

Drought risk management in the Mediterranean under the Water Framework Directive – the example of Algarve (Portugal)

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Abstract

Recent experience and developments on drought knowledge are encouraging modern societies to shift from a traditional crisis-based management to a risk management approach. In southern Portugal, new EU legislation (and namely the Water Framework Directive) has set the framework for several policies and juridical tools covering drought and water scarcity issues, now driven by the principles of integrated and sustainable use of water resources.

This paper aims to assess the role and effectiveness of all major legal tools covering drought risk management and drought impact mitigation, as well as their level of integration and coordination. The tools currently enforced in the region that were thoroughly analysed were the National Water Plan, two River Basin Plans (Guadiana River and Algarve Streams), the 1998 Portuguese-Spanish Convention on the use of shared waters, the ad-hoc Commission for Drought 2005, and several activity regulations, namely on domestic water supply and agricultural irrigation.

Results point out the dispersion and lack of coordination within this wide range of legal instruments, especially under scarcity conditions as occurred in 2004 and 2005, calling for improved linkages between such tools under an integrated regional drought plan. Such plan should be consistent with the Water Framework Directive, integrating resources, policies and institutions, and elaborated in close collaboration with the neighbouring Iberian water regions.

Keywords: drought plans, risk management, mitigation policies, Algarve.



1 Introduction

Recent experience and developments on drought knowledge are encouraging modern societies to shift from a traditional crisis-based management to a risk management approach (Figure 1).

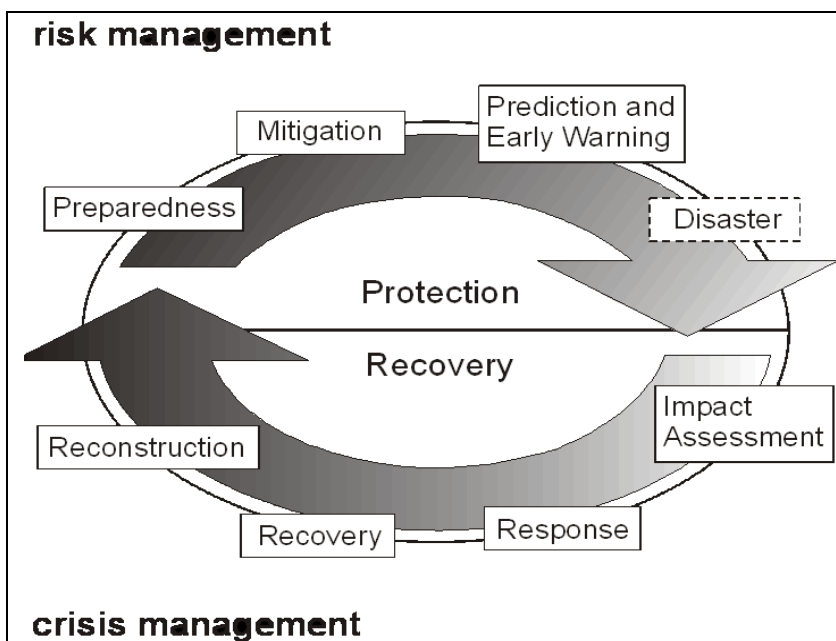


Figure 1: Crisis vs. risk management (Wilhite [1]).

This new approach is focused on preventive planning and pro-active measures, rather than reactive actions which are usually taken after the event and its impacts are already onset. Such approach calls for an integration of policies affecting water management and scarcity issues, as drought impacts are scattered among different water uses and different time and space scales.

The risk management approach to drought has been developed and implemented mainly in the USA, Australia, and South Africa, and only recently became an issue in Europe. Nevertheless, Southern Portugal, with its fully Mediterranean climate, landscape and culture, has long been facing drought impacts as a crucial component of the regional interface between society and environment. Recent severe events (1980-1983, 1991-1995, 2004-2006) with increasing impacts at supra-national scales (namely southern Iberian and western Mediterranean), have strengthened the need for targeted policies and actions, as well as for a common Mediterranean and European strategy on water scarcity and drought issues.

