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# APPLICATION OF THE THREE-LAYER MODEL QUESTIONNAIRE ON POLICY AND GOVERNANCE TO THE PORTUGUESE RESEARCH SITE OF BINGO PROJECT

Bingo project – Bringing INnovation to onGOing water  
management – a better future under climate change

Lisbon • February 2017

**I&D** HYDRAULICS AND ENVIRONMENT

REPORT 46/2017 – **DHA/NRE**

The BINGO project has received funding from the European Union's Horizon 2020 Research and Innovation programme, under the Grant Agreement number 641739.



## **Title**

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Report 46/2017

Proc. 0605/111/1911002

# APPLICATION OF THE THREE-LAYER MODEL QUESTIONNAIRE ON POLICY AND GOVERNANCE TO THE PORTUGUESE RESEARCH SITE OF BINGO PROJECT

## Abstract

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The BINGO project Work Package 5 envisages the understanding and improving of the decision making process at the individual, societal and institutional levels to cope with the expected impacts of climate change at six European research sites. The initial input of this work is based on interviews at each research site using the three-layer model questionnaire on water policy and governance from the Water Governance Centre – Content, Institutional and Relational layers.

The purpose of this document is to describe the interviewing process, based on this questionnaire, of some members of the Portuguese community and of some relevant personalities, in order to provide the context of the Portuguese research site features and institutional framework. It aims at facilitating the BINGO partners understanding of the answers received and summarizing the main conclusions.

For this purpose, the answers received are exhaustively analysed and the main issues regarding water resources management in Portugal are identified. The conclusions are presented according to the three-layer questionnaire on water resources governance and climate change risk management.

This report starts by presenting the framework of BINGO and, in particular, the objectives and activities regarding Work Package 5. It contains a brief reference to the three-layer model of policy and governance questionnaire, allowing a better understanding of its content. The findings and recommendations, to be discussed with the relevant stakeholders, are presented in chapter 3. The key conclusions are presented in the last chapter. Those will be the basis for the recommendations for improvement to be provided in the future by the BINGO project.

Keywords: BINGO / Water resources policy / Water resources governance

## APLICAÇÃO DO QUESTIONÁRIO DO MODELO-DE-TRÊS-NÍVEIS SOBRE POLÍTICAS E GOVERNANÇA AO CASO DE ESTUDO PORTUGUÊS DO PROJETO BINGO

### Resumo

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A tarefa WP5 do projeto BINGO visa melhorar o entendimento dos impactos associados às alterações climáticas e facilitar o processo de tomada de decisão relacionado com estes impactos a nível individual, societal e institucional. O projeto BINGO tem por base seis casos de estudo europeus. Este trabalho baseia-se nos resultados de uma série de entrevistas à comunidade portuguesa do baixo Tejo, utilizando um questionário do Water Governance Centre sobre a política e governança da água que se encontra estruturado em três níveis - Conteúdo, Institucional e Relacional.

Os objetivos deste documento consistem em descrever o processo das entrevistas realizadas a alguns membros da comunidade portuguesa e a algumas personalidades relevantes do sector da água, bem como contextualizar o quadro institucional português. Para além de resumir as principais conclusões obtidas, o presente relatório destina-se a oferecer aos parceiros internacionais do projeto BINGO uma visão abrangente que facilite o entendimento das respostas recebidas no caso português.

Assim, os resultados das respostas a dez questionários e a quatro entrevistas são exaustivamente analisados, sendo identificadas as principais questões relativas à gestão de recursos hídricos em Portugal. As conclusões são apresentadas de acordo com a estrutura em três-níveis do questionário e focando os temas da governança da água e da gestão do risco.

Este relatório também descreve, no seu primeiro capítulo, o âmbito do trabalho desenvolvido e a sua relação com os objetivos do projeto BINGO, em particular os que se relacionam com a tarefa WP5. Apresenta também uma breve referência ao modelo do questionário sobre a política e governança da água, por forma a permitir uma melhor compreensão do conteúdo do mesmo. As conclusões e recomendações, que serão discutidas com os principais *stakeholders*, são apresentadas no último capítulo e constituirão a base da proposta de recomendações de melhoria a serem definidas no futuro pelo projeto BINGO.

