



ADASA

WATER AND ENVIRONMENT
TECHNOLOGY

The implementation of WFD Art 5 in the Ebro River Basin

Pogdorica, Montenegro
10 – 12 March 2015

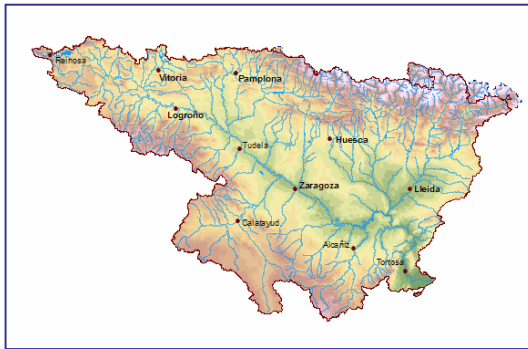


CONTENT

1. INTRODUCTION
2. PRESSURES ANALYSIS
3. IMPACT ANALYSIS
4. RISK ANALYSIS
5. MEASURES PROPOSAL
6. CONCLUSIONS

1. INTRODUCCION

"Study of the impact of human activity on the status of surface waters of the river basin district of Ebro"



Ebro river basin district

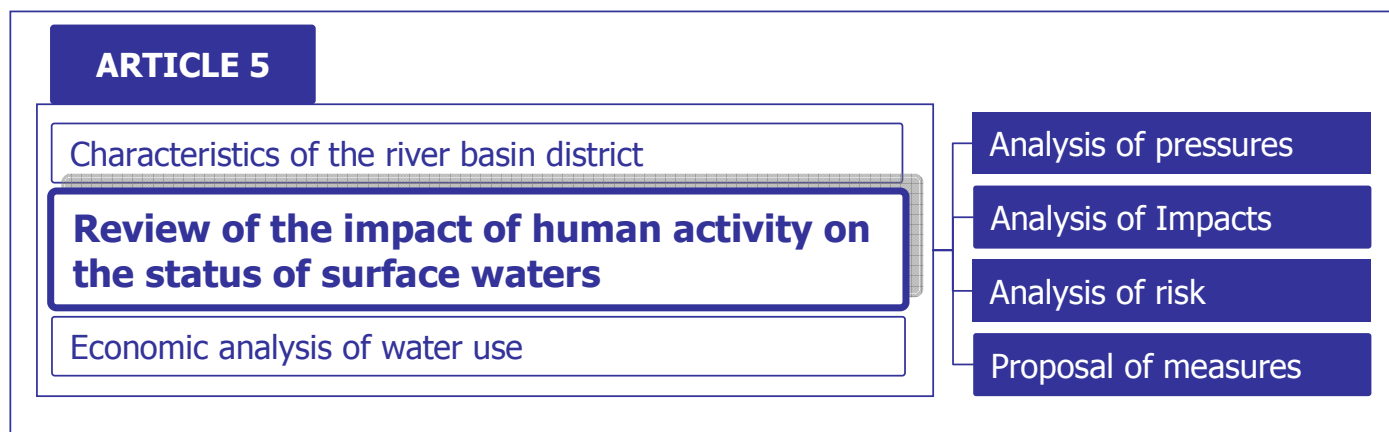


- This project, as part of the application of the Article 5 of the WFD, was focused on the **review of the impact of human activity on the status of surface waters**. Specially on the surface water bodies designated as “**with risk in study**”, because in previous impress studies were detected evidences of a potential risk, but it couldn't be verified due to the lack of information
- The main objective was **to identify water bodies at risk of not achieve the objectives** established down the Article 4, in order to apply or implement measures that allow to achieve these objectives

1. INTRODUCCION

Developed tasks were:

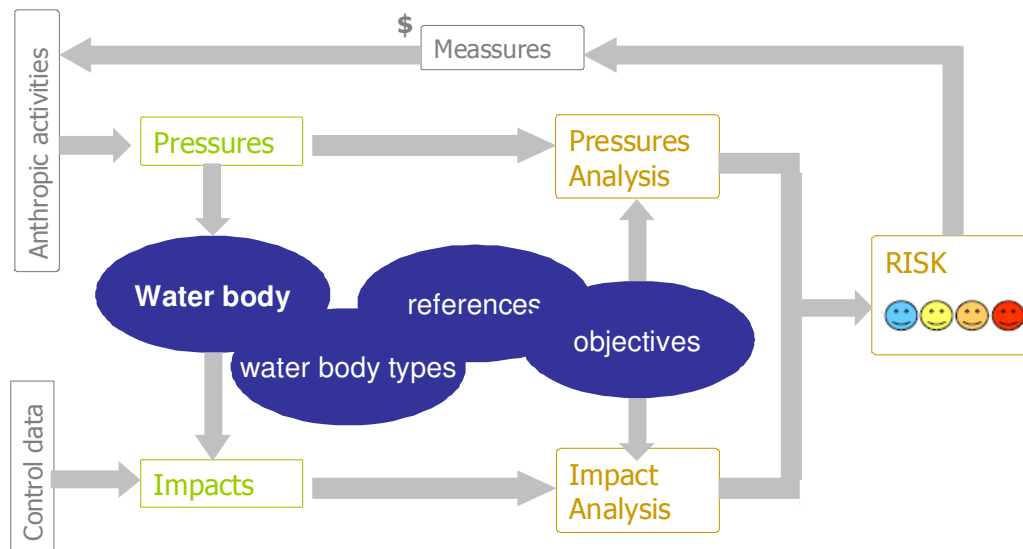
- **Quantitative analysis of the pressures** affecting surface water bodies
- **Analysis of Impacts** based on the existing monitoring network
- **Risk analysis** as combination of the results of the pressures and impact status
- A first approximation to a **proposal of measures** to ensure the achieving of the objectives for the water bodies on risk



1. INTRODUCCION

All the **information available** was collected and considered, especially information from different inventories of pressures and from different historical control networks.

This was one of the greatest challenges of the project and one of the reasons that led us to consider the need or the **chance to develop a mechanism to automatize as much as possible the collection of this data**



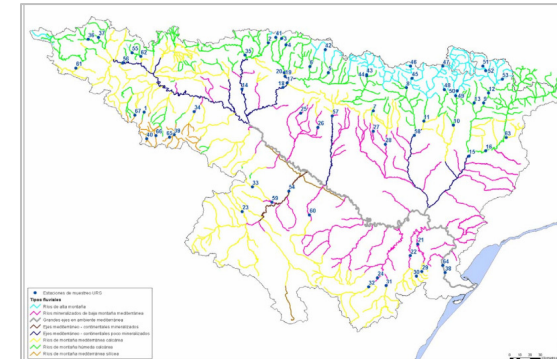
The **analysis of pressures and impacts** was developed as an **iterative process** aimed to allow right control of the water status and a management for the good status

Therefore, until this moment at least 5 projects have been developed for the analysis of pressures and impacts on the Ebro and results are updated periodically

1. INTRODUCTION

Previous works allowed to have necessary information about:

Tipos	Representación de los tipos en las masas fluviales en la cuenca del Ebro	
	En nº	En km
109 – Ríos mineralizados de baja montaña mediterránea	102 (15,9%)	2606 (21,2%)
111 – Ríos de montaña mediterránea silíceo	24 (3,7%)	297 (2,4%)
112 – Ríos de montaña mediterránea calcárea	183 (28,4%)	3906 (31,8%)
115 – Ejes mediterráneo-continentales poco mineralizados	48 (7,5%)	802 (6,5%)
116 – Ejes mediterráneo-continentales mineralizados	5 (0,8%)	128 (1,0%)
117 – Grandes ejes en ambiente mediterráneo	16 (2,5%)	368 (3,0%)
126 – Ríos de montaña húmeda calcárea	172 (26,7%)	3068 (25,0%)
127 – Ríos de alta montaña	93 (14,5%)	1099 (9,0%)