This paper aims to assess the role and effectiveness of all major legal tools presently covering drought risk management and drought impact mitigation, as well as their level of integration and coordination.

2 European policy context and regional legal framework

In Southern Portugal, new European Union (EU) legislation (and namely the Water Framework Directive, WFD, EC [2]) has set the framework for several policies and juridical tools covering drought and water scarcity issues, increasingly driven by the principles of integrated and sustainable use of water resources.

The WFD has no specific article on drought issues, and only makes reference to “prolonged droughts” on Article 4, while defining the exceptionality regime in face of the Directive objectives, and on Article 11, as a condition that may call for supplementary measures of water demand management. Nevertheless, as it aims at reaching a good state of European waters by 2015, both in quality and quantity, it does provide some cover to drought related policies and other legal tools that might be conceived.

The growing severity of economic, social and environmental impacts during recent drought events has provided the grounds for increasing pressure on the EU to promote a common European drought policy (EEA [3], EurAqua [4], WWF [5]). The EU has responded to these signs of public concern, and significant political action is being developed as the European Commission (EC) is preparing a policy development on Water Scarcity and Droughts (WS and D), which may lead to a Communication being issued by mid-2007.

This has been considered by political analysts as the Iberian counterweight (or even compensation) to the flood policy recently introduced, which was promoted by central and northern European countries (and namely Germany) and soon will be approved as an EU Directive, in close relation with the WFD, also called “mother-directive”.

Behind the political scene, technical work has been prepared. Early actions were taken in 2003 by the Member States Water Directors, by creating an Expert Group on WS and D. Based on its work, and pressed by the severe Iberian event of 2004 and 2005 (also affecting large parts of France and Italy severely), a number of Member States informally led by Portugal and Spain requested to initiate a European Action on WS and D, during the Environment Council of March 2006. The EC agreed to analyse this request, and to present a first report to the Environment Council in June 2006. At that stage, the EC presented a first analysis based on available data, and proposed to strengthen the diagnosis and plan for further actions to be taken at the EU level. In parallel, a Mediterranean Working Group, set up in the framework of the MED-EU Water Initiative, was in charge of producing a specific report on Mediterranean specificities and examples in the region.

The technical work of the Expert Group on WS and D can be divided in two main working modules:



- a) An interim report of existing data on impacts of WS and D, which was discussed with the Water Directors in November 2006, and should be updated with new data by 2007;
- b) The identification of pending issues (exemptions, drought management plans) dealing with the WFD implementation process, to be further analysed.

At the time of writing this article, no further information was available on this complex policy building process.

Although this European legal “umbrella” is only now being set on, Mediterranean countries such as Portugal have considerable experience dealing with drought events and its impacts. In most cases, this has only meant that each of the affected activities has developed its own contingency planning, but little or no integration policy or action was taken by public authorities.

In fact, there is no specific integrated drought policy or plan which is active in the Algarve, either at the European, national, or regional level. Drought management is scattered through different activity regulations, namely domestic water supply and irrigated agriculture, and ad-hoc emergency relief actions. All of these regulations are usually planned and set on at the national level, with little or no cross boundary integration, and very little attention to specific water basin or regional issues.

Nevertheless, several planning tools are enforced in the Algarve region, with references to drought and water scarcity management issues. These include the National Water Plan, two River Basin Plans (Guadiana River and Algarve Streams), the 1998 Portuguese-Spanish Convention on the use of shared waters (Albufeira Convention), the Commission for Drought 2005, and specific regulations on domestic water supply and agricultural irrigation, all of which were thoroughly analysed in terms of its scope and effectiveness on drought impact mitigation.

3 Permanent drought related policies and plans

The key legal instrument for water issues in Portugal is the Water Law, which was only recently approved (Law 58/2005), transposing the contents of the WFD to the national legal framework. The law itself has more of a guidance scope than a regulatory one, which is only given by specific legislation still being produced (such as the economic and financial regime, the property and public domain regulation, and others).