Palavras-chave: BINGO / Política da água / Governança da água

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## Acronyms

ABLGVFX	Associação de Beneficiários da Lezíria Grande de Vila Franca de Xira (Association of Beneficiaries of Lezíria Grande de Vila Franca de Xira)
APA	Agência Portuguesa do Ambiente (Portuguese Environment Agency – National Water Authority)
ARH	Administração da Região Hidrográfica (River Basin District Administration or Hydrographic Region Administration)
ARH_TO	Administração da Região Hidrográfica (River Basins District Administration of Tagus and West)
BINGO	Bringing INnovation to onGOing water management
CADC	Comissão para a Aplicação e o Desenvolvimento da Convenção sobre Cooperação para a Proteção e o Aproveitamento Sustentável das Águas das Bacias Hidrográficas Luso-Espanholas Convenção de Albufeira (Commission for the Implementation and Development of the Convention on Cooperation for the Protection and Sustainable Use of Luso-Spanish Water Watersheds)
CAP	Agricultores de Portugal (Association of Agricultures of Portugal)
CC	Climate change
CCDR	Comissão de Coordenação e Desenvolvimento Regional (Commission for Coordination and Regional Development)
CCR	Comissão de Coordenação (Regional Coordination Commission)
CES	Centro de Estudos Sociais da Universidade de Coimbra (Centre for Social Studies, University of Coimbra)
CGA	Comissão de Gestão de Albufeiras (Reservoirs Management Commission)
CIM	Comunidade Intermunicipal da Lezíria do Tejo (Intermunicipal Community of Lezíria do Tejo)
COTR	Centro Operativo e de Tecnologia de Regadio (Operative Center and of Irrigation Technology)
CNA	Conselho Nacional da Água (National Water Council)
CRH	Conselho de Região Hidrográfica do Tejo (River Basin District Council or Hydrographic Region Council of Tagus)
DAGRI	Diretiva de Avaliação e Gestão dos Riscos de Inundações (Directive on the Assessment and management of flood risks)
DGADR	Direção-Geral de Agricultura e Desenvolvimento Rural (Directorate General for Agriculture and Rural Development)
DRAOT	Direção Regional do Ambiente e Ordenamento do Território (Regional Directorate for Environment and Spatial Planning)
DQA	Diretiva Quadro da Água ( WFD Water Framework Directive)
DRAPLVT	Direção Regional de Agricultura e Pescas de Lisboa e Vale do Tejo (Regional Directorate for Agriculture and Fishery of Lisbon and Tagus River Valley)



