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Methodology for the analysis of the organizations and institutions relevant to drought management and mitigation in the Mediterranean

A. Iglesias and A. Garrido

Dpto de Economía y Ciencias Sociales Agrarias, E.T.S. Ingenieros Agrónomos,
Universidad Politécnica de Madrid, Avenida Complutense s/n, 28040 Madrid, Spain

SUMMARY – The objective of the first phase of the MEDROPLAN project is to identify and map national, regional and local organizations and institutions in the partner countries as well as international organizations and institutes at the Mediterranean and global level that work on: (i) the collection, processing, storing and disposing of meteorological and hydrological data; and (ii) drought preparedness and mitigation and/or water management. This chapter provides a common methodology for analysing the organizations and institutions relevant to water scarcity and drought management. The common methodology is adequate to provide information that will contribute to comparing among and across countries and to promote the cooperation of MEDROPLAN with the existing institutions, organizations, networks and other stakeholders in the Mediterranean.

Key words: Drought management, water scarcity, institutional analysis.

RESUME – "Méthodologie pour l'analyse des organisations et institutions intervenant dans la gestion et l'atténuation de la sécheresse en Méditerranée". L'objectif de la première phase du projet MEDROPLAN est d'identifier et de cartographier les organisations et institutions nationales, régionales et locales dans les pays partenaires ainsi que les organisations et instituts internationaux à l'échelle méditerranéenne et mondiale s'occupant de : (i) la collecte, traitement, stockage et mise à disposition de données météorologiques et hydrologiques ; et (ii) la prévention et atténuation de la sécheresse et/ou la gestion de l'eau. Ce chapitre présente une méthodologie commune pour analyser les organisations et institutions concernées par la pénurie d'eau et la gestion de la sécheresse. Cette méthodologie commune vise à apporter de l'information qui contribuera aux comparaisons entre pays et à l'intérieur de ceux-ci, et à promouvoir la coopération de MEDROPLAN avec les institutions, organisations, réseaux existants et autres acteurs en Méditerranée.

Mots-clés : Gestion de la sécheresse, pénurie d'eau, analyse institutionnelle.

Objectives

Although the objectives of MEDROPLAN (Mediterranean Drought Preparedness and Mitigation Planning) project are not directly focused on the institutional analysis *per se*, it is important to understand the concept, to identify the institutions and map them to ensure the relevance of subsequent drought management analysis. The methodology includes:

(i) Explicit description of institutions and organizations with competence in water policy and administration, in planning, decision making, operation of water supply systems and in drought preparedness and emergency action with particular emphasis in municipal and irrigation water supply.

(ii) Explicit description of the linkages and hierarchical relations among the organizations and institutions.

(iii) Information on existing drought preparedness and management plans.

(iv) Document the institutional experience on the application of the existing drought preparedness and management plans.

(v) Description of the data collection system in the country, specifying the institutions responsible, the type of reporting and accessibility, and the primary uses of the data.

The analysis aims to provide insights to the following key questions:

- (i) Are the set of organisations and institutions that interact within a formal or an informal network?
- (ii) Are there networks to provide communication and hierarchical flows of command?
- (iii) Are the stakeholders included into the network?
- (iv) What is the degree of influence and dependence of the stakeholders' decisions on the institutions' core themes?

The methodology proposed and described in this chapter is supported by previous leading experiences synthesised by Vogt and Somma (2000), Wilhite (2000) and Rossi *et al.* (2003).

Methodology

The methodology developed comprises five main tasks:

- (i) Elaborate a mental model of organisations and institutions in each country and describe the institutional and legal frameworks.
- (ii) Collect additional information by interviews and/or other dialog methods. The interview should include "problem analysis" (i.e. what actions did your institution take during a historical drought in a specific year?) and identification of the stakeholders affected by the decisions of each institution.
- (iii) Validate the model structure. Communicate back to the organizations and institutions the results of the previous two tasks and complete the analysis.
- (iv) Analysis of the strengths and weaknesses of the system organizational processes to take decision within the institution and within the hierarchical structure in each country.
- (v) Discussion of the challenges and opportunities to improve drought management.