In this context, it is understandable that references to drought and drought impact mitigation are scarce and rather vague. Nevertheless, the Water Law refers specifically to the protection of society against drought effects on its article 41, through eventual “drought intervention programs” which should state the goals to be achieved, specific measures to be adopted by each of the economic activities affected, and description of its implementation mechanisms. Such measures should specify any changes or limitations foreseen to regular uses and procedures, such as water pressure in supply systems, or water prices. Another positive aspect is that general priority in water uses is clearly defined:



first is domestic supply, and secondly vital activities within agriculture (permanent crops) and industry (energy production and infrastructure maintenance), with the remnant not being listed.

More importantly, the Water Law defines the planning structure and juridical context for water resources management, comprising therein the National Water Plan (approved by DL 112/2002) and the Water Basin Plans (WBPs).

The National Water Plan is mostly a sum of the 15 WBPs composing the Portuguese continental territory, and the 2 Regional Water Plans referring to the archipelagos of Azores and Madeira. It sets the conceptual framework for drought definition and drought impacts, and features a national survey of drought vulnerability based on a supply-demand balance. It concludes that agriculture and domestic water supply became increasingly vulnerable over the last couple of decades, especially in the southern regions, and proposes a “Drought Effects Mitigation Plan”, and a set of measures designed to ensure 80% of the water demand for agriculture, 95% for livestock, and 100% for domestic households (Program 6, measures 1 and 2). These measures also include increasing the efficiency of water use, and the reduction of losses in supply systems (Program 7, measures 1 and 2).

But the practical implementation of such programs and measures is dependent on a national budget capacity, which has been extremely limited over the last few years, as well as its inclusion in the respective WBPs, which are the cornerstone for effective measures and actions to be taken. In the case of the Algarve, the region is split between two Plans:

- a) the Guadiana Basin Plan (approved by DR 16/2001), shared with the northern neighbouring region of Alentejo, while the basin itself is also shared with Spain, where 80% of the total basin area lies, although no common Plan is legally active;
- b) the Algarve Streams Basin Plan (approved by DR 12/2002), which includes most of the region, along a network of small temporary streams flowing within it, similar to conditions of an island system.

Both Plans were produced before the Water Law was approved, based on the former legal framework for water resources management (approved by DL 45/1994), but already including the guidelines defined under the Portuguese-Spanish Convention of 1998, discussed further ahead. The two WBPs include several components related to drought issues, such as a more detailed regional diagnosis of drought occurrence, and the framework for the set-up of an early warning system, and for the elaboration of multiple planning tools, such as intervention plans, contingency plans, emergency plans, impact mitigation and impact prevention plans.

This excessive number of proposed plans, coupled with some lack of objectivity, suggests that its applicability will be nearly impossible. In fact, none of them was elaborated, and when drought stroke in 2004, only ad-hoc and emergency actions were taken (as analysed in chapter 4 further ahead), with little or none input coming from WBPs. Such lack of effectiveness results from several major operational and policy design handicaps as follows:



- a) The effort put on the elaboration of these Plans was mostly concentrated on the current status analysis, instead of defining adequate strategies and operating schemes;
- b) Its ambiguous and broad scope, between the strategic political plan and the operational technical project, has resulted in the lack of interest, knowledge, participation and reconnaissance from public officers and end-users in general, which was a major cause for the inefficient linkage with other planning tools as well;
- c) The main results achieved under these Plans were in the field of public sanitation, domestic sewage and water supply systems, which were foreseen under other planning tools (specifically PEASAAR, Strategic Plan for Water Supply and Wastewater Treatment), and received financing priority from EU funding;
- d) Lack of follow-up, assessment and updating practices, as well as poor project implementation, is due to the absence of a permanent planning structure, including both human and financial resources;
- e) The strict guidelines defined under the National Water Plan generated a set of WBPs far too uniform, regardless of the strong internal regional differentiation in terms of water resources and drought vulnerability;
- f) Last, but possibly most important for the Algarve, these plans sanction groundwater resources as a complementary and emergency source, suppressing one of the primary principles of integrated water resources management, promoted under the WFD, of a joint strategic use of both surface and groundwater resources. This vision set the fundamentals for the second largest national public investment ever made in the Algarve (after the motorway network): the domestic water supply system, exclusively based on surface resources, which was built in the late 1990s at a total cost of approximately 1.000M€, largely supported by the EU Cohesion Fund.

