurí and del Moral, 2001). In that context, adaptive water management constitutes an alternative approach which can be used to address traditional limitations of determinism and administrative decision making (Cots et al., 2009). Resource management should be carried out using rules that are locally crafted and socially enforced by the users themselves, understanding that the resource is partially flexible, taking into account traditional and local knowledge, keeping options open and carrying out management wherein feedbacks rather than toward fixed targets (Berkes et al., 2000). One of the targets of adaptive management is precisely increasing the adaptive capacity of the system (Pahl-Wostl, 2007).

The dissertation examines if water adaptive capacity in relation to water management is enhanced in two different levels in the agrarian sector: the legislative regional government and the praxis of farmers and irrigation communities. On one hand, the regional administration prepares policies, plans and programs about agriculture as the sector is a regional competence. On the other hand, farmers and irrigation communities are “on the ground” actors within the governance of the implementation of public policies and programs and the last actors in managing water to irrigate crops. So, analysing if those two levels enhance the adaptive capacity of the agrarian sector in water management, would give a good picture of the actual overall adaptive capacity of the sector. This could help detecting the points and actions to be maintained and, if necessary, which the actions and improvements to carry out are in order to prepare the sector toward changes.

The approach is novel because although in Spain water policy and management have been abundantly studied from a descriptive and historical perspective, few analyses deal with the regional level and/or based on policies. As national governments are no longer the only target of advice for policy analysis (Ostrom, 2002) and that current policy questions require knowledge about the interactions between sectors and regional and local stakeholders (Iglesias et al., 2003), it seems relevant that regional policy, which is more accurate and close to the context they have to deal with, understand the problematic of

² The Spanish Constitution recognizes and guaranties the economic and social solidarity among regions to ensure equality of every citizen. This principle is commonly labeled as territorial solidarity

water use by enhancing adaptive capacity. Apart from that, the focus taken for solving water problems in agriculture is commonly relying on technological improvements and future predictions although successful resource management depends on integrating the Human and Social Sciences as it is largely a problem of governance (Ostrom et al., 2003). Scientific research in predictions are uncertain, affecting institution's perception and thus, determining investments and policies aimed at improving agricultural adaptation to climate change (Lobell et al., 2008). Furthermore, research perspective recalls that the complexity of the socioeconomic system and historical and biophysical dynamics that underpin the agricultural sector influence the collective dynamics, actions and responses to climate changes and therefore add an extra layer of complexity (Ziervogel and Zermoglio, 2009). Due to all the reasons exposed, a study focused on how the actors involved in the sector act, prevent and prepare for change is a good opportunity to take into account the social side of the agrarian activity. We must not forget that besides the novel approach needed, agriculture is of vital importance as a food and energy sources, an economic opportunity and has an important role in maintaining rural communities and settlement dynamic.

The regions for the study are Catalonia and Navarre, both part of the Ebro River Basin. These two cases allow their comparison given the fact that they share water national regulations in water management. Taking into account the importance of agriculture in the area and actual available water and the climatic changes in near future – the Ebro Basin is characterized by a Mediterranean climate – the scarcity of resource will probably increase and so will do the well-known conflicts in the area.

The dissertation is structured in eight main chapters. This first chapter is an introduction to this research and its main objectives. The second chapter focuses on describing the politico-administrative and physical context of the study. Chapter three introduces the theoretical framework that builds bridges between the adaptive capacity and the concepts of resilience, vulnerability and governance. Adaptive capacity has a close relation with these concepts and it is promoted as a key factor of adaptive management. This chapter also presents two frameworks developed by the author to assess if adaptive capacity is enhanced in the two levels of analysis: policy content and farmers' and irrigation communities' management. After that, in chapter V and VI, the author presents the results of those levels for the two regions, Catalonia and Navarre and in chapter VII compares both regions. Finally, once it is concluded if adaptive capacity is enhanced and by who, chapter VIII draws the main conclusions of the research and recommendations to take in order to increase the capacity to adapt to future changes and shocks.

II. Context of study

The decentralized model in the country of Spain generates a big amount of institutions, organizations and actors interacting at different spatial levels. Water competence, as any other policy field, is scattered in various levels, each of it with specific responsibilities and assigned tasks. The same happens to other activities, like tourism or agriculture, which have a clear effect on superficial and underground waters. Thus, due to the high complexity of the administrative and political organization of the country, further description is needed in order to understand which levels in competence of water planning and management of the study are and its specific responsibility and significance for the dissertation. Furthermore, the physical and social characteristics of the basin and the role of the sector in the area are described.

2.1 Politico-administrative framework of Spain

Spain is spatially and politico-administratively organized as a regional state with 16 autonomous regions, one Foral community³ (Navarre) and two autonomous cities⁴. Every region is divided into one or more provinces and every province is divided into municipalities (Map 1). There are as well municipal associations that have legal personality, such as the “comarcas” or “mancomunidades”. Spain is a member of the European Union and therefore EU legislation and policy programmes are applied and implemented in the country.

Map 1. Regional and provincial division of the state of Spain



Source: author

Every politico-administrative level has its own government and administration with specific competences and roles. Based on the principles of decentralization and autonomy, the State and the Autonomous Regions hold different level of competences in the various themes, which can be legislative, statutory and executive. The competences can be exclusive - if only one of the two is fully competent in a specific subject -, shared or

³ Foral Community is the name that the region of Navarre has due to historical rights, protected and respected by the actual Spanish Constitution.

⁴ The cities of Ceuta and Melilla are autonomous cities; they have more competences than a municipality but less than an autonomous region.

concurrent. Water competences are shared between the central and the regional government. The management of the resource, moreover, is affected by several domains such as fishery, agriculture, energy, health and environment, over which every territorial government has a competence (Hispagua, 2012).

The guidelines of the Public Water Administration are decentralization, coordination, efficiency, integral treatment, water economy and users' participation. The watershed basin is the basic unity of management and it must be respected so as the water cycle. Moreover, the public management of water must be compatible with spatial planning and the protection and conservation of the environment (Hispagua, 2012).

Map 2. Water management administrative borders in Spain (the hydrographical demarcations, in various colours, and the intercommunity basins in grey)⁵



Source: Hispagua, 2012

The Hydraulic Public Domain⁶ is a state competence since the 1879 Water Law, where superficial water was declared public. The central state administration for water management in Spain was decentralized years later, in 1926, when specific basin institutions were created: *Confederación Hidrográfica* (Watershed Management Body) or *Agencia del Agua* (Water Agency). Every *Confederación Hidrográfica* is in charge of a basin that covers more than one autonomous community. The number of Confederaciones has changed through time and nowadays there are twelve intra-community basins: Guadalquivir, Segura, Júcar, Miño-Limia, Cantábrico Oriental, Cantábrico Occidental, Duero, Tajo, Guadiana, Ebro, Ceuta y Melilla (Map 2). All of them, except the first three, are shared with other countries.

⁵ The map doesn't show the demarcations of Cantábrico Oriental and Cantábrico Occidental as separated basins (Royal Decree 29/2011)

⁶ It is considered as "Hydraulic Public Domain" the a) continental waters (superficial and underground ones), b) inland water channels of natural streams (continuous or discontinuous), c) lake, lagoon and public reservoir beds, d) underground aquifers, and e) the water from a desalination process when, out of the production plant, are incorporated into any of the previous mentioned subsection (Legislative Royal Decree 1/2001)

For the basins limited within the borders of an autonomous community, the administrative state competence has been totally transferred to the regional level, the autonomous community. There are seven inter-community basins: Galicia-Costa, País Vasco, Cataluña, Atlánticas de Andalucía, Mediterráneas de Andalucía, Islas Baleares and Islas Canarias. These basins are responsibility of the Water Agencies.

The 1985 Water Law introduced important innovations trying to secure the rational use of water, a decreasing resource. It also considered the hydrologic planning. Plans should take into account actual demands, the reuse of water from the agrarian and industrial sectors and the quality of water to fight against pollution and residual spilling. The 21 article of this law assigns the functions of the watershed bodies. The 62/2003 Law, *de medidas fiscales, administrativas y del orden social*, modified the mentioned law in order to incorporate the European Directive 2000/60/CE in which a communitarian water framework is established (Magrama, 2012) although the implementation of the EU Water Framework Directive meant no important changes in the Watershed Management Bodies. After, in 2007, two Royal Decrees (RD 125/2007 and RD 126/2007) set the territorial scope of the hydrographical demarcations (Figure 2) and the composition, function and attribution of the authority committees in those demarcations.

The function of the Watershed Management bodies has been changing in the last century. At the beginning, they focused on the construction of big infrastructures and basin exploitation planning (Plana, 1991) but in the last decades their role shifted towards the protection and sustainable use of water. Since the creation of these institutions, the participation of different stakeholders has been notable. Local government and representative of various sectors take part of the committees and assemblies that control and plan the use of water like the users' assembly, the Dam water release Commission, the Operation board, the water council or the governing board. The users' participation is thus large and this has been widespread recently as several stakeholders must be involved in the basin planning elaboration and the creation of competent authorities committee (Omedas et al., 2008).

Despite being attached to the State Ministry of the Environment or to the corresponding Ministry in the Autonomous Community, the watershed institutions have a special institutional status and are not subordinated by the central government. They have exclusive competence over the basin. That means that they have total executive autonomy to carry out their tasks: basin planning, resource and use management, demand management, execution of new infrastructure, water policies and Public Domain Water protection, among others (Omedas et al., 2008). The watershed institutions must design the basin plan management, which is formally approved by the central government. These plans commonly compromise an inventory of the hydric resources and the existing and predictable uses and demands, the criteria for priorities and compatibility of uses, the assignation and reservoir of resources, the spilling regulation and the basic normative for irrigation improvement (Estrela, n.d.).

Table 1 summarizes the water competences for every administrative level and the competence of other activities that have an effect on superficial or underground waters. EU's role can be positioned as a level above the national level as its legislation and protocols in the State Members is apparent (Beunen, 2006). In water management, the

implementation of the Water Framework Directive (WFD) has been of vital importance. Like in other countries, hydro-politics in Spain has moved from a stage of social contestation to a new scenario of consensual governance through the WFD (Parés, 2011). Kaika (2003) argues that the change from government to governance in the European water legislation is a response to the recent changes in the political, economic and social spheres of all governmental levels. These parameters of change enumerated by Kaika (2003) are the multiplication of the actors involved in water management and the reconfiguration of their respective roles, the multiplication of power centres and scales at which decision-making is exercised in the water sector and the increasing concern for the environment. Thus, consensus, participation and network governance becomes part of the WFD hydro-politics and by the implementation of this Directive, national governments of the EU prepare and have to deliver water policies in a more participatory way.

In the case of Catalonia and Navarre, the regional government is the only responsible for the hydraulic uses, channels, underground water and irrigation land when water flows entirely within its territory. As shown in Table 1, autonomous regions have assumed exclusive competence in agriculture in accordance with the article 148 1.7 of the Constitution; they have total competence on the programming and execution of transformative hydraulic works in irrigation land in the intra-community basins. The regions also have institutional representation in the governing, planning and management bodies of the watershed institutions although the state has the competence in inter-community basins. The regions, thus, have a vital role in water management as they have exclusive competence in water demand (agriculture, fishing, environment...) and participate actively in intra-community basins management and planning. Although it may seem clear, the competence cross-linking between the state and the regions is inevitable and sometimes cause of conflict (Fanlo-Loras, 2004).

It is worth mentioning, that there is an important and traditional actor in the water management in Spain: the *Comunidad de regantes* (Irrigation Communities). These are associations conducted by Roman and Arab rules that the governing bodies allowed for the distribution of water for the irrigation of crops. They were recognized in 1866 and 1879 Water Laws but their origin is lost in history. The right to water use in irrigated land in Spain is directly connected to land property. Thus, an irrigation community (IC) is the non-profit association of all the owners of an irrigable area, which must gather together by law, for the common and autonomous administration of public water among the members, both superficial and underground (FENACORE, 2012). As in the practice of agriculture there are common goods to be governed (water, hydraulic infrastructures of distribution and conduction, and the servitudes originated by those infrastructures), it seems logic that the resource is managed, exploited and financed in an associative way.

There are approximately 6.200 irrigation communities in Spain (FENACORE, 2012) with a surface of more than 3 million hectares that form three different irrigation systems: traditional, state-driven superficial water and groundwater (Giménez Casalduero and Palerm Viqueira, 2007). Irrigation Communities are autonomous organisms that carry out a set of public functions in administrating, distributing and managing the water granted by the State, which is, as mentioned, the responsible of water use and protection. Summarising, the irrigation communities' characteristics are:

- They are legally constituted and do not depend on central, regional or local governments. They are set up autonomously and have exclusive competences although they are legally recognized through the central administration.
- They have a public mission as they distribute and manage water, a public good.
- Their legal status is corporative because the reason of association is exercising functions of autonomous administration for the public water.

Table 1. Distribution of competences in water and other activities in Spain.

Politico-administrative level	Competence
State	<ul style="list-style-type: none"> • Legislation, planning and concession of hydraulic resources and uses when the water flows through more than one autonomous region (inter-community basin) • Electric installations authorization when the profit affects another region or when the distribution of the energy leaves the national scope. • General interest Public works or the realization of which affects more than one autonomous region • Basic legislation about the environment, forests, health, mining, energy and public works, without prejudicing the regional faculties of establishing additional protection regulation.
Autonomous region	<ul style="list-style-type: none"> • Projects, construction and exploitation of the hydraulic uses, channels and irrigation land of interest for the Autonomous region • Planning and concession of the hydraulic resources and uses when the water flows within the territory of an autonomous region. • The mineral and thermal waters. • Inland water fishery, shell fishing, aquiculture, hunting and river fishing. • Agriculture and livestock • Tourism • Environmental management • In addition to the role performed by the state, regions have a competence related to forests, mining, energy, health and public works.
Municipality	<ul style="list-style-type: none"> • Urbanism • Water supply • Water sanitation • Waste collection
Irrigation Communities	<ul style="list-style-type: none"> • Effective and fair distribution of water for irrigation among the associated members.

Note. The provinces do not have specific competences in water and other activities in Spain

Source: Adapted from Hispagua (2012)

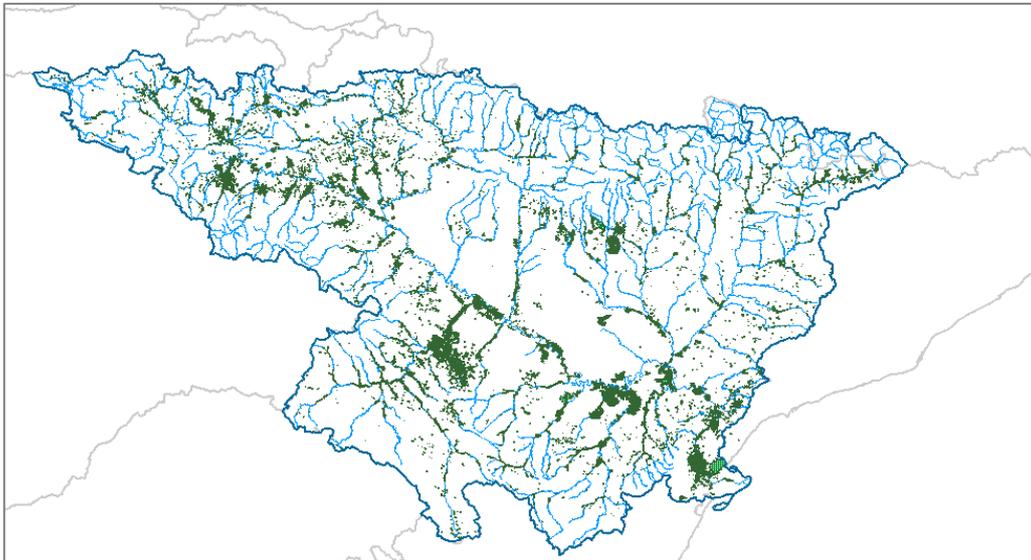
All Irrigation Communities carry out three functions: legislative, executive and judicial through their own committees. They also participate directly in the watershed institution committees and boards.

Summarising, the responsibility for the water for irrigation is distributed within different actors and government levels. The stock and regulation depends on the State Ministry of the Environment and the corresponding Watershed institution. The distribution of water is, however, responsibility of different institutions. Most of the big water channels are

aggressive to the environment (Pinilla Navarro, 2008). This transformation was greatly promoted by the Spanish government and institutions since the beginning of the twentieth century as the exploitation of water with agrarian purposes was considered to be one of the most effective means to increase the agrarian production and, consequently, the national wealth (Fernández Clemente, 2004).

The Ebro River basin is the Spanish basin with more land dedicated to agriculture and the first one in irrigated land surface (Ministerio de Medio Ambiente, 2007). The basin has 783.900 hectares of irrigated land (Map 4) which demand about 6.310 hm³/year (Cuadrats Prats, 2006). The water for irrigation is distributed by big and large channels – although it can also be used to distribute water for urban areas and industrial uses – and other irrigation ditches. More than 100 irrigation communities exist in the basin. Catalonia, with 207.035 Ha of irrigation land, represents the 26,42% of land irrigated in the basin, the majority of which is irrigated by big channels. Navarre, with 87.766 Ha of irrigation land, means the 11,20% of irrigated land in the area. The most used irrigation method in the basin is by gravity, continued by the aspersion and drip systems.

Map 4. Irrigated land use in the Ebro River Basin



Source: CHEbro, 2012

Studies predicting future climatic tendencies seem worrying. Valencia et al. (2010) confirm that there is a weak trend towards a new climatic situation in the Ebro Basin, including the precipitation regime, although this is not expected to be radical. The quantity of hydric resources is expected to be reduced in 16% (Ayala-Carcedo, 2001). The temperature is expected to increase and the precipitation to decrease.

The certainty of these quantitative climate studies, however, is debatable - especially regarding precipitation. Scenarios show a more confident increase of temperature in the future than a clear tendency in precipitation (Samper and Álvarez, 2005). In any case, the future impacts could be significant. Taking into account that the superficial network of the river has a complex hydrologic performance, that varies significantly with the variability of its tributary rivers (Vázquez López and Vázquez Maldonado, 2004) and that the water for irrigation comes mainly from superficial waters, a change in superficial flow would mean less water available for its use and irrigation farms strongly dependten on this type

of water. The consequences on the agriculture of the area would be economic but also social and environmental.

Agrarian farms in the Mediterranean are a traditional landscape that despite having lost economic importance in the last century, they continue to be an important activity to secure food and energy sources and to preserve heritage, environmental and social factors in rural areas. Thus, agriculture and specially irrigated agriculture have a vital importance in spatial planning and resource management. Due to the quantity of water served for agriculture in the Ebro basin, its climatic characteristics and the high degree of complexity and uncertainty of the agrarian sector, analysing which is the management of water in this area is of vital importance for the continuity of the activity in the future and its social, economic and environmental associated effects.

III. Adaptive capacity: concepts and theories

The dissertation is particularly based on the adaptive management concept. This approach structures a process for decision making where project design, management and monitoring are systematically integrated with the purpose of adapting and learning. This capacity to adapt can be partly translated as the “adaptive capacity” of a system. This key concept of adaptive management, among others, is detailed in this chapter so to connect the research question to the existing knowledge and to introduce the necessary concepts to understand and examine the phenomenon under study. In order to examine the adaptive capacity of the policies and the users’ management, I use and combine a range of assessment models to determine the specific criteria of analysis.

3.1 Adaptive management

As Folke et al. (2002) indicated past policies wrongly concluded that a) ecosystem responses to human use are linear, predictable and controllable, and that b) human and natural systems can be treated separately. Those errors entailed environmental management practices that promoted controlling or canalizing change and consequently, the results obtained were unexpected. This equilibrium-centred management in biophysical environment led commonly to more fragile, more dependent on vigilance and error-free management at a time when greater dependencies had developed in the socioeconomic and institutional environment for continued success (Holling, 1994). If the reality is rooted in change and it is impossible to know the evolution path of systems, those require to be managed from an adaptive approach.

The concept of adaptive management was exposed during the 1970 by two ecologists, C.S. Holling and C.J. Walters (Johnson, 1999). According to Walters (1986) management of evolving systems should be adaptive but also active. Management should therefore be treated as an adaptive learning process, where management activities themselves are viewed as the primary tools for experimentation. Uncertainty in adaptive management is considered in plans and models and not avoided or aimed to be reduced. Three basic concepts in adaptive management are fundamental: a) a strategic range of alternative and consistent hypotheses that imply different responses (and opportunities) are identified; b) both the managed system and the possible effects of decision making are attempted to be modelled, and c) efficient monitoring programs for detecting system responses are implemented (Walters, 1986b). In such a way, policy design includes resource knowledge production while exploring better understanding and opportunities. Adaptive management acknowledges that policies must satisfy social objectives, but also must be continually modified and flexible for adaptation to these surprises (Gunderson, 1999). In relation to that, Lee (1993) declared that “policies are experiments” and that participation is necessary. Experimentation is also highlighted by Ostrom (1999) that declares that all policy proposals must be considered as experiments given the complexity of the process of designing rules to regulate the use of common-pool resources.

3.2 Key concepts of adaptive management

The approach to confront **uncertainty** is, then, contrary to the traditional conviction aiming to reduce uncertainty by increasing scientific knowledge. As social and ecological

systems are extremely complex and evolve through time, forecasting methods for scientific study fail to analyse them (Walker et al., 2002). In fact, knowledge of ecological systems is not always complete (Walters and Holling, 1990). Uncertainty in adaptive management is treated in resource management in a notably integral and multidisciplinary way (Gunderson, 1999).

It is precisely this experimentation, the management of the experiences, a source of **learning**. The concept of learning is central to adaptive management and is grounded in recognition that learning derives from action and, in turn, informs subsequent action (Stankey et al. 2005). This on-going learning process and information collection should be done by the population affected by the policies and programs and not only rely on normal science (Lee, 1993).

System understanding is clearly essential for adaptive management. Although scientists have frequently examined social systems and ecological systems separately, the way in which human social and economic systems evolve will depend on the ecological endowments of a region, and the changes in these ecological systems over time will, in turn, depend on the extent, intensity and type of human activity (Kinzing et al., 2000). This is especially visible in the agrarian activities. Thus, the biophysical, social, cultural and economic elements of this dissertation are considered part of a fully integrated and territorially embedded **social-ecological system** (SES) (from now on, agrarian system).

There is a close link between **adaptability** and **resilience**. While resilience is defined as the capacity of a system to absorb shocks and the capacity to learn from those and to reorganize (Folke, 2006), adaptability is the capacity of actors to manage resilience and deal with current and future shock (Walker et al. 2004). In fact, adaptability is part of resilience according to Folke et al. (2010) as it captures the capacity of a social-ecological systems to learn, combine experience and knowledge, adjust its responses to changing external drivers and internal processes, and continue developing within the current stability domain (Berkes et al., 2003). Management can destroy or build resilience (Folke et al. 2002) as the resilience of social and ecological systems depends on the way in which these systems have historically developed and are currently evolving (Kinzing et al., 2000). In such a way, assessing the role of both the policies and the role of farmers and irrigation communities in enhancing the adaptive capacity of the agrarian system can give a picture of the current preparedness and coping capacity towards change.

Furthermore, **adaptation** is intimately associated with the concepts of **vulnerability** and **adaptive capacity** (Smit and Wandel, 2006). The forces that influence the ability of the system to adapt are the drivers or determinants of adaptive capacity (Smit and Wandel, 2006). So, the system's ability to adjust to a disturbance, moderate potential damage, take advantage of opportunities, and cope with the consequences of a transformation is understood as "adaptive capacity" (Gallopín, 2006; IPCC, 2001). That ability depends on the context and the time. Some authors (Berman et al., 2012; Brooks et al., 2005) suggest differentiating between *coping capacity* (the ability of actors to draw on available skills, resources and experiences as an immediate response to manage adverse stress or shocks) and *adaptive capacity* (the medium and long-term ability to adjust, respond and adapt to stress). Taking into account that coping capacity is part of the adaptive capacity (Berman

et al., 2012), this dissertation includes both short and long-term responses in adaptive capacity.

Smit et al. (2001) identified six determinants of adaptive capacity in the context of climate change as a contribution to the third assessment report for the IPCC: a) economic resources, b) access to information, c) social capital, d) technology, e) information and skills, f) infrastructure, g) institutions and h) equity. Greater economic resources and technology increase the adaptive capacity. Moreover, greater access to information increases likelihood of quick and appropriate adaptation while lack of informed, skilled and trained personnel reduces adaptive capacity. A variety of infrastructures can enhance adaptive capacity as it provides more options although the characteristics and location of infrastructure affect this capacity. Social institutions play a significant role in increasing the adaptive capacity as well as the existing policies and regulations. Finally, resources' distribution, availability and entitlement are important in increasing the adaptive capacity.

