Water demand management in the Mediterranean, progress and policies

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Guidelines for drought manamaent in Mediterranean countries

A. Iglesias, L. Garrote

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GUIDELINES FOR DROUGHT MANAGEMENT IN MEDITERRANEAN COUNTRIES

Ana Iglesias[(1,*)] Luis Garrote[(1)], Marta Moneo[(1)], Dunixi Gabiña[(2)]

[(1)] Universidad Politecnica de Madrid
[(2)] Mediterranean Agronomic Institute of Zaragoza

[(*)] Person to present at the workshop
Scientific Coordinator of MEDROPLAN
Department of Agricultural Economics and Social Sciences
Universidad Politecnica de Madrid, Spain
ana.iglesias@upm.es

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Surface and geographical/administrative level

Mediterranean countries

Abstract

The purpose of this paper is to provide Mediterranean countries with a framework for effective and systematic approach to prevent and/or minimize the impacts of drought on people. The Mediterranean region exemplifies many other drought-prone regions with rapidly expanding populations that are placing increased pressure on already limited water supplies.

Drought planning and management includes activities and actions taken by any interested individual or collective group. The Meda-Water project MEDROPLAN has synthesised academic and policy aspects of drought planning and developed drought management guidelines (the “guidelines” from now on) that appeal to a broad audience, the non-technical users and especially oriented to the support of policy making. The adaptive and dynamic character of the Guidelines presented in this Chapter includes the following aspects:

- Aim to provide a methodological framework by using examples that may be followed to develop drought management plans in a range of situations.
- Information intending to complement the ongoing regional and country water basin planning efforts and the ongoing agricultural policy initiatives.
- Consideration of both long term and short term measures that are to be used to prevent and mitigate the effects of drought.

- Design broad enough to incorporate new criteria for establishing priorities as societies change or as scientific and technological aspects of drought management improve.
- The experiences in the development and implementation of drought management plans highlight the success and challenges of coping with drought for societies with different vulnerabilities and emphasize risk-based drought management as a critical approach to mitigate the impacts associated to drought-induced water shortages.

1. Context

The Guidelines respond to the growing issue of drought preparedness planning, monitoring, and mitigation which has worldwide application. The methodologies and lessons learned are focused on the Mediterranean that is a specific, drought-prone region so the applications have more significance. The Mediterranean region exemplifies many other drought-prone regions with rapidly expanding populations that are placing increased pressure on already limited water supplies.

The Mediterranean region is one that has been identified as experiences significant changes in climate as a result of climate change. Preparing for climatic extremes (i.e., managing climate variability) is an important first step in preparing for climate change.

There are significant challenges for developing drought management guidelines since every drought has unique problems and impacts therefore it is difficult to present a plan that details and addresses all of them. Furthermore, the social and economic structure of every basin or water unit is different. There is existing valuable information and knowledge related to water supply management under scarcity and development of drought response procedures. Therefore, the Guidelines are not prescriptive, rather a range of options that enhance the current knowledge in each location and system.

This paper summarises the Guidelines developed as the result of the research carried out within the framework of the MEDA-Water project MEDROPLAN and are fully documented in several publications (Iglesias and Moneo, 2005; Iglesias et al., 2006a,b; Garrote et al., 2006) that include numerous references to scientific work in the various aspects of drought characterization and risk management.

2. Methodology and process used

The purpose of the MEDROPLAN Guidelines is to provide Mediterranean countries with a framework for effective and systematic approach to prevent and/or minimize the impacts of drought on people. The Guidelines are intended to complement the ongoing regional and country water basin planning efforts and the ongoing agricultural policy initiatives. The Guidelines outline both long term and short term measures that are to be used to prevent and mitigate the effects of drought.

The Guidelines are the result of the research carried out within the framework of the MEDA-Water project MEDROPLAN, and will be published in six languages and a tutorial to be used in print and on-line. The Guidelines give the tools to analyse drought

management in selected Mediterranean countries promoting a risk based preparedness and mitigation approach.

Drought, aridity, water shortage and desertification are common and overlapping processes in Mediterranean countries and often are misinterpreted and used. Starting with clear and agreed definitions and concepts contributes to the development of clear methods and the interpretation of the results for developing drought management plans.

2.1. The process of creating the guidelines

The Guidelines are developed in the context of current drought vulnerability, legislation, management, and technologies. The design of the Guidelines intends to be broad enough to incorporate new criteria for establishing priorities as societies change or as scientific and technological aspects of drought management improve. Figure 1 summarises the process

Drought management plans are always in progress and all components need to be considered dynamic (Figure 1). As technologies evolve, new programs are developed, and institutional responsibilities change, these plans have to be revised. However the proposed drought plan is the result of more than three years of research and it should be considered as an integrated drought plan, which takes into account almost every aspect of mitigating drought for the time being. It is true, though that from time to time it should be reviewed and probably edited and updated.