Mental model of organizations and institutions

The mental model at the country level of organizations and institutions includes four components:

- (i) Data and information systems relevant to drought preparedness and management.
- (ii) Legal framework – laws, rules, norms and statutes that have direct or indirect inflows on drought preparedness and management.
- (iii) Map with explicit linkages among the organizations, institutions and stakeholders, and their description.
- (iv) Proactive and reactive plans and actions.

Data and information systems

This component refers to the collection, recording, manipulation, processing and accessibility of variables that provide a representation of natural processes and socio-economic patterns. Table 1 outlines the types and characteristics of the data relevant to drought management. The sources of data and the reliability have to be evaluated. In some cases, data are processed to create drought indices or other indicators, and in others, other sources of evidence are used to identify drought or its impacts.

Table 1. Types and characteristics of the data relevant to drought management

Type of information	Description and variables to be included in the analysis
Data types	Biophysical data: climate, soils, water, land, agriculture. Socio-economic data: water and land uses supplies and demands, economic indicators (i.e. GDP), demographic indicators
Data suppliers	List the organisations and institutions that have the responsibility of data collection and processing, and describe the strategic mandates or policies that dictate the data collection policies
Data acquisition	Description of the instrumental base for data collection, processing, and recording. For example for climatic data, the information should include the number of weather stations, variables collected, length of the data series, etc.
Data accessibility	Description of the accessibility conditions of data: costs, regularity, format. Documentation of the metadata, location and publications
Data reporting	Mention the mandatory dependencies that exist with regards to data reporting among official organisations, stakeholders and NGOs
Data users	List the organisations and institutions that receive data on a regular basis

Legal framework

This component provides a description, ordered hierarchically, of all laws, rules, norms and statutes that are presently in force in each country with connection to water uses, management, conservation as well as land uses and the natural environment, as it concerns or are influenced by all types of drought.

The water and drought legal framework are all laws and regulations related to water resources management, wastewater management, non-conventional water resources and environment related issues. The legal framework includes all laws on national, regional, district and local levels including international agreements or regulations in force.

Map linking and describing all relevant institutions, organizations and stakeholders

Water and drought institutional framework are all organizations and institutions related with the management of water resources. The institutions are classified into policy-level institutions, executive-level institutions, user-level institutions and the NGO's institutions, at national, regional, district and local levels.

A correct definition of the roles of the different levels of government in planning and co-ordination is a primary need in the preparedness and management processes. This component of the mental model includes a topology-type graph and a written description.

The organizations and institutions to be included are those within the formal framework of the political and government structures in each country (i.e. ministries, general directorates, commissions, etc.) and the official institutes and offices with relevant roles in drought preparedness and management, including water management organisations (e.g. municipal supply agencies, irrigation district consortia), institutions responsible of disaster's defence and *ad hoc* drought emergency committees or offices. The analysis includes a topology-type map and a description.

Topology-type graph

A general topology-type graph or flow-chart that provides a snapshot of organisations, their linkages, the flows of command and influence. The organizations and institutions should be classified into four categories, for example into policy level, executive level, users level and others. In areas of especial connection with drought preparedness and management, a more detailed specific flow-chart should be also included, indicating the connection and relationship within the general scheme.

Figure 1 provides an overview of the institutional framework within which meteorological and agricultural droughts may be faced, mitigated and alleviated. The figure illustrates a general guide and road mapping that may be used as conceptual framework in the specific country analysis. In all cases, the analysis and evaluation of this institutional performance takes into account the reactive capacity, the scope, and the social learning process.