Social capital can be defined as the advantage generated by groups and social networks and their norms that enable people to act collectively. Change and uncertainty come in many forms and fostering new ways of governance can create space for adaptive capacity to emerge (Armitage, 2007). In fact, contemporary societies are governed by a multiplicity of interdependent actors and socio-institutional arrangements (Parra, 2010). So, a shift is taking place and the old national and centralized command-and-control approach is being substituted by new forms of "governance" although some policy makers and policy scholars still believe that the world is characterized by linear and predictable processes (Buit and Galaz, 2008). Folke et al. (2005) suggests that successful social transformations involving adaptive capacity are often preceded by the emergence of informal social networks. This new "governance" tries to promote knowledge, creativity and experimentation and precisely, social networks facilitate information exchange, highlight knowledge gaps and create nodes of expertise. Thus the individuals' role and their relations and networks are highly important in this search and promotion of learning and experimentation both in institutions and organizations at different levels.

In the last decade, some literature pointing out the importance of increasing the adaptive capacity of water systems in front of uncertain future and the complexity of its management has greatly emerged (Turton 1999; Ohlsson and Turton, 1999; Folke et al., 2002; Pahl-Wostl, 2007; Pandey et al. 2010). This literature states that a system with high adaptive capacity is able to re-organise and renew against changes and thus, policies and management practices should promote flexibility, learning and generate knowledge in order to respond to uncertainty and surprise rather than reacting to these. This task is not simple as the water regime in Spain is nowadays dominated by a control and predictive paradigm.

3.3 Examining the adaptive capacity of the agrarian system

If we wish to evaluate the existing adaptive capacity of a system we must understand how it is constituted, and how it is translated into adaptation (Brooks, 2003). Systems change in space and time through internal and external forces and the adaptive capacity is considered inherent to it. The adaptive capacity of a system, in reality, can be obstructed and depends on several factors. However, to simplify the examination of this ability it is

assumed that adaptive capacity depends on the resources the system has to “construct” it and the willingness to adapt. Thus, in this dissertation, if a system has one or both conditions, the adaptive capacity is high (or higher).

Due to the varied and several conditions and factors that make up the adaptive capacity of a system a clear framework is needed. Many models exist in literature and some more specific frameworks are used to determine the criteria to analyse the adaptive capacity of the agrarian activity. In order to determine the criteria that enhances the AC of policies, models of Wiechmann (2007), Swan (2010) and Gupta et al. (2010) are merged defining a new model (Figure 2) that aggregates important characteristics needed to enhance this ability of the document, both in content and process. For the farmers’ and irrigation communities practices analysis, the dimensions of Gupta et al. (2010) are combined with more specific indicators (Figure 3).

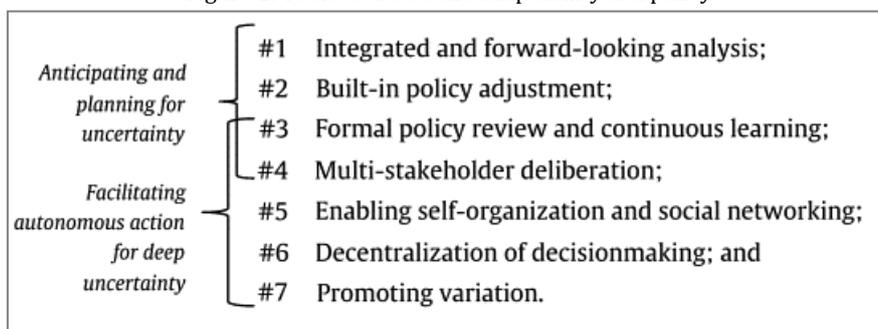
Table 2. Comparison of linear and adaptive strategy models

	Linear Strategy Model	Adaptive Strategy Model
Definition	Strategy as a plan	Strategy as a pattern
Actors	Rational and informed	Bounded rational and intuitive
Starting Point	Internal and external analysis	Discovery of consistent action
Time perspective	Prognostic	Retrospective
Approach	Formal planning	Collective planning
Strategy formulation	Complete and explicit	Incomplete and implicit
Governance mode	Central implementation	Adaptive, gradual adjustment
Interaction	Limited to strategists and experts	Participative in collective processes
Means-ends relation	From ends to means	From means to ends
Strategy content	Defined objectives, required means	Behaviours patterns and routines
Purpose	Decision support, intentional guidance	Decision heuristics, mobilization

Source: Wiechmann, 2007

Wiechmann (2007) indicates that planning and adaptation are, in reality, in a constant encounter with social dynamics and paradoxes. Furthermore, in a world of uncertainty, linear planning seems to fail in implementation. The labelled adaptive strategy model which is based on complexity, collective learning and flexibility is presented as an alternative of the traditional planning model. The aspects listed in Table 2 are useful to identify the characteristics that policies should follow to be considered adaptive.

Figure 1. Tools to assess the adaptability of a policy



Source: Swanson et al., 2010

Policies usually have unintended impacts and do not accomplish their goals in dynamic, complex and uncertain conditions (Swanson et al. 2010). Swanson et al. (2010) observe that the capacity of a policy to adapt to anticipated and unanticipated conditions can be facilitated by using the seven tools presented in Figure 1.

The Adaptive Capacity Wheel designed by Gupta et al. (2010) evaluates if an institution enhances the necessary adaptive capacity for climate change but it can also be applied to the assessment of policies and regulations. The framework presents six dimensions, each with different criteria considered as necessary to increase the adaptive capacity of an institution or policy (Table 3).

Table 3. Summary of the criteria and sub criteria used to assess adaptive capacity of an institution

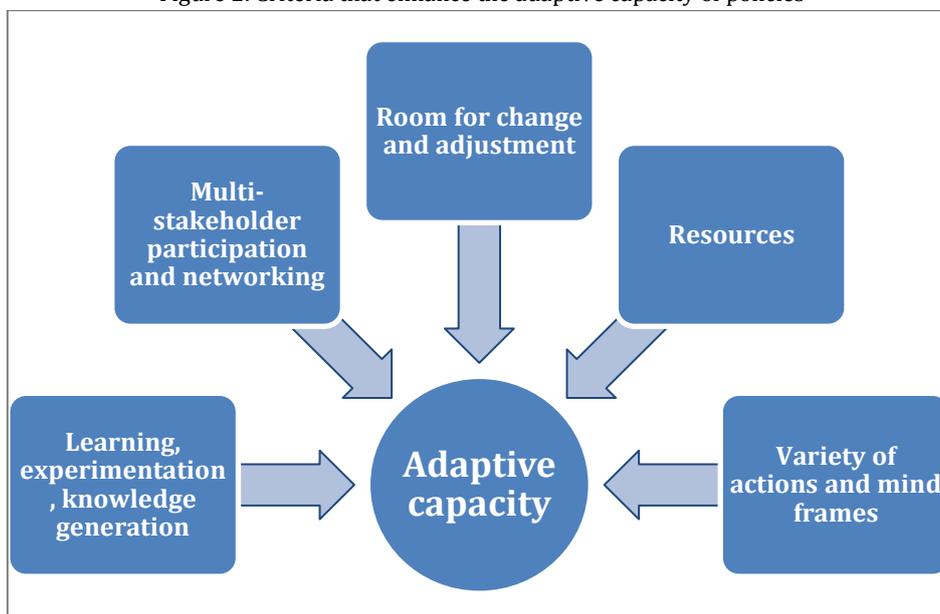
Dimension	Criteria
Variety	Variety of problem frames
	Multi-actor, multi-level, multi-sector
	Diversity of solutions
	Redundancy (duplication)
Learning capacity	Trust
	Single loop learning
	Double loop learning
	Discuss doubts
	Institutional memory
Room for autonomous change	Continuous access to information
	Act according to plan
	Capacity to improvise
Leadership	Visionary
	Entrepreneurial
	Collaborative
Resources	Authority
	Human resources
	Financial resources
Fair governance	Legitimacy
	Equity
	Responsiveness
	Accountability

Source: Gupta et al., 2010

For the analysis of the regional policies, programs and plans in relation to agriculture and water management, the three models are merged and a new and simpler framework is created (Figure 2), taking into account the key points highlighted in the three models. Learning, experimentation and knowledge generation is one of the basic principles of adaptive management. In this group any kind of education, information access, arenas to discuss or debate, innovation, etc. is included. As planning must be collective and participative (Wiechmann, 2007), multi-actor, multi-level and multi-sector (Gupta et al.), a second aspect to be considered is the multi-stakeholder participation in decision-making and in the implementation of the policy. A good coordination and networking between actors, sectors, institutions and policies is an advantage. In order to be adaptive, there must be room for change and adjustment. This criterion coincides with the retrospective

approach and a gradual adjustment to facilitate autonomous action mentioned by Wicheman (2007). In the same line, Swanson et al. (2010) considers integrated and forward-looking analysis, policy review and built-in policy adjustment tools for adaptive policies. In this aspect, the institutional memory and the capacity to improvise criteria of the Adaptive Capacity Wheel are contained. Resources (financial, technological and human) are a vital criterion. Based on those means, ends can be achieved. Those should be well distributed and available through actors, sectors and levels. Finally, any policy should promote different and varied behaviour and patterns as solutions in solving diverse problematical situations always taking into account all the actors involved in the agrarian sector. The actions proposed should specially take into account the criteria of fair governance of the Adaptive Capacity Wheel. It is noteworthy that the boundaries of the mentioned criteria that enhance the adaptive capacity of a policy are not clear and totally closed so some can often overlap in definition.

Figure 2. Criteria that enhance the adaptive capacity of policies



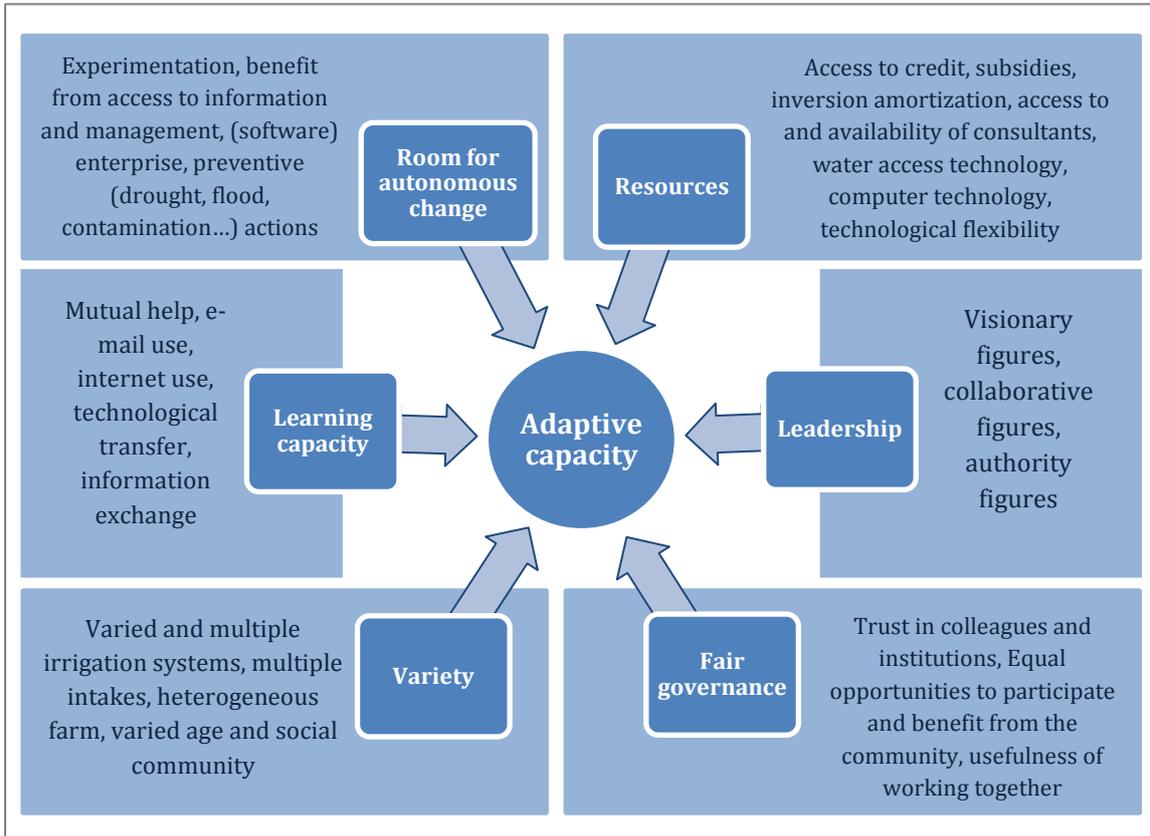
Source: Author

The dimension of fair governance listed in the AC Wheel is considered a transversal criterion. The criteria of equity, legitimacy, accountability and responsiveness should be, if possible, considered in every specific criterion. Leadership, on the other hand, is not included as a criterion due to the high difficulty to extract it from policy analysis. Nonetheless, leadership is expected to emerge if learning is promoted and if different actors are involved in policy making and implementation.

For the analysis of the farmers and irrigation communities' performance in managing water, the model used is the Adaptive Capacity Wheel to assess institutions. Irrigation communities can be considered as institutions as they are structured associations made up by a set of ideas, values and rules that have own normative and juridical body. Farmers can be considered as an institution too because they are commonly associated in agrarian cooperatives and must be part of an irrigation community if they want to irrigate their farms.

Some other studies (Sietchiping, 2006; Swanson, 2007; Brown, 2010) present specific formulas to evaluate the adaptive capacity of farmers through the use of specific indicators. Although having a large scope, some of them can be used to complement the Adaptive Capacity Wheel of Gupta et al. (2010), making the model more practical and realistic in relation to water management (Figure 3).

Figure 3. Criteria to assess the enhancement of adaptive capacity of farmers and irrigation communities



Source: Author

These models for analysing the adaptive capacity of policies (Figure 2) and the adaptive capacity of farmers and irrigation communities (Figure 3) present the criteria that is analysed in Chapters V and VI for the regions of Catalonia and Navarre. For the analysis of the policies, plans and programmes the criteria is determined but still fuzzy by definition and quite open. Therefore, the actions disposed by the policies can fit in more than one criterion. The analysis of the farmers and irrigation communities' management is more concise due to the use of indicators for every criterion.

IV. Research Methodology

In a research study the main aim is to find answers to a set of questions defined within a theoretical discussion and research approach, which will be answered through the use of different research methods and techniques. The aim of this dissertation is to discover if the agrarian sector develops adaptive capacity to cope with short and long term changes in relation to water. As adaptive capacity depends on several actors and factors, the dissertation focusses on two basic levels in enhancing its potential adaptive capacity: the policies written by the regional government and the water management practices of farmers and irrigation communities. Therefore, the main research question is:

- Is the adaptive capacity of the agrarian sector in relation to water management enhanced in the Ebro River Basin?

To unpack this, two sub questions are formulated:

- Are the existing plans, programmes and policies implemented in Catalonia and Navarre enhancing the adaptive capacity of the agrarian sector in relation to water management?
- Are the actual practices of farmers and irrigation communities in those regions enhancing the adaptive capacity of the agrarian sector in relation to water management?

The nature of the research is descriptive as the enhancement of the adaptive capacity is attempted to be described from two different levels based on the existence or not of a set of criteria. The two levels of analysis are the regional policies and the final water users (farmers and irrigation communities). At the same time, two regions of Spain that take part of the Ebro River Basin are studied: Catalonia and Navarre. The approach and tools for the empirical research used in the dissertation are in general qualitative.

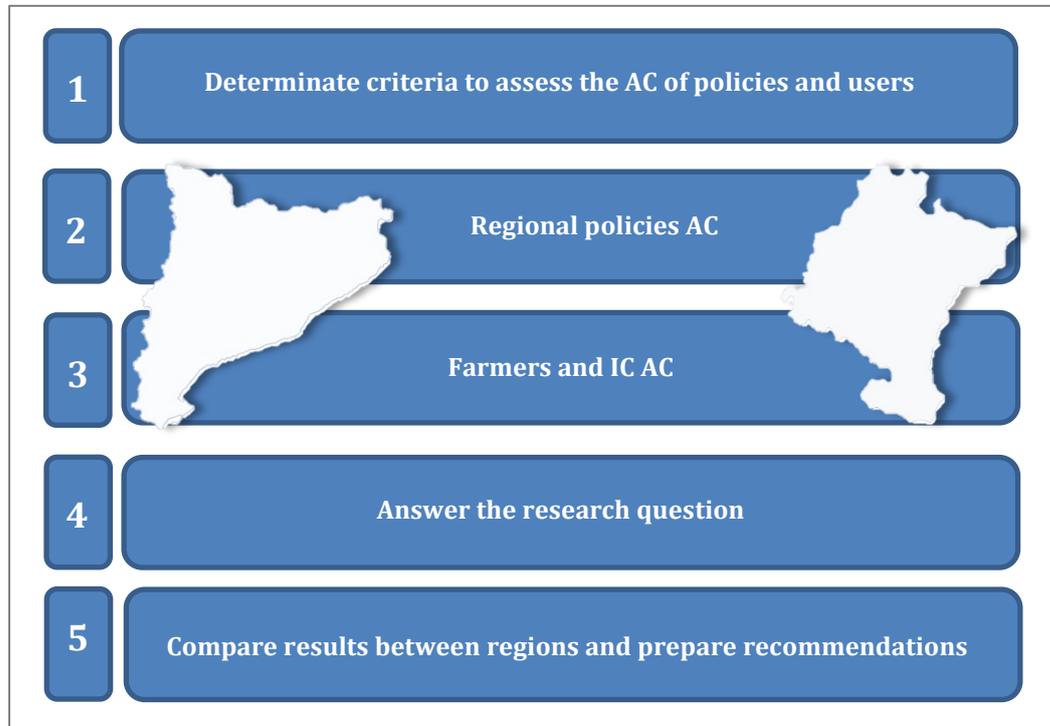
Although many actors, institutions and organizations affect the behaviour of the agrarian sector and its adaptive capacity, only the two mentioned levels are considered. This choice is based on the importance of both within the sector. Agriculture is a regional competence and the influence of regional policies, plans and programs in the sector is notable. On the other hand, the farmers and irrigation communities are the ultimate water managers and have traditionally had a wide range of action in the resource use. Thus, both the policies and the farmers and IC's practices can show if the potential capacity of reorganisation and restructuring of the sector in front of changes in water availability, distribution or quality is enhanced or not.

First of all, I revised literature about adaptive capacity in order to create a theoretical framework (Figure 4). Based on it, I designed two models of analysis to study, on one hand, the regional policies, and, on the other hand, the farmers and the irrigation communities' practices. Each model is composed by a set of criteria that is considered necessary to enhance the adaptive capacity of the sector.

After that, I analysed various policy plans and programmes in relation to water, agriculture, climate change and rural development from the two regions according to the key points of assessment identified in the theoretical framework. Water management and

irrigated agriculture is contemplated in the irrigation plan of every region. However, other activities and policy fields affect the management of the resource in the agrarian sector and it is necessary to count on them on the analysis of the adaptive capacity enhancement.

Figure 4. Main steps of the dissertation



Source: Author

Thus, in all the selected policies, water in agriculture is treated although in different degree and approach. For the case of Catalonia, the documents used are:

- Pla d'Acció per l'alimentació i agricultura ecològiques (2008 – 2012) – *Action plan for the ecologic food and agriculture (2008 – 2012)*.
- Programa de Desenvolupament Rural (2007 – 2013) – *Rural Development Program (2007 – 2013)*.
- Pla de regadius (2008 – 2020) – *Irrigation farming Plan (2008 – 2020)*
- Programa de mesures del Pla de gestió del districte de conca fluvial de Catalunya (2006 – 2015) – *Measures program for the management plan of the fluvial basin of Catalonia (2006 – 2015)*.

For the case of Navarre, the documents used are:

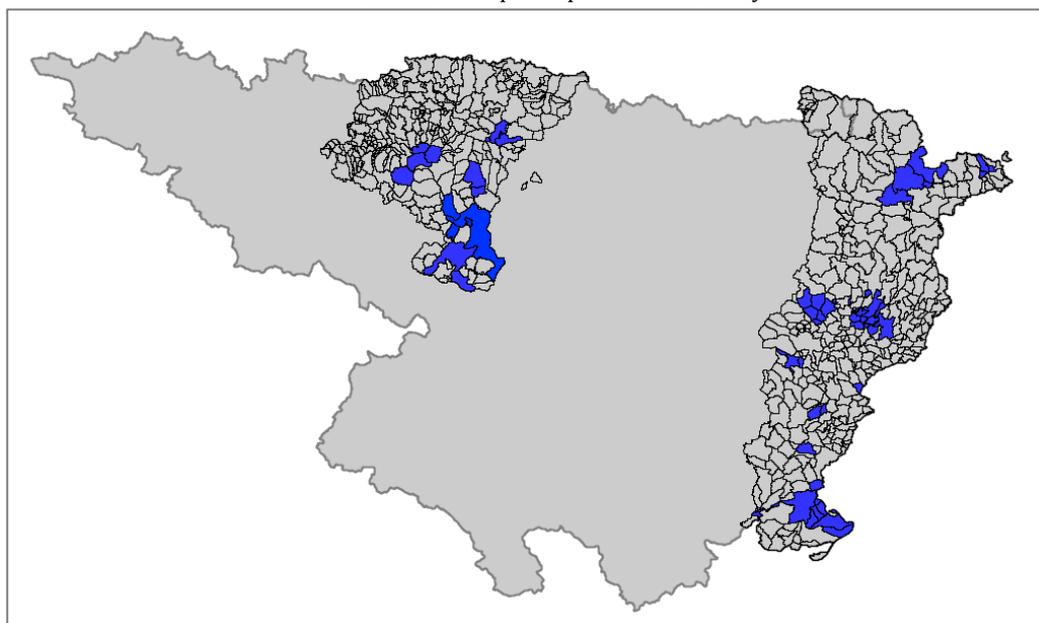
- Plan Estratégico de la Agricultura Navarra (2006) – *Strategic plan of Navarre Agriculture (2006)*.
- Programa de Desarrollo Rural (2007 – 2013) – *Rural Development Programme (2007 – 2013)*.
- Plan foral de regadíos (1998) – *Foral Plan for irrigated farming (1998)*.
- Estrategia para la gestión y el uso sostenible del agua en Navarra: metas y plan de Acción (2005) – *Strategy for water management and its sustainable use in Navarre: goals and action plan (2005)*.

- Plan de acción: Estrategia frente al Cambio Climático de Navarra (2010 – 2020) – *Action Plan: Strategy in front of Climate Change of Navarre (2010 – 2020).*

The method of data collection is essentially primary sources as there are no previous studies about the adaptive capacity in agriculture in relation to water management in the regions of study or about the selected regional policies.

To obtain information about the adaptive capacity of the system from the farmers and irrigation communities' actions, I conducted a set of surveys. No more source of information is used for that purpose. As the territorial context covered is large and in the territory there are many farmers and irrigation communities of variable nature, the most appropriate type of interview is the questionnaire. Questionnaires are cheaper, easier to respond and less time-consuming than interviews. The questionnaire is prepared according the theoretical framework and interviews with farmers in Navarre and Catalonia. The questionnaires are composed of a set of short closed-ended questions (Yes/No) as well as a few broad open-ended questions to deepen the contextual differences (Appendix 1). These questionnaires were sent to different irrigation communities and municipalities by mail. If the interviewee preferred so, the questionnaire was realized on the telephone.

Figure 5. Municipalities in the regions of Catalonia and Navarre within the basin boundaries from which farmers and IC have participated in the survey.



Source: Author

In order to guarantee the diversity within the regions, several questionnaires were sent to farmers and irrigation communities trying to ensure variance the regarding number of members, hectares of irrigated land, rainfall and dominant crop. Nineteen questionnaires were answered (Figure 5). From Catalonia, farmers from Sunyer, Torres de Segre, IC of Canal d'Algèrri-Balaguer, IC of Canal d'Urgell, IC of Quatre Pobles, IC El Vilosell, IC of Móra d'Ebre, IC of Palma d'Ebre, IC Canal d'Aldea Camarles, IC Sindicat Agrícola de l'Ebre and IC Sèquia de la Solana participated in the survey. From Navarre, farmers from Murillo el Fruto, from two sectors of the IC of the Navarre Channel, the IC El Ferial, IC Huertas

Mayores, IC Lerín, IC Murchannte and the IC Urraúl Bajo y Lumbier answered the questionnaire. The answered questionnaires are compiled in the Appendix II and III.

The analysis of the policies and the survey answers allows me to formulate some conclusions about the adaptive capacity in these regions and to solve the main research question of the dissertation. Moreover, the two regions can be compared as the criteria for the assessment is common and a set of recommendations per level and region are presented.