1. Characterization of surface water body types according the system A of the annex 2 of the WFD.

- 700 surface water bodies were identified, from which 600 were natural, 2 artificial and the rest heavily modified

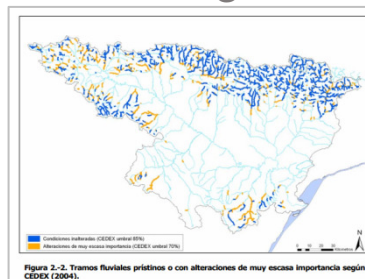
2. Establishment of the **surface water monitoring network** in accordance with the requirements of Article 8: it was developed after the first impress analysis and based on the available data until that moment, which fortunately in the Ebro was quite high



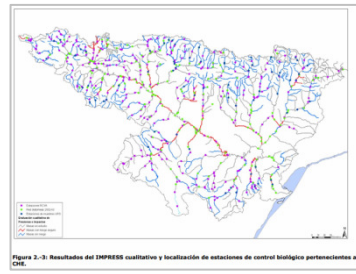
1. INTRODUCTION

3. Register of **protected areas** as indicates in Article 6 (areas for the **abstraction of water for human consumption**, areas for the **protection of economically significant aquatic species**, **recreational waters**, **nutrient-sensitive areas** and **habitat protection areas**)
4. Establishment of the **reference conditions** for the surface water body types, based on the REFCOND guide.

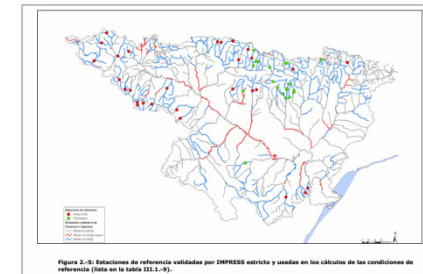
It meant identification of water bodies in natural condition, analysis and development of the monitoring network, establishment of elements and metrics for the ecological analysis and intercalibration.



Natural rivers



Previous pressures analysis



Reference control stations

Experts defined the reference conditions for biological, hydromorphological and physicochemical elements and metrics for 5 of the 8 existing types of water bodies. The others 3 did not have enough control stations. For these water bodies types, were applied reference conditions from another similar type of water body . Anyway these conditions were more restrictive

2. PRESSURES ANALYSIS

■ PRESSURES CATALOG:

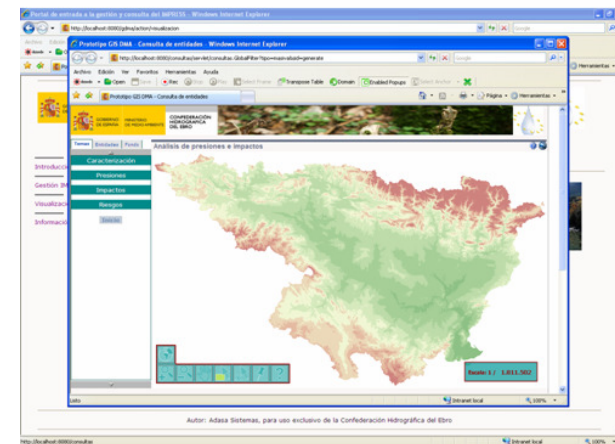
For the analysis of pressures is indispensable to have a **detailed catalog** of human activities exerted on water bodies

Only then the mechanisms of **pressure quantification** can be defined followed by the **identification of significant pressures** and the development of the **analysis of status** of water bodies because of pressures

Therefore the first task involved the **collection and updating of information** about the sources of pressure and the attributes that characterize each kind of activity (inventories, reports, own or external databases, information obtained from field, etc)

All this information was scattered with different formats and characteristics

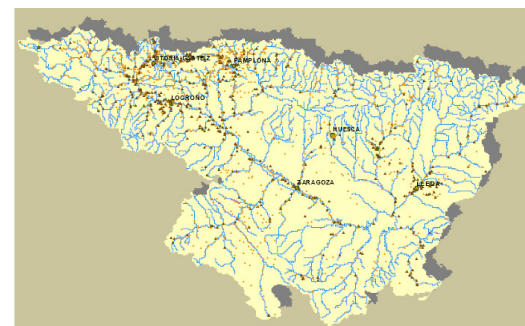
This situation led to us and the Ebro basin authorities to develop in the frame to other project a **technological platform to support the periodical analysis of pressures and impacts**