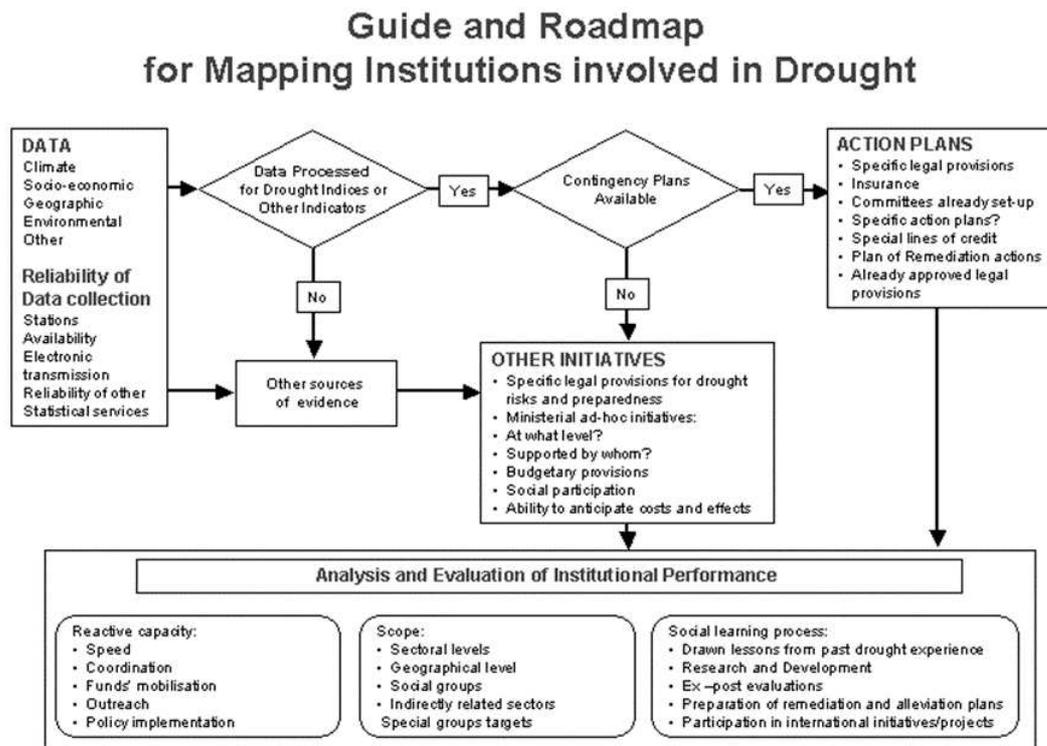


Fig. 1. General guide and road mapping that may be used as conceptual framework in the specific country analysis.

Description

A complete detailed description of each of the following points:

- (i) Description of the organizations and institutions included in the flow-chart.
- (ii) Description of the formal and informal means of communication and hierarchical command among the organisations and institutions described above. This should include both regular, and *ad hoc* modes of interaction, both at the pre-active and pro-active levels.
- (iii) Description of the various governing boards, commissions and groups' actions that have direct responsibility in drought preparedness, planning, management and mitigation. Under pre-crisis and crisis situations, a very detailed description of these should be provided.
- (iv) List, description and location of each stakeholder that either influences drought preparedness and management or is directly affected by it. Description of the means of communication, interaction and dependency with the map of organisations and institutions.
- (v) At the local and stakeholders level, it would be of special interest reporting on the customary rules and actions, and their dependence from upper organisations.

In the context of MEDROPLAN we define organization as a group of people who work together in a systematic way arranged in a structure. An institution is an entity defined interactively by birth in a

formal and informal way, as well as at the macro and micro level, that establish sets of rules, norms and shared strategies for their operation in relation to law, policy and administration. Network is a group that interacts or engages in informal communication for mutual assistance or support.

The institutions relevant to drought management are those that are concerned with water law, water policy and water administration in relation to water shortages, risks and impacts. Institutions are not simply organisations and they transcend organizations.

This complex broad definition implies the following ideas about institutions: they have regularised patterns of behaviour, informal and formal rules, explicit and implicit rules, kinds or/and levels of rules' and laws' enforcement, and formal and informal sanctioning rules.

Proactive and reactive plans and actions

This component of the mental model includes a description of the proactive and reactive drought preparedness and management plans that have been developed or are already developed and put in action in the past or are applied in the present, detailing the responsible organisation, and sources of funding for the plan or its actions. If no drought preparedness or management plan has been applied to the present time, focus on plans that are currently being developed. The analysis should be done at the country level and examples should be provided.

An example of a proactive plan may be an insurance policy for dry-land cereal and forage growers. An example of a reactive plan may be a list of water plants to be realized for increasing water resources (new wells, conduit for water transfer or desalination plants) or for reducing water losses in conveyance and distribution network. An example of a reactive plan may be a programme of water use restrictions for cities (prohibition to water public parks or to clean streets).

Each plan should at least include: objectives, list target groups, logic and rationale, attempt to judge and determine its performance, either proved or potential, budget and funding sources, and bodies and offices that are responsible in design, development and application.