EAFRD	European Agricultural Fund for Rural Development
EFMA	Empreendimento de Fins Múltiplos de Alqueva (Alqueva Multi-Purpose Undertaking)
ENAAC	Estratégia Nacional de Adaptação às Alterações Climáticas (National Strategy for Climate Change Adaptation)
ENAAC RH	Estratégia Nacional de Adaptação às Alterações Climáticas – Recursos Hídricos (National Strategy for Climate Change Adaptation for Water Resources)
EDP	Eletricidade de Portugal (Electricity of Portugal)
EPAL	Empresa Portuguesa das Águas Livres – Grupo Águas de Portugal (EPAL – Public Water Supply Company to Lisbon and all the right margin of lower Tagus river)
ERSAR	Entidade Reguladora dos Serviços de Água e Resíduos (Regulatory Authority on Water and Waste services)
EEC	European Economic Community
EU	European Union
IGT	Instrumentos de Gestão Territorial (Territorial Management Instruments)
INAG	Institute for Water
IPMA, IP	Instituto Português do Mar e da Atmosfera (Portuguese Institute for Sea and Atmosphere, I. P.)
FEADER	Fundo Europeu Agrícola de Desenvolvimento Rural (EAFRD European Agricultural Fund for Rural Development)
FENAREG	Federação Nacional de Regantes (National Federation of Irrigators)
FPRH	Fundo de Proteção dos Recursos Hídricos (Water Resources Protection Fund)
LA	Lei da Água (Water Law)
MAFDR	Ministério da Agricultura, Florestas e Desenvolvimento Rural (Ministry of Agriculture, Forestry and Rural Development)
MAOTDR	Ministério do Ambiente, do Ordenamento do Território e do Desenvolvimento Regional (Ministry of environment, regional planning and Regional Development)
PAC	Política Agrícola Comum (Common Agricultural Policy)
PAZVN	Programa de Ação das Zonas Vulneráveis a Nitratos (Action Programme for Nitrate vulnerable zones)
PDR	Plano de Desenvolvimento Rural (RDP - Rural Development Plan)
PEGA	Plano Específico de Gestão de Albufeiras (Specific Management Plan for Reservoirs)
PENSAAR	Plano Estratégico de Abastecimento de Água e Saneamento de Águas Residuais (A new strategy for water supply and wastewater services)
PGRH	Plano de Gestão da Região Hidrográfica (River Basin District Management Plan or Hydrographic Region Management Plan)
PGRI	Planos de Gestão dos Riscos de Inundações (Flood Risk Management Plans)
PNA	Plano Nacional da Água (National Water Plan)

PNAAC	Plano Nacional de Adaptação às Alterações Climáticas (National Plan for Climate Change Adaptation)
PNR	Plano Nacional de Regadio (National Irrigation Plan)
PNUEA	Plano Nacional para o Uso Eficiente da Água (National Plan for Efficient Use of Water)
POA	Plano de Ordenamento das Albufeiras (Land and Water Reservoir Management Plan)
PROT	Plano Regional de Ordenamento do Território (Regional Plan of Territory Planning)
PT	Portugal
PWS	Public Water Supply
RASARP	Relatório Anual dos Serviços de Águas e Resíduos em Portugal (Annual report on water and waste services in Portugal)
RDP	Rural Development Plan
REA	Relatório do Estado do Ambiente (Report on the State of the Environment)
REAP	Licenciamento da atividade pecuária em pequenas explorações (Licensing of livestock farming in small farms)
REN	Redes Energéticas Nacionais (National Energy Networks)
RH	Recursos Hídricos (Water Resources)
RS	Research Sites
SiliAmb	Sistema Integrado de Licenciamento do Ambiente (Integrated Licensing Environment System)
SNIRH	Sistema Nacional de Informação dos Recursos Hídricos (Water Resources National Information System)
TRH	Taxa de Recursos Hídricos (Water Resources Tax)
WGC	Water Governance Centre
WP	Work package

# 1 | Introduction

## 1.1 Purpose of this document

Among other goals, BINGO work package 5 (WP5) envisage the understanding and improving of the decision making process at the individual, societal and institutional levels to cope with the expected impacts of climate change.

As a first step BINGO looks into the current situation at the six research sites. The initial input is based on interviews using the three-layer-model questionnaire on policy and governance from the Water Governance Centre at each research site. This framework was selected by the BINGO leader of work package 5 and it was a proposal commitment. The findings and recommendations, discussed with the relevant stakeholders, will be the basis of the recommendations for improvement to be provided in BINGO.

The purposes of this document are to describe the interviewing process based on the questionnaire on policy and governance to the Portuguese community and to some relevant personalities, to provide some contextualization of the Portuguese research site features and institutional framework (chapter 2), in order to facilitate BINGO partners understanding of answers received, and to summarize the main conclusions obtained (chapter 3).

In this first chapter the development of this activity is framed within BINGO objectives and, in particular, within work package 5 objectives and road map. A brief reference to the three-layer-model of policy and governance is provided to better allow understanding of its content.