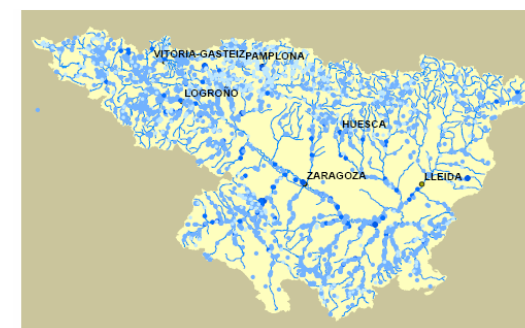
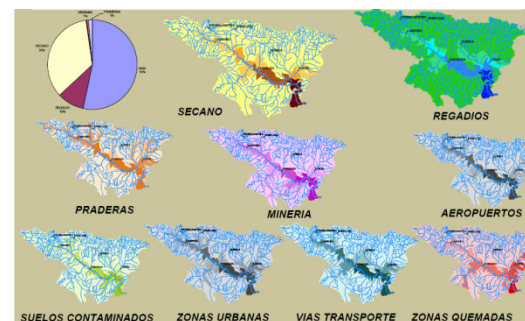
2. PRESSURES ANALYSIS

■ Types of pressures identified were:

Point source pollution: all the information from the register for discharge authorizations of the water authority	Biodegradable discharges
	Localities without sanitation
	Discharges of dangerous substances
	Industries subject to integrated environmental authorisation
Diffuse source pollution: from CORINE LAND COVER information and other more detailed	Agricultural uses
	Livestock uses
	Urban uses
	Mining areas
Alteration of the flow regime	Communication routes
	Water abstraction
Morphological alterations	Water flow regulation
	Cross (dams and weirs)
Land use	Longitudinal
	Invasion of the floodplain for urban uses
Other significant anthropogenic impacts	Contaminated sediments
	Not native species



Distribución de fuentes puntuales: 1783 vertidos urbanos y 960 vertidos industriales



Puntos de captación superficial

2. PRESSURES ANALYSIS

- QUANTITATIVE ANALYSIS OF PRESSURES: was developed considering:
 - The **magnitude** of the characteristic parameters of pressure,
 - The **susceptibility** or **vulnerability of the environment** to the different kinds of the pressure
 - Setting a **target value** for each one of the types of pressures analyzed
- The **formulas** that were applied to each type of pressure, generally had the following structure:

Amount of pressure on the body of water.

Target value from which it is considered that the pressure may cause a alteration in the enviroment

- The outputs was classified into 4 categories of pressures:

Null pressure	$0 \leq P < 0,8$
Low pressure	$0,8 \leq P < 1,2$
Medium pressure	$1,2 \leq P < 2,0$
High pressure	$P \geq 2$

- When the effect of pressure was equal to the objective, the pressure value was 1 and means low pressure.
 - When the effect of the pressure was twice the objective, the result obtained was 2 and it was considered that the pressure on the environment was high.
- Objectives were **calibrated** based on the status of water registered in existing control networks or designated based on normatives or experience

2. PRESSURES ANALYSIS

■ EXAMPLE:

For the analysis of the **Cross structures (dams and weirs)** as morphological alterations:

First, from all the cross infrastructures of a water body, those considered as **significant pressure** were the ones that had a height greater than 2 meters

The **magnitude** of pressure (PE) was estimated considering:

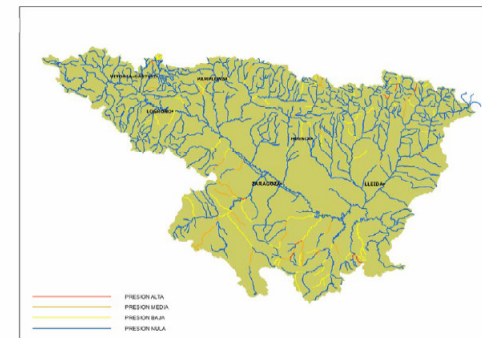
$$PRs = \frac{1}{objective} \times \frac{number_of_cross_structures}{water_body_length}$$