The revision of the plans will contribute to the interview process by identifying the potential candidates for the interview and by outlining the main themes and questions that may be of interest to them.

Stakeholder analysis

Recognizing the importance that representative stakeholders are formally incorporated within the structure of MEDROPLAN, the stakeholders are interviewed and further engaged in model validation (see next section). As a result, the models described in each country have been accepted by the stakeholders. This will contribute to the acceptance and trust of the science that feeds into the guidelines for drought mitigation and preparedness planning that will result from MEDROPLAN.

The stakeholders considered are those actors who are directly or indirectly affected by drought and water scarcity and who could affect the outcome of a decision making process regarding that issue or are affected by it. Table 2 outlines the stakeholders considered and included.

The stakeholder analysis is conducted by mean of interviews. The objectives of the interviews are: (i) to confirm that the mental models described above provide an accurate representation about drought preparedness and management plans; (ii) to complete the findings and fill the gaps that may exist in the mental models; and (iii) to collect personal and subjective views of the country's level of preparedness and capacity for developing and carrying out management plans.

The target individuals for the interviews are: policy makers/practitioners at the highest technical level and leading researchers with experience in drought's analyses and characterisation. The number of interviews should be six to eight. The interview's structure is described in Annex 1, at the end of this document.

Table 2. Stakeholder identification and participation

Stakeholder	Characteristics and structure	Interests and expectations	Potential and deficiencies	Involvement and participation [†]
Mediterranean rainfed farmers	Sometimes in collective organizations or unions. Very interested in guidelines development	Plan and adopt practices adapted to drought. Anticipate drought effects on livestock. Avoid decreasing livestock capitals	Some with low financial margin to invest in new technologies. Some with insurance coverage. Increasing experience in alternative sources of livestock feeding	Benefit from new insurance products. R&D for insurance activities. Alert in case of drought
Mediterranean irrigated area farmers	Frequently, in irrigators associations. Interested and positively involved	Same as above	Same as above	RB plan design and functioning. (Represented by irrigation communities). R&D for insurance. Alert in case of drought
Urban water consumers and water utilities	Directly affected by water shortages. Sometimes represented by consumers associations. Aware of need to save water	To avoid water shortages, increase supply guarantee levels and water standards' increase	High potential of saving water	RB plan design and functioning. (Represented in assembly of users)
Tourism companies	Directly affected by water shortages. Represented by tourist companies associations	To avoid water shortages and bad quality that limits sector development	Very influential in economic policies. Sometimes the tourism model is water-wasting	RB plan design and functioning. (Represented in assembly of users)
Industrial companies	Directly affected by water shortages. Represented by employers' organizations	To avoid water shortages and bad quality that limits sector development	Very influential in economic policies. Sometimes the industry development model is not water-sustainable	RB plan design and functioning. (Represented in assembly of users)
Water basin authorities	Depend on the State government. In charge of administration and distribution of water	Directly affected by water shortages. Need to develop water policies based on risk analysis	Main actors in drought guidelines. Need to take into account different and opposed interests	Pro-active: design, management, decision-making and implementation of RB plans. Reactive: permanent committee, emergency works strategies
Local water authorities and water suppliers	Depend on the local authorities. Also private companies in some cases	Directly affected by water shortages. Need to develop water policies based on risk analysis	Main actors in drought guidelines	RB plan design and functioning. Priority in water allocation. (Represented in assembly of users)
Meteorological and hydrographical institutions	Depend on national and/or regional governments	Interested in the use of their data in risk analysis	Main actors in drought guidelines. In some countries, difficulties to provide data	Provide information for plan designing and monitoring