Figure 1 Development and revision of the guidelines for drought management plans

2.2. The intended user of the Guidelines

Drought management plans must make information available to the largest possible audience; therefore the goal of the MEDROPLAN Guidelines is to reach the full range of stakeholders related to drought in the Mediterranean, and especially oriented to the support of policy making. In order to achieve this goal, the Guidelines are written with the user in mind and try to avoid the use of very specific scientific or technical language that may be difficult to understand by a non specialist. Finally, the Guidelines are produced in six languages to reach the largest possible number of stakeholders in the Mediterranean (Arabic, English, French, Greek, Italic, and Spanish).

The Guidelines are designed to appeal to a broad audience. Each component of the Guidelines includes information that can be understood by a non-technical user. The methodological component also includes more in-depth scientific information and developments in drought characterization and risk analysis. The Guidelines link academic and technical issues with operational aspects therefore linking scientific and policy communities.

3. The Guidelines: A tool to complement integrated water resources management

Figure 2 summarises the main components of drought planning and management based on the Medroplan guidelines:

1. The planning framework
2. Organizational component
3. Methodological component
4. Operational component
5. Examples of the application
6. Public review component

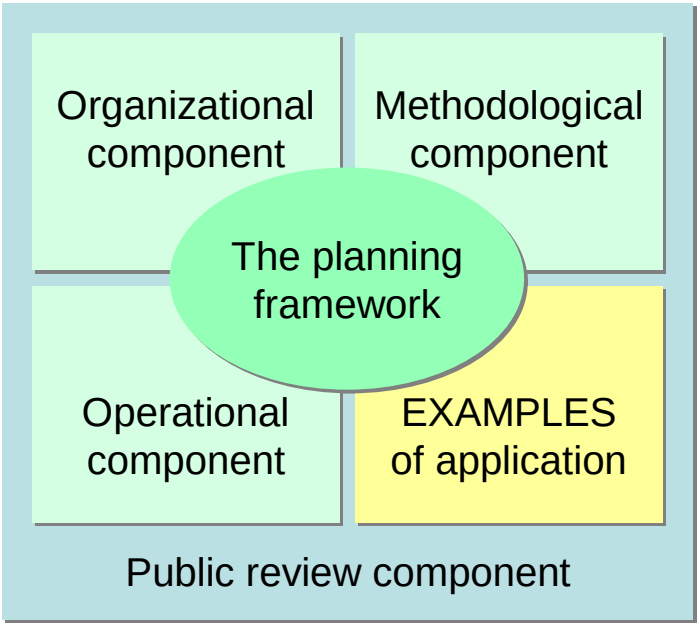

Figure 2 Components of drought planning and management

The ***planning framework*** defines the local, regional and national purpose for developing drought planning and highlights the dynamic process that responds to changing pressures in the environment and society. The planning framework guides the user of the Guidelines to define the planning purpose and process, establish a common language among stakeholders, and highlights the importance of using a common set of terms and concepts for developing a drought management plan that can be discussed among a full range of stakeholders.

The ***organizational component*** assists the user to:

- Compile and provide the most comprehensive information about how society responds to drought and establish the linkages among the stakeholders
- Coordinate with the various institutions to avoid conflict, duplication, and expedite the administrative and legal process
- Provide responsible and timely public information
- Encourage water and energy conservation
- "Declare drought"

The ***methodological component*** presents the scientific approach to risk evaluation, including characterization of drought episodes, development of indicators of risk in hydrological and agricultural systems, and analysis of the role of economic instruments and groundwater for risk mitigation. This component also includes the description of an integrated method for evaluating social vulnerability based on indicators that include the capacity to anticipate, cope, and respond to drought.

Drought is characterisation and risk and vulnerability analysis are complex and there are a wide range of methods applied. Each method has its own merit and they are usually supportive of each other. A combination of methods is usually most rewarding.

The methodological component provides a framework to:

- Compile and provide the most comprehensive technical and scientific approaches to drought characterization, development of indicators of risk in hydrological and agricultural systems
- Define the methods used for risk management in the context of Mediterranean climate and social characteristics: including economic instruments, application of technology, and groundwater use, etc.
- Define the academic methods for evaluating social vulnerability based on indicators that include the capacity to anticipate, cope, and respond to drought.
- Encourage technical studies to strengthen the use of indicators and the declaration of drought

The ***operational component*** identifies both the long and short term activities and actions that can be implemented to prevent and mitigate drought impacts. The activities and actions are essential for the creation of specific drought planning and response efforts. The operational component includes three aspects:

- Preparedness and early warning (permanent measures)
- Establishing priorities to be respected during water scarcity situations
- Thresholds defined by drought indices and indicators (physical and social)
- Evaluating the process to implement the actions
- Defining the actions

The Guidelines includes examples of the application of the planning framework to specific situations (Figure 2) in order to show how the various components and methodologies can be developed and applied to develop drought management plans.