V. Analysis of the regional adaptive capacity of the agrarian sector in Catalonia

5.1 Policy analysis of the adaptive capacity of the sector in Catalonia.

Based on the criteria formulated in the theoretical framework (Figure 2), the results of the policy review of Catalonia that enhance the adaptive capacity of the sector are described. Thus, for every policy, the specific actions in relation to the criteria are classified (Table 4). In order to estimate this enhancement, three scores are defined: if the criterion is considered (✓), ambiguously considered (-) or not (or very poorly) considered (✖) in the policy, plan or programme. It is important to mention that some actions are transversal and can be embedded in more than one criterion. Finally, particular conclusions for these policies are stated.

5.1.1 Action plan for the ecological food and agriculture (2008 – 2012)

This plan was written by three institutional levels: an interdepartmental group, a technical work group from the regional Ministry of Agriculture and Rural Development of Catalonia (MARDC), and a Social Table gathering representatives of ONGs, farmers' unions, agrarian associations, merchants' associations... among others. The objectives of the plan are to promote the information, consumption, production and innovation in the ecological farming and food. One of the principle aims of organic production is to promote the healthy use and proper care of water resources so there is a strong link between water and organic agriculture (Rigby and Cáceres, 2001). The implementation of the plan is principally responsibility of the MARDC.

From the different actions proposed, learning and experimentation have a significant relevance. The regional government aims to carry out pilot projects and analysis about the ecologic agriculture (EA) in order to expand its presence. Moreover, it proposes to design and manage a data base about phytosanitary products and fertilizers to assess farmers and specifically analyse the benefits of the EA over the hydric balance in the Catalan context. It also mentions the elaboration of a good practice guide, the design, promotion and adaptation of educational courses (for different actors and sectors) and the creation of specific roles to coordinate future experimentations and helping the farmers.

The monitoring and adjustment task represents an important part of the plan. The actors involved in the policy making process (Social Table, Sectorial Platform, and the MARDC) are responsible of this task using a set of indicators listed. Even, an Observatory is created to constantly review the plan and its implementation. Based on some studies, the subsidies given are expected to be adjusted and new actions to be proposed. The plan contemplates the creation of an Investigation Committee to detect the necessities of research, technological transference, education and divulgation.

Every action presented has a specific financing in time. Thus, each action to promote the EA has a closed and specific budget during the years the action is implemented. The economic subsidies to promote the production mean an important part of the funding. As human resources, the plan considers the figures of ecological farming agents and

consultants. However, less attention seems to be given to technical infrastructures and mechanisms in the regional plan.

The plan contemplates the supporting social initiatives in projects and local initiatives. It gives importance to technological transfer within the sector. Moreover, the creation of the Sectorial Platform or the Observatory means the coordination and networking of different actors and levels that participate in the agrarian sector. Thus, the variety in relation to actors and levels is relatively high in problem frames, actions designed, implantation, resources and monitoring tasks.

5.1.2 Rural Development Program (2007 – 2013)

This programme was written by the MARDC with the help from other regional Ministries. It is the principal tool to implement the Directives and strategies from the European, national and regional levels, in relation to rural development. The agrarian sector and its promotion are a key part in the development of this type of areas. Another strategic objective of the programme is encouraging environmental improvement.

Due to the important social component of the Rural Development Program (RDP), several consultations were carried out to design the strategic lines and the catalogue of actions. The actors involved were from different social and economic agents of various sectors and public administrations. Thus, the process of policy making was carried out with broad public participation. As the program comes from upper scale legislation, the coordination of the regional program with the European and National policies is detailed and accurate. Nonetheless, the coordination with lower levels is non-existent and proposals to improve and enhance the social networking at lower levels are not considered.

The program basically focuses on detailing economic subsidies. Those, among others, try to promote sustainable practices by giving economic help to the land owners that use eco-friendly fertilizers or phytosanitary products or the ones that carry out ecological or integrated agriculture⁷. Those practices are water quality and availability beneficial. At the same time, the program aims to generously help land owners in improving the agrarian irrigation infrastructures by technical solutions: land consolidation and efficient water plot irrigation mechanisms to save water and energy.

The document also takes into account the learning and experimentation criteria. For example, different educational courses and information exchange at different levels, professionals and government employees are considered. The program mentions the creation and implantation of advisor agents for the management of agrarian production and carrying out Social Public Partnerships in innovative experimentation.

Monitoring and review systems for the plan are included in the document through a tracking committee. This is composed of representatives of institutions and various sectors. Due to the implementation results and new proposals, the programme can slightly

⁷ The Integrated Agriculture is a type of agrarian production that use practices compatible with the protection of the environment, the natural resources and the genetic diversity. It is similar to the ecologic agriculture but the integrated agriculture allows a limited use of some agrochemical products.

change. In spite of this, there is no consideration of improvement of the proposals through experimentation results.

The content of the programme is varied in relation to actors involved in policy-making and favoured by the actions. However, the majority of the actions are helping the farmer economically to continue with farming and trying to conduct its practices to more environmentally respectful ones. Thus, the actions proposed are mainly technical and the aim of those is increasing the efficiency of the irrigation system, not being more robust. At the same time, in order to modernize the sector, the government intends to retire old farmers. That action can be counterproductive as experienced people are removed from the sector and so is their knowledge of past events and experimentation.

5.1.3 Irrigation farming Plan (2008 – 2020)

This is a specific plan for the water management in farming in Catalonia so the approach is highly sectorial. It was written by the MARDC, through an external consultancy, and the principal aim of it is liberating the sector from the resource variability that water has in Catalonia. It is not clear to which degree other actors from the sector participated in the policy-making process.

Although the actions proposed are mainly technical focused in ensuring the availability of the resource during the whole year and reducing its consumption, the plan takes into account the necessity of experimentation and information access and exchange. There is a web portal to inform farmers and irrigation about the meteorological events, education opportunities, new technologies, sustainable practice in irrigation and production, consulting tools, etc. However, nothing is mentioned about its promotion or maintenance. In the same line, the government promotes research through educational institutions and universities, so both public and private sector participate in the research. Moreover, the government involved farmers and irrigation communities in the creation of a tool for asking advice.

In terms of monitoring, the document does not include who, how and when it should be reviewed and updated if necessary. The actions are highly detailed and specific in time and place so the room for adjustment is too limited. In spite of this, the plan contemplates that continuous cabal and quality control of water (superficial and underground) will be carried out. It also talks about being *flexible* and *adaptive* in relation to water management but this is only considered in the presentation of alternatives actions.

The actions proposed are mainly designed to partially fund the modernization of traditional farms, by improving the irrigation and water transport systems, and for the implantation of irrigation farms in potential areas for the enlargement of this type of agriculture. This funding is direct for infrastructure improvement and implantation or indirect by helping the farmers and irrigation communities with these works through credit facilitation. Like the Rural Development Program, the economic and infrastructures resources are clearly promoted but the human resources are, comparatively, almost forgotten. The plan talks about helping the irrigation communities in their task, but this is probably just economically.

The variety of actors, levels and sectors involved and participated in the plan is low due to its sectorial nature. Nonetheless, there are specific peculiarities among farmers or irrigation communities that the plan could be contemplate. Furthermore, although several technical measures are listed to increase the water efficiency and saving and securing that the resource arrives everywhere equally, the variability is reduced as the technical actions are too strict and previously designated. It gives the impression that the engineering frame is the only problem frame considered in the document.

5.1.4 Measures program for the management plan of the fluvial basin of Catalonia (2006 – 2015)

The hydraulic planning of basin is responsibility for the Ebro Watershed Management Body but, due to the fact that other activities may be affected by the resource, the regional government of Catalonia prepares actions and tools for hydrologic planning in the region. Thus, some of the listed actions in the program include territory of the Ebro Basin. Some of these are, particularly, in relation to managing the demand, the quality of the resource and in modernizing the irrigation land. The latter objective is said to have positive repercussions in water saving and reducing the diffuse contamination.

The actions listed on the plan are very technical and precise: detecting vulnerable areas of contamination, decontamination of underground waters, design protection perimeters, improvement of collectings, underground water recharge, seal and perforation of new dwells if necessary, construction of new irrigation infrastructures, prevention and mitigation actions against invading species in the irrigation system, reuse of water, etc. In order to do so, the government funds these actions.

Besides these technical proceedings, the plan considers preparing action programs for the nitrate vulnerable areas so to study them and prepare future concrete actions/plans. Furthermore, the plan mentions projects to model the availability of the resource and detailed studies in punctual areas. In spite of this, the result of this experimentation is not expected to be used for the plan.

Although the multidisciplinary and multi-sectorial nature of the plan, the document was written by the Catalan Water Agency. Moreover, adjustment of actions is mentioned only for punctual cases. The plan is only reviewed once objectives have been reached. Thus the criterion of multi-stakeholder participation and social networking are obviously not enhanced. Similarly, the variety of actions, sectors and actors is debatable.

5.1.5 Conclusions about these plans

From the document analysis Table 4 is completed to outline the criteria results. From the four documents studied, the Action plan for the ecologic food and agriculture (2008 – 2012) is the one with the best score results as all the criteria are positively considered. The action plan is then an example for the rest of the policies. Contrarily, the Measures program for the management plan of the fluvial basin of Catalonia (2006 – 2015) is the document with the most negative scores, only learning is well considered in the program. These low criteria scores could be partly caused by the sectorial agency in charge of the plan, the Water Agency of Catalonia. This organization seems to have a very proud and with a clear scientific and engineering identity. Moreover, the agency didn't involve other

actors that could give new and different positions and opinions that would have enriched the document.

The only criterion with negative score is the multi-stakeholder participation and networking. In two documents, the Irrigation Farming Plan and the Measures program for the management plan of the fluvial basin, few actors were involved in the policy making process and its implementation. In particular, networking of the regional level with lower levels and the different associations and organizations at lower levels is usually not considered with the needed attention. Generally, due to the legislative hierarchical order, regional policies are well coordinated with superior levels (national and European) and just expect that those will be accepted by lower levels. Although the importance of social capital as an important asset to enhance adaptive capacity (Smit et al., 2001), organizations or associations of the sector are not promoted nor considered as important agents for policy making, implementation and monitoring. In the case of the agriculture sector, there is a strong tradition of agrarian associations and the existence and work of irrigation communities.

Table 4. Results of the criteria enhancing the AC of policies in Catalonia

Criteria enhancing the AC of policies				
Learning, experimentation, knowledge generation	Multi-stakeholder participation and networking	Room for change and adjustment	Resources	Variety
Action plan for the ecologic food and agriculture (2008 – 2012)				
✓	✓	✓	✓	✓
Rural Development Program (2007 – 2013)				
✓	✓	-	✓	-
Irrigation Farming Plan (2008 – 2020)				
✓	x	-	✓	-
Measures program for the management plan of the fluvial basin of Catalonia (2006 – 2015)				
-	x	-	✓	-

Source: Author

The room for change and adjustment criterion is dubiously considered in most of the policies. Monitor activities are considered but this is mainly done by the regional government, without other stakeholders' participation. The process to do so is also straight forward and based normally on quantitative indicators. However, the most important lacking aspect is linking experimentation and room for adjustment. This is hardly taken into account with the exception of the Action plan for the ecologic food and agriculture. Nonetheless, an evaluation of this plan in 2011 by the MARDC highlights that by most of the interviewees the plan review was "systematic", "disciplined" or "strict" in formal and content aspects (Institut Català d'Avaluació de Polítiques Públiques, 2011). Thus, there seems to be a contradiction in the regional policies vision. They wish to promote learning, experimentation and knowledge but forget to use it in the long-term to enrich the whole system and not only individuals or organizations in a particular moment in time.

Something similar occurs with the variety criterion. The variety of solutions and actions proposed by the policies is commonly narrow and too focused on subsidies and technical solutions for water availability and quality. Conversely, the resources criterion registers good values in all documents studied.

There are evaluation documents for the Action plan for the ecologic food and agriculture (2008 – 2012) and the Rural Development Program (2007 – 2013). For the first plan the most important implementation pitfalls in relation to the criteria are the monitoring of the plan, as mentioned, and the lack of economic resources for innovation promotion and research, very important for learning and information exchange. The Rural Development Program (RDP), on the contrary, seems to have a more elaborated process for the monitoring of the document. The European Commission Regulations 1698/2005 and 1974/2006 establish specific dispositions for the RDP that regulate the evaluation and follow of the programs. The EC even prepared a Common Framework of monitoring with guidelines for this system of evaluation and review. Then, every year, the program must be monitored and informed using a set of indicators for every action proposed in the program. Apart from updating the results, the indicators should also be reviewed and modified if necessary. The work done by the regional government is following strictly the European rules and the evaluation reports are complete and precise. In spite of the large amount of data collected, there are no final recommendations and actions to take so as to improve the results.

5.2 Farmers and irrigation communities' analysis in Catalonia

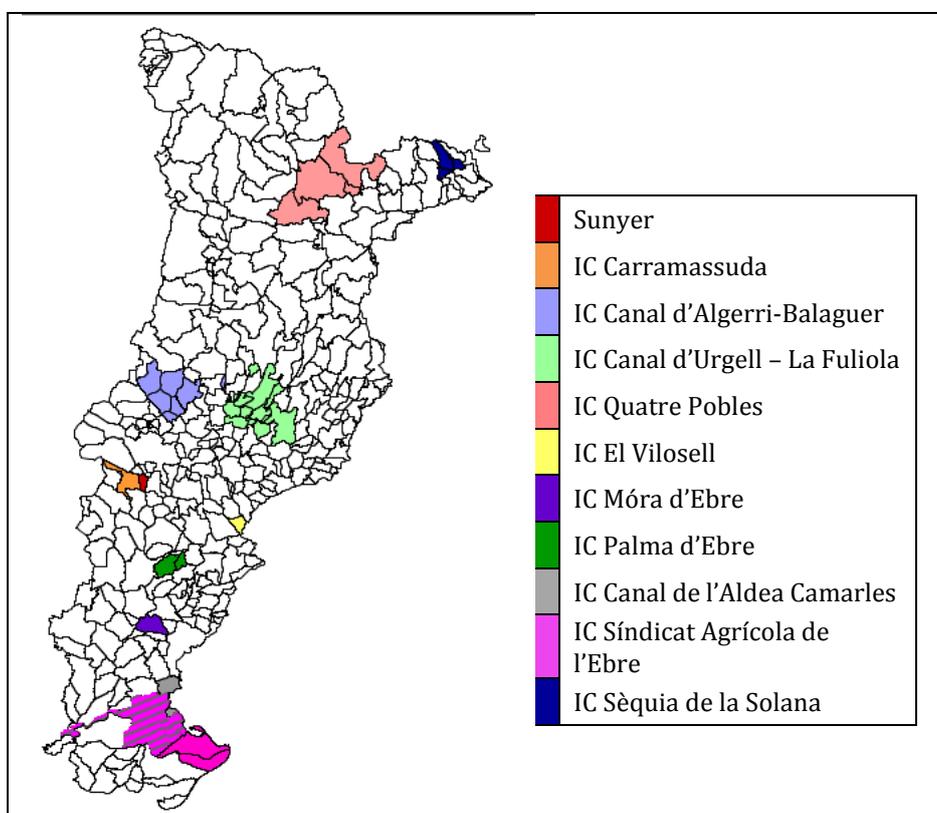
Through the questionnaire results, the criteria of the model presented in the theoretical framework (Figure 3) are assessed quantitatively. The score applied, in contrast to the one used in the policies assessment, represents how adaptive capacity is enhanced through the answers marked. If the majority of the answers have a positive answer (more than 66% of the answers), it is considered that the adaptive capacity for the criteria is positive (✓). If less of the 33% of answers for the criteria are positive, the adaptive capacity is not enhanced (*). If the results were between these two percentages, the effect on the adaptive capacity is dubious (-).

In Catalonia, eleven questionnaires were answered: one by a farmer from Sunyer and eight by irrigation communities (Figure 6). The irrigation communities are:

- The irrigation Community of Carramassuda that covers irrigation land in Torres de Segre.
- The irrigation Community of Canal d'Algerri-Balaguer that distributes water to land in seven municipalities: Algerri, Albesa, Castelló de Farfanya, Menàrguens, Torrelameu and Balaguer.
- The second collectivity of the IC Canal d'Urgell, known as Fuliola. The irrigation community distributes water to 70.000ha of land approximately and for its organization the community is sub-divided in collectivities. The interviewed one comprises farms from ten municipalities: Agramunt, Puigverd d'Agramunt, Tàrraga, Tornabous, Barbens, La Fuliola, Castellserà, Penelles, Anglesola and Ivars d'Urgell.

- The IC Quatre Pobles in the municipalities of la Seu d’Urgell, Montferrer, Valls den Valira and Valls d’Aguilar.
- The IC El Vilosell in the municipality of the same name.
- The IC Móra d’Ebre from Móra d’Ebre
- The IC Palma d’Ebre, distributing water to farms in Palma d’Ebre and la Bisbal de Falset.
- The IC Canal d’Aldea Camarles that distributes the resource to Tortosa, l’Aldea, Camarles, l’Ampolla and El Perelló.
- The IC Síndicat Agrícola de l’Ebre that manages water in farms in l’Aldea, l’Ampolla, Camarles, Deltebre, Sant Jaume d’Enveja and Tortosa.
- The IC Sèquia de la Solana that distributes water to municipalities in the north-east of Catalonia: Saneda, Bolvir, Ger, All and Isòvol.

Figure 6. Municipalities in the regions of Catalonia from which farmers and IC have participated in the survey



Source: author

The results of the questionnaires show that none of the farmers and IC has a positive score for every criterion. Analyzing the criteria, leadership and fair governance seems to be commonly enhanced, with the exception of the IC El Vilosell and the IC Sèquia de la Solana. Contrarily, the variety criterion and the room for change criterion display negative or dubious scores in general. The IC Quatre Pobles is the only association that enhances all criteria.

In terms of variety, there are particularly bad scores for question 4, 5 and 10 (Figure 7). It can be said that generally there is one water intake only for the irrigation of land, rain-fed farms are dominant and farmers regularly direct their farms for business. The low results in terms of room for change are mainly due to the fact that farmers do not take into

account water availability or water price in their farms. This is especially important in enhancing the AC in relation to water management and can happen due to the infrastructures built. These secure the amount of quantity in almost every season even when the resource is scarce. Another possible reason is that, in case of important water scarcity, as some farmers pointed out, the institutions (at different levels) and the irrigation communities are the ones responsible for acting by reducing the amount of water available, for example, during the drought period. Thus, the farmers just accomplish the rules given. It is difficult to explain why the farmers do not take into account water price in their activity. One of the reasons can be the low price of the resource for agriculture in Spain. Although the country has an important hydric stress, it has one of the lowest water price lists in the EU (Iagua, 2012). Nonetheless, others can be the reasons like the acceptance of the price for the profit that irrigated land gives in comparison to rain-fed production. In Spain, the relative productivity of irrigation land is 7.3 times in relation to rain-fed land (Corominas, 1996). Although this results in the room for change, most of the interviewees affirm that farmers are open to change and to innovative solutions.

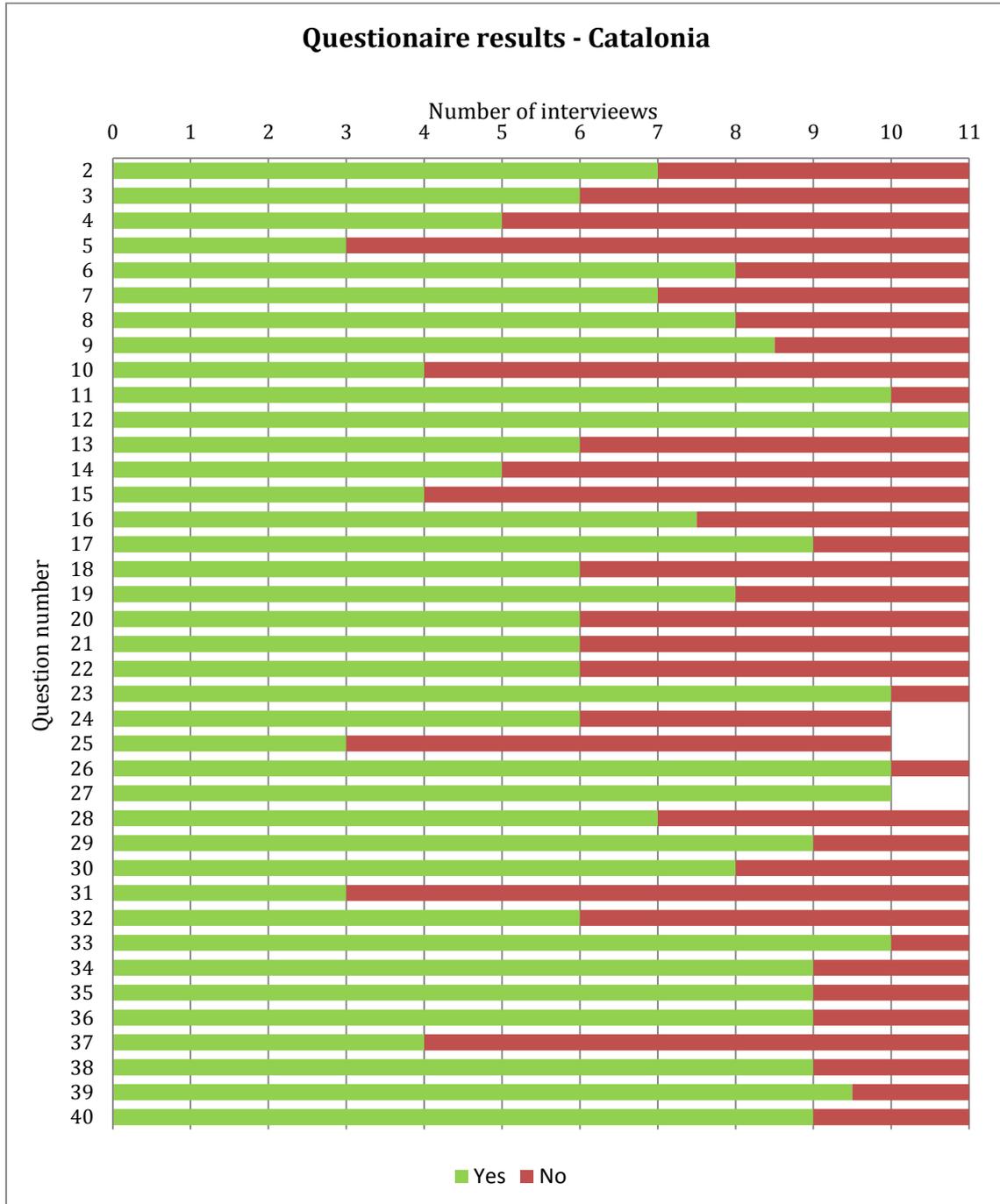
Table 5. Results of the criteria enhancing the AC of farmers and irrigation communities' practices in Catalonia

Criteria enhancing the AC in farmers and IC practices					
Variety	Learning, capacity	Room for autonomous change	Resources	Leadership	Fair governance
Sunyer					
✗	-	-	✓	✓	✓
IC Carramassuda					
✓	-	-	✓	✓	✓
IC Canal d'Algerri-Balaguer					
-	✓	✓	✓	✓	✓
IC Canal d'Urgell - La Fuliola					
✓	-	✗	✗	✓	✓
IC Quatre Pobles					
✓	✓	✓	✓	✓	✓
IC El Vilosell					
✗	-	✗	✗	✗	✗
IC Móra d'Ebre					
✓	-	-	✓	✓	✓
IC Palma d'Ebre					
-	✓	✓	✓	✓	✓
IC Canal de l'Aldea Camarles					
-	-	✓	-	✓	✓
IC Síndicat Agrícola de l'Ebre					
-	✓	-	-	✓	✓
IC Sèquia de la Solana					
✓	✓	-	✗	✗	✗

Source: Author

The learning capacity is dubious in most cases but it should be mentioned this is mainly due to the negative results that the use of internet (question number 13 in the questionnaire) has among farmers and IC (Figure 7). The positive of the other two questions in relation to learning, however, ensure that information and knowledge is usually ensured as farmers help each other and talk about their work and productions.

Figure 7. Results of the questionnaires for farmers and IC in Catalonia.



Source: Author

Resources have good results with the exception of IC La Fuliola, IC Vilosell and IC Sèquia Solana. Almost all the interviewees consider the infrastructures are correct in the area and in general farmers think that the inversion in irrigation technologies is recovered. Human

resources available for farmers have very good values although the knowledge of subsidies and help is not recognized by all the interviewees and part of the IC assure that it is difficult to receive economic help. In general, although there are computational technologies for the irrigation of farms, those are not common. The answer to this question (number 31 in the questionnaire) is habitually negative.