Nevertheless, some positive aspects should be pointed out as well, such as the quality and extent of the basic diagnosis, the increasing sensibility of decision-makers and end-users to the principles of sustainable and integrated management of water resources, and the definition of some critical framing regulations, such as the protection of aquifers in sensitive areas, and the use of wastewater on golf courses.

According to the timing enforced for the implementation of the WFD, this first generation of WBPs should be replaced until 2009 by a new generation of Plans called Water Region Management Plans, to be elaborated in full accordance with the principles and guidelines defined in the WFD and the Portuguese Water Law.

In the specific case of the Guadiana Basin Plan, it was already elaborated under the orientation and guidance provided by the so-called Albufeira Convention, which was signed in 1998, and defines the framework for cooperation between Portugal and Spain in what concerns the management of the common water basins, which cover most of the Iberian Peninsula.

The Convention establishes an annual flow regime, defining mandatory flow volumes in sections upstream of the border, for Spain, and on the respective estuary or mouth for Portugal. It includes an article (19) specifically on “drought and water scarcity”, covering only generic aspects. Therefore, a large part of the innovative regulations within the Convention are included in the flow regime mentioned above, which was the object of an additional Protocol to the Convention.

The Protocol defines, in its article 5, the flow regime to the Guadiana River, as well as the conditions for defining an exception regime, usually associated with drought periods. Although the Guadiana flow regime has little meaning in terms of regional water supply, the Convention holds the importance of its strategic thinking and political design. Significant examples can be found in the definition of priorities among economic activities (domestic supply, livestock, permanent crops, ecologic functions), bilateral compliance with European and international laws and regulations, set-up of permanent information exchange circuits, and the promotion of a sustainable and frugal use of water (Serra [6]), since any significant increase on water consumption results on increasing risk of non compliance with the flow regime defined.

The Convention has a technical follow-up unit (CADC, Commission for the Application and Development of the Convention), subdivided into four working groups, one of which is focused on “flows, droughts and emergency situations”. As the Convention is to be revised by the end of 2007, this group has the crucial task of adapting the annual flow regime to a monthly one, as well as redefining the criteria defining exception situations.

4 Emergency plans and tools during the drought of 2004-06

As this institutional and planning panoply is only recently being created and established, practical action in emergency situations still relies on ad-hoc reactive measures. This was clear during the severe drought event of 2004-06, when public authorities (in this case, the Government) created a “Drought Commission 2005”, and the response from the two major users, agriculture and domestic supply, was completely separated.

Irrigation is the main user of water in the Algarve (Table 1), concentrated in large public infrastructure schemes that rely on surface water from reservoirs, and on groundwater in countless individual schemes.

Table 1: Distribution of major water uses in the Algarve, Do Ó and Monteiro [7].

Activity	Agriculture	Domestic	Golf	Industry	Total
volume (hm ³)	230	70	10	9	319
% of total	72	22	3	3	100

These farmers seldom have any systematic monitoring or preventive procedure in face of droughts, and farmers simply seek for alternative sources



which, in consequence, might become exposed to overexploitation. If these sources run dry, farmers can only reduce or even stop their activity, eventually with dramatic social and economic consequences.

Each of the large public irrigation schemes has its own users' regulation under scarcity conditions. However, the customary approach is just to distribute eventual supply reductions among users. In 2004, when water resources were already below average, no action was taken, but in 2005 two were forced to impose 30% cuts in supply, and the other one had cuts of over 90%, with available resources being used to maintain livestock and perennial crops only. The key issue is that these schemes only represent about 14% of the total water volume used for irrigation, and therefore such regulations have a relatively small impact on overall regional water balance during drought events. Thus, it remains quite unknown what are the real impacts and responses of drought on agriculture in the Algarve.

