

SEA, Basin Management and the Water Framework Directive (WFD)

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Abstract: The water basin management plans of the southern region of Portugal and Spain, established under the Water Framework Directive of the European Union, are particularly important, not only for development and economic purposes but also for landscape, biodiversity and nature conservation. Many water bodies, both superficial and underground, are under stress due to growing pressure from agriculture, agro-industry and urban and industrial consumption. Water scarcity, already a serious present-day threat, is expected to increase with future climate change, and phenomena of desertification have been reported in some areas. This paper summarizes three Water Management Plans for the Guadiana + Sado, Mira and Algarve Basins, emphasizing critical problems, and measures that are proposed to improve water management in these areas. This information is then related to SEA processes, which should contribute for a better understanding and evaluation of future plans and programs in the region, and which should not ignore the main challenges that the water management imposes, in the short, medium and long term.

Keywords: basin management, river basin management plan, water framework directive, strategic environmental assessment, water bodies

1. INTRODUCTION

The Water Framework Directive (WFD) adopted in 2000 by the European Union establishes a legal framework to protect and restore water resources across Europe and to ensure its long-term and sustainable use by setting new environmental objectives for water protection and focusing the water management at the river basin level.

The Directive defines 2015 as the deadline for achieving the “good status” for all water bodies and providing the framework for an integrated management of all water sources. The objectives of a good status include, for surface water, the achievement of both good ecological and chemical status, and for groundwater, the achievement of both good chemical and quantitative status.

The River Basin Management Plan (RBMP) is the main operational tool for achieving the objectives set for the water bodies within the timescale required by WFD.

The WFD is implemented through six-year recurring cycles, the first of which covers the period 2009-2015. To date, all European countries have adopted RBMP, with Portugal, Spain and Greece being the only exceptions. In Portugal public consultations have finalized, with the RBMPs waiting final approval.

The WFD has significant interconnections and linkages with other EU legislation, such as the Strategic Environmental Assessment (SEA) directive (2001/42/EC). SEA of the RBMP is the major area of overlap between these directives. In fact, Article 11 of the SEA directive states that coordinated procedures should be taken where there are such overlapping assessment requirements. To satisfy both directives, these procedures need to include baseline data, assessment of alternatives, mitigation measures, monitoring procedures and public participation. Once these coordination procedures are in place both directives can be expected

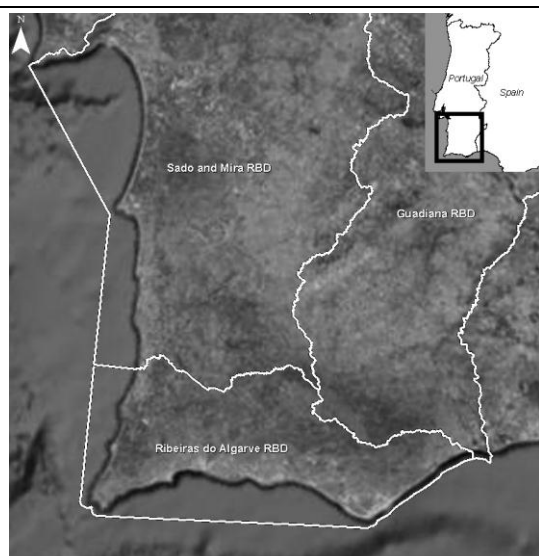
to ensure that environmental considerations are included in RBMP (Carter & Howe, 2006; Hirji & Davis, 2009).

Ordinance 1284/2009, 19th October, which establishes the structure and content of River Basin Management Plans in Portugal, determines that environmental assessment is a part of the Plan, as follows: Volume I- RBMP Report; Volume II- Additional procedural reports: Part A - Environmental assessment; Part B - Public participation.

The 1st version of the RBMPs and the corresponding SEA, have been prepared under the coordination of the River Basin District (RBD) Administrations, created by Law 58/2005, 29th December, that (with Decree-Law 77/2006, 30th March) transposes WFD into Portuguese law.