It can be said that leadership and fair governance play well among farmers and irrigation communities in Catalonia. In spite of this, there seems to be low trust in governmental institutions (question 37). The case of Vilosell and Sèquia de la Solana are particularly interesting as leadership and fair governance criteria have very low rates. In fact, both IC declared not having important visionary or collaborative figures among farmers and also that the authority of the irrigation community is not well-recognized. These facts have a connection with the inequality when participation in the IC, the low legitimacy and accountability of the association and the fact that farmers don't trust each other. The interviewee in the IC Vilosell explains that the irrigated farms are worked by old people and for their own consume. That characteristic may explain the low values in leadership and fair governance, as mentioned, but also the totally negative value scored in room for change and resource criteria. Nonetheless, the IC Sèquia de la Solana has varied farmers in terms of age and education and the farms are for business but presents bad scores for leadership and fair governance. Thus, there is no defined pattern among farmers and IC that explains good and bad scores in the different aspects studied.

As the most important events happening in the area in relation to agriculture, the most common is the modernization of the irrigation system in the plots like in the case of IC Móra d'Ebre or IC Quatre Pobles. The interviewees also consider the built of important channels, like in Sunyer, IC Canal d'Aldea Camarles or the IC of Algerri-Balaguer, as a significative event. These kinds of infrastructures have meant the expansion of irrigated farms. Irrigation is regarded by the farmers as a more profitable type of agriculture rather than rain-fed farming however nowadays even rain-fed crops, like olive grove, have support irrigation. The four interviewees that estimated negatively the infrastructures and system in the area ask for different improvements: IC Aldea Camarles thinks that an irrigation plan should be written and implemented, IC La Fuliola and IC Sèquia la Solana hopes to improve the irrigation system for crops; and Vilosell would like to increase the surface of irrigation land through technical possibilities.

One farmer from Sunyer who was interviewed by the author expressed that water infrastructures in the area were good, that the sector survives thanks to governmental subsidies and that it must to be restructured urgently. In his opinion, there are many environmental regulations that amply the costs of the production and many intermediaries that increase the final cost of the product. Therefore, the demands that every IC and farmers in the area can change and depend on many factors, but specially the tradition the area has in irrigation land and the availability of water.

VI. Analysis of the regional adaptive capacity of the agrarian sector in Navarre

6.1 Policy analysis of the adaptive capacity of the sector in Navarre

Similarly to the analysis done for the region of Catalonia, the adaptive capacity of the agrarian sector in Navarra in the policies is studied using the theoretical framework presented in Chapter II. At the end of the description of each policy, conclusions are formulated and a summary of the results is presented in Table 6.

6.1.1 Strategic plan of Navarre Agriculture (2006)

More than 130 stakeholders were involved in the plan of the regional Ministry of Farming and Food of Navarre (from now on, DAGA) and of different spheres of the sector: farmers, producers, distributors, local governments, technicians, consumers... etc. The development of the document was considerably iterative and bottom-up. The process of policymaking was done in an open arena where the government involved the sector in study and work groups and where more than 160 specialists participated directly. It was oriented to obtain strategic actions based on an analysis and diagnostic of the sector situation. The objectives of the plan are economic, like the quality and efficiency of the sector in a competitive world; social, like the maintenance of population and its culture in the territory; and environmental, like promoting environmental quality and maintaining the rural landscape. The plan is coordinated with other European, national and regional legislation in relation to the environment and public health security.

Generating knowledge and distributing it to the different actors of the sector is treated as a fundamental matter. The plan details many programs and projects in order to: enlarge in the experimentation of new products and improvements in irrigation land, new irrigation technologies and re-plot the land; educate and advise about irrigation land or in the conversion of rain-fed plots into irrigation plots; give technical counselling to irrigation communities; demonstrations of the available technology; experimentation and knowledge transfer of ecological agriculture; education and information to the governmental and technical workers; improve the availability of agrarian data on the internet; encourage innovation, among others.

The plan, besides generating information and experiments, mentions that these are used for the monitoring of the sector. In that sense, a program to analyse, assess and monitor environmental impacts of the agrarian activity is incorporated. The counselling service mentioned before, is a tool for monitoring too. Moreover, the plan intends to adapt the subsidies given to the actual necessities and the environmental legislation to the context of the region. The plan expects to identify knowledge gaps and necessities of information and use technologies to update data. So, the room for adjustment in the plan is perfectly covered. Moreover, as it indicates, the “document is open and dynamic” (p. 84). A Monitoring Commission is to be created to control the implementation of the strategies and coordinate the different agents involved. To monitor the sector, an Observatory is expected to be created too.

The plan, then, finances the experimentation and projects of diversification, optimization of irrigation systems and transformation of land to irrigated farms. Also, the plan contemplates giving economic help to irrigation communities, local entities and landowners for the restructuration of traditional irrigation farms and other transformations of the irrigation system. The document considers, moreover, the implantation of telecontrol in irrigated farms and compensatory subsidies for the production of ecological and/or integrated agriculture. As pointed before, the document aims to promote the availability and technical advice of governmental and institutions and resources for exploiters, landowners, agrarian associations, irrigation communities and local entities. In general, the document wishes to improve their human resource services being closer to the rural reality.

The variety and number of stakeholders in the content and process of the policy making is clear. The coordination and connection between the agents of the sector is evident. The document talks about increasing the governmental actions and information with the irrigation communities and local entities and to improve the coordination of the various Ministries that interact in the sector. Even the exchange of information between the sector and other activities, like participating in forums created by the WFD, it is necessary to coordinate the research and education in order to improve the transference of knowledge.

6.1.2 Rural Development Program (2007 – 2013)

This extensive policy firstly analyses the situation of the rural areas of the region taking into account the economic sectors, the environment and the quality of life, to after describe a large set of programs and actions to carry out in order to improve the competitiveness of the agrarian sector, improve the rural environment and the quality of life and develop local initiatives in relation to employment and economy. The plan has as a specific objective the coherence of the plan with the European planning and tools. This results from the fact that the European Commission (EC) developed a specific line of help through the Agrarian European Fund of Rural Development (FEADER) in 2005 that obligated every state member to do a strategic rural plan to improve these zones. The State Environmental Ministry worked, then, on a framework for all the regions. The actions are structured around four axes by the EC and those are respected in the state and regional resulting programs.

This program from Navarre was developed mainly by the DAGA but other regional ministries participated like the Ministry of the Environment, Spatial Planning and Housing, the Ministry of Culture and Tourism or the Ministry of Economy. This document was subject of a consultation process where economic and social agents, like agrarian cooperatives, work unions, the federation of municipalities of Navarre, ONGs, etc, participated actively. As the regional government recognizes, the Rural Development Program is one of the principal tools to structure the agrarian governance in Navarre. Thus, it is important to analyse this program to know the adaptive capacity of the agrarian sector.

The main directions of the document are related to the description, in great detail, of the actions that are subsidized or economically facilitated. In relation to water and agriculture, the government would give economic help to the farms that want to modernize in

diversifying the production and crops, carry out practices to protect water quality or/and to implement technologies that increase the efficiency of water use. Also, if the farmer lives in a rural area and carries out ecological agriculture and respects the environmental legislation, he or she would receive a certain amount of money to compensate for the related money loses (compared to traditional farming). Moreover, the program indicates in its diagnosis of the rural situation that although water is sufficient in the region, the flow of the resource is irregular. Therefore, a set of infrastructures are needed to secure its adequate use where and when needed: reservoirs, supply networks, big and small channels of distribution, etc. In this line, the program expects to improve some water infrastructures and to boost some others that are of regional or state interest. The document also contemplates the human resources. A consulting service for farmers is planned to be implemented to help them in economic and environmental issues. The document is notably worried with the gap between the legislation and the farmers and the bad reputation that environmental practices and legislation has within the sector. Farmers think that environmental measures taken lately have increased costs besides being time consuming and too complex to understand. It is particularly suggested that these advisors can help farmers to determinate the reference consume of irrigation water. In that sense, many regional policies are taken into account in the scope of the document.

The generation of knowledge and its transference and experimentation is insufficient. Learning is promoted economically by the program if local entities, both public and private, decide to develop educational projects and programs in relation to some themes. Among these themes, one can find projects of conservation, recuperation and restoration of natural resources and the projects of education, good practices and innovation.

The document is evaluated *ex ante* and prepares a large list of indicators for the program implantation and for every objective to be achieved. However, there are no actions considered to review the actions and improve the program in its implementation or to facilitate its adaptation through time if necessary.

In terms of variety, the document seems correct. Economic resources are widely explained although all of them are focused on improving existing technology and human resources are considered. Various stakeholders were considered in the policy making process and they are considered in the measures presented. Nonetheless the problem frame and the solutions exposed seem to be too narrow and strict in some of the actions in relation to water management.

6.1.3 Foral Plan for irrigated farming (1998 - 2018)

The plan was written in 1998 to promote farming and to increase its potential taking into account environmental, social, technical and economic criteria. Besides, other objectives of the plan are rationalizing the water use, protect the territory against depopulation, increase the information of the sector and improve the methodology and procedures of projects. It is worth mentioning that the entire document is not available and only the executive summary of it is public and available online.

The principal strategy course is to create new irrigated land and the modernization of traditional irrigated farms. The plan includes the study of new zones for irrigation and the education of farmers in new irrigation and environmental skills. Although nothing is

mentioned about the monitoring and review of the plan, the plan prepares the review of pending studies and the diagnostic and the monitoring of the transformed irrigated land in order to improve the projects of work to implement.

The plan is thus focused mainly in improving and transforming the irrigated land through methods to rationalize water use. The environmental benefits are highlighted: quality improvement, more flowing water in the channels, decreasing the diffused contamination, better availability of water for all uses and reduction of wetland affection. A closed budget is presented for its implementation but no more details are public in relation if more stakeholders are expected to participate in this phase or which is the relation of this regional plan with local authorities and organizations.

6.1.4 Strategy for water management and sustainable use in Navarre: goals and action plan (2005)

The plan was approved by the Planning, Housing and Environmental Commission of the Navarre Parliament on 2005. The implementation of the document was from 2005 to 2009 and no other plan has been presented since then although the year 2010 was the deadline to implement the WFD and that state basin plans of basins in the region were reviewed on 2010 and 2011. For this strategy for water management, stakeholders were invited to discuss the draft presented by the Environmental General Directorate of the regional Ministry of the Environment and Spatial Planning and, after some modifications, a mixed Commission finished the document.

This document encompasses seven goals that are expected to be achieved. One of them is especially ambitious as it counts on achieving a new water culture in the use and enjoyment of the resource through social involvement and information, a new water culture in its use and enjoyment. Every sector and user is included in this objective. Thus, the social participation and involvement in water management is essential in the plan. This is going to be done through programs of support, information and education to several and varied sectors and entities. The knowledge generation is highly promoted as the document aims to forecast the future demand based on the study of available options and priorities of use. Specifically, the plan mentions that a program reviewing and updating the actual and future necessities of the irrigated land is to be done and to study which are the related infrastructures to build for this use. Moreover, several programs and projects are expected to be carried out to update the water data, the research studies and to improve the networks of information and control.

The room for change is also taken into account in relation to water management. The data and studies are going to be updated and reviewed in order to reconsider and restructure the programs of new infrastructures design. Even, specific infrastructures of reserve and irrigation systems are listed to be checked out because a big infrastructure (the Navarre Channel) was then projected and started. Nonetheless, how and who is responsible for the monitoring and review of the plan is not included.

The Strategy for water management was well coordinated with other plans (Foral Plan for irrigated farming) and legislation (Foral Law 1/2002 of Agrarian Infrastructures, Water Framework Directive). Also, the plan wants to coordinate and update the competences of

the different institutional levels and the regional legislation. In the same line, different actors and sectors are involved.

The resources proposed are generally technical for the agrarian sector: new infrastructures and improvement and modernization of the irrigation systems to save water. Different options are presented: underground water use, reuse of water, efficiency improvement, alternative resource use... Furthermore, human resources are taken into account, with the mentioned technical resources, as a target of the plan. The document details a financing for every objective and associated programs.

6.1.5 Action Plan: Strategy in front of Climate Change in Navarre (2010 – 2020)

Based on a diagnosis and various future scenarios, the region prepared this strategy and action plan to establish, in a coordinated way, the contribution of Navarre to the mitigation and adaptation to climate change. The elaboration of the plan was multi-stakeholder and multi-sectorial. Several actors were involved from different Ministries from the regional government (Business General Directorate, Agriculture General Directorate, Rural Development General Directorate, Environment and Water General Directorate, Tourism General Directorate, Transport General Directorate, among others) and from the general public during 2009 through informative and participative sessions. Among others, the energetic and industrial sector, universities, environmental groups or municipal entities took part of those sessions.

The region deals with the problem of climate change from two perspectives: a long term strategy until 2020 and an action plan, until 2012, with more concrete actions. Thus, in every goal of the plan in relation to emissions and sectors (reduction, preparation, transformation and traction), corresponding actions are described. One of the activities that actively participate is the agriculture.

For the primary sector, the document recommends the promotion of integrated and more sustainable production and an improvement of the efficiency of the irrigation and fertilization. This is expected to be achieved through the implementation of appropriate technology, education and advice to the farmers. Although these technical resources are mentioned, nothing is said about human resources or economic help for the sector actors and there is no clear financing for those resources.

Learning, knowledge generation and its diffusion are particularly considered. The document wants to reinforce data collection and the observation network to have sufficient and updated information about the agrarian sector. In the same line, the government intends to develop maps and scenarios for the design of climate and sectorial models. Furthermore, it is mentioned that new and more indicators of sustainability are needed and the coordination of the different actions must be developed. Besides this, the plan includes the development of a general educational program and a program of knowledge diffusion about climate change, resource depletion and energetic efficiency.

The plan expresses the desire of monitoring the plan using two lines: an internal, so to say, through institutional and governmental employees, and an external, in which the whole society can participate. In this line, the document lists a set of indicators for the sectors and fields involved to monitor the plan and review it.

Finally, the variety in learning and experimentation is generally described although, in terms of resources and solutions presented, this criterion is debatable. Nonetheless, the stakeholders involved during the policy making formed a heterogeneous group and different actions are exposed in the plan.

5.1.6 Conclusions about these plans

The strategic plan of Navarre Agriculture has a very good score as every criterion is enhanced while the Foral Plan for irrigated farming is the document where AC is less enhanced. This document uses a high sectorial and technical approach. This may partially be tied to the fact this is the oldest document among the ones analysed and that the engineering frame is too dominant. It is worrying that the plan of water management for the agrarian sector is not totally available and the degree of detail is too low.

Table 6. Results of the criteria enhancing the AC of policies in Navarre

Criteria enhancing the AC of policies				
Learning, experimentation, knowledge generation	Multi-stakeholder participation and networking	Room for change and adjustment	Resources	Variety
Strategic plan of Navarre Agriculture (2006)				
✓	✓	✓	✓	✓
Rural Development Program (2007 - 2013)				
-	✓	-	✓	✓
Foral Plan for irrigated farming (1998 - 2018)				
-	✗	-	-	-
Strategy for water management and sustainable use in Navarre: goals and action plan (2005)				
✓	✓	-	✓	✓
Action Plan: Strategy in front of Climate Change in Navarre (2010 - 2020)				
✓	✓	✓	-	-

Source: Author

Room for change and adjustment is particularly problematical among the evaluated policies. Nonetheless, there is no common pattern among the three documents that score dubious. The Rural Development Program (RDP) prepares a large list of indicators but doesn't take profit of the experimentation and learning processes promoted. This criterion, however, it is also not well determined. Moreover, it is not clear when and how the implementation is going to be adjusted through time. The Foral Plan for irrigated land expects to study and analyse in the future the transformed irrigated land but nothing is said about by whom and how it is this going to be done. Something similar happens with the Strategy for water management and sustainable use in Navarre as the studies and data are expected to be updated and reviewed but no more details are facilitated.

However the Strategic plan of Agriculture and the Strategy in front of Climate Change score good for the room for change and adjustment, the real implementation of these documents is far from what was supposed to be. There is no public monitoring or review report for the first plan and the second was withdrawn a year ago by the regional

government. On the contrary, and following the same EC regulations that in Catalonia, the RDP in Navarre is monitored and reported every year.

There seems to be a relation between variety and resources in Navarre. The documents with these characteristics do not enhance these criteria properly because of the low consideration of economic or human resources. Moreover, the financing of any action and resource is not well determined.

Except for the Foral Plan for irrigated farming, all documents enhance the multi-stakeholders participation and networking. The documents were written under DAGA's responsibility but other ministries and social organizations and associations were involved. Also, public consultation processes were carried out before the documents were approved. The documents are well coordinated with upper levels (national and European) and with lower levels (municipalities and mancomunidades). Moreover, the proposed action and subsidies listed in the policies take into account agrarian associations, irrigation communities and other local entities as target actors of the agrarian sector. The association of individuals and the involvement of social organizations and associations are promoted too.

6.2 Farmers and irrigation communities' analysis in Navarre

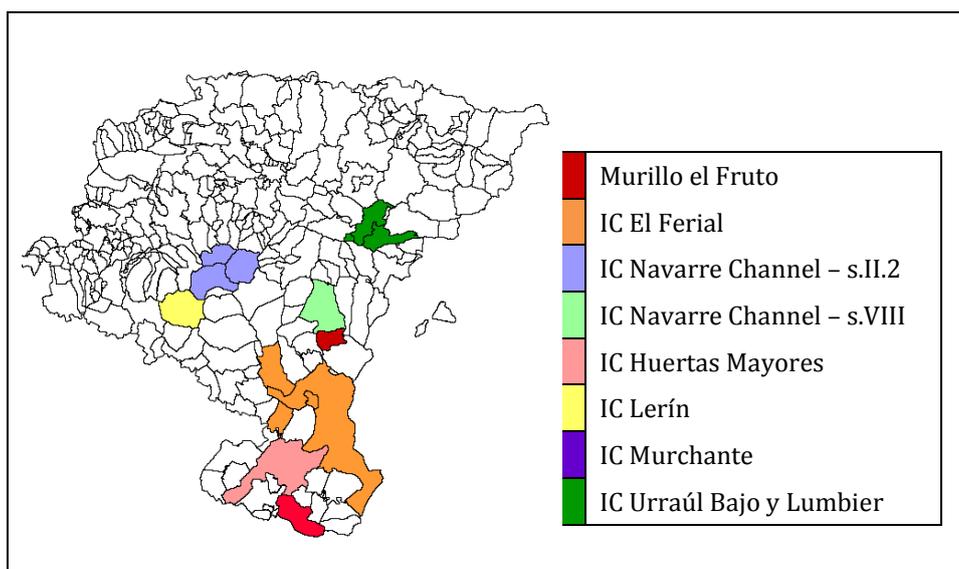
Using the same methodology as in the region of Catalonia, the answers of farmers in Navarre in relation to water management are summarized in the Table 7.

Eight questionnaires were filled in Navarre, one by a farmer in Murillo and Fruto and seven by irrigation communities (Figure 8). The irrigation communities are:

- The IC El Ferial that manages water in farms located in three municipalities: Valtierra, Caparroso and Bardenas Reales.
- The IC of the Navarre Channel nowadays distributes water to more than 20.000ha and the irrigation community is sub-divided into sectors to facilitate its organization. Two different sectors, the II.2 and the VIII, participated in the dissertation. The first sector covers 3.200ha approximately of irrigated land from Mendigorria, Larraga and Artajona. Sector VIII gives water to 243ha in the municipality of Ujué.
- The IC Huertas Mayores in the municipality of Tudela.
- The IC Lerín in the municipality of Lerin.
- The IC Murchante that irrigates land from the municipality of Ablitas.
- The IC Urraúl Bajo y Lumbier that distributes water to areas of both municipalities.

The results of the questionnaires show that none of the areas studied has a positive score for every criterion (Table 7). Analyzing the criteria, leadership and fair governance seem to be commonly enhanced, with the exception of the IC Murchante. The variety criterion and the room for change criterion display particularly negative or dubious scores in general.

Figure 8. Municipalities in the regions of Navarre from which farmers and IC have participated in the survey



Source: author

Although in the areas asked there is variety of irrigation systems in the area (question 2 in Figure 9), water usually comes from one source (one river) and the system of irrigation used per plot is well determined. It can be said that different crops are produced and the farmers have various ages (questions 6 and 7 in Figure 9) but the profile of the farmer is highly marked. While in Murillo el Fruto, El Ferial, Huertas Mayores and Urraul Bajo y Lumbier the production is for business, in sector VIII of the IC Navarre Channel, IC Lerín and IC Murchante the subsistence agriculture is majoritarian. The educational level and social background among farmers is very homogeneous.

The learning criterion, although having dubious result for some of the interviewees, scores very well as the farmers help each other (question 11) and there is information exchange among them (question 12) in the whole region (Figure 9). The only problematic point in some areas is the low use of internet and e-mail.

Room for autonomous change is dubious in the region of Navarre. Although all the interviewees consider that farmers are open to changes and innovations, in general they do not take into account water availability or its price as an important factor in their productions. Furthermore, they do not normally carry out preventive actions in case of droughts or floods. As the interviewee in Murillo el Fruto pointed out, water availability is not a problem in the region and in case of drought, the IC or the institutions are the ones that warn about it and take direct and mandatory actions to continue having water for the problematic period.

Resources score well except in two irrigation communities (Table 7). All farmers believe that is profitable investing in irrigation systems and that governmental advisors are easy to contact and useful. However, for some of the interviewees, subsidies and credit help are difficult to get and/or not well-known. Most of the interviewees consider that infrastructures in their area are correct but IC Huertas Mayores and IC Lerín think that water should be better regulated and that more efficient systems must be implemented to

avoid the traditional gravity irrigation. Those two interviewees are the only ones not scoring positively in the resources criteria.

Table 7. Results of the criteria enhancing the AC in farmers and irrigation communities' practices in Navarre

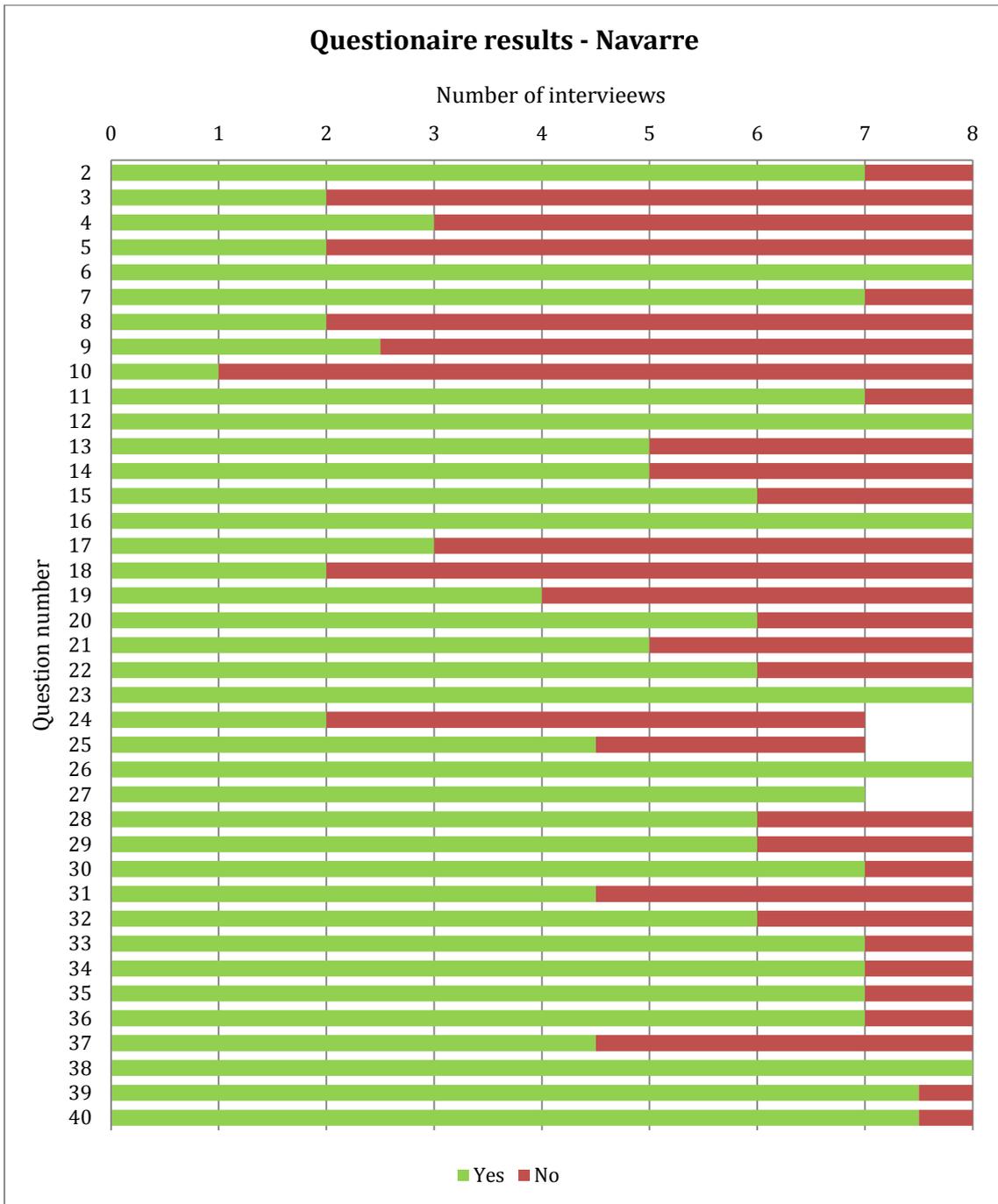
Criteria enhancing the AC in farmers and IC practices					
Variety	Learning, capacity	Room for autonomous change	Resources	Leadership	Fair governance
Murillo el Fruto					
-	✓	✓	✓	✓	✓
IC El Ferial					
✓	-	-	✓	✓	✓
IC of the sector II.2 of the Navarre Channel					
-	✓	-	✓	✓	✓
IC of the sector VIII of the Navarre Channel					
✗	✓	-	✓	✓	✓
IC HuertasMayores					
-	-	-	-	✓	✓
IC Lerín					
-	✓	-	✗	✓	✓
IC Murchante					
✗	-	-	✓	✗	-
IC Urraúl Bajo y Lumbier					
✗	-	-	✓	✓	✓

Source: Author

Fair governance is enhanced almost in all the zones studied in Navarre. Nonetheless, half of the interviewees assure that there is no confidence among governmental institutions (question 37). The IC Murchante is singular in this point as the interviewee considers that although there is equality in participation, he does not believe that the benefits are equally distributed or that the IC is efficient in its task. He also thinks that farmers do not trust each other. The leadership criterion is negative as the interviewee considers that there are no collaborative or visionary figures and that the irrigation community is not respected by the farmers.