It is acknowledged the effort and constructive collaboration of the Portuguese community that readily participated in this phase of the BINGO project. Besides being time consuming, it was an activity done beyond their professional obligations.

## 1.2 Objectives and structure of the BINGO project

BINGO project (*Bringing INnovation to onGOing water management*) aims at providing practical knowledge and tools to end users, water managers, decision and policy-makers affected by climate change (CC) to better cope with all climate projections, including droughts and floods.

The **main objectives of BINGO** are to provide **adaptation strategies for climate change-related challenges**, by coproduced *tools and methodologies* for water and land resources management strategies that are based on an *improved understanding* of future climate and its impact on the hydrological cycle.

BINGO addresses *average* and *extreme conditions* of climate change scenarios, focusing on integrated demand-driven solutions for six representative areas across Europe (BINGO research sites).

Key climate changes adaptation-oriented outcomes of BINGO include:

- a) Improved and downscaled decadal **climate predictions** and projections of climate variables (e.g. precipitation, radiation, etc.) for the BINGO sites.
- b) Integrated analysis of the **impacts of climate change scenarios on the water cycle**, using a set of powerful numerical models, producing an increased understanding of the impacts of average and extreme weather conditions on water availability and quality and **their effects on multiple sectors**, including “domino” effects.
- c) A **portfolio of validated risk adaptation strategies** usable by decision makers, underlined by a common standard risk management framework, based on ISO 31 000. In this context, nature-based solutions will be considered as a key element in creating climate resilience.
- d) A set of **key indicators** to identify scenarios that require the anticipation of specific strategic management measures and, afterwards, to monitor and allow revision of implemented measures.
- e) **Data management plans** facilitating data provision and access, contributing to the European use of multiple data streams. The improved reliability of models and enhanced trust in their projections will be a major contribution to the development of a market for climate services.
- f) **Guidelines and procedures**, based on actionable research labs at the six research sites, designed to better address: 1) public awareness and acceptance of the role of climate change; 2) interactions and dialogue among different actors, disciplines, cultures, and habits; 3) the understanding and improving of the decision making process at the individual, societal and institutional levels.
- g) A virtual multi-stakeholder platform, with impact far beyond the geography of the Partners and the project duration.

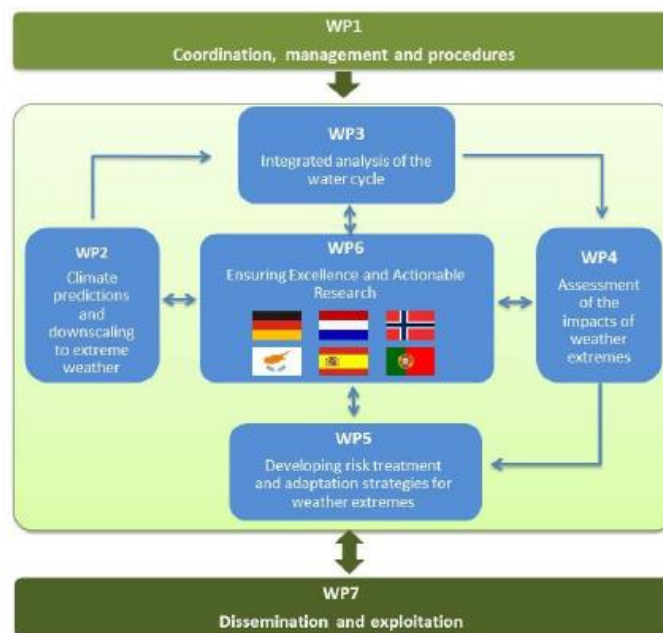


Figure 1.1 – Diagram of the structure and BINGO project approach (Figure 4 of BINGO, 2014)

BINGO is being implemented through a set of seven Work Packages (WPs). Figure 1.1 depicts the project structure and approach of BINGO.

In BINGO, WP1 and WP7 are cross cutting to all the project activities (respectively coordination/management and dissemination and exploitation). Communication and consultation (WP6) is another relevant cross-cut work package all over the project.