2. STUDY AREA

According to WFD requirements, eight RBD were identified in Portugal mainland territory, three of which are located in the south of the country: Sado and Mira (RBD 6), Guadiana (RBD 7) and Ribeiras do Algarve (RBD 8). These three regions occupy an area of 27.599 Km², which represent a third of the total area of the country (89.045 Km²) (INE, 2002; Nemus-Ecosistema-Agro.Ges, 2011a,b; Nemus-Hidromod-Agro.Ges, 2011) (Figure 1).



Source: GoogleEarth (2012)

Figure 1 – Location of the River Basin Districts in the South of Portuguese territory

The total surface area, number of inhabitants, main river basins and number of identified water bodies by water category are presented for each RBD in Table 1.

Table 1 – Main characteristics of RBDs of the South of Portuguese territory

Characteristics	RBD6	RBD7	RBD8
Total area (Km ²)	12 149	11 611	3 839
Population (No.)	345 724	200 863	409 000
Main River Basins	<ul style="list-style-type: none"> • Alcáçovas • Costeiras entre o Mira e o Barlavento • Costeiras entre o Sado e o Mira • Costeiras entre o Tejo e o Sado • Mira • Roxo • Sado 	<ul style="list-style-type: none"> • Alcarrache • Ardila • Caia • Chança • Cobres • Degebe • Guadiana • Murtega • Xévorra 	<ul style="list-style-type: none"> • Barlavento • Arade • Sotavento
Surface waters			
Rivers	196	227	62
Lakes (*)	20	20	3
Transitional	9	5	3
Coastal	3	2	10
Artificial	8	6	2
Total No.	236	260	80
Groundwaters	8	9	23

Source: Nemus-Ecosystema-Agro.Ges (2011a,b); Nemus-Hidromod-Agro.Ges (2011)

(*) Reservoirs

Our objective in this paper is to present the main results of the three RBMP developed for the south region of Portugal by two consortiums led by NEMUS, Lda (Nemus-Ecosystema-Agro.Ges and Nemus-Hidromod-Agro.Ges). The significant problems identified are presented and this information is then related to the SEA of the RBMP.

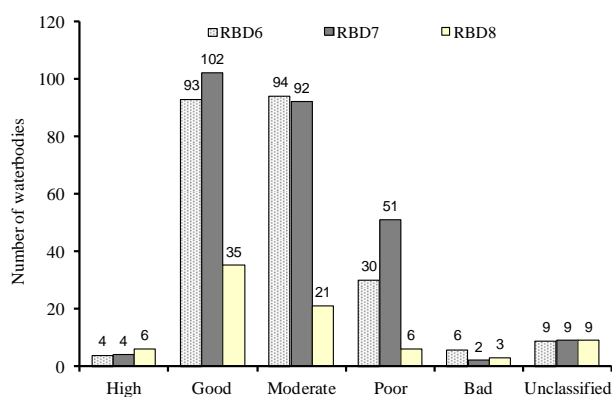
3. CRITICAL ASPECTS – SURFACE WATER

Table 2 and Figure 2 show the percentage and number of water bodies in each status category for the three RBD.

Table 2 – Percentage of surface water bodies in each status category

Status	RBD6	RBD7	RBD8
High	2%	2%	8%
Good	39%	39%	44%
Moderate	40%	35%	26%
Poor	13%	20%	8%
Bad	3%	1%	4%
Unclassified	4%	3%	11%

Source: Nemus-Ecosystema-Agro.Ges (2011a,b); Nemus-Hidromod-Agro.Ges (2011)



Source: Nemus-Ecosystema-Agro.Ges (2011a,b); Nemus-Hidromod-Agro.Ges (2011)

Figure 2 – Status of surface water bodies

For rivers, the main elements indicating that “good ecological status” is not achieved are invertebrates, phytobenthos, phosphates and nitrogen.