The tutorial guides the web-user to find and select the relevant information in the different aspects of developing a drought management plan, and provides examples of use of the methods and models available and applied in the examples of application.

The ***examples of application*** are a key component since:

- Every drought has unique problems and impacts therefore it is difficult to present a plan that details and addresses all of them.
- The social and economic structure of every basin or water unit is different and examples are used to show the range of possible application of drought management and preparedness planning.
- Existing valuable information and knowledge: water supply management under scarcity; development of drought response procedures.
- The Guidelines are not prescriptive, rather a range of options is provided based on real case studies.

The ***public review component*** tests a draft proposal for a drought management and preparedness plan by means of public multi-stakeholder dialogue.

Drought management plans are not static products, they are always in progress. As technologies evolve, new programs are developed, and institutional responsibilities change, drought management plans have to be revised and therefore all components need to be considered dynamic (Figure 2).

However the proposed drought plan is the result of more than three years of research and it should be considered as an integrated drought plan, which takes into account almost every aspect of mitigating drought for the time being. It is true, though that from time to time it should be reviewed and probably edited and updated.

4. Results of the experience and lessons learned

4.1. Analysis of the institutions and stakeholders

Figure 3 summarises our methodology to analyse the institutions and organizations in each case study. This includes the following steps:

- 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.
- Explicit description of the linkages and hierarchical relations among the organizations and institutions.
- Information on existing drought preparedness and management plans.
- Document the institutional experience on the application of the existing drought preparedness and management plans.
- 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.

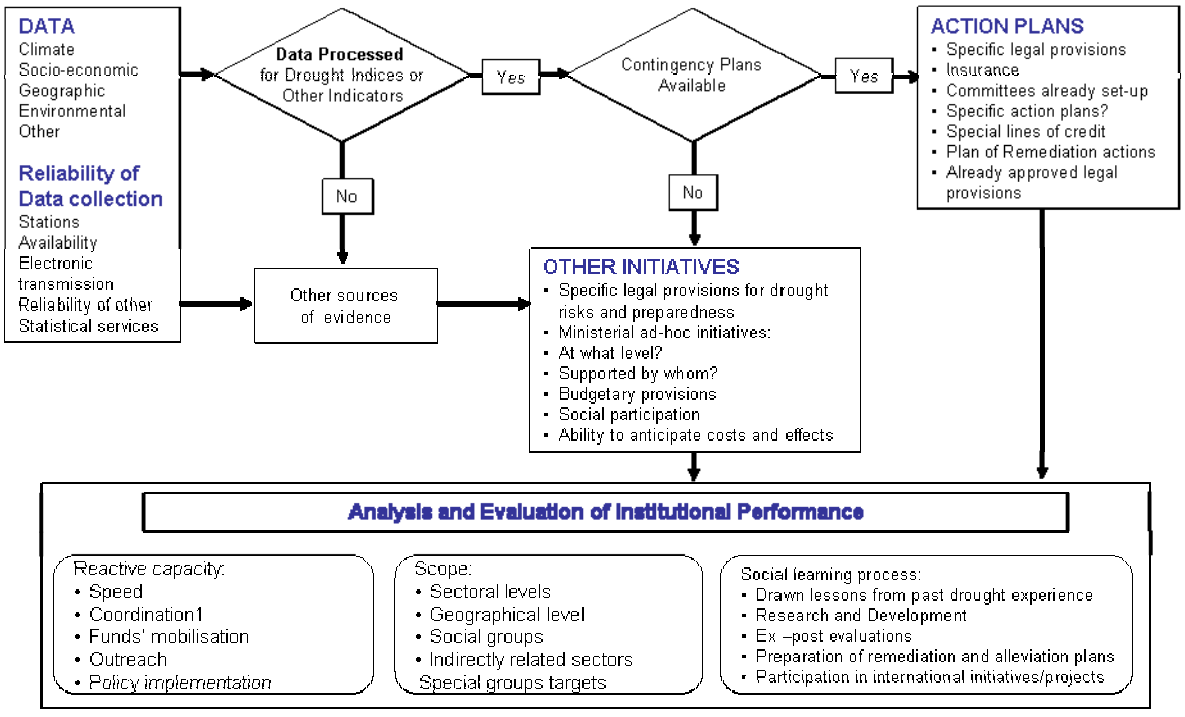

Figure 3 Outline of the methodology applied for the analysis of organizations and institutions involved in drought planning

Table 1 outlines the results of the institutional analysis. When water is managed at the river basin level and the institutional responsibilities are clearly defined, drought legislation is more effectively applied. Nevertheless, a characteristic of all countries in the region is the weak cooperation among different institutions, and the fragmented roles of the State, the administrative regions and the river basin authorities, that often results in conflicts and impediments for implementation of existing legislation.