Work Packages WP2, WP3, WP4 and WP5 are focused on research and innovation. These work packages are closely interconnected, forming a logical sequence aligned with a risk management process approach, as shown in Figure 1.2.

In work package 2 (WP2) climate change scenarios will be predicted. These predictions will be used in WP3 to analyse the effect of average trends and extreme weather conditions on the water cycle, both on quantity and quality.

The main objective of WP4 is to perform the assessment of impacts of climate change extreme scenarios on human activities, at each BINGO research site, based on the risk assessment procedure of ISO 31000:2009 (ISO, 2009). WP5 will try to produce risk validated adaptation strategies to cope with climate changes (risk treatment).

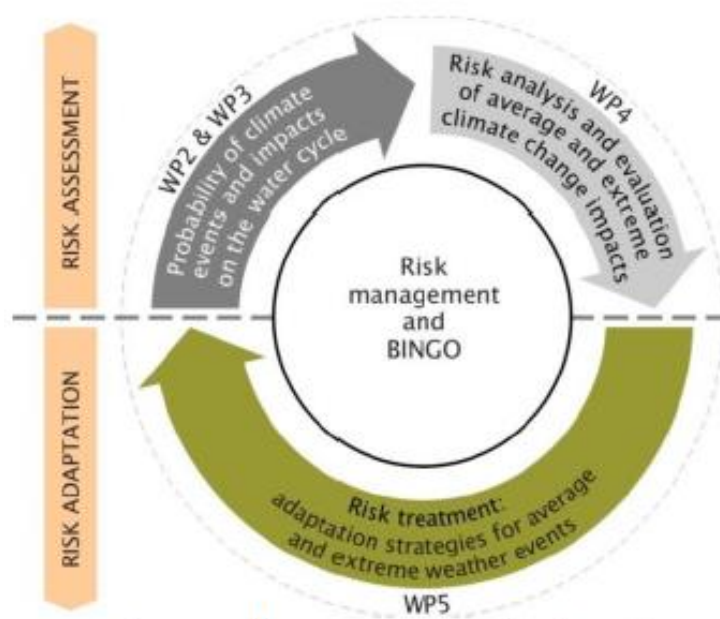


Figure 1.2 – Risk management phases in relation to BINGO Work packages (Figure 5 of BINGO, 2014)

### 1.3 Objectives and framework of BINGO Work Package 5

Water Governance is a concept not always defined and understood in the same way. An excerpt from the summarizing paper of an international experts workshop, held in Singapore, to address the issue of water governance states the following (TORTAJADA, 2010):

*“Governance has been used mostly as an umbrella concept and no agreed definition exists. Governance is not synonymous with government. It is instead a complex process that considers multi-level participation beyond the state, where decision making includes not only public institutions, but also the private sector, civil society and society in general. Good governance frameworks refer to new processes and methods of governing and changed conditions of ordered rule on which the actions and inactions of all parties concerned are transparent and accountable. It embraces the relationships between governments and societies, including laws, regulations, institutions, and formal and informal interactions which affect the ways in which governance systems function, stressing the importance of involving more voices, responsibilities, transparency and accountability of formal and informal organizations associated in any process.”*

Embracing these concepts, the specific objectives of work package 5 (WP5) are:

- To develop specific risk management and adaptation strategies for each of the six research sites;
- To produce an analysis of the economic and societal implication of the climate change induced impacts and of the proposed measures for each research site;
- To provide support to decision-makers at local and regional level to better address policy and governance issues to cope with the expected impacts of climate change and extreme events and help them to plan the implementation of new/adapted measures to address expected impacts;
- To develop methodologies to support and facilitate the more general applicability in situations, regions and communities beyond the research sites (in close co-operation with the activities in WP6 and the Community of Practice - CoP).