The **objective** was 0,5 that means a limit of one structure between 2 meters of river



Distribución de fuentes de presión por alteraciones morfológicas significativas: Azudes del Ebro

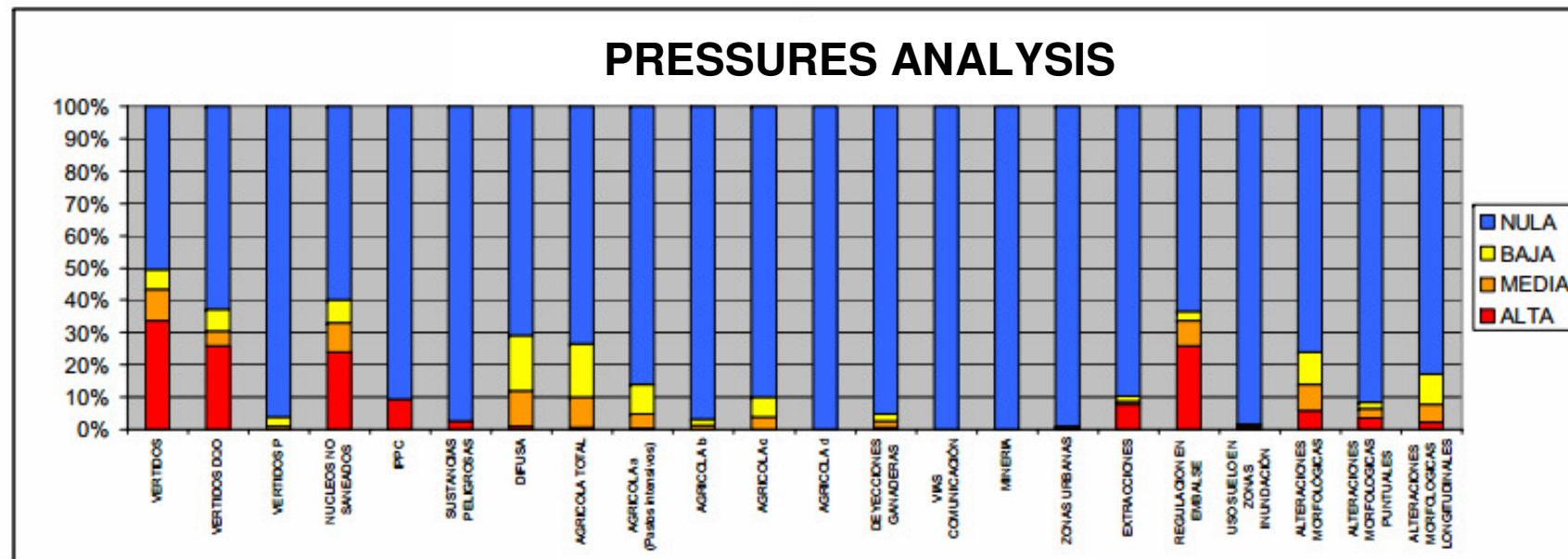
Presas y azudes



Mapa general de presión por Alteraciones Morfológicas Transversales

2. PRESSURES ANALYSIS

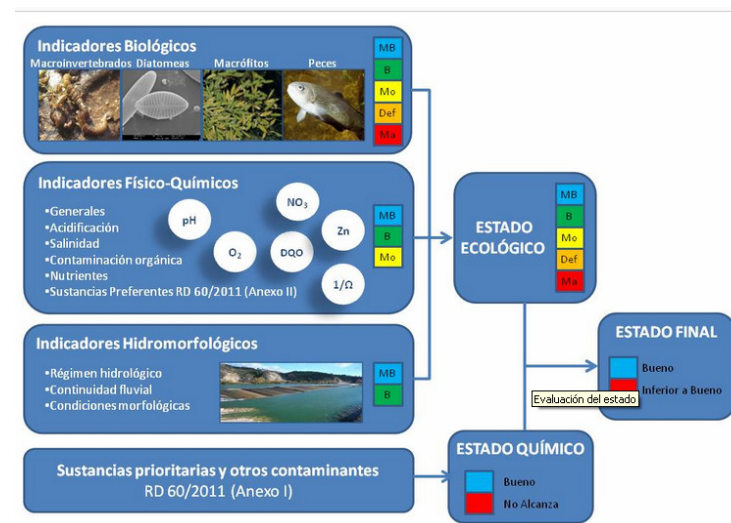
- This analysis shows that the principals problematic in the Ebro basin was:
 - point source pollution from different kind of discharges,
 - management of reservoirs and
 - water abstractions



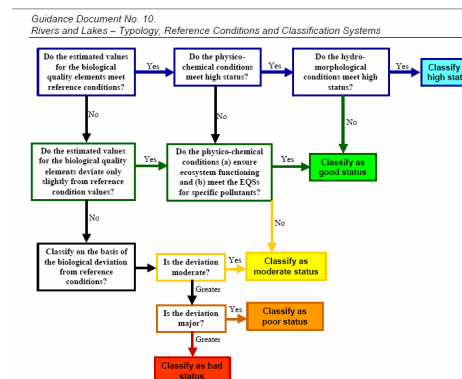
3. IMPACT ANALYSIS

- The diagnostic of **impacts** was obtained based on the surface water monitoring network defined in accordance with the requirements of Article 8. For this diagnostic was considered:

- Compliance with **all directives transposed** into national legislation affecting protected areas