Domestic water supply is, since 2001, exclusively based on surface resources and managed by a semi-private company (Águas do Algarve, AdA), which was the first large user in the region to formally react to the increasingly intense drought event. By the end of summer 2004 AdA had drafted a Contingency Plan, reinforced in March 2005 after one of the driest winters ever recorded in the region (as in most of the Iberian Peninsula). It pointed, not surprisingly but in paradox with the system design, to the need to use groundwater resources in addition to those stored in reservoirs. To achieve this, emergency boreholes and pipelines had to be constructed, as the system had not planned for any other connections.

The Plan also suggested some long-term solutions to the chronic regional water-deficit, which have since been publicly discussed, such as desalination plants, water basin transfers, dam construction, water reuse, and others, but the discussion itself faded when average rains returned during the winter of 2006.

On a higher level of political decision, the national Government created (in March 2005 only) a Drought Commission that gathered most of the public authorities involved and, to a limited extent, some of the end-users. The Commission put considerable effort in producing regular information on the situation and its impacts, and launched a set of emergency response actions. Unfortunately, as the drought receded with the average rains of winter 2005-2006, the Commission was simply disbanded, and few plans or actions were made to respond more effectively to future events.

The last report, produced in March 2006, proposed significant contributions towards drought risk management and impact mitigation, such as:

- a) Contingency plans for each supply system, both in domestic supply and in agriculture;
- b) Educational campaigns for water saving during drought events;
- c) Information system on water uses;
- d) Criteria and resources to provide technical and financial support to drought affected institutions;
- e) Institutional framework for the creation of a permanent drought prediction and monitoring system.

None of these had any publicly announced developments. Furthermore, two working groups were to continue their tasks: one was to review the legal framework regulating the functioning of the Reservoir Management Commission, where most key decisions were taken (including the creation of the Drought Commission), and another one was to create a permanent drought prediction and monitoring system. Up to the present, neither of these working groups has produced any known results.

5 Results and conclusions

Results of the analysis point out the dispersion and lack of coordination within the wide range of legal instruments in the Algarve region, especially under scarcity conditions as occurred in 2004-06, and summarized in Table 2. An effective risk management approach to drought requires improved linkages between existing policy and planning tools, and may suggest the need for an integrated regional drought plan. Nevertheless, integration between surface and groundwater on the supply side, between different activities on the demand side, and between managing institutions on a permanent basis, are key issues (Nunes *et al* [8]) to be addressed before any drought-specific plan is elaborated, as it may be just intended action rather than an effective mitigation tool.

Table 2: List of major policy tools active in the Algarve covering drought issues.

Policy tool	Thematic scope	Geographic scope	Drought relevance
Water Framework Directive	Water resources	European Union	Policy guidance
Water Law	Water resources	Portugal	Policy guidance, top level planning
National Water Plan	Water resources	Portugal	Thematic analysis, WBP's guidelines
Water Basin Plans	Water resources	Guadiana and Algarve Streams River Basins	Regional objectives and drought planning structure
Albufeira Convention	Surface water resources	Joint Iberian River Basins	Flow regime, strategic policies
Drought Commission 2005	Drought affected activities	Portugal	Coordination and decision on emergency actions
AdA Contingency Plan	Domestic supply system	Algarve (90%)	Alternative and emergency sources
Irrigation schemes regulations	Public irrigation perimeters	Algarve (14%)	Management of supply reduction

Such plans should be consistent with the WFD principles, and could well be elaborated at the water basin scale, in close collaboration with the neighbouring



Iberian water regions. Portuguese authorities should in fact seek to learn from recent policy improvements in Spain, where Contingency Plans for large urban areas (over 20.000 inhabitants), and integrated Drought Plans for water basin districts, are currently being implemented.

In this context, there is high expectancy on the forthcoming revision of the Portuguese-Spanish Convention of Albufeira, during 2007. This might be of particular interest since both countries are currently leading the efforts for a common European policy on drought and water scarcity, and this has already been identified as one of the key environmental priorities to be assumed during the Portuguese presidency of the EU during the second semester of 2007.

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