In order to accomplish these objectives WP5 is structured in three tasks:

***Task 5.1 - Risk treatment and potential adaptation strategies for each research site***

This task main output is a portfolio of adaptation measures that will enable decision-makers at the six BINGO research sites to develop and implement strategies to cope with the impacts of extreme weather events in their own specific situation.

***Task 5.2 - Economic and social analysis of the impacts of measures for each research site***

Selection of the most appropriate risk treatment options in WP5 will take into consideration costs and benefit, socio-economic impacts and policy implications of the different measures. Application of an economic and social analysis at the six research sites, integrating the social, economic and governance context of each research site is the main purpose of this task.

***Task 5.3 - Policy and governance adapted to future climate***

BINGO intends to have an impact on good governance in the water sector, by:

- a) Enabling better decisions based on better data: deliver of more reliable data about the specific climate and hydrological conditions for the research sites (WP2 and WP3), as well as a portfolio

of validated and demonstrated adaptation measures according to the existing level of risk (WP4 and WP5.1) is one road map;

- b) Providing support to decision-makers at local and regional level to better address policy and governance issues to cope with the expected impacts of climate change: recommendations for Policy and Governance’ to better adapt to future climate change impacts and extreme events will be produced for the six research sites. Task 5.3 should provide the recommendations and suggestions for implementing the best transition path for each site, dealing with concrete (detailed) results, with the focus on implementation and decision support.

In summary, this task envisage the understanding and improving of the decision making process at the individual, societal and institutional levels.

While doing this, BINGO will bear in mind the existing European and national strategies, initiatives and policies, keeping in line with the main objectives of the EU2020 strategy, supportive of the initiatives “Innovation Union” and “Resource-efficient Europe”, as well as water-relevant EU policies such as the Water Framework Directive and the “EU Biodiversity Strategy 2020”.

BINGO is focused on enhancing institutional capacity of public authorities and stakeholders, by “networking, cooperation and exchange of experience between regional, local urban and other public authorities, economic and social partners and relevant bodies representing civil society” (BINGO, 2014).

As already referred water governance is a far discussed concept. The way it is practiced has strong political and economic links and has evolved along time. HOFSTRA, Maarten (2016) resumes, in short, that “*Water governance is all you need to give water its place in society*”, recognising the general tendency of shifting from government to governance, as illustrated in the following diagram, that puts in evidence the transfer of power and authority from the nation state towards a set of entities, markets and the civil society (Figure 1.3).