- Compliance with **Environmental Quality Standards**
- Compliance with the **good ecological status** of water bodies


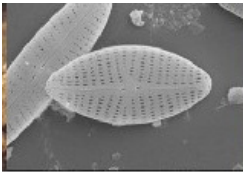





- In the assessment of **ecological status** were considered, biological, physico-chemical and hydromorphological elements appropriate for each typology of water body, following the protocol described in the REFCOND guidance.



3. IMPACT ANALYSIS

- For the analysis of the ecological status, the considered elements were:

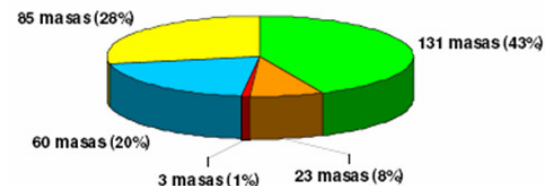
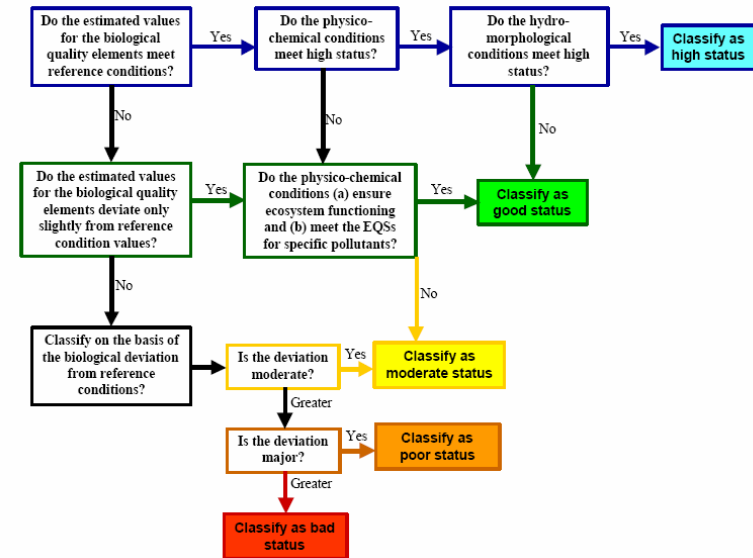
Biological quality elements			
Composition and abundance of benthic invertebrate fauna	Composition and abundance of aquatic flora		Composition, abundance and age structure of fish fauna.
Macroinvertebrates	Diatoms	Macrophytes	Fishes
IBMWP 	IPS 	IVAM 	IBICAT and EFI+ 