Hydromorphological pressures and flow irregularity are other factors responsible for unfavorable statuses (less than “good”) of water bodies. There is a deficient implementation of environmental flow regimes, and the interruption of the river continuum (mainly by dams and weirs). Water abstraction without an adequate control coupled with the lack of cleaning and conservation of some water streams, erosion and changes in land use have introduced significant changes in flow regime, with more significant impacts as lower flow rates are recorded. It is also worth mentioning the impacts associated with abandoned mines, which give rise to acidic runoff enriched with metals, in RBD6 and 7 (Nemus-Ecosystema-Agro.Ges, 2011a,b; Nemus-Hidromod-Agro.Ges, 2011).

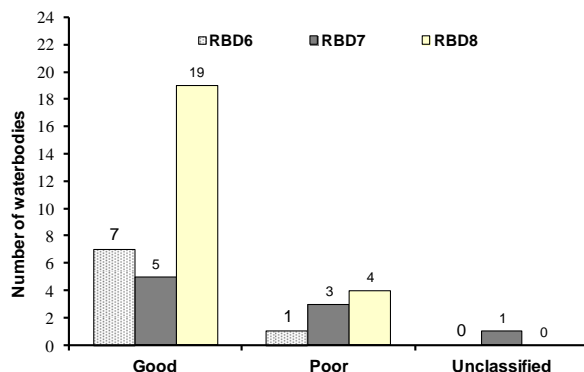
4. CRITICAL ASPECTS – GROUNDWATER

Table 3 and Figure 3 show the percentage and number of water bodies in each status category for the three RBD.

Table 3 – Percentage of groundwater bodies in each status category

Status	RBD6	RBD7	RBD8
Good	88%	56%	83%
Poor	13%	33%	17%
Unclassified	0	11%	0

Source: Nemus-Ecosystema-Agro.Ges (2011a,b); Nemus-Hidromod-Agro.Ges (2011)



Source: Nemus-Ecosystema-Agro.Ges (2011a,b); Nemus-Hidromod-Agro.Ges (2011)

Figure 3 – Status of groundwater bodies

Regarding RBD6, currently all groundwater bodies are at good quantitative status, 88 per cent are at “good chemical status”, which means overall that 88 per cent are at “good status”. The classification of the “Sines” groundwater body as “poor” was due to high concentrations of organic compounds derived from petroleum associated with industrial pollution. Nevertheless, “Sines” groundwater quality does not affect the quality of nearby surface water nor contributes to the degradation of groundwater dependent terrestrial ecosystems (Nemus-Ecosystema-Agro.Ges, 2011a,b; Nemus-Hidromod-Agro.Ges, 2011).

With regards to RBD7, currently 89 per cent of groundwater bodies had a “good quantitative status”, 67 per cent had a “good chemical status”, one water body (“Moura-Ficalho”) was not classified which means overall that 56 per cent are at “good status”. Environmental quality objectives were not met for three groundwater bodies due to nitrates associated with diffuse pressures (“Elvas- Campo Maior”, “Elvas-Vila Boim” and “Gabros de Beja”).

From the twenty-three groundwater bodies of RBD8, four were classified as having a “poor chemical state” (i.e. 17 per cent) mainly due to the nitrate concentrations. Nevertheless, groundwater quality at RBD7 and RBD8 does not affect the quality of surface water nor contribute to the degradation of groundwater dependent terrestrial ecosystems. Twenty-two groundwater bodies (96 per cent) are at “good quantitative status” and only one water body (“Campina de Faro”) remains unclassified relative to quantitative state. Overall 83 per cent have a “good status” (Nemus-Ecosystema-Agro.Ges, 2011a,b; Nemus-Hidromod-Agro.Ges, 2011).

5. CHALLENGES FOR WATER MANAGEMENT IN THE SOUTH REGION

For the three Plans, detailed Programs of Measures were developed to meet the defined environmental objectives. These Programs integrate basic measures, complemented by supplementary and other measures, when the basic measures proved to be insufficient to meet the defined environmental objectives.