Table 2 (cont.). Stakeholder identification and participation

Stakeholder	Characteristics and structure	Interests and expectations	Potential and deficiencies	Involvement and participation [†]
Ministries of Agriculture, Environment, Water, Tourism, Industry	Depend on national and/or regional governments	Directly concerned by water shortages. In charge of the implementation of mitigation policies	Key actors. In some countries, coordination between them is to be improved	Approval of basin plans. Funding of insurance premia. Funding for subsidies, tax abatement. Create permanent office for drought
Insurance companies	Depend on national and/or regional governments	Directly concerned with the reduction in agricultural production due to drought periods	Key source of data for risk analysis in some countries. Main actors in drought preparedness guidelines	R&D new insurance products. Approval of products
Agricultural banks and rural lending institutions	Depend on national and/or regional governments. Private	Directly concerned with the need of extraordinary financial resources due to drought periods	Key source of data for risk analysis in some countries. Main actors in drought guidelines	Credits to farmers
Research, training and development institutions	Depend on national and/or regional governments. Private	In charge of development, adaptation and adoption of technologies for efficient water use	Key human capital in some disciplines but limited financial resources	New insurance products. Water planning. Transfer of technology and knowledge
International cooperation organizations	Intergovernmental	Drought and water are key issues. Key actors in technology transfer and knowledge	Good network of contacts and human resources. Limitation of financial resources	Networking. Facilitate international agreements. Use common tools for water management. Capacity building
NGO's	Non-profit, non-governmental	Environmental and social improvements	Very active and sharp users of scientific results. Limitations resulting from their clear political standpoints	Indirect participation in RB plans. Link between society and institution. Press governments to include environmental topics in political agenda. Information

[†]R&D: Research and development; RB: River basin.

In relation to drought management, stakeholders can be individuals, organisations, institutions, decision-makers, or policy-makers, who determine or are affected by water use and exposure to drought and water scarcity. Stakeholders enact institutions – sets of rules, norms, shared strategies – and they are constrained by them in their responses to drought preparedness and management. Therefore a purposeful description of the map of legitimate actors, as well as an analysis of their interests, values and approaches to risk is a pre-requisite for the understanding of their link with institutional drought policy.

Model structure validation

The mapping models presented above are validated with the participation of the stakeholders interviewed. The process included four sequential steps. First, the theoretical involvement of the stakeholders was included in the mental model. Second, key stakeholders were interviewed to validate the model. Third, the participation of the stakeholders in the process was defined. Finally, the four mapping models were reviewed, identifying omissions, redundancies and other diverging elements. To do so, it is essential to follow the same structure developed to present the mappings.

The mental model structure validation includes the following steps:

- (i) Final collection of information and data needed for the institutional analysis.
- (ii) Ensure that the mental model components provide a realistic representation of each country's drought preparedness and management plans as well as the country's capacity to implement them.
- (iii) Contrast the mental model with the interviews' insights and results.
- (iv) Set the framework of reference for the analysis of the strengths and weaknesses of the institutions and the conclusions.

Analysis of strengths and weaknesses of the model structure

This task should clearly identify the institutions strengths and weaknesses for implementing or developing drought preparedness and management plans. The analysis should consider all aspects of the model. Table 3 outlines the major issues to be evaluated.

Table 3. Summary of the major issues to be evaluated in the analysis of the model structure

Topic	Relevant issues
Data and information	Representation (spatial and temporal). Adequacy for risk analysis. Appropriate for historical analysis. Accuracy. Handling. Accessibility. Legal data: Water right-holders records. Updated registries. Socio-economic data: Water users. Sectorial distribution. Demographics. Other
Institutional organization	Organisational set-up. Legal set-up. Personnel capacity and training. Coordination among institutions. Information flows and utilisation. Units in charge of drought preparedness actions. Bodies in charge of developing proactive and reactive management plans. NGOs and stakeholders participation
Institutional performance	Based on the most recent drought episode. Based on the present state of approved contingency plans. Based on the strategies developed as a response to recent drought episodes. Based on the capacity to conduct risk analysis. Based on the capacity to pool risks and ensure compensation mechanisms at the lowest cost
Conflict resolution	Levels at which conflicts are faced and solved. Means to solve conflicting issues. Stakeholders and users participation. Groups left unattended or disenfranchised

The analysis may consider the following aspects:

(i) Synthetic and comprehensive view of the current state of institutions in each country in relation to all issues related to drought preparedness and management.

(ii) Concise and specific conclusions about the institutions' performance (both based on past episodes and future contingencies) in relation to mitigation of drought impacts and anticipatory measures.

(iii) Discussion about the major strengths and challenges (impediments and weaknesses) that stand against drought preparedness and the capacity to develop and carry out management plans. Following the analysis, tentative recommendations as to what specific institutional changes would be needed to improve the current preparedness plans can be made. In some cases, specific identified changes may take place within the current political and administrative context in each country.