Hydromorphological quality elements	
Morphological conditions	River connectivity
Índices IHF (river hábitat indice) and QBR (quality of the riparian forest)	

Physico-chemical quality elements	
General conditions	Temperature conditions
	Oxygenation conditions
	Talinity
	Acidification state
	Conditions for nutrients
Specific synthetic pollutants	
Specific non-synthetic pollutants	

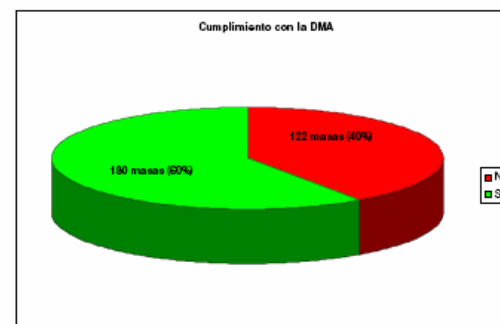
3. IMPACT ANALYSIS

- For each typology of surface water bodies, **reference** of the considered elements were defined considering data control of the stations situated on those kind of river on natural state.
- Then from the comparison of the results of the metrics with the reference, each element of diagnostic was evaluated.
- All the diagnostics from the elements of each water body were considered to the final diagnostic with the principle of one out and all out and applying the REFCONG algorithm
- This analysis resulted in: 60 water bodies in very good status, 131 water bodies in high status, 85 in moderate status, 23 in poor status and 3 in bad status



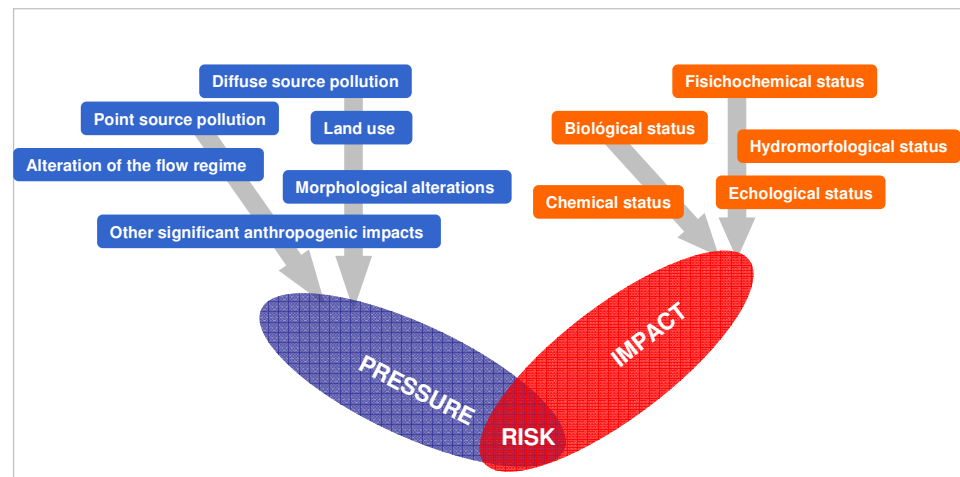
3. IMPACT ANALYSIS

- For the **chemical diagnostic** was considered:
 - Compliance with **all directives transposed** into national legislation affecting protected areas (Areas for the abstraction of water for human consumption, areas for the protection of economically significant aquatic species, waters designated as recreational waters, Nutrient-sensitive areas, areas for the protection of habitats or species)
 - Compliance with **Environmental Quality Standards** (EQS) set for surface water bodies (D. 2006/11 / EC, RD 995/2000 D 2000/60 / EC. D. 2008/105 / EC)
- In this case, the final result was achieve or not achieve
- These **chemical analysis** resulted in: 4 water bodies that do not meet environmental quality standards, 34 water bodies that do not meet specific normative
- Final outcomes of **impact** analysis for the Ebro, considering both chemical and ecological status turned out : 122 water bodies that not achieve the objectives