Table 1 Summary of the drought management actions in the Mediterranean

Concept	Cyprus	Greece	Italy	Morocco	Tunisia	Spain
Water law	Includes drought	Includes drought	Includes drought	Includes drought	Includes drought	Includes drought
River basin authorities	Managed at central level Developed	Developed	Developed	Development	Partially developed	Developed
Relation among institutions	High	Low	Low	Medium	High	Medium
Public participation in water management	Low	Medium	High	Low	Low	High
Drought contingency plan	Developed	In development	Sub-national	In development	National	River basin
Drought monitoring system	Partially developed	Partially developed	River basin	National	National	River basin
Surface Water ownership	Public	Public	Public	Public	Public	Public
Groundwater ownership	Public	Public	Public	Partially private	Public	Partially private

National: developed at country level. Sub-national: developed at a level smaller than the country, such as a province or district. River basin level: refers to the portion of the river basin within the country.
Source of data: Iglesias and Moneo (2005).

4.2. Management actions

The management actions can be established by applying the operational component described above. This component identifies both the long and short term activities and actions that can be implemented to prevent and mitigate drought impacts. The activities and actions are essential for the creation of specific drought planning and response efforts. The operational component includes five aspects:

- Preparedness and early warning (permanent measures)
- Establishing priorities to be respected during water scarcity situations
- Thresholds defined by drought indices and indicators (physical and social)
- Evaluating the process to implement the actions

- Defining the actions

Table 2 summarises the types of actions that may be adequate for preparedness before drought and three levels of drought risk.

Table 2 Summary of the types of actions that may be adequate for preparedness before drought and three levels of drought risk.

	Preparedness	Pre-alert	Alert	Emergency
Monitoring indicators	Indicators show a normal situation	Indicators show initial stage of danger; no observed impacts (meteorological drought)	Drought is occurring and impacts will occur if measures are not taken (meteorological and hydrological drought)	Drought is persistent and impacts have occurred; water supply is not guaranteed (socio-economic drought)
Objective of the plan in each stage	To ensure that a preparedness and early warning plan is in place	To ensure acceptance of measures to be taken in case of alarm or emergency by raising awareness of the danger of drought	To overcome the drought situation and to guarantee water supply while emergency measures can be put in place	To minimize damage, the priority is drinking water
Measures	Development of a management plan and strategy for revision and review Implementation of a monitoring and early warning system Integration with development and land use policies	Low cost, indirect, voluntary Non structural directed to influence water demand and avoid worse situations Focus on communication and awareness Intensification of monitoring and evaluation of worse case scenarios	Low cost, direct, coercive, direct impact on consumption costs Non structural directed to specific water use groups Water restrictions for uses that do not affect drinking water Changes in management Revision of tariffs Rights Exchanging Centres	High cost, direct, restrictive, approved as general interest actions Structural, new infrastructure, intra-basin, inter-basin and transboundary transfers Non structural, such as permission for new groundwater abstraction points Water restrictions for all users, including urban demand

5. Justification of the importance of the paper

The Mediterranean region is undergoing rapid socio-economic and technological changes that increase the pressure on its already structural water deficit and question the ability to maintain the current management philosophy. In addition, climate change projections indicate an increased likelihood of droughts. Institutions in the region are evolving to respond to these pressures and to ensure more sustainable water resources management. There is an ongoing progress in many of these countries, which is favoured by the increasing regional cooperation, a better monitoring and management systems, and above all by the awareness of governments. The adoption of emerging technologies for using fresh or unconventional water resources more effectively is crucial for water management.

Drought management measures need to be integrated into the long-term strategies for water and land uses and overall development strategies. When water resources are managed at the river basin level, there is an opportunity to respond directly to policy decisions and to the needs and problems of the natural hydrological system. Monitoring and early warning systems continue to improve and are being incorporated into the planning processes. Lastly, strengthened regional cooperation and better understanding

of the resource's dynamics and social dimension, and more efficient monitoring systems give hope for alleviating the present pressures on the water resources in the next decades.

Key words

Drought, water scarcity, Mediterranean region, water use, irrigation, management actions

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