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Annex 1. Questionnaire for stakeholders

Introduction

Name, age, organisation, current position, previous position, profession.

Organisation (history)

- How many years have you been working for/an activist in.....?
- How, when and why was the organisation created?
- What type of public does it represent and how many members does it have? (not applicable for governmental organisations and media)
- Approximately how many people work in the organisation? What kind of profiles and skills do they have?
- What is the socio-professional profile of the members of the organisation? (not applicable for governmental organisations and media)

Perception of drought and uncertainty

What is drought in your opinion?

In your opinion, water scarcity in the region is chronic, cyclical or irregular? Give reasons for your answer. a) Chronic ; b) Cyclical How often?; c) Irregular

Do you think that mankind can ever control droughts? Why?

Do you think that mankind can ever control floods? Why?

What sector is mostly affected by droughts? Order them from 1 (most affected) to 7 (least affected). Give reasons for your first and last choice.

	No.	Reasons
Industries		
Tourism and services		
Irrigation		
Environment		
Recreational uses		
Dry farming		
Domestic users (households)		
Others		

What sector is with whom lies the main responsibility to cope with the effects of drought?

Order the following factors of uncertainty, which affect irrigation farmers from 1 (high level of uncertainty) to 5 (low level of uncertainty). Give reasons for your first and last choice.

Factors of uncertainty	No.	Reasons
Climate		
Level of guarantee in irrigation supply		
Agricultural policies		
Work market		
Other		

Legal arrangements on water allowances and water reserves

Do you think that the current legal framework defines clearly the rights of the water permit holders? Why?

Do you think that the compensations due to users affected by a reduction in water allowance during drought periods are clearly defined in the current legal framework?

Which groups participate in the definition of water allowances during drought periods?

In your opinion, do the sectors, which are affected by water allocation during drought periods, participate sufficiently and adequately in such organisations/committees? Why? If the answer is *no*, which actors should improve their participation?

Do you think there are groups with greater capacity to make or influence decisions concerning the definition of water allowances? Give reasons. If the answer is *yes*, which groups?

How are the droughts inceptions defined or established? Is there a formal procedure to declare a "drought situation"?

Stakeholders (relations and conflicts)

In the case of drought, to which activities would you (personal opinion) give priority for the supply of water? Order them from 1 (highest priority) to 6 (lowest priority). Give reasons for your first and last choice.

Sector	No.	Reasons
Domestic use		
Services and tourism		
Environmental uses		
Irrigation		
Recreational uses		
Industry		
Other		

Do you think that these priorities correspond to the priorities that the administration defends in situations of water scarcity? Give reasons.

Do you think that the administration adequately enforces the agreements reached on water allocations? If the answer is *no*, where does the main non-compliance lie? If the answer is *yes* or *do not know*, what are the main difficulties (both internal and external) that the administration faces in enforcing the agreements?

Do you think that irrigation farming is a very, little or not at all homogeneous sector? What factors give homogeneity to this sector? What features are responsible for internal diversity? Could you list any more clearly defined/differentiated groups?

Do you think that the arguments that were put forward during the past drought in favour and against the social distribution of water – i.e. water allocation according to farm unit rather than agricultural surface – were reasonable?

Do you think that the definition of irrigation water allowances during drought periods should take into account the different irrigation systems used?

Do you think that the definition of irrigation water allowances during drought periods should take into account the diversity of crop types, in terms of different water requirements and timing of irrigation?

Mechanisms of political and media pressure

Do you think there are measures of political and media pressure that can condition or modify the decisions taken on water allowances during drought periods? To what extent are they effective? For instance, to what extent specific groups of users obtain privilege positions in times of droughts at the expense of others that are less powerful or politically active?

List in the types of actions to exert political and media pressure and the actors that normally use them.

Drought mitigation measures

Which ones of the following measures do you think are most necessary? Order them from 1 (most necessary) to 13 (least necessary). Give reasons for the first and last choice.