In most of the questionnaires the constructions of big infrastructures of reservoir and distribution in the region, the Navarre Channel and the Itoiz Dam, and the plot concentration and the modernization of the irrigation systems are the most important events happening in the sector lately. Only one irrigation community, the IC Lerín, gives importance to the irregularity of water flow of the river that serves for agriculture in the area. They have flood episodes and during summer, the river dried out sometimes.

Figure 9. Results of the questionnaires for farmers and IC in Navarre.



Source: Author

VII. Adaptive capacity in the Ebro Basin

After the analysis of the adaptive capacity enhanced in the policies and in the farmers and IC practices in Chapter V and VI, this chapter attempts to answer the main research question of this thesis. In order to simplify the results of the AC in policies (Table 4 and 6) and the AC in farmers and IC practices (Table 5 and 7) of both regions the scores are summarized and transformed into quantitative criteria, which is more concise and easier to work with. If the criteria is positive enhancing AC then the score value is 2; if the criteria is dubious, the value is 1; and if it is (poorly or) not enhanced, the new value is 0. The resultant tables for policies (Table 8) and for farmers practices (Table 9) present the sum of each criterion versus the maximum possible score.

Table 8. Summation of results of the criteria enhancing the AC in policies in the two regions

Summation criteria enhancing the AC of policies in Catalonia and Navarre				
Learning, experimentation, knowledge generation	Multi-stakeholder participation and networking	Room for change and adjustment	Resources	Variety
Catalonia				
Action plan for the ecologic food and agriculture (2008 – 2012)				
2	2	2	2	2
Rural Development Program (2007 – 2013)				
2	2	1	2	1
Irrigation Farming Plan (2008 – 2020)				
2	0	1	2	1
Measures program for the management plan of the fluvial basin of Catalonia (2006 – 2015)				
1	0	1	2	1
7/8	4/8	5/8	8/8	5/8
Navarre				
Strategic plan of Navarre Agriculture (2006)				
2	2	2	2	2
Rural Development Program (2007 – 2013)				
1	2	1	2	2
Foral Plan for irrigated farming (1998 - 2018)				
1	0	1	1	1
Strategy for water management and sustainable use in Navarre: goals and action plan (2005)				
2	2	1	2	2
Action Plan: Strategy in front of Climate Change in Navarre (2010 – 2020)				
2	2	2	1	1
8/10	8/10	7/10	8/10	8/10

Source: Author

Table 9. Summation of results of the criteria enhancing the AC in farmers and IC practices in the two regions

Summation criteria enhancing the AC in farmers and IC practices					
Variety	Learning, capacity	Room for autonomous change	Resources	Leadership	Fair governance
Catalonia					
Sunyer					
0	1	1	2	2	2
IC Carramassuda					
2	1	1	2	2	2
IC Canal d'Algerri-Balaguer					
1	2	2	2	2	2
IC Canal d'Urgell - La Fuliola					
2	1	0	0	2	2
IC Quatre Pobles					
2	2	2	2	2	2
IC El Vilosell					
0	1	0	0	0	0
IC Móra d'Ebre					
2	1	1	2	2	2
IC Palma d'Ebre					
1	2	2	2	2	2
IC Canal de l'Aldea Camarles					
1	1	2	1	2	2
IC Síndicat Agrícola de l'Ebre					
1	2	1	1	2	2
IC Síndicat Agrícola de l'Ebre					
2	2	1	0	0	0
14/22	16/22	13/22	14/22	18/22	18/22
Navarre					
Murillo el Fruto					
1	2	2	2	2	2
IC El Ferial					
2	1	1	2	2	2
IC of the sector II.2 of the Navarre Channel					
1	2	1	2	2	2
IC of the sector VIII of the Navarre Channel					
0	2	1	2	2	2
IC HuertasMayores					
1	1	1	1	2	2
IC Lerín					
1	2	1	0	2	2
IC Murchante					
0	1	1	2	0	1
IC Urraúl Bajo y Lumbier					
0	1	1	2	2	2
6/16	12/16	9/16	13/16	14/16	15/16

Source: Author

Using the figures of the summation of the Table 8 and 9, the percentage of each criterion in policies and users' practices for both regions is presented in Table 10 and 11.

Table 10. Results of the criteria enhancing the AC in policies for the two regions

Criteria enhancing the AC of policies (%)				
Learning, experimentation, knowledge generation	Multi-stakeholder participation and networking	Room for change and adjustment	Resources	Variety
Catalonia				
87,5%	50%	62,5%	100%	62,5%
Navarre				
80%	80%	70%	80%	80%

Source: Author

Table 11. Results of the criteria enhancing the AC in farmers and IC practices for the two regions

Criteria enhancing the AC in farmers and IC practices (%)					
Variety	Learning capacity	Room for autonomous change	Resources	Leadership	Fair governance
Catalonia					
64%	73%	59%	64%	82%	82%
Navarre					
37,5%	75%	56,3%	81,2%	87,5%	93,8%

Source: Author

Based on the results of Table 10 and 11 it can be said that adaptive capacity in relation to water management seems to be enhanced in the agrarian sector in the Ebro River Basin. Any of the criteria to examine the AC of the policies and farmers' practices is low and the majority of the scores are high, above 67%. Nonetheless, some criteria could be improved both in the policies documents and in the farmers and IC water management.

The policies of the region of Navarre are positive in enhancing the adaptive capacity of the agrarian sector as all the criteria are positive. In the case of Catalonia, some points should be particularly improved. Multi-stakeholder participation and networking is less enhanced dimension of AC. On the other hand, resources are perfectly considered, available and prepared for the sector both the infrastructure and technical solutions and the economic help/subsidies and consulting figures for the agents involved. Special attention should be given to the room for change and variety criteria in the policies of Catalonia.

Two criteria, variety and room for autonomous change, are dubious in farmers' level in both regions however these values in are well enhanced by the policies in Navarre. This could mean that the actions proposed in the policies in the region are not well implemented.

In the case of resources, those are dubiously enhanced in Catalonia although they are perfectly promoted in the Catalan policies. On the contrary to these low criteria, leadership and fair governance have very good results in enhancing the AC of the sector both in Catalonia and Navarre.

VIII. Conclusions

On the basis of the individual analysis of every region presented in chapters V and VI and the results for the basin in chapter VII, adaptive capacity is concluded to be enhanced in the Ebro River Basin. However, the results in every region and in every level are different and some dimensions necessary to enhance the adaptive capacity are not promoted or carried out as needed. Adaptive capacity in relation to water management should be considered by the agents of the sector as an ability to be potentiated due to the expected climatic and governance changes that the system is going to face. Additionally, the agrarian sector and the use of this resource would confront uncertain shocks and unexpected disturbances and must be prepared to react to them preserving (and even reinforcing) its economic, cultural, social and environmental values.

Adaptive capacity is concluded to be generally enhanced in the basin but the engineering mind frame is still too dominant and prevents a change from the old water paradigm. Policies still promote technical mechanism to make the activity profitable considering irrigation systems and water distribution one of the main objectives of policymaking. Water seems to be understood sometimes just as a tool to obtain benefits and no more connections are considered in relation to the ecosystem. Most of the negative consequences remain then in the background in front of the advantages of irrigation agriculture. Similarly, farmers are aware of the benefits of irrigated farms and thus claim for technological improvements that secure water everywhere and anytime. It is necessary to achieve the sector interests, like better quality production, but at the same time secure its adaptive capacity. Taking into account the result of the dissertation, the sector has the base for the promotion of adaptive management, a new paradigm.

It is noteworthy that increasing the adaptive capacity of the agrarian sector in relation to water management does not always entail making the sector more sustainable. For example, the promotion of more efficient irrigation system in the plot is leading to a reduction of available systems in several areas. Thus, although large amounts of water are being saved, the technical variability is being decreased. Other actions, like the construction of water channels for the distribution of the resource, are debatable in sustainable terms. Therefore, it is necessary to study every case and balance which are the benefits in terms of sustainability (social, economic and environmental) and the ones of enhancing and preserving AC.

7.1 Conclusions about the AC in policies

While the policies in Navarre enhance the adaptive capacity as a whole, the documents analysed in Catalonia present other results. The involvement of important stakeholders of the sector in the process and the content of the policies is neglected in some policy documents, having an impact on networking and stakeholder criteria and variability criteria. Although the resources are well listed and financed, those are mostly focused in helping the farmer economically or in the design of infrastructures. The technical improvement of the farmers' water availability normally captures the interest of the document, pushing other aspects, necessities and agents of the sector into the background. This could be partially explained by the traditional importance of the technical paradigm in the water management in Spain. Even today, the actual water national policy

encourages environmental responsibly to “guarantee greater equality, efficiency and sustainability, taking advantage of the best technology available” (MMA, 2012).

In both regions, the most critical document in enhancing the AC is the plan designed for irrigated farming and this is crucial for the water management done in agriculture. In both regions the multi-stakeholders participation and networking scores negative. The plans were written by few governmental agents and the coordination and consideration of other actors during the process and in the content of the documents is clearly low. The majority of the other criteria are dubious. For that particular policy, Navarre could learn from the document written by the regional government of Catalonia in terms of learning and resources. Both irrigation plans, however, should improve the room for change and adjustment for the policy and its actions and the variety of those taking into account every agent in the sector.

Room for change is especially dubious in enhancing the adaptive capacity of the policies studied in the two regions. In that sense, besides the formal and detailed process of monitoring which is responsibility of the regional government, it should involve the participation of more agents of the sector. In that sense, the Action plan for the ecologic food and agriculture of Catalonia and the Strategic plan of Navarre Agriculture are good examples of how to do it. These documents expect to involve different (existing or created by the plan) organizations and entities in the monitoring task. In the same line, the Strategy in front of Climate Change in Navarre prepares an internal and an external review process. Moreover, these policies prepare studies of knowledge gaps and projects to monitor the actions proposed by the plan to be adjusted if necessary. At the same time, organizations (existing or created by the plan) are expected to collect data of the agrarian sector to be constantly updated. These documents even consider more than one entity or group to do this various exercises being redundant and securing the possibility of change and reaction. Therefore, there is a close link between learning and experimentation, multi-stakeholder participation and room for change. New technologies facilitate this monitoring task so institutions should exploit the possibilities that internet presents to connect easily social and local organizations and entities, farmers and the regional government.

Learning and resources are criteria that both regional governments take into account in the document content of policies. Nevertheless, some improvements could be done. In the case of learning, policies should plan more taking into account double-loop learning because water management could be re-directed only if organizations’ norms and policies and individual assumptions and practices are analysed. In terms of resources, technical solutions are perfectly covered but others, like human and economic should gain importance in the future policies.

It is noteworthy that the monitoring and review documents of the policies show that implementation is a critical phase in policymaking. As shown in Chapters V and VI, policies are sometimes not well implemented, specially failing in securing the room for adjustment criteria, and some others don’t arrive to be implemented by political or economic interests. Moreover, most of the policies analysed have not been reviewed. On the contrary, the Rural Development Programme has an exhaustive monitoring process that secures the review of the programme in both regions and the correction of the actions

contained in the document. Thus, the regional government must pay more attention to the implementation of the policies and the review of that phase to be reactive in front of unexpected changes.

Adaptive capacity and adaptation might be novel concepts for the policies studied. Only some documents introduce ideas and lessons of those concepts. In order to enrich the policy analysis, further studies could consider governmental agents' opinion and experience. Internal procedures and reports polish up different aspects of the policies, plans and programs affecting the real institutional action and aptitude in front of water management and its potential adaptive capacity. As shown in the case of the Rural Development Plans, other levels (mainly upper levels) inevitably affect the functioning in the field and the policies written and approved by the regional government.

7.2 Conclusions about the AC in farmers and IC practices

The users' management and experience of the two regions evaluated shown that there is no clear pattern when enhancing the adaptive capacity. Thus, it can be said that there is no "formula" to enhance the adaptive capacity within the farmers and irrigation communities' water management as many factors influence in boosting the ability. The six dimensions and its concrete indicators could show which the problematic points are but a more detailed study should be done taking into consideration external and internal characteristics of the farmers and IC like the climatic and geographical characteristics, the tradition of irrigation land and the interest of the farmers in a specific area.

In spite of this, general conclusions can be formulated based on the analysis done in the dissertation. Leadership and fair governance seems to be a common quality among farmers. Although not having confidence in governmental institutions, the interviewees consider that the resources the government facilitates are correct and that the inversions they do in the irrigation of their farms are profitable. Nonetheless, the two farmers interviewed personally, pointed out that the sector survives mainly thanks to the subsidies the different institutional levels give to farmers. Besides, they have a negative opinion about environmental legislation and conclude that some aspects of the sector must be reformed. The farmer of Navarre, also, considered that the governments are acting dangerously in relegating agriculture as a secondary concern for the country due to the food and energy importance of agriculture.

Room for change and variety are the dimensions that less enhance the AC in both regions, as pointed in Chapter VII. In the first dimension, the availability, price and quality of water seems to be not so important when irrigating crops as expected when talking about water management. This could be explained by many reasons: the abundance of water available for agriculture in some areas of Navarre and north of Catalonia; the security of water availability generated by the large amount of channels that distribute water in some zones in Catalonia; the price of irrigated crops in the market and the expansion of this to rain-fed products in order to secure continuous production; the idea of some farmers that the IC or other institutional entities are the ones responsible of preventing water contamination and securing that water arrives to every farmer. Then, it can be said that many farmers in the basin think that water is a non-limited resource.

In order to improve learning and experimentation criteria, the government should extend broad-band Internet service to rural areas and promote the use of internet among farmers and IC. Despite the lack of e-mail and internet use in some areas, information and knowledge has been always easily exchanged by other means and farmers still use them.

It is interesting the contradicted opinion that farmers have about the institutions. Irrigation communities and farmers demand more involvement of the government with the sector and do not trust in the capacity of this to solve their problems. However, the majority of farmers think that the resources and infrastructures available to distribute water to their plots and the systems to irrigate their land are correct and well-distributed. Those works and initiatives were mainly promoted, designed and implemented by the regional government. Then, although the regional government gave them water in big quantities at low prices, farmers do not have good opinion of institutions. On the other hand, they value the existence and work of irrigation communities. It can be concluded then, that despite the fact the sector is beneficiated by governmental actions, the approach took by the institutions could be too top-down and based on the old idea that the government is the sole source of decision making authority. The farmers interviewed personally shown having a clear personal opinion due to their experience and interest and a motivation to be involved in what could be done, where and how.

The effect of the actions proposed by the policies over the farmers' practices is not very evident. The majority of the farmers carry out preventive measures to avoid water contamination and most of the policies analysed compensate the farmers that avoid bad practices. In the same line, the infrastructures designed and constructed for the sector are implemented and are well considered by farmers. The advisors are very well rated although human resources are less promoted than economic and technological measures in the policies, particularly in Catalonia. Finally, all policies promote subsidies and economic help but some of the farmers in both regions think that these are not always well-known by everybody in the sector. Thus, there seems to be sometimes a gap between regional vision and objectives and the final users' interests and motivations.

References

- Allison, H. E. & Hobbs R. J. (2004). Resilience, adaptive capacity, and the “Lock-in Trap” of the Western Australian agricultural region. *Ecology and Society*, 9(1), 3. Retrieved from <http://www.ecologyandsociety.org/vol9/iss1/art3/>
- Armitage, D. (2007). Building Resilient Livelihoods through adaptive co-management: the role of adaptive capacity. In: Armitage, D., Berkes, F. and Doubleday, N. (Eds). *Adaptive co-management: collaboration, learning and multi-level governance* (pp. 62 – 83). Vancouver, Canada: UBC Press.
- Ayala Carcedo, F. (2001). La viabilidad del Plan Hidrológico Nacional de 2001 desde la perspectiva del cambio climático. In: del Moral, L. (coord.), *Planificación hidrológica y eficiencia* (pp. 19-32). Zaragoza: Fundación Ecología y Desarrollo.
- Bergh, J. van den (1996). *Ecological Economics and Sustainable Development*. Cheltenham, UK: Edward Elgar.
- Berkes, F & Folke, C., (1994). Investing in cultural capital for sustainable use of natural capital. In: Jansson, A. M., Hammer, M., Folke, C. & Costanza, R. (Eds.), *Investing in Natural Capital: the Ecological Economics Approach to Sustainability* (pp. 128 – 249). Washington, DC : Island Press.
- Berkes, F., J. Colding, & Folke, C. (2000). Rediscovery of traditional ecological knowledge as adaptive management. *Ecological Applications* 10(5), 1251 – 1262.
- Berkes, F., J. Colding, & Folke, C. (Eds.) (2003). *Navigating social–ecological systems: building resilience for complexity and change*. Cambridge, UK: Cambridge University Press.
- Berman, R., Quinn, C., & Paavola, J. (2012). The role of institutions in the transformation of coping capacity to sustainable adaptive capacity. *Environmental Development*, 2, 86 – 100.
- Beunen, R. (2006), European Nature Conservation Legislation and Spatial planning: For better or for worse? *Journal of Environmental Planning and Management*, 49(4), 605 – 619.
- Brooks, N., (2003). Vulnerability, risk and adaptation: a conceptual framework. Working Paper 38, Tyndall Centre for Climate Change Research, University of East Anglia, Norwich. Retrieved from <http://www.tyndall.ac.uk/sites/default/files/wp38.pdf>
- Brooks, N., Adger, W. N. & Kelly, P. M. (2005). The determinants of vulnerability and adaptive capacity at the national level and the implications for adaptation. *Global Environmental Change*, 15, 151 – 163.
- Brown, P. R., Nelson, R., Jacobs, B., Tracey, J., Ahmed, M. & de Voil, P. (2010), Enabling natural resource managers to self-assess their adaptive capacity. *Agricultural systems*, 103, 562 – 568.
- Confederación Hidrográfica del Ebro (CHEbro) (2012). *La Cuenca*. Retrieved 10 March 2012 from <http://www.chebro.es/>
- Coronminas, J. (1996), El regadío en el umbral del siglo XXI: Plan Nacional de Regadíos de Andalucía. *Revista Ingeniería del Agua*, 3(4), 57 – 76.
- Costanza, R., d’Arge, R., de Groot, R., Farberk, S., Grasso, M., Hannon, B., ..., van den Belt, M. (1997). The value of the world’s ecosystem services and natural capital, *Nature*, 387, 253 – 260. Retrieved from http://www.esd.ornl.gov/benefits_conference/nature_paper.pdf
- Cots, F., Tàbara, J.D, McEvoy, D., Werners, S. & Roca, E (2009). Cross-border organisations as an adaptive water management response to climate change: the case of the Guadiana river basin. *Environment and Planning C: Government and Policy*, 27, 876 – 893.

- Cuadrat Prats, J.M. (2006). La cuenca del Ebro: recursos hídricos y gestión. In: Cuadrat Prats, J. M (Eds) *El agua en el siglo XXI: gestión y planificación* (pp. 101-129). Zaragoza, Spain: Institución Fernando el Católico.
- Duit, A. & Galaz, V. (2008), Governance and Complexity. Emerging issues for governance theory. *Governance*, 21(3), 311 – 335.
- Ekins, P. (1992). A four-capital model of wealth creation. In: Ekins, P. & Max-Neef, M. (Eds.), *Real-Life Economics: Understanding Wealth Creation* (pp. 147 – 155). London/New York: Routledge.
- Ekins, P., Simon, S., Deutsch, L., Folke, C. & De Groot, R. (2003). A Framework for the practical application of the concepts of critical natural capital and strong sustainability. *Ecological Economics*, 44(2-3), 165 – 185.
- Estrela, T. (n.d.). *La planificación hidrológica en España*. Madrid: Ministerio de Medio Ambiente, Medio Rural y Marino. Retrieved from <http://www.zaragoza.es/contenidos/medioambiente/cajaAzul/28S8-P3-TEODORO%20ESTRELA-PPTACC.pdf>
- Fanlo Loras, A. (2004). El Derecho de aguas en el 25 aniversario de la constitución española. *Revista Electrónica del Departamento de Derecho de la Universidad de la Rioja (REDUR)*, 2. Retrieved from <http://www.unirioja.es/dptos/dd/redur/numero2/fanlo.pdf>
- Federación Nacional de Comunidades de Regantes de España (FENACORE). *Las Comunidades de Regantes de España y su federación nacional*. Retrieved from www.fenacore.org/empresas/fenacore/documentos/espanol.doc
- Fernández Carrasco, P. (2002). *Estudio del impacto del CC sobre los recursos hídricos. Aplicación en diecinueve pequeñas cuencas de España* (Unpublished doctoral dissertation). Universidad Politécnica de Madrid, Madrid.
- Fernández Clemente, E. (2004), De la utopía de Joaquin Costa a la intervención del Estado: un siglo de obras hidráulicas en España. *Contribuciones a la Economía*.
- Folke, C., Carpenter, S. R., Elmqvist, T., Gunderson, L., Holling, C.S., & Walker, B. (2002), Resilience and Sustainable Development: Building Adaptive Capacity in a World of Transformations. *AMBIO: A Journal of the Human Environment*, 31(5), 437 – 440.
- Folke, C., Hahn, T., Olsson, P. & Norberg, J. (2005), Adaptive governance of social-ecological systems. *Annual Review of Environment and Resources*, 30, 441 – 473.
- Folke, C. (2006) Resilience: the emergence of a perspective for social-ecological systems analyses. *Global Environmental Change*, 16(3), 253–267.
- Folke, C., Carpenter, S. R., Walker, B., Scheffer, M., Chapin, T. & Rockström, J. (2010). Resilience thinking: integrating resilience, adaptability and transformability. *Ecology and Society*, 15(4), 20. Retrieved from <http://www.ecologyandsociety.org/vol15/iss4/art20/>
- Gallopin, G.C. (2006). Linkages between vulnerability, resilience, and adaptive capacity. *Global Environmental Change*, 16(3), 293 – 303.