All the three plans identified where water bodies’ good status can not be achieved by 2015. In these cases, an alternative objective of good status by 2021 or 2027 was set. However, achieving a good status in all water bodies by no more than 2027 in the three river basin districts, as proposed, is already a significant challenge.

Pollution pressures in the river basin districts will evolve significantly in some of the main river basins. Agriculture will respond to the change of climate, market conditions, financial incentives and regulatory pressures, but the expected tendency is an increase of water demands from this sector. Given this situation and the lack of efficiency of irrigation infrastructures, measures related to the recovery and modernization of public irrigation schemes and promotion of efficient use of water in agriculture were proposed.

Despite some degree of uncertainty associated with estimation of organic, nutrient and hazardous substances and pollutant loads on water bodies, qualitative pressures were identified as one of the main causes for unfavorable status conditions. In fact, in some cases, it was difficult to identify appropriate remedies for water bodies that are currently not achieving good ecological status. In some cases it was because the cause of the problem and its sources are not yet known. In other cases the most appropriate solution to the problem needs further research. Opportunities for a better regulation, supervision and monitoring of domestic wastewater discharges as well as discharges from food industry, non-food industry and farming were also identified in the diagnosis of river basin districts. These opportunities led also to the establishment of measures to fulfill these gaps and to ensure that water bodies achieve the environmental goals proposed.

The SEA process of RBMPs has ensured that potential environmental effects associated with the implementation of the RBMPs have been given due consideration in the preparation of the Plans.

Informed by Part 5 of the RBMPs (Objectives), SEAs analyzed the compatibility between assessment objectives and RBMPs objectives (strategic and operational), which showed mainly compatible relations. Part 6 of the RBMPs (Program of Measures) were the input for SEA effects assessment.

The primary effect of the RBMPs will be to improve the water status condition by 2015 and beyond, with many of the measures resulting in direct positive effects on water and aquatic biodiversity.

Despite that negative effects were not identified, some uncertain effects were pointed, namely, the fact that the cost recovery of water services in this region implies a great effort, with potential negative effects in terms of impact on social cohesion and economic activities (particularly in public irrigation perimeters in which cost recovery is currently lower).

Regarding the previous situation, the measure initially proposed was reviewed, and the Plans considered the need for a program of action that demonstrates the ability of Irrigator Associations to meet the proposed goal (cost recovery over 60% in all perimeters), and defined the admissible exception situations.

In terms of SEA, the three Plans were evaluated as strongly positive, and recommendations were proposed, especially as regards the plan implementation and follow-up.

6. FINAL CONSIDERATIONS

In this paper, three RBMPs for the south region of Portugal were presented and were of the responsibility

of two consortiums led by NEMUS, Lda. The SEAs were under the responsibility of other team. Both processes were coordinated by RBD Administrations.

The elaboration of the first generation RBMPs was a major challenge at the national level, due to the pioneering nature of WFD approach. A new legal framework was created compliant with WFD principles, the water sector was redesigned and a huge effort of data compilation and organization was done. Significant advances were observed, in terms of harmonization of procedures for the monitoring and assessment of the status condition and for the characterization of pollution pressures. Nevertheless, some aspects such as the knowledge and diagnosis of certain water bodies still need further improvement.

The final approval of RBMP (by Portuguese Environment Agency) and thus, the implementation of the designed Programs of Measures, constitute a challenge in regional and national terms, only achievable through a significant effort and a very strong commitment from public authorities and all the stakeholders involved, especially in the current economic context.

The SEA of the three Plans highlighted the positive effects for the environment expected from measures implementation, and recommendations were made, especially regarding the plan implementation and follow-up.

RBMP are important supporting tools for future SEA and Environmental Impact Assessment processes since they establish the strategic reference framework for water analyses; identify the main problems of water bodies; establish the strategic, operational and environmental objectives for water bodies; define the goals and the indicators for the river basins. Since RBMPs are reviewed every 6 years, the inputs for SEA and EIA will be continuously updated.

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