4. RISK ANALYSIS

- The **risk analysis** for each water body considered the combination of pressures status and impacts.
- In this case was a qualitative analysis even though that in posterior projects was defined a quantitative methodology to combine its



- Final results were:

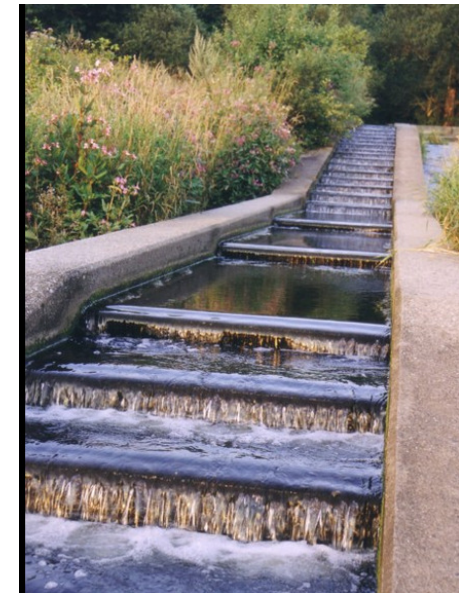
RISK		IMPACT	
		With impact	without impacting
PRESSURE	Significant (medium or high)	ON RISK	ON RISK
	No Significant (low or null)	ON RISK	NOT ON RISK
	No data	ON RISK	NOT ON RISK

5. MEASURES PROPOSAL

- Having in consideration the outputs of the risk analysis, a **first proposal** of measures was done.
- For it, the river basin was divided in few **sectors** to help in to the definition of a coherent proposal. The number of sector were 8
- For each one of these sectors was developed a integral analysis of the problems, both impacts and the human activity. Based on it, was developed a first proposal of measures for each sector in order to be analyzed with more detail in the planning tasks
- Measures were organized in order of priority within each sector and water body
- Few examples of measures are optimization of the management of reservoirs, irrigation modernization, construction of water treatment plants to fish ladder installation, ...

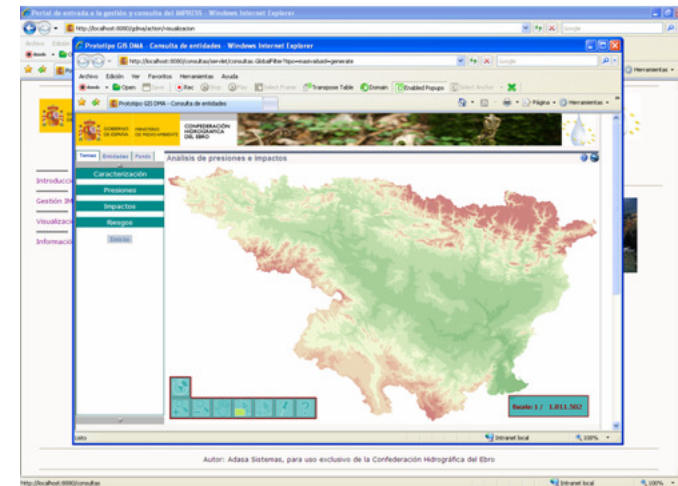


Sectores del Ebro

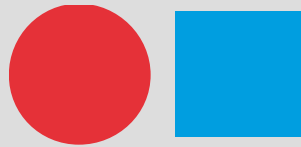


6. CONCLUSION

- As well as the results and the knowledge of the situation and problematic of the Ebro river basin, this project was a chance to identify:
- The need to manage the required information putting order in different sources, duplicates, managers,.....,
- The chance to create a unique system to help in to this analysis and that allows its periodical development
- In this context was developed a DYNAMIC IMPRESS SYSTEM for the Ebro that helps the experts in the periodic analysis of pressures and impacts and that can be a helpful tool in the control of the effect of the measures



THANKS



ADASA

www.adasasistemas.com

www.adasaproducts.com