Action	No.	Reasons
Increase in the regulation capacity for urban supply		
Improved efficiency of the urban water distribution networks		
Freeze the increase in the irrigation surfaces		
Water markets		
Increase in the regulation capacity for conjunctive uses		
Increase in the regulation capacity for irrigation purposes		
Substitution of high- with low water-demanding crops		
Water metering		
Reallocation of water from irrigation to urban uses		
Improved irrigation efficiency		
Inter-basin transfers		
Conversion of some irrigation surfaces to dry farming		
Remote control		
Reuse of waste water		
Full cost recovery		
Other		

In your opinion, which of these measures receive the highest social acceptance and which the lowest? Give reasons.

Which of the following activities are most socially and economically important for your region/country? Order them from 1 (most important) to 6 (least important). Give reasons for your first and last choice.

Sector	No.	Reasons
Cattle-raising		
Building sector		
Tourism		
Irrigation farming		
Dry farming		
Industry		
Other		

In your opinion, which of these functions or effects of irrigated agriculture receives the highest social acceptance? Which the lowest? Give reasons.

	Highest	Lowest
It creates jobs		
It avoids emigration from the countryside		
It contributes to the economic development of less favoured regions		
It has negative impacts on the environment		
It contributes to the distribution of wealth		
It wastes water		
Other		

Economic instruments

Do you think that water can be traded in a way similar to other natural resources (e.g. oil, gas, etc.)? Why?

If the following measures were to be carried out, how and who should make the greatest contribution in terms of investment. Give reasons.

	Users (totally)	Users (majority)	50% users 50% public sector	Public sector (majority)	Public sector (totally)
Increase in the regulation capacity for urban supply					
Improved efficiency of the urban water distribution networks					
Increase in the regulation capacity for conjunctive uses					
Increase in the regulation capacity for irrigation purposes					
Substitution of high- with low water-demanding crops					
Reallocation of water from irrigation to urban uses					
Improved irrigation efficiency					
Inter-basin transfers					
Water metering					
Remote control					
Reuse of waste water					
Other					

List the advantages and disadvantages of the water pricing systems, based either on actual abstracted volume or irrigated surface.

	Advantages	Disadvantages
Irrigated surface		
Abstracted volume		

Do you think that water prices should adjust to the real costs of the resource? Do you think that this adjustment of water prices would entail a considerable reduction of irrigation water use? To what extent?

Do you think that the option to buy and sell water would involve a considerable number of users? Would it involve a considerable volume of water? What proportion?

What should be the role of the public administration in the process?

1. To get involved as little as possible, letting the water rights holders operate freely.
2. To supervise interchanges so that certain requirements are met.
3. To control the process, by acting as an intermediary, fixing the prices, etc.
4. Other.

What would be the major cultural obstacles for the application of this new framework?

What could be its possible negative effects?

Would it lead to an uneven distribution of benefits and prejudices for different actors? If the answer is yes, which ones?

Institutional scenarios

Do you think that the current proportion of water assigned to irrigated agriculture (about 80%) will be reduced in the future? No ; Yes If the answer is yes, fill in the next two tables:

	5	10	20	Longer
In what time span (years) would the reduction begin?				

	70%	60%	50%	Other
What percentage would it reach?				

What would be the main factors that could condition such redistribution of water between sectors?

How likely is it (high, medium, low probability) that agricultural policy measures with a significant effect on water use are approved? Low ; Medium ; High Why? To what extent would they affect water use?

Do you think that cultural changes are taking place, which could affect the volumes of water used and its distribution between sectors? Yes Which ones? No

Climate change

With the hindsight of the past three drought periods (1970s, 1980s, 1990s), do you think that our capacity to face the effects of drought has improved? Yes To what extent?; No Why?

How do you define climate change? Do you think you have sufficient information on this issue?

How could climate change affect the water resources and demand?

Was the problem of climate change ever discussed at your work?

Given the impacts that climate change could entail, how would it affect the level of priority of the previously mentioned measures? Give brief reasons for your answer.

Action	No.	Reasons
Increase in the regulation capacity for urban supply		
Improved efficiency of the urban water distribution networks		
Freeze the increase in the irrigation surfaces		
Water markets		
Increase in the regulation capacity for conjunctive uses		
Increase in the regulation capacity for irrigation purposes		
Substitution of high- with low water-demanding crops		
Water metering		
Reallocation of water from irrigation to urban uses		
Improved irrigation efficiency		
Inter-basin transfers		
Conversion of some irrigation surfaces to dry farming		
Full cost recovery		
Remote control		
Use of waste water		
Other		