- Giménez Casalduero, M. & Palerm Viqueira, J. (2007). Organizaciones tradicionales de gestión del agua: importancia de su reconocimiento legal para su pervivencia. El caso de España. *Región y sociedad*, 19(38). Retrieved from http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1870-39252007000100001&lang=es
- Gupta, J., Termeer, C. Klostermann, J., Meijerink, S., van den Brink, M., Jong, P. & Nooteboom, S. (2010). The Adaptive Capacity Wheel: a method to assess the inherent characteristics of institutions to enable the adaptive capacity of societ., *Environmental Science & Policy*, 13(6), 459 – 471.
- Gunderson, L. (1999). Resilience, flexibility and adaptive management - antidotes for spurious certitude? *Conservation Ecology*, 3(1), 7. Retrieved from <http://www.consecol.org/vol3/iss1/art7/>
- Holling, C.S. (1994). Simplifying the Complex. The paradigms of ecological function and structure. *Futures*, 26(6), 598 – 609.
- Huitema, D. & Meijerink, S. (2010). Realizing water transitions: the role of policy entrepreneurs in water policy change. *Ecology and Society* 15(2), 26. Retrieved from <http://www.ecologyandsociety.org/vol15/iss2/art26/>
- Hispagua - Sistema Español de Información sobre el Agua. (2012) *Distribución de Competencias*. Retrieved April 11, 2012, from <http://hispagua.cedex.es/instituciones/distribucion>
- iAgua (2012, March 29), ¿Subir los precios para la agricultura o perder los fondos europeos? Retrieved March 29, 2012, from <http://www.iagua.es/noticias/ue/12/03/29/%C2%BFsubir-los-precios-del-agua-para-la-agricultura-o-perder-los-fondos-europeos-15739>
- Iglesias, A., Ward, M. N., Menendez, M. & Rosenzweig, C. (2003). Water availability for agriculture under climate change: understanding adaptation strategies in the Mediterranean. In: M. Shechter and Giupponi, C. (eds.). *Climate change and the Mediterranean: in the Mediterranean: socio-economic perspectives of impacts, vulnerability and Adaptation* (pp. 75-93). Northampton: Edward Elgar Publishers.
- Institut Català d'Avaluació de Polítiques Públiques (2011), *Avaluació de la Implementació del Pla d'Acció per l'Alimentació i l'Agricultura Ecològiques. Resum Executiu*, Barcelona: Institut Català d'Avaluació de Polítiques Públiques. Retrieved from http://www.ivalua.cat/documents/1/28_06_2011_09_39_37_Resumexecutiu.pdf
- Instituto Nacional de Meteorología (2007). Generación de Escenarios regionalizados del cambio climático para España. Madrid: Ministerio de Medio Ambiente y Medio Rural y Marino.
- Intergovernmental Panel on Climate Change (IPCC) (2001), *Climate change 2001: Impacts, adaptation and vulnerability*. Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change. Geneva: UNEP/WMO.
- Johnson, B.L. (1999), The role of adaptive management as an operational approach for resource management agencies. *Conservation Ecology*, 3(2), 8. Retrieved from <http://www.consecol.org/vol3/iss2/art8/>
- Kaika, M. (2003). The Water Framework Directive: A New Directive for a Changing Social, Political and Economic European Framework. *European Planning Studies*, 11(3), 299 – 316.
- Karl, T.R., J. M. Melillo, & Peterson, T.C. (eds)(2009). *Global climate change impacts in the United States*. Cambridge, UK: Cambridge University Press.

- Kinzig, A. P., Antle, J., Ascher, W., Brock, W., Carpenter, S., Chapin III, ... Mark Wilson (2000). Nature and society: An imperative for integrated environmental research. A report from a workshop, Developing a Research Agenda for Linking Biogeophysical and Socioeconomic Systems, 5-8 June 2000, Tempe, Arizona, USA.
- Lee, K. N. (1993). *Compass and Gyroscope. Integrating science and politics for the environment*. Washington, D.C.: Island Press.
- Llamas Madurga, M. R. (2008). Aspectos éticos de los conflictos del agua en España. *Revista de la Real Academia de Ciencias Exactas, Físicas y Naturales*, 120(1), 161 – 184.
- Lobell, D.B., Burke, M.B., Tebaldi, C., Mastrandrea, M.D., Falcon, W.P. & Naylor, R.L. (2008). Prioritizing climate change adaptation needs for food security in 2030. *Science*, 319, 607 – 610.
- Loucks, D.P, van Beek, E., Stedinger, J.R., Dijkman, J.P.M, Villars & M.T (2005). *Water Resources Systems Planning and Management: An Introduction to Methods, Models and Applications*. Paris: UNESCO.
- Martínez, J. & Esteve, M. A. (2004). Dynamics of water scarcity on irrigated landscapes: Mazarron and Aguilas in Southeastern Spain. *System Dynamics*, 20 (2), 117 – 137.
- Ministerio de Medio Ambiente (2007). *El Agua en la Economía Española: situación y perspectivas*. Madrid: Ministerio de Medio Ambiente. Retrieved from http://circa.europa.eu/Public/irc/env/wfd/library?!=/framework_directive/implementation_documents_1/wfd_reports/member_states/spain/article_5/completo_nivel1pdf/EN_1.0_&a=d
- Naredo, J.M. (2006). La encrucijada de la gestión del agua en España. In: Cuadrat Prats, J. M (eds) *El agua en el siglo XXI: gestión y planificación* (pp.9-28). Zaragoza, Spain: Institución Fernando el Católico.
- Ohlsson, L. & Turton, A.R. (1999). *The turning of a screw: Social resource scarcity as a bottle-neck in adaptation to water scarcity*. Working Paper. London: School of Oriental and African Studies, University of London. Retrieved from <http://www.soas.ac.uk/water/publications/papers/file38362.pdf>
- Omedas, M., Benítez, C., Mora, B. & Galván, R. (2008). *Los organismos de cuenca en el siglo XXI*. Zaragoza, Spain: Gambón.
- Ostrom E, Gardner R, & Walker J. M. (1994). *Rules, Games, and Common-Pool Resources*. Ann Arbor: Univ. Mich. Press.
- Ostrom, E. (1999). Coping with tragedies of the commons. *Annual Review of Political Science*, 2, 493 – 535.
- Ostrom, E. (2002). Policy Analysis in the Future of Good Societies. *The Good Society*, 11(1), 42 – 48.
- Ostrom, E., Stern, P.C & Dietz, T. (2003). Water rights in the commons. *Impact*, 5(2), 9 – 12.
- Pahl-Wostl, C. (2005). Information, public empowerment, and the management of urban watersheds, *Environmental Modelling & Software*, 20(4), 457 – 467.
- Pahl-Wostl, C. (2007). Transition towards adaptive management of water facing climate and global change, *Water Resources Management*, 21(1), 49- 62.
- Pandey, V.P., Babel, M. S., Shrestha, S. & Kazama, F. (2010). A framework to assess adaptive capacity of the water resources system in Nepalese river basins, *Ecological Indicators*, 11(2), 480 – 488.

Parés, M. (2011). River Basin Management planning with participation in Europe: from contested hydro-politics to governance-beyond-the-state, *European Planning Studies*, 19(3), 457 – 478.

Parra, C. (2010). sustainability and multi-level governance of territories classified as protected areas in France: the Morvan regional park case, *Journal of Environmental Planning and Management*, 53(4), 491 – 509.

Pinilla Navarro, V. (eds.) (2008). *Gestión y usos del agua en la cuenca del Ebro en el siglo XX*, Zaragoza, Spain: Prensas Universitarias de Zaragoza.

Plana, J.A (1991). Apuntes a una visión histórica del agua. *Treballs de la Societat Catalan de Geografia*, 31, 89 – 96. Retrieved from <http://revistes.iec.cat/index.php/TSCG/article/viewFile/36892/36885>

Programa A.G.U.A. Ministerio de Medio Ambiente de España (n.d.). Retrieved January 17, 2012, from <http://www.mma.es/secciones/agua/entrada.htm>

Rigby, D. & Cáceres, D. (2001). Organic farming and the sustainability of agricultural systems, *Agricultural Systems*, 68(1), 21- 40 .

Röling, N.G. & Wagemakers, M. A. E. (Eds.) (1998). *Facilitating sustainable agricultura: participatory learning and Adaptive Management in times of Environmental Uncertainty*. Cambridge, UK: Cambridge University Press.

Samper, J. & Diego, A. (2005), *Evaluación de los impactos del cambio climático en los recursos hídricos del río Ebro*. Madrid: Oficina de Planificación Hidrológica, Ministerio de Medio Ambiente.

Saurí, D. & del Moral, L. (2001). Recent developments in Spanish water policy. Alternatives and conflicts at the end of the hydraulic age. *Geoforum*, 32(3), 351-362.

Sietchiping, R. (2006). Applying an index of adaptive capacity to climate change in north-western Victoria, Australia, *Applied GIS*, 2(3), 16.1 – 16.28.

Smit, B., Pilifosova, O., Burton, I., Challenger, B., Huq, S., Klein, R.J.T. & Yohe, G. (2001), Adaptation to climate change in the context of sustainable development and equity. In J.J. McCarthy & O.F. Canziani, eds., *Climate Change 2001: Impacts, adaptation and vulnerability*. Contribution of Working Group III to the 3rd Assessment Report of the Intergovernmental Panel on Climate Change. Retrieved from http://www.grida.no/publications/other/ipcc_tar/?src=/climate/ipcc_tar/wg2/641.htm

Smit, B. & Wandel, J. (2006). Adaptation, adaptive capacity and vulnerability. *Global Environmental Change*, 16, 282–292.

Spain. Law 29/1985, of 2 August, of Water. *Boletín Oficial del Estado*, 8 August 1985, no. 189, p. 25123.

Spain. Legislative Royal Decree 1/2001, of 20 July, by which the consolidated version of the Water Law is approved. *Boletín Oficial del Estado*, 24 July 2001, no. 176, p. 26791.

Spain. Royal Decree 125/2007, of 2 February, by which the territorial domain of the hydrographical demarcations is fixed. *Boletín Oficial del Estado*, 3 February 2007, no. 30, p. 5118.

Spain. Royal Decree 126/2007, of 2 February, by which the composition, operation and attribution of the competent authority committees in the hydrographical demarcations with inter-community basins is regulated. *Boletín Oficial del Estado*, 3 February 2007, no. 30, p. 5120.

Spain. Royal Decree 29/2011, of 14 January, by with the Royal Decree 125/2007, of 2 February, by which the territorial domain of the hydrographical demarcations is fixed, and the Royal Decree 650/1987, of 8 May, by which the territorial domain of the Basin Organisms and the hydrologic plans are defined, are modified. *Boletín Oficial del Estado*, 15 January 2011, no. 13, p. 4766.

Stankey, G. H., Clark, R.N. & Bormann, B.T. (2005) *Adaptive management of natural resources: theory, concepts, and management institutions*. Gen. Tech. Rep. PNW-GTR-654. Portland, USA: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Stern, P.C., Dietz, T. & Ostrom, E. (2002). Research on the Commons: lessons for environmental resource managers. *Environmental Practice*, 4, 61 – 64.

Swanson, D.A., Hiley, J. C., Venema, H.D. & Grosshans, R. (2007). *Indicators of Adaptive Capacity to Climate Change for Agriculture in the Prairie Region of Canada: An analysis based on Statistics Canada's Census of Agriculture*. Working Paper for the Prairie Climate Resilience Project, Winnipeg: International Institute for Sustainable Development.

Swanson, D., Barg, S., Tyler, S., Venema, H., Tomar, S., Bhadwal, ... Drexhage, J. (2010). Seven tools for creating adaptive policies, *Technological Forecasting and Social Change*, 77(6), 924 – 939.

Tompkins, Emma L. & Adger, W.N. (2002) Building resilience to climate change through adaptive management of natural resources. In UNDP Expert Group Meeting: Integrating Disaster Reduction and Adaptation to Climate Change, Havana, CU, 17 - 19 Jun 2002.

Turton, A.R. (1999), *Water scarcity and social adaptive capacity: towards an understanding of the social dynamics of water demand management in developing countries*. MEWREW Occasional Paper No.9. London, UK: School of Oriental and African Studies, University of London. Retrieved from <https://www.soas.ac.uk/water/publications/papers/file38353.pdf>

VVAA (2009). *La economía de agua de riego en España. Una perspectiva regional*. El Ejido, Spain: Fundación Cajamar. Retrieved from <http://www.fundacioncajamar.com/files/publicaciones/215.pdf>

Valencia, J.L, Requejo, Saa Requejo, A., Gascó, J.M and Tarquis, A.M. (2010), A universal multifractal description applied to precipitation patterns of the Ebro River Basin, Spain. *Climate Research*, 44, 17 – 25. Retrieved from http://www.int-res.com/articles/cr_oa/c044p017.pdf

Varela Casado, M.A. (2007). *Futuro del regadío*. Lleida: Universitat de Lleida. Retrieved from <http://oph.chebro.es/DOCUMENTACION/DirectivaMarco/ParticipacionCiudadana/12mvarea-unilleida.pdf>

Vázquez López, L.A. and Vázquez Maldonado, C. (2004). *Las causas hidrológicas y climáticas de las variaciones de los caudales en el Bajo Ebro: implicaciones para la gestión del agua*, Speech presented at the IV Iberian Congress about water planning and management, Tortosa, Spain.

Walker, B., Carpenter, S.R., Anderies, J., Abel, N., Cumming, G.S., Janssen, M.,... Pritchard, R. (2002). Resilience management in social-ecological systems: a working hypothesis for a participatory approach. *Conservation Ecology*, 6(1), 14. Retrieved from <http://www.ecologyandsociety.org/vol6/iss1/art14/print.pdf>

Walker, B., Holling, C. S., Carpenter, S. R. & Kinzig, A. (2004). Resilience, adaptability and transformability in social-ecological systems. *Ecology and Society*, 9(2), 5. Retrieved from <http://www.ecologyandsociety.org/vol9/iss2/art5/>

Walters, C. (1986). *Adaptive Management of Renewable Resources*. New York, USA: Macmillan.

Walters, C. (1986b). *Adaptive Management of Renewable Resources, Executive Report 12*, Laxenburg, Austria : MacMillan Publishing Company.

Walters, C.J. & Holling, C.S. (1990). Large-scale management experiments and learning by doing, *Ecology*, 71(6), 2060 – 2068 .

Wiechmann, T. (2007). *Planning and adaptation: strategising in complex contexts with social paradoxes*. Paper presented to the International Conference 'New Concepts and Approaches for Urban and Regional Policy and Planning, April 2007, Leuven, Belgium.

Young, O. R. (1982). *Resource Regimes. Natural Resources and Social Institutions*. Berkeley-Los Angeles-London: University of California Press.

Ziervogel, G. & Zermoglio, F. (2009). Climate change scenarios and the development of adaptation strategies in Africa: challenges and opportunities. *Climate Research*, 40(2-3), 133 – 146. Retrieved from <http://www.int-res.com/abstracts/cr/v40/n2-3/p133-146/>

Appendix A

QUESTIONNAIRE (MODEL)

Position in the IC (if applicable):

Contact (telephone or e-mail):

1	Which are the most important events in the last years in the irrigated land of the area?		
	Which municipalities are included in this irrigation community?		
2	Is there variety of irrigation systems in the area?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Which are those?		
	If there is more than one system, which is the most common?		
3	Is there variety of irrigation systems in the plot?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
4	Are there different water intakes in the area? (So to say, water comes from different channels, dwells, reservoirs, etc. the contrary situation would be that the water source is common for all the plots)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why all the water comes from the same source?		
5	In the area, the amount of irrigated land is similar to the amount of raining-fed land?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, which could be the reason for that?		
6	Is there variety among the crops produced in the area?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Which product(s) is(are) more common? Why?		
7	Is the farmers' age variable in the area?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
8	Is the farmers' social position variable?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
9	Is the farmers' educational level variable?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
10	The most common farmers profile in the area is:	Business <input type="checkbox"/>	
		Subsistence economy <input type="checkbox"/>	
		Both (in a similar percentage) <input type="checkbox"/>	
11	Do farmers help each other?	Yes <input type="checkbox"/>	No <input type="checkbox"/>

12	Do you think that there is knowledge transference and information among farmers?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
13	Is the use of internet/e-mail widely used among farmers?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
14	Do farmers experiment which crop is more profitable taking into account water availability?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
15	Do they experiment taking into account the price of water?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
16	Do you think that farmers are open to changes, to innovative solutions?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
17	Do farmers venture in experiments more easily if they are advised by institutions/organizations?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
18	Do farmers/the irrigation community carry out preventive actions in front of droughts or floods?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?		
19	Do farmers carry out actions to prevent water contamination?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
20	Is it easy for farmers to get a credit to change the irrigation system or to modernize it?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Who facilitates those credits? Local institutions, regional institutions, a <i>Caja Rural</i> ⁸ ...		
21	Are there subsidies for farmers to change the irrigation system, to modernize the plots, if they carry out good practices...?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
22	Are those subsidies well-known by the farmers?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
23	Do you think that the inversion in irrigation systems is recovered?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?		
24*	Do the IC ask for credits or economic help to carry out particular initiatives in water management?	Si <input type="checkbox"/>	No <input type="checkbox"/>
	If the answer is yes, which are those initiatives?		
25*	Would you say that is easy for the IC to obtain economic help?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
26	Is it easy for farmers to contact with governmental advisors?	Yes <input type="checkbox"/>	No <input type="checkbox"/>

⁸ A *Caja Rural* is a non-profit cooperative society that promote saving of its members and the use of these savings in granting credit to them for the financing of agrarian operations.

27*	Is it easy for the IC to contact with governmental advisors?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
28	Do you think that the water infrastructures in the area are correct?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	If not, what can be improved?		
29	Do you think that the infrastructures are well-distributed?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
30	Are there computational technologies for the irrigation farms?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
31	Are those common in the area?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
32	Is the irrigation technology flexible to seasonal changes/urgent needs?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
33	Are there visionary figures among the farmers?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
34	Are there collaborative figures among the farmers?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
35	Is the IC authority respected by farmers?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
36	Is there trust among farmers?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
37	Is there trust with the institutions?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
38	Are there equal opportunities when participating in the IC?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
39	Are there equal profits among the members of the IC?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
40	Do you think that the IC gives fast and effective response to the problems presented by its associated farmers?	Yes <input type="checkbox"/>	No <input type="checkbox"/>

*Answer only if the interviewee has an active function in the irrigation community.

If you need space to comment any question, please do so in the table, indicating the number of question.

Question number	Comments

Appendix B

QUESTIONNAIRES IN CATALONIA

1) SUNYER

Position in the IC (if applicable): Farmer

1	Which are the most important events in the last years in the irrigated land of the area?		
	Which municipalities are included in this irrigation community?	Sunyer	
2	Is there variety of irrigation systems in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	Which are those?	Aspersion	
	If there is more than one system, which is the most common?	-	
3	Is there variety of irrigation systems in the plot?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
4	Are there different water intakes in the area? (So to say, water comes from different channels, dwells, reservoirs, etc. the contrary situation would be that the water source is common for all the plots)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why all the water comes from the same source?	It comes from the Garriga Segarres Channel	
5	In the area, the amount of irrigated land is similar to the amount of raining-fed land?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, which could be the reason for that?	The majority of land is irrigated land since the water infrastructure was finished	
6	Is there variety among the crops produced in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	Which product(s) is (are) more common? Why?	Fruit	
7	Is the farmers' age variable in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
8	Is the farmers' social position variable?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
9	Is the farmers' educational level variable?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
10	The most common farmers profile in the area is:	Business <input type="checkbox"/>	
		Subsistence economy <input type="checkbox"/>	

		Both (in a similar percentage) <input checked="" type="checkbox"/>	
11	Do farmers help each other?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
12	Do you think that there is knowledge transference and information among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
13	Is the use of internet/e-mail widely used among farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
14	Do farmers experiment which crop is more profitable taking into account water availability?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
15	Do they experiment taking into account the price of water?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
16	Do you think that farmers are open to changes, to innovative solutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
17	Do farmers venture in experiments more easily if they are advised by institutions/organizations?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
18	Do farmers/the irrigation community carry out preventive actions in front of droughts or floods?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why?		
19	Do farmers carry out actions to prevent water contamination?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
20	Is it easy for farmers to get a credit to change the irrigation system or to modernize it?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Who facilitates those credits? Local institutions, regional institutions, a <i>Caja Rural</i> ...	Several <i>Cajas</i> can help you with credits.	
21	Are there subsidies for farmers to change the irrigation system, to modernize the plots, if they carry out good practices...?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
22	Are those subsidies well-known by the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
23	Do you think that the inversion in irrigation systems is recovered?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?		
24	Do the IC ask for credits or economic help to carry out particular initiatives in water management?	Si <input type="checkbox"/>	No <input type="checkbox"/>
	If the answer is yes, which are those initiatives?		
25	Would you say that is easy for the IC to obtain economic help?	Yes <input type="checkbox"/>	No <input type="checkbox"/>

26	Is it easy for farmers to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
27	Is it easy for the IC to contact with governmental advisors?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
28	Do you think that the water infrastructures in the area are correct?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If not, what can be improved?		
29	Do you think that the infrastructures are well-distributed?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
30	Are there computational technologies for the irrigation farms?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
31	Are those common in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
32	Is the irrigation technology flexible to seasonal changes/urgent needs?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
33	Are there visionary figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
34	Are there collaborative figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
35	Is the IC authority respected by farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
36	Is there trust among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
37	Is there trust with the institutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
38	Are there equal opportunities when participating in the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
39	Are there equal profits among the members of the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
40	Do you think that the IC gives fast and effective response to the problems presented by its associated farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

2) IC CARRAMASSUDA

Position in the IC (if applicable): President of the Irrigation Community

1	Which are the most important events in the last years in the irrigated land of the area?		
	Which municipalities are included in this irrigation community?	Torres de Segre	
2	Is there variety of irrigation systems in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which are those?	Gravity and aspersion	
	If there is more than one system, which is the most common?	Both have more or less the same importance	
3	Is there variety of irrigation systems in the plot?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
4	Are there different water intakes in the area? (So to say, water comes from different channels, dwells, reservoirs, etc. the contrary situation would be that the water source is common for all the plots)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why all the water comes from the same source?		
5	In the area, the amount of irrigated land is similar to the amount of raining-fed land?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, which could be the reason for that?	Traditionally we have many irrigated land.	
6	Is there variety among the crops produced in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which product(s) is (are) more common? Why?	Fruit and cereal	
7	Is the farmers' age variable in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
8	Is the farmers' social position variable?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
9	Is the farmers' educational level variable?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
10	The most common farmers profile in the area is:	Business <input checked="" type="checkbox"/>	
		Subsistence economy <input type="checkbox"/>	
		Both (in a similar percentage) <input type="checkbox"/>	
11	Do farmers help each other?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

12	Do you think that there is knowledge transference and information among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
13	Is the use of internet/e-mail widely used among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
14	Do farmers experiment which crop is more profitable taking into account water availability?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
15	Do they experiment taking into account the price of water?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
16	Do you think that farmers are open to changes, to innovative solutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
17	Do farmers venture in experiments more easily if they are advised by institutions/organizations?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
18	Do farmers/the irrigation community carry out preventive actions in front of droughts or floods?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why?		
19	Do farmers carry out actions to prevent water contamination?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
20	Is it easy for farmers to get a credit to change the irrigation system or to modernize it?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	Who facilitates those credits? Local institutions, regional institutions, a <i>Caja Rural</i> ...	The regional government	
21	Are there subsidies for farmers to change the irrigation system, to modernize the plots, if they carry out good practices...?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
22	Are those subsidies well-known by the farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
23	Do you think that the inversion in irrigation systems is recovered?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why?	Due to the high costs and the prize of the product	
24	Do the IC ask for credits or economic help to carry out particular initiatives in water management?	Si <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is yes, which are those initiatives?		
25	Would you say that is easy for the IC to obtain economic help?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
26	Is it easy for farmers to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
27	Is it easy for the IC to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

28	Do you think that the water infrastructures in the area are correct?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If not, what can be improved?		
29	Do you think that the infrastructures are well-distributed?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
30	Are there computational technologies for the irrigation farms?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
31	Are those common in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
32	Is the irrigation technology flexible to seasonal changes/urgent needs?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
33	Are there visionary figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
34	Are there collaborative figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
35	Is the IC authority respected by farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
36	Is there trust among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
37	Is there trust with the institutions?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
38	Are there equal opportunities when participating in the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
39	Are there equal profits among the members of the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
40	Do you think that the IC gives fast and effective response to the problems presented by its associated farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

3) IC CANAL D'ALGERRI-BALAGUER

Position in the IC (if applicable): President of the Irrigation Community

1	Which are the most important events in the last years in the irrigated land of the area?	The construction of the channel	
	Which municipalities are included in this irrigation community?	Algerri, Albesa, Castelló de Farfanya, Menàrguens, Torrelameu and Balaguer	
2	Is there variety of irrigation systems in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which are those?	Gravity and drip system	
	If there is more than one system, which is the most common?	Gravity	
3	Is there variety of irrigation systems in the plot?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
4	Are there different water intakes in the area? (So to say, water comes from different channels, dwells, reservoirs, etc. the contrary situation would be that the water source is common for all the plots)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why all the water comes from the same source?	The water comes from the channel only	
5	In the area, the amount of irrigated land is similar to the amount of raining-fed land?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, which could be the reason for that?	There is more rain-fed land in the area	
6	Is there variety among the crops produced in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which product(s) is (are) more common? Why?	Corn because of the price.	
7	Is the farmers' age variable in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
8	Is the farmers' social position variable?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
9	Is the farmers' educational level variable?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
10	The most common farmers profile in the area is:	Business <input checked="" type="checkbox"/>	
		Subsistence economy <input type="checkbox"/>	
		Both (in a similar percentage) <input type="checkbox"/>	

11	Do farmers help each other?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
12	Do you think that there is knowledge transference and information among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
13	Is the use of internet/e-mail widely used among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
14	Do farmers experiment which crop is more profitable taking into account water availability?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
15	Do they experiment taking into account the price of water?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
16	Do you think that farmers are open to changes, to innovative solutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
17	Do farmers venture in experiments more easily if they are advised by institutions/organizations?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
18	Do farmers/the irrigation community carry out preventive actions in front of droughts or floods?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?		
19	Do farmers carry out actions to prevent water contamination?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
20	Is it easy for farmers to get a credit to change the irrigation system or to modernize it?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Who facilitates those credits? Local institutions, regional institutions, a <i>Caja Rural</i> ...	The regional government	
21	Are there subsidies for farmers to change the irrigation system, to modernize the plots, if they carry out good practices...?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
22	Are those subsidies well-known by the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
23	Do you think that the inversion in irrigation systems is recovered?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?		
24	Do the IC ask for credits or economic help to carry out particular initiatives in water management?	Si <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is yes, which are those initiatives?		
25	Would you say that is easy for the IC to obtain economic help?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
26	Is it easy for farmers to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

27	Is it easy for the IC to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
28	Do you think that the water infrastructures in the area are correct?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If not, what can be improved?		
29	Do you think that the infrastructures are well-distributed?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
30	Are there computational technologies for the irrigation farms?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
31	Are those common in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
32	Is the irrigation technology flexible to seasonal changes/urgent needs?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
33	Are there visionary figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
34	Are there collaborative figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
35	Is the IC authority respected by farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
36	Is there trust among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
37	Is there trust with the institutions?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
38	Are there equal opportunities when participating in the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
39	Are there equal profits among the members of the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
40	Do you think that the IC gives fast and effective response to the problems presented by its associated farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

4) IC CANAL D'URGELL-LA FULIOLA

Position in the IC (if applicable): Unknown

1	Which are the most important events in the last years in the irrigated land of the area?		
	Which municipalities are included in this irrigation community?	La Fuliola, Castellserà, Anglesola, Tornabous, Barbens and Claravalls	
2	Is there variety of irrigation systems in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which are those?	Gravity, aspersion and drip system	
	If there is more than one system, which is the most common?	Gravity	
3	Is there variety of irrigation systems in the plot?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
4	Are there different water intakes in the area? (So to say, water comes from different channels, dwells, reservoirs, etc. the contrary situation would be that the water source is common for all the plots)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why all the water comes from the same source?		
5	In the area, the amount of irrigated land is similar to the amount of raining-fed land?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, which could be the reason for that?	There is more rain-fed land in the area	
6	Is there variety among the crops produced in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which product(s) is (are) more common? Why?	Corn because of the price.	
7	Is the farmers' age variable in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
8	Is the farmers' social position variable?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
9	Is the farmers' educational level variable?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
10	The most common farmers profile in the area is:	Business <input checked="" type="checkbox"/>	
		Subsistence economy <input type="checkbox"/>	
		Both (in a similar percentage) <input type="checkbox"/>	

11	Do farmers help each other?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
12	Do you think that there is knowledge transference and information among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
13	Is the use of internet/e-mail widely used among farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
14	Do farmers experiment which crop is more profitable taking into account water availability?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
15	Do they experiment taking into account the price of water?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
16	Do you think that farmers are open to changes, to innovative solutions?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
17	Do farmers venture in experiments more easily if they are advised by institutions/organizations?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
18	Do farmers/the irrigation community carry out preventive actions in front of droughts or floods?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why?		
19	Do farmers carry out actions to prevent water contamination?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
20	Is it easy for farmers to get a credit to change the irrigation system or to modernize it?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	Who facilitates those credits? Local institutions, regional institutions, a <i>Caja Rural</i> ...	The regional government and different <i>cajas</i>	
21	Are there subsidies for farmers to change the irrigation system, to modernize the plots, if they carry out good practices...?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
22	Are those subsidies well-known by the farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
23	Do you think that the inversion in irrigation systems is recovered?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?		
24	Do the IC ask for credits or economic help to carry out particular initiatives in water management?	Si <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is yes, which are those initiatives?		
25	Would you say that is easy for the IC to obtain economic help?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
26	Is it easy for farmers to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

27	Is it easy for the IC to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
28	Do you think that the water infrastructures in the area are correct?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If not, what can be improved?	It is necessary to modernize the irrigation system	
29	Do you think that the infrastructures are well-distributed?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
30	Are there computational technologies for the irrigation farms?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
31	Are those common in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
32	Is the irrigation technology flexible to seasonal changes/urgent needs?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
33	Are there visionary figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
34	Are there collaborative figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
35	Is the IC authority respected by farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
36	Is there trust among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
37	Is there trust with the institutions?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
38	Are there equal opportunities when participating in the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
39	Are there equal profits among the members of the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
40	Do you think that the IC gives fast and effective response to the problems presented by its associated farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

5) IC QUATRE POBLES

Position in the IC (if applicable): Maintenance worker of the Irrigation Community

1	Which are the most important events in the last years in the irrigated land of the area?	The transformation of gravity irrigation	
	Which municipalities are included in this irrigation community?	La Seu d'Urgell, Montferrer, Valls d'en Valira and Vall d'Aguilar	
2	Is there variety of irrigation systems in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which are those?	Gravity, aspersion and drip system	
	If there is more than one system, which is the most common?	Aspersion	
3	Is there variety of irrigation systems in the plot?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
4	Are there different water intakes in the area? (So to say, water comes from different channels, dwells, reservoirs, etc. the contrary situation would be that the water source is common for all the plots)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why all the water comes from the same source?	Traditionally there is only one intake	
5	In the area, the amount of irrigated land is similar to the amount of raining-fed land?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, which could be the reason for that?		
6	Is there variety among the crops produced in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	Which product(s) is (are) more common? Why?	Forage crops	
7	Is the farmers' age variable in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
8	Is the farmers' social position variable?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
9	Is the farmers' educational level variable?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
10	The most common farmers profile in the area is:	Business <input type="checkbox"/>	
		Subsistence economy <input type="checkbox"/>	
		Both (in a similar percentage) <input checked="" type="checkbox"/>	

11	Do farmers help each other?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
12	Do you think that there is knowledge transference and information among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
13	Is the use of internet/e-mail widely used among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
14	Do farmers experiment which crop is more profitable taking into account water availability?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
15	Do they experiment taking into account the price of water?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
16	Do you think that farmers are open to changes, to innovative solutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
17	Do farmers venture in experiments more easily if they are advised by institutions/organizations?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
18	Do farmers/the irrigation community carry out preventive actions in front of droughts or floods?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?		
19	Do farmers carry out actions to prevent water contamination?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
20	Is it easy for farmers to get a credit to change the irrigation system or to modernize it?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	Who facilitates those credits? Local institutions, regional institutions, a <i>Caja Rural</i> ...	The regional government	
21	Are there subsidies for farmers to change the irrigation system, to modernize the plots, if they carry out good practices...?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
22	Are those subsidies well-known by the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
23	Do you think that the inversion in irrigation systems is recovered?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?	The benefits overcome the costs	
24	Do the IC ask for credits or economic help to carry out particular initiatives in water management?	Si <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is yes, which are those initiatives?	For the improvement and maintenance of the irrigation stations	
25	Would you say that is easy for the IC to obtain economic help?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

26	Is it easy for farmers to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
27	Is it easy for the IC to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
28	Do you think that the water infrastructures in the area are correct?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If not, what can be improved?		
29	Do you think that the infrastructures are well-distributed?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
30	Are there computational technologies for the irrigation farms?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
31	Are those common in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
32	Is the irrigation technology flexible to seasonal changes/urgent needs?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
33	Are there visionary figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
34	Are there collaborative figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
35	Is the IC authority respected by farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
36	Is there trust among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
37	Is there trust with the institutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
38	Are there equal opportunities when participating in the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
39	Are there equal profits among the members of the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
40	Do you think that the IC gives fast and effective response to the problems presented by its associated farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

6) IC EL VILOSELL

Position in the IC (if applicable): (unknown)

1	Which are the most important events in the last years in the irrigated land of the area?	The improvement of harvests	
	Which municipalities are included in this irrigation community?	Vilosell	
2	Is there variety of irrigation systems in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	Which are those?	Pressurized (to support when necessary)	
	If there is more than one system, which is the most common?	-	
3	Is there variety of irrigation systems in the plot?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
4	Are there different water intakes in the area? (So to say, water comes from different channels, dwells, reservoirs, etc. the contrary situation would be that the water source is common for all the plots)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why all the water comes from the same source?	The water comes from the Set River	
5	In the area, the amount of irrigated land is similar to the amount of raining-fed land?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, which could be the reason for that?		
6	Is there variety among the crops produced in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which product(s) is (are) more common? Why?	Olive, almond, cereal and vineyard due to the climate and the orography	
7	Is the farmers' age variable in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
8	Is the farmers' social position variable?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
9	Is the farmers' educational level variable?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
10	The most common farmers profile in the area is:	Business <input type="checkbox"/>	
		Subsistence economy <input checked="" type="checkbox"/>	
		Both (in a similar percentage) <input type="checkbox"/>	

11	Do farmers help each other?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
12	Do you think that there is knowledge transference and information among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
13	Is the use of internet/e-mail widely used among farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
14	Do farmers experiment which crop is more profitable taking into account water availability?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
15	Do they experiment taking into account the price of water?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
16	Do you think that farmers are open to changes, to innovative solutions?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
17	Do farmers venture in experiments more easily if they are advised by institutions/organizations?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
18	Do farmers/the irrigation community carry out preventive actions in front of droughts or floods?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why?	Farmers are too old and normally continue labouring the land for tradition	
19	Do farmers carry out actions to prevent water contamination?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
20	Is it easy for farmers to get a credit to change the irrigation system or to modernize it?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	Who facilitates those credits? Local institutions, regional institutions, a <i>Caja Rural</i> ...	The regional government	
21	Are there subsidies for farmers to change the irrigation system, to modernize the plots, if they carry out good practices...?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
22	Are those subsidies well-known by the farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
23	Do you think that the inversion in irrigation systems is recovered?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?	Irrigation ensures more productivity.	
24	Do the IC ask for credits or economic help to carry out particular initiatives in water management?	Si <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is yes, which are those initiatives?		
25	Would you say that is easy for the IC to obtain economic help?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

26	Is it easy for farmers to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
27	Is it easy for the IC to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
28	Do you think that the water infrastructures in the area are correct?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If not, what can be improved?	The irrigation system should modernized to be more efficient and give more water	
29	Do you think that the infrastructures are well-distributed?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
30	Are there computational technologies for the irrigation farms?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
31	Are those common in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
32	Is the irrigation technology flexible to seasonal changes/urgent needs?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
33	Are there visionary figures among the farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
34	Are there collaborative figures among the farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
35	Is the IC authority respected by farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
36	Is there trust among farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
37	Is there trust with the institutions?	Yes <input checked="" type="checkbox"/>	No <input checked="" type="checkbox"/>
38	Are there equal opportunities when participating in the IC?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
39	Are there equal profits among the members of the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
40	Do you think that the IC gives fast and effective response to the problems presented by its associated farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

7) IC MORA D'EBRE

Position in the IC (if applicable): Secretary of the irrigation community

1	Which are the most important events in the last years in the irrigated land of the area?	The project of transformation of the irrigation system in the plot	
	Which municipalities are included in this irrigation community?	Móra d'Ebre	
2	Is there variety of irrigation systems in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which are those?	Pressurized and gravity	
	If there is more than one system, which is the most common?		
3	Is there variety of irrigation systems in the plot?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
4	Are there different water intakes in the area? (So to say, water comes from different channels, dwells, reservoirs, etc. the contrary situation would be that the water source is common for all the plots)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why all the water comes from the same source?	The water comes from a river intake	
5	In the area, the amount of irrigated land is similar to the amount of raining-fed land?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, which could be the reason for that?	Due to the orography of the area	
6	Is there variety among the crops produced in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which product(s) is (are) more common? Why?	fruit, almond and vineyard	
7	Is the farmers' age variable in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
8	Is the farmers' social position variable?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
9	Is the farmers' educational level variable?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
10	The most common farmers profile in the area is:	Business <input type="checkbox"/>	
		Subsistence economy <input type="checkbox"/>	
		Both (in a similar percentage) <input checked="" type="checkbox"/>	

11	Do farmers help each other?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
12	Do you think that there is knowledge transference and information among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
13	Is the use of internet/e-mail widely used among farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
14	Do farmers experiment which crop is more profitable taking into account water availability?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
15	Do they experiment taking into account the price of water?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
16	Do you think that farmers are open to changes, to innovative solutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
17	Do farmers venture in experiments more easily if they are advised by institutions/organizations?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
18	Do farmers/the irrigation community carry out preventive actions in front of droughts or floods?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?		
19	Do farmers carry out actions to prevent water contamination?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
20	Is it easy for farmers to get a credit to change the irrigation system or to modernize it?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Who facilitates those credits? Local institutions, regional institutions, a <i>Caja Rural</i> ...	The regional government	
21	Are there subsidies for farmers to change the irrigation system, to modernize the plots, if they carry out good practices...?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
22	Are those subsidies well-known by the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
23	Do you think that the inversion in irrigation systems is recovered?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?	Irrigation ensures better productivity.	
24	Do the IC ask for credits or economic help to carry out particular initiatives in water management?	Si <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is yes, which are those initiatives?	To improve and expand the irrigated land	
25	Would you say that is easy for the IC to obtain economic help?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
26	Is it easy for farmers to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

27	Is it easy for the IC to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
28	Do you think that the water infrastructures in the area are correct?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If not, what can be improved?		
29	Do you think that the infrastructures are well-distributed?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
30	Are there computational technologies for the irrigation farms?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
31	Are those common in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
32	Is the irrigation technology flexible to seasonal changes/urgent needs?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
33	Are there visionary figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
34	Are there collaborative figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
35	Is the IC authority respected by farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
36	Is there trust among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
37	Is there trust with the institutions?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
38	Are there equal opportunities when participating in the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
39	Are there equal profits among the members of the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
40	Do you think that the IC gives fast and effective response to the problems presented by its associated farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

8) IC PALMA D'EBRE

Position in the IC (if applicable): President of the IC

1	Which are the most important events in the last years in the irrigated land of the area?		
	Which municipalities are included in this irrigation community?	Palma d'Ebre i la Bisbal d'en Falset	
2	Is there variety of irrigation systems in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	Which are those?	Localized irrigation (drip system)	
	If there is more than one system, which is the most common?	-	
3	Is there variety of irrigation systems in the plot?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
4	Are there different water intakes in the area? (So to say, water comes from different channels, dwells, reservoirs, etc. the contrary situation would be that the water source is common for all the plots)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why all the water comes from the same source?		
5	In the area, the amount of irrigated land is similar to the amount of raining-fed land?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, which could be the reason for that?		
6	Is there variety among the crops produced in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which product(s) is (are) more common? Why?	Olive due to traditional reasons	
7	Is the farmers' age variable in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
8	Is the farmers' social position variable?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
9	Is the farmers' educational level variable?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
10	The most common farmers profile in the area is:	Business <input checked="" type="checkbox"/>	
		Subsistence economy <input type="checkbox"/>	
		Both (in a similar percentage) <input type="checkbox"/>	

11	Do farmers help each other?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
12	Do you think that there is knowledge transference and information among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
13	Is the use of internet/e-mail widely used among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
14	Do farmers experiment which crop is more profitable taking into account water availability?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
15	Do they experiment taking into account the price of water?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
16	Do you think that farmers are open to changes, to innovative solutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
17	Do farmers venture in experiments more easily if they are advised by institutions/organizations?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
18	Do farmers/the irrigation community carry out preventive actions in front of droughts or floods?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?		
19	Do farmers carry out actions to prevent water contamination?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
20	Is it easy for farmers to get a credit to change the irrigation system or to modernize it?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Who facilitates those credits? Local institutions, regional institutions, a <i>Caja Rural</i> ...	The regional government (La Generalitat)	
21	Are there subsidies for farmers to change the irrigation system, to modernize the plots, if they carry out good practices...?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
22	Are those subsidies well-known by the farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
23	Do you think that the inversion in irrigation systems is recovered?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?	Irrigation improves the quality and quantity of the crops.	
24	Do the IC ask for credits or economic help to carry out particular initiatives in water management?	Si <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is yes, which are those initiatives?	For the maintenance	
25	Would you say that is easy for the IC to obtain economic help?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
26	Is it easy for farmers to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

27	Is it easy for the IC to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
28	Do you think that the water infrastructures in the area are correct?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If not, what can be improved?		
29	Do you think that the infrastructures are well-distributed?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
30	Are there computational technologies for the irrigation farms?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
31	Are those common in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
32	Is the irrigation technology flexible to seasonal changes/urgent needs?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
33	Are there visionary figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
34	Are there collaborative figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
35	Is the IC authority respected by farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
36	Is there trust among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
37	Is there trust with the institutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
38	Are there equal opportunities when participating in the IC?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
39	Are there equal profits among the members of the IC?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
40	Do you think that the IC gives fast and effective response to the problems presented by its associated farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

9) IC ALDEA CAMARLES

Position in the IC (if applicable): President of the IC

1	Which are the most important events in the last years in the irrigated land of the area?	The implementation of irrigation in the area of Terra Alta and the construction of the Xerta-Sènia Channel	
	Which municipalities are included in this irrigation community?	Tortosa, l'Aldea, Camarles, l'Ampolla and el Perelló.	
2	Is there variety of irrigation systems in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	Which are those?	Support irrigation for the rain-fed crops and intensive irrigation for the fruit trees. There is aspersion and drip systems in the area	
	If there is more than one system, which is the most common?	Support irrigation	
3	Is there variety of irrigation systems in the plot?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
4	Are there different water intakes in the area? (So to say, water comes from different channels, dwells, reservoirs, etc. the contrary situation would be that the water source is common for all the plots)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why all the water comes from the same source?		
5	In the area, the amount of irrigated land is similar to the amount of raining-fed land?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, which could be the reason for that?	The rain-fed land is larger than the irrigated one	
6	Is there variety among the crops produced in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which product(s) is (are) more common? Why?	Olive	
7	Is the farmers' age variable in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
8	Is the farmers' social position variable?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
9	Is the farmers' educational level variable?	Yes <input checked="" type="checkbox"/>	No <input checked="" type="checkbox"/>
10	The most common farmers profile in the area is:	Business <input type="checkbox"/>	

		Subsistence economy <input checked="" type="checkbox"/>	
		Both (in a similar percentage) <input type="checkbox"/>	
11	Do farmers help each other?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
12	Do you think that there is knowledge transference and information among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
13	Is the use of internet/e-mail widely used among farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
14	Do farmers experiment which crop is more profitable taking into account water availability?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
15	Do they experiment taking into account the price of water?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
16	Do you think that farmers are open to changes, to innovative solutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
17	Do farmers venture in experiments more easily if they are advised by institutions/organizations?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
18	Do farmers/the irrigation community carry out preventive actions in front of droughts or floods?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why?	The climatic characteristics of the area are too tough, drought prevention actions are not enough	
19	Do farmers carry out actions to prevent water contamination?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
20	Is it easy for farmers to get a credit to change the irrigation system or to modernize it?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Who facilitates those credits? Local institutions, regional institutions, a <i>Caja Rural</i> ...	<i>Cajas</i> and the ICA	
21	Are there subsidies for farmers to change the irrigation system, to modernize the plots, if they carry out good practices...?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
22	Are those subsidies well-known by the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
23	Do you think that the inversion in irrigation systems is recovered?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?	Irrigation improves the quality and increases quantity of products.	

24	Do the IC ask for credits or economic help to carry out particular initiatives in water management?	Si <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is yes, which are those initiatives?		
25	Would you say that is easy for the IC to obtain economic help?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
26	Is it easy for farmers to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
27	Is it easy for the IC to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
28	Do you think that the water infrastructures in the area are correct?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If not, what can be improved?	The implementation of the irrigation plan of the IC	
29	Do you think that the infrastructures are well-distributed?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
30	Are there computational technologies for the irrigation farms?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
31	Are those common in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
32	Is the irrigation technology flexible to seasonal changes/urgent needs?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
33	Are there visionary figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
34	Are there collaborative figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
35	Is the IC authority respected by farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
36	Is there trust among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
37	Is there trust with the institutions?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
38	Are there equal opportunities when participating in the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
39	Are there equal profits among the members of the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
40	Do you think that the IC gives fast and effective response to the problems presented by its associated farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

10) IC SINDICAT AGRÍCOLA DE L'EBRE

Position in the IC (if applicable): President of the IC

1	Which are the most important events in the last years in the irrigated land of the area?	The improvement of vegetal varieties and the mechanization of the labour	
	Which municipalities are included in this irrigation community?	L'Aldea, l'Ampolla, Camarles, Deltebre, Sant Jaume d'Enveja, Tivells and Tortosa	
2	Is there variety of irrigation systems in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	Which are those?	Gravity	
	If there is more than one system, which is the most common?	-	
3	Is there variety of irrigation systems in the plot?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
4	Are there different water intakes in the area? (So to say, water comes from different channels, dwells, reservoirs, etc. the contrary situation would be that the water source is common for all the plots)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why all the water comes from the same source?		
5	In the area, the amount of irrigated land is similar to the amount of raining-fed land?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, which could be the reason for that?	The majority of land is irrigated as we are in a delta.	
6	Is there variety among the crops produced in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	Which product(s) is (are) more common? Why?	Almost everything is rice.	
7	Is the farmers' age variable in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
8	Is the farmers' social position variable?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
9	Is the farmers' educational level variable?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
10	The most common farmers profile in the area is:	Business <input type="checkbox"/>	
		Subsistence economy <input type="checkbox"/>	
		Both (in a similar	

		percentage) <input checked="" type="checkbox"/>	
11	Do farmers help each other?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
12	Do you think that there is knowledge transference and information among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
13	Is the use of internet/e-mail widely used among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
14	Do farmers experiment which crop is more profitable taking into account water availability?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
15	Do they experiment taking into account the price of water?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
16	Do you think that farmers are open to changes, to innovative solutions?	Yes <input checked="" type="checkbox"/>	No <input checked="" type="checkbox"/>
17	Do farmers venture in experiments more easily if they are advised by institutions/organizations?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
18	Do farmers/the irrigation community carry out preventive actions in front of droughts or floods?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?		
19	Do farmers carry out actions to prevent water contamination?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
20	Is it easy for farmers to get a credit to change the irrigation system or to modernize it?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	Who facilitates those credits? Local institutions, regional institutions, a <i>Caja Rural</i> ...	The regional government and various <i>Cajas</i> but now it is more difficult to gain them.	
21	Are there subsidies for farmers to change the irrigation system, to modernize the plots, if they carry out good practices...?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
22	Are those subsidies well-known by the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
23	Do you think that the inversion in irrigation systems is recovered?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?	The drip system makes the production profitable.	
24	Do the IC ask for credits or economic help to carry out particular initiatives in water management?	Si <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is yes, which are those initiatives?	Works to increase the efficiency of distribution	

25	Would you say that is easy for the IC to obtain economic help?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
26	Is it easy for farmers to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
27	Is it easy for the IC to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
28	Do you think that the water infrastructures in the area are correct?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If not, what can be improved?		
29	Do you think that the infrastructures are well-distributed?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
30	Are there computational technologies for the irrigation farms?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
31	Are those common in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
32	Is the irrigation technology flexible to seasonal changes/urgent needs?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
33	Are there visionary figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
34	Are there collaborative figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
35	Is the IC authority respected by farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
36	Is there trust among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
37	Is there trust with the institutions?	Yes <input checked="" type="checkbox"/>	No <input checked="" type="checkbox"/>
38	Are there equal opportunities when participating in the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
39	Are there equal profits among the members of the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
40	Do you think that the IC gives fast and effective response to the problems presented by its associated farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Appendix C

QUESTIONNAIRES IN NAVARRE

1) MURILLO EL FRUTO

Position in the IC (if applicable): Farmer

1	Which are the most important events in the last years in the irrigated land of the area?	The plot concentration and improvement of the irrigation systems to more efficient and computational ones.	
	Which municipalities are included in this irrigation community?	Murillo el Fruto	
2	Is there variety of irrigation systems in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which are those?	Gravity, drip system and aspersion	
	If there is more than one system, which is the most common?	aspersion	
3	Is there variety of irrigation systems in the plot?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
4	Are there different water intakes in the area? (So to say, water comes from different channels, dwells, reservoirs, etc. the contrary situation would be that the water source is common for all the plots)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why all the water comes from the same source?	There are two different main intakes from two different rivers	
5	In the area, the amount of irrigated land is similar to the amount of raining-fed land?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, which could be the reason for that?	The majority of land is rain-fed because the distribution of water was not possible to all farms in the municipality	
6	Is there variety among the crops produced in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which product(s) is (are) more common? Why?	Nowadays the most common is corn because of the good quality-price ratio	
7	Is the farmers' age variable in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

8	Is the farmers' social position variable?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
9	Is the farmers' educational level variable?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
10	The most common farmers profile in the area is:	Business <input checked="" type="checkbox"/>	
		Subsistence economy <input type="checkbox"/>	
		Both (in a similar percentage) <input type="checkbox"/>	
11	Do farmers help each other?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
12	Do you think that there is knowledge transference and information among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
13	Is the use of internet/e-mail widely used among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
14	Do farmers experiment which crop is more profitable taking into account water availability?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
15	Do they experiment taking into account the price of water?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
16	Do you think that farmers are open to changes, to innovative solutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
17	Do farmers venture in experiments more easily if they are advised by institutions/organizations?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
18	Do farmers/the irrigation community carry out preventive actions in front of droughts or floods?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why?	The responsible to limit the use of water or to prevent this situations is the IC	
19	Do farmers carry out actions to prevent water contamination?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
20	Is it easy for farmers to get a credit to change the irrigation system or to modernize it?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Who facilitates those credits? Local institutions, regional institutions, a <i>Caja Rural</i> ...	The regional government and <i>Caja Rural de Navarra</i>	
21	Are there subsidies for farmers to change the irrigation system, to modernize the plots, if they carry out good practices...?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
22	Are those subsidies well-known by the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

	Do you think that the inversion in irrigation systems is recovered?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
23	If the answer is no, why?	Irrigation agriculture is profitable but this is principally due to the governmental subsidies given	
24	Do the IC ask for credits or economic help to carry out particular initiatives in water management?	Si <input type="checkbox"/>	No <input type="checkbox"/>
	If the answer is yes, which are those initiatives?		
25	Would you say that is easy for the IC to obtain economic help?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
26	Is it easy for farmers to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
27	Is it easy for the IC to contact with governmental advisors?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
28	Do you think that the water infrastructures in the area are correct?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If not, what can be improved?		
29	Do you think that the infrastructures are well-distributed?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
30	Are there computational technologies for the irrigation farms?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
31	Are those common in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
32	Is the irrigation technology flexible to seasonal changes/urgent needs?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
33	Are there visionary figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
34	Are there collaborative figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
35	Is the IC authority respected by farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
36	Is there trust among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
37	Is there trust with the institutions?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
38	Are there equal opportunities when participating in the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
39	Are there equal profits among the members of the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
40	Do you think that the IC gives fast and effective response to the	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

	problems presented by its associated farmers?		
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Question number	Comments
37	The regional and the central government could do more and work better; we, as farmers, can demand more and we should be listened.

2) IC EL FERIAL

Position in the IC (if applicable): Secretary

1	Which are the most important events in the last years in the irrigated land of the area?	The plot concentration, the modernization of the irrigation system in the plots and the construction of the Navarre Channel.	
	Which municipalities are included in this irrigation community?	Bardenas Reales, Valtierra and Caparroso	
2	Is there variety of irrigation systems in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which are those?	Aspersion and drip system	
	If there is more than one system, which is the most common?	Aspersion	
3	Is there variety of irrigation systems in the plot?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
4	Are there different water intakes in the area? (So to say, water comes from different channels, dwells, reservoirs, etc. the contrary situation would be that the water source is common for all the plots)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why all the water comes from the same source?		
5	In the area, the amount of irrigated land is similar to the amount of raining-fed land?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, which could be the reason for that?		
6	Is there variety among the crops produced in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which product(s) is (are) more common? Why?	Corn	
7	Is the farmers' age variable in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
8	Is the farmers' social position variable?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
9	Is the farmers' educational level variable?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
10	The most common farmers profile in the area is:	Business <input checked="" type="checkbox"/>	
		Subsistence economy <input type="checkbox"/>	
		Both (in a similar percentage) <input type="checkbox"/>	

11	Do farmers help each other?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
12	Do you think that there is knowledge transference and information among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
13	Is the use of internet/e-mail widely used among farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
14	Do farmers experiment which crop is more profitable taking into account water availability?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
15	Do they experiment taking into account the price of water?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
16	Do you think that farmers are open to changes, to innovative solutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
17	Do farmers venture in experiments more easily if they are advised by institutions/organizations?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
18	Do farmers/the irrigation community carry out preventive actions in front of droughts or floods?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?		
19	Do farmers carry out actions to prevent water contamination?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
20	Is it easy for farmers to get a credit to change the irrigation system or to modernize it?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Who facilitates those credits? Local institutions, regional institutions, a <i>Caja Rural</i> ...	The regional government	
21	Are there subsidies for farmers to change the irrigation system, to modernize the plots, if they carry out good practices...?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
22	Are those subsidies well-known by the farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
23	Do you think that the inversion in irrigation systems is recovered?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?	Irrigated land is more comfortable and a more secure inversion. Also, the value of the plot if it has a irrigation system	
24	Do the IC ask for credits or economic help to carry out particular initiatives in water management?	Si <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is yes, which are those initiatives?	For the construction of reserves and the implementation of telecontrol systems.	

25	Would you say that is easy for the IC to obtain economic help?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
26	Is it easy for farmers to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
27	Is it easy for the IC to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
28	Do you think that the water infrastructures in the area are correct?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If not, what can be improved?		
29	Do you think that the infrastructures are well-distributed?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
30	Are there computational technologies for the irrigation farms?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
31	Are those common in the area?	Yes <input checked="" type="checkbox"/>	No <input checked="" type="checkbox"/>
32	Is the irrigation technology flexible to seasonal changes/urgent needs?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
33	Are there visionary figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
34	Are there collaborative figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
35	Is the IC authority respected by farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
36	Is there trust among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
37	Is there trust with the institutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
38	Are there equal opportunities when participating in the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
39	Are there equal profits among the members of the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
40	Do you think that the IC gives fast and effective response to the problems presented by its associated farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

3) IC NAVARRE CHANNEL – S.II.2

Position in the IC (if applicable): Secretary

1	Which are the most important events in the last years in the irrigated land of the area?	The expansion of irrigated land due to the improvement of the irrigation systems and the Navarre Channel	
	Which municipalities are included in this irrigation community?	Artajona, Mendigorria and Larraga (3.200ha)	
2	Is there variety of irrigation systems in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which are those?	Aspersion and drip system	
	If there is more than one system, which is the most common?	Aspersion	
3	Is there variety of irrigation systems in the plot?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
4	Are there different water intakes in the area? (So to say, water comes from different channels, dwells, reservoirs, etc. the contrary situation would be that the water source is common for all the plots)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why all the water comes from the same source?	Water comes from the channel	
5	In the area, the amount of irrigated land is similar to the amount of raining-fed land?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, which could be the reason for that?		
6	Is there variety among the crops produced in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which product(s) is (are) more common? Why?	Corn (because of the actual prices)	
7	Is the farmers' age variable in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
8	Is the farmers' social position variable?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
9	Is the farmers' educational level variable?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
10	The most common farmers profile in the area is:	Business <input type="checkbox"/>	
		Subsistence economy <input type="checkbox"/>	
		Both (in a similar percentage) <input checked="" type="checkbox"/>	

11	Do farmers help each other?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
12	Do you think that there is knowledge transference and information among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
13	Is the use of internet/e-mail widely used among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
14	Do farmers experiment which crop is more profitable taking into account water availability?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
15	Do they experiment taking into account the price of water?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
16	Do you think that farmers are open to changes, to innovative solutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
17	Do farmers venture in experiments more easily if they are advised by institutions/organizations?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
18	Do farmers/the irrigation community carry out preventive actions in front of droughts or floods?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why?	There is water enough, there is no need to carry out preventive actions	
19	Do farmers carry out actions to prevent water contamination?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
20	Is it easy for farmers to get a credit to change the irrigation system or to modernize it?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Who facilitates those credits? Local institutions, regional institutions, a <i>Caja Rural</i> ...	Caja Rural	
21	Are there subsidies for farmers to change the irrigation system, to modernize the plots, if they carry out good practices...?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
22	Are those subsidies well-known by the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
23	Do you think that the inversion in irrigation systems is recovered?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?	Irrigated land has better return and more varieties are planted	
24	Do the IC ask for credits or economic help to carry out particular initiatives in water management?	Si <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is yes, which are those initiatives?		
25	Would you say that is easy for the IC to obtain economic help?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

26	Is it easy for farmers to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
27	Is it easy for the IC to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
28	Do you think that the water infrastructures in the area are correct?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If not, what can be improved?		
29	Do you think that the infrastructures are well-distributed?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
30	Are there computational technologies for the irrigation farms?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
31	Are those common in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
32	Is the irrigation technology flexible to seasonal changes/urgent needs?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
33	Are there visionary figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
34	Are there collaborative figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
35	Is the IC authority respected by farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
36	Is there trust among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
37	Is there trust with the institutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
38	Are there equal opportunities when participating in the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
39	Are there equal profits among the members of the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
40	Do you think that the IC gives fast and effective response to the problems presented by its associated farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

4) IC NAVARRE CHANEL – S.VIII

Position in the IC (if applicable): President

1	Which are the most important events in the last years in the irrigated land of the area?	The Navarre Channel.	
	Which municipalities are included in this irrigation community?	Ujué (Uxue)	
2	Is there variety of irrigation systems in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which are those?	Aspersion and drip system	
	If there is more than one system, which is the most common?	Aspersion	
3	Is there variety of irrigation systems in the plot?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
4	Are there different water intakes in the area? (So to say, water comes from different channels, dwells, reservoirs, etc. the contrary situation would be that the water source is common for all the plots)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why all the water comes from the same source?	Water is distributed in the area by the channel	
5	In the area, the amount of irrigated land is similar to the amount of raining-fed land?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, which could be the reason for that?	Rain-fed is predominant, due to the altitude	
6	Is there variety among the crops produced in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which product(s) is (are) more common? Why?	Corn because it is highly profitable and easy to manage	
7	Is the farmers' age variable in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
8	Is the farmers' social position variable?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
9	Is the farmers' educational level variable?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
10	The most common farmers profile in the area is:	Business <input type="checkbox"/>	
		Subsistence economy <input checked="" type="checkbox"/>	
		Both (in a similar percentage) <input type="checkbox"/>	

11	Do farmers help each other?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
12	Do you think that there is knowledge transference and information among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
13	Is the use of internet/e-mail widely used among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
14	Do farmers experiment which crop is more profitable taking into account water availability?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
15	Do they experiment taking into account the price of water?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
16	Do you think that farmers are open to changes, to innovative solutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
17	Do farmers venture in experiments more easily if they are advised by institutions/organizations?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
18	Do farmers/the irrigation community carry out preventive actions in front of droughts or floods?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why?	We have never have water shortcomings since the channel was built	
19	Do farmers carry out actions to prevent water contamination?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
20	Is it easy for farmers to get a credit to change the irrigation system or to modernize it?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Who facilitates those credits? Local institutions, regional institutions, a <i>Caja Rural</i> ...	Different <i>Cajas Rurales</i>	
21	Are there subsidies for farmers to change the irrigation system, to modernize the plots, if they carry out good practices...?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
22	Are those subsidies well-known by the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
23	Do you think that the inversion in irrigation systems is recovered?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?	The traditional rain-fed land of the municipality was not profitable so the transformation was necessary as it is more profitable	
24	Do the IC ask for credits or economic help to carry out particular initiatives in water management?	Si <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is yes, which are those initiatives?		

25	Would you say that is easy for the IC to obtain economic help?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
26	Is it easy for farmers to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
27	Is it easy for the IC to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
28	Do you think that the water infrastructures in the area are correct?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If not, what can be improved?		
29	Do you think that the infrastructures are well-distributed?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
30	Are there computational technologies for the irrigation farms?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
31	Are those common in the area?	Yes <input checked="" type="checkbox"/>	No <input checked="" type="checkbox"/>
32	Is the irrigation technology flexible to seasonal changes/urgent needs?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
33	Are there visionary figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
34	Are there collaborative figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
35	Is the IC authority respected by farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
36	Is there trust among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
37	Is there trust with the institutions?	Yes <input checked="" type="checkbox"/>	No <input checked="" type="checkbox"/>
38	Are there equal opportunities when participating in the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
39	Are there equal profits among the members of the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
40	Do you think that the IC gives fast and effective response to the problems presented by its associated farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

5) IC HUERTAS MAYORES

Position in the IC (if applicable): Unknown

1	Which are the most important events in the last years in the irrigated land of the area?	The plot concentration and the construction of the Itoiz dam and the Navarre Channel.	
	Which municipalities are included in this irrigation community?	Tudela	
2	Is there variety of irrigation systems in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which are those?	Gravity, aspersion and drip system	
	If there is more than one system, which is the most common?	Gravity	
3	Is there variety of irrigation systems in the plot?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
4	Are there different water intakes in the area? (So to say, water comes from different channels, dwells, reservoirs, etc. the contrary situation would be that the water source is common for all the plots)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why all the water comes from the same source?		
5	In the area, the amount of irrigated land is similar to the amount of raining-fed land?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, which could be the reason for that?	There were no infrastructures before to regulate the resource	
6	Is there variety among the crops produced in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which product(s) is (are) more common? Why?	Cereal and horticultural crops	
7	Is the farmers' age variable in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
8	Is the farmers' social position variable?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
9	Is the farmers' educational level variable?	Yes <input checked="" type="checkbox"/>	No <input checked="" type="checkbox"/>
10	The most common farmers profile in the area is:	Business <input checked="" type="checkbox"/>	
		Subsistence economy <input type="checkbox"/>	
		Both (in a similar	

		percentage) <input type="checkbox"/>	
11	Do farmers help each other?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
12	Do you think that there is knowledge transference and information among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
13	Is the use of internet/e-mail widely used among farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
14	Do farmers experiment which crop is more profitable taking into account water availability?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
15	Do they experiment taking into account the price of water?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
16	Do you think that farmers are open to changes, to innovative solutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
17	Do farmers venture in experiments more easily if they are advised by institutions/organizations?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
18	Do farmers/the irrigation community carry out preventive actions in front of droughts or floods?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why?	Lack of technical advice	
19	Do farmers carry out actions to prevent water contamination?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
20	Is it easy for farmers to get a credit to change the irrigation system or to modernize it?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	Who facilitates those credits? Local institutions, regional institutions, a <i>Caja Rural</i> ...	The local and regional government, <i>Cajas Rurales</i> , other institutions...	
21	Are there subsidies for farmers to change the irrigation system, to modernize the plots, if they carry out good practices...?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
22	Are those subsidies well-known by the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
23	Do you think that the inversion in irrigation systems is recovered?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?	Cost are lower and more profitable in irrigated agriculture	
24	Do the IC ask for credits or economic help to carry out particular initiatives in water management?	Si <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is yes, which are those initiatives?		
	Would you say that is easy for the IC to obtain economic help?	Yes <input checked="" type="checkbox"/>	No <input checked="" type="checkbox"/>

25			
26	Is it easy for farmers to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
27	Is it easy for the IC to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
28	Do you think that the water infrastructures in the area are correct?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If not, what can be improved?	It is necessary to regulate the resource and to improve the gravity system that is predominant in the area	
29	Do you think that the infrastructures are well-distributed?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
30	Are there computational technologies for the irrigation farms?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
31	Are those common in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
32	Is the irrigation technology flexible to seasonal changes/urgent needs?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
33	Are there visionary figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
34	Are there collaborative figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
35	Is the IC authority respected by farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
36	Is there trust among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
37	Is there trust with the institutions?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
38	Are there equal opportunities when participating in the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
39	Are there equal profits among the members of the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
40	Do you think that the IC gives fast and effective response to the problems presented by its associated farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

6) IC LERIN

Position in the IC (if applicable): Secretary

1	Which are the most important events in the last years in the irrigated land of the area?	The high variability of the flow of the Ega River.	
	Which municipalities are included in this irrigation community?	Lerin	
2	Is there variety of irrigation systems in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which are those?	Gravity, aspersion and drip system	
	If there is more than one system, which is the most common?	Gravity	
3	Is there variety of irrigation systems in the plot?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
4	Are there different water intakes in the area? (So to say, water comes from different channels, dwells, reservoirs, etc. the contrary situation would be that the water source is common for all the plots)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why all the water comes from the same source?	There is one intake in the Ega River	
5	In the area, the amount of irrigated land is similar to the amount of raining-fed land?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, which could be the reason for that?	The majority of farms are rain-fed	
6	Is there variety among the crops produced in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which product(s) is (are) more common? Why?	Cereal, tomato, potato, paprika, vineyard...	
7	Is the farmers' age variable in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
8	Is the farmers' social position variable?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
9	Is the farmers' educational level variable?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
10	The most common farmers profile in the area is:	Business <input type="checkbox"/>	
		Subsistence economy <input checked="" type="checkbox"/>	
		Both (in a similar percentage) <input type="checkbox"/>	

11	Do farmers help each other?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
12	Do you think that there is knowledge transference and information among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
13	Is the use of internet/e-mail widely used among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
14	Do farmers experiment which crop is more profitable taking into account water availability?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
15	Do they experiment taking into account the price of water?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
16	Do you think that farmers are open to changes, to innovative solutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
17	Do farmers venture in experiments more easily if they are advised by institutions/organizations?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
18	Do farmers/the irrigation community carry out preventive actions in front of droughts or floods?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why?	Because of the lack of prevision	
19	Do farmers carry out actions to prevent water contamination?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
20	Is it easy for farmers to get a credit to change the irrigation system or to modernize it?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	Who facilitates those credits? Local institutions, regional institutions, a <i>Caja Rural</i> ...	The regional and local government, <i>Cajas</i> , the <i>Diputación</i>	
21	Are there subsidies for farmers to change the irrigation system, to modernize the plots, if they carry out good practices...?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
22	Are those subsidies well-known by the farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
23	Do you think that the inversion in irrigation systems is recovered?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?	Irrigation systems improve the quality of life and the safe of water is high	
24	Do the IC ask for credits or economic help to carry out particular initiatives in water management?	Si <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is yes, which are those initiatives?		
25	Would you say that is easy for the IC to obtain economic help?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

26	Is it easy for farmers to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
27	Is it easy for the IC to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
28	Do you think that the water infrastructures in the area are correct?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If not, what can be improved?	The gravity system of irrigation should be substituted by more efficient ones. To do this change, however, it is necessary to advice farmers and help them	
29	Do you think that the infrastructures are well-distributed?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
30	Are there computational technologies for the irrigation farms?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
31	Are those common in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
32	Is the irrigation technology flexible to seasonal changes/urgent needs?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
33	Are there visionary figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
34	Are there collaborative figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
35	Is the IC authority respected by farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
36	Is there trust among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
37	Is there trust with the institutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
38	Are there equal opportunities when participating in the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
39	Are there equal profits among the members of the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
40	Do you think that the IC gives fast and effective response to the problems presented by its associated farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

7) IC MURCHANTE

Position in the IC (if applicable): Unknown

1	Which are the most important events in the last years in the irrigated land of the area?	The modernization of the irrigation systems and the increase of water price	
	Which municipalities are included in this irrigation community?	Ablitas	
2	Is there variety of irrigation systems in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	Which are those?	Aspersion	
	If there is more than one system, which is the most common?		
3	Is there variety of irrigation systems in the plot?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
4	Are there different water intakes in the area? (So to say, water comes from different channels, dwells, reservoirs, etc. the contrary situation would be that the water source is common for all the plots)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why all the water comes from the same source?	All water comes from the Lodosa Channel	
5	In the area, the amount of irrigated land is similar to the amount of raining-fed land?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, which could be the reason for that?	The farms in the municipality are irrigated	
6	Is there variety among the crops produced in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which product(s) is (are) more common? Why?	Vineyard, by tradition, and horticultural crops due to the increase of water available	
7	Is the farmers' age variable in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
8	Is the farmers' social position variable?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
9	Is the farmers' educational level variable?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
10	The most common farmers profile in the area is:	Business <input type="checkbox"/>	
		Subsistence economy <input checked="" type="checkbox"/>	
		Both (in a similar percentage) <input type="checkbox"/>	

11	Do farmers help each other?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
12	Do you think that there is knowledge transference and information among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
13	Is the use of internet/e-mail widely used among farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
14	Do farmers experiment which crop is more profitable taking into account water availability?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
15	Do they experiment taking into account the price of water?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
16	Do you think that farmers are open to changes, to innovative solutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
17	Do farmers venture in experiments more easily if they are advised by institutions/organizations?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
18	Do farmers/the irrigation community carry out preventive actions in front of droughts or floods?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?		
19	Do farmers carry out actions to prevent water contamination?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
20	Is it easy for farmers to get a credit to change the irrigation system or to modernize it?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	Who facilitates those credits? Local institutions, regional institutions, a <i>Caja Rural</i> ...	The government	
21	Are there subsidies for farmers to change the irrigation system, to modernize the plots, if they carry out good practices...?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
22	Are those subsidies well-known by the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
23	Do you think that the inversion in irrigation systems is recovered?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?	Farms are more profitable with irrigated systems	
24	Do the IC ask for credits or economic help to carry out particular initiatives in water management?	Si <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is yes, which are those initiatives?	The IC asked for a credit to help farmers in the modernization of the irrigation systems	
25	Would you say that is easy for the IC to obtain economic help?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

26	Is it easy for farmers to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
27	Is it easy for the IC to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
28	Do you think that the water infrastructures in the area are correct?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If not, what can be improved?		
29	Do you think that the infrastructures are well-distributed?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
30	Are there computational technologies for the irrigation farms?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
31	Are those common in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
32	Is the irrigation technology flexible to seasonal changes/urgent needs?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
33	Are there visionary figures among the farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
34	Are there collaborative figures among the farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
35	Is the IC authority respected by farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
36	Is there trust among farmers?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
37	Is there trust with the institutions?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
38	Are there equal opportunities when participating in the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
39	Are there equal profits among the members of the IC?	Yes <input checked="" type="checkbox"/>	No <input checked="" type="checkbox"/>
40	Do you think that the IC gives fast and effective response to the problems presented by its associated farmers?	Yes <input checked="" type="checkbox"/>	No <input checked="" type="checkbox"/>

8) IC URRAUL BAJO Y LUMBIER

Position in the IC (if applicable): President

1	Which are the most important events in the last years in the irrigated land of the area?	The construction of the Itoiz Dam and the Navarre Channel	
	Which municipalities are included in this irrigation community?	Urraul and Lumbier	
2	Is there variety of irrigation systems in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which are those?	Aspersion and drip system	
	If there is more than one system, which is the most common?	Aspersion	
3	Is there variety of irrigation systems in the plot?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
4	Are there different water intakes in the area? (So to say, water comes from different channels, dwells, reservoirs, etc. the contrary situation would be that the water source is common for all the plots)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why all the water comes from the same source?	Water is pumped from the Irati River	
5	In the area, the amount of irrigated land is similar to the amount of raining-fed land?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, which could be the reason for that?	Rain-fed is still productive and profitable	
6	Is there variety among the crops produced in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Which product(s) is (are) more common? Why?	Corn, wheat and sunflower	
7	Is the farmers' age variable in the area?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
8	Is the farmers' social position variable?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
9	Is the farmers' educational level variable?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
10	The most common farmers profile in the area is:	Business <input checked="" type="checkbox"/>	
		Subsistence economy <input type="checkbox"/>	
		Both (in a similar percentage) <input type="checkbox"/>	
11	Do farmers help each other?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

12	Do you think that there is knowledge transference and information among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
13	Is the use of internet/e-mail widely used among farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
14	Do farmers experiment which crop is more profitable taking into account water availability?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
15	Do they experiment taking into account the price of water?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
16	Do you think that farmers are open to changes, to innovative solutions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
17	Do farmers venture in experiments more easily if they are advised by institutions/organizations?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
18	Do farmers/the irrigation community carry out preventive actions in front of droughts or floods?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is no, why?	Nobody carry out this kind of measures	
19	Do farmers carry out actions to prevent water contamination?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
20	Is it easy for farmers to get a credit to change the irrigation system or to modernize it?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	Who facilitates those credits? Local institutions, regional institutions, a <i>Caja Rural</i> ...	<i>Cajas rurales</i>	
21	Are there subsidies for farmers to change the irrigation system, to modernize the plots, if they carry out good practices...?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
22	Are those subsidies well-known by the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
23	Do you think that the inversion in irrigation systems is recovered?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If the answer is no, why?	Because these are subsidized	
24	Do the IC ask for credits or economic help to carry out particular initiatives in water management?	Si <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If the answer is yes, which are those initiatives?		
25	Would you say that is easy for the IC to obtain economic help?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
26	Is it easy for farmers to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
27	Is it easy for the IC to contact with governmental advisors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

28	Do you think that the water infrastructures in the area are correct?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If not, what can be improved?		
29	Do you think that the infrastructures are well-distributed?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
30	Are there computational technologies for the irrigation farms?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
31	Are those common in the area?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
32	Is the irrigation technology flexible to seasonal changes/urgent needs?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
33	Are there visionary figures among the farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
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39	Are there equal profits among the members of the IC?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
40	Do you think that the IC gives fast and effective response to the problems presented by its associated farmers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>