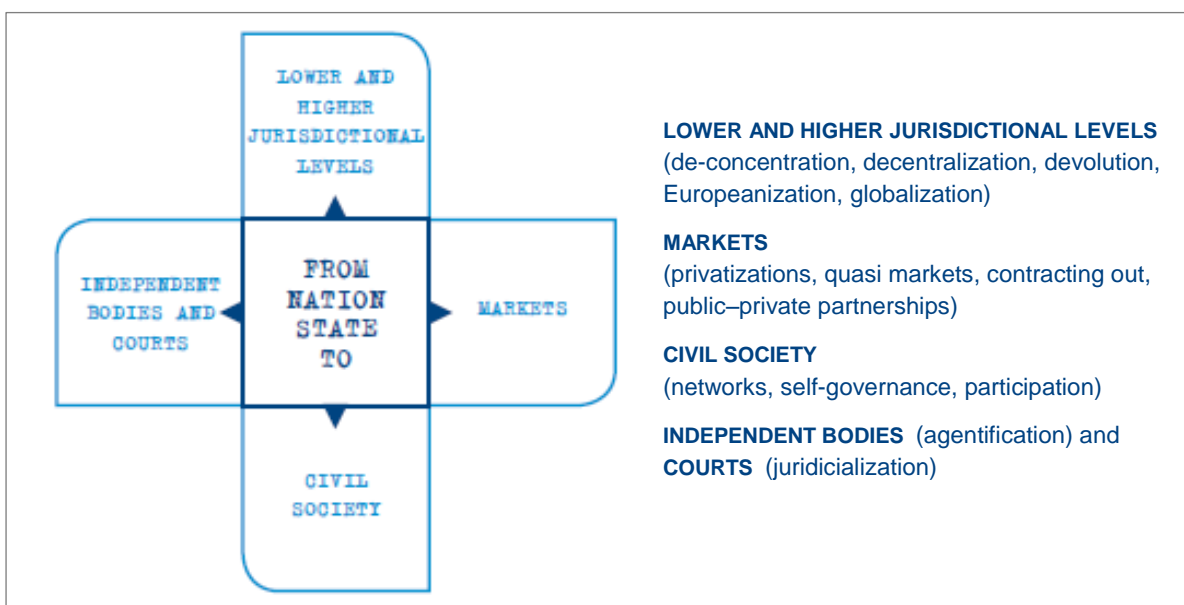


Figure 1.3 – Shift from government to governance (HOFSTRA, Maarten, 2016)

BINGO Work Package 5 (Task WP5.3) uses the **Water Governance Centre’s three-layer model** as framework to better address and elaborate policy and governance issues (HOFSTRA, Maarten, 2016). The core element of this approach is that good water management comprises three layers: a **content layer**, an **institutional layer** and a **relational layer** (Figure 1.4).

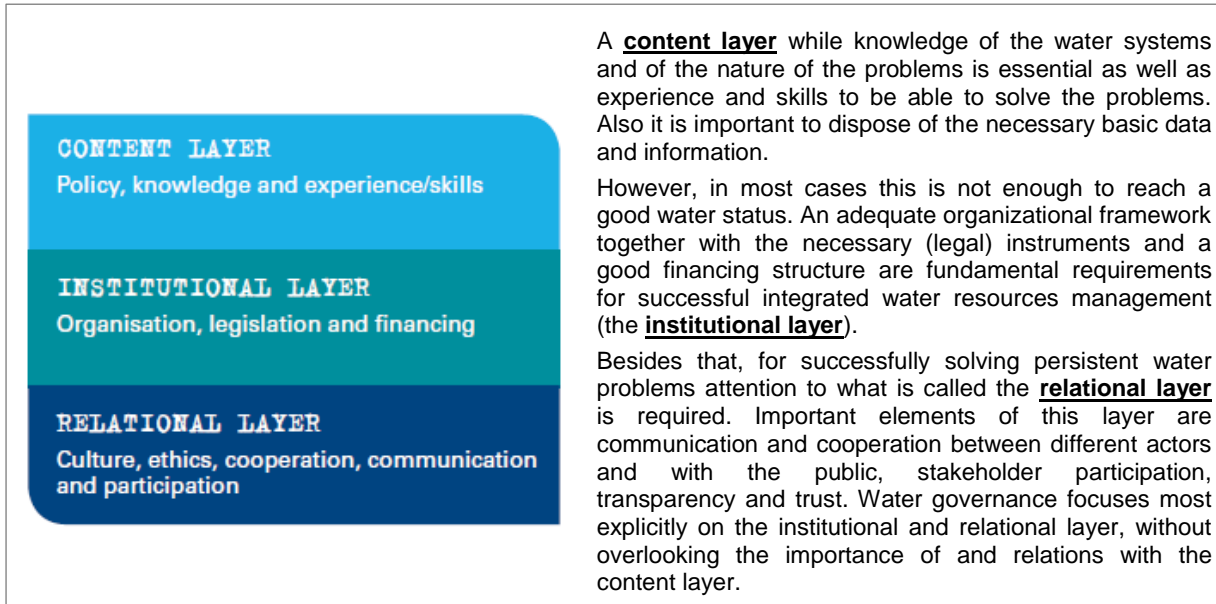


Figure 1.4 – The three layer model of water governance (WGC) (from HOFSTRA, Maarten, 2016)

The OECD Multi-level Governance Framework is organized around seven ‘gaps’ (OECD, 2012). It is worthwhile to analyse how HOFSTRA, Maarten (2016) arrange them according to the three layers model in Figure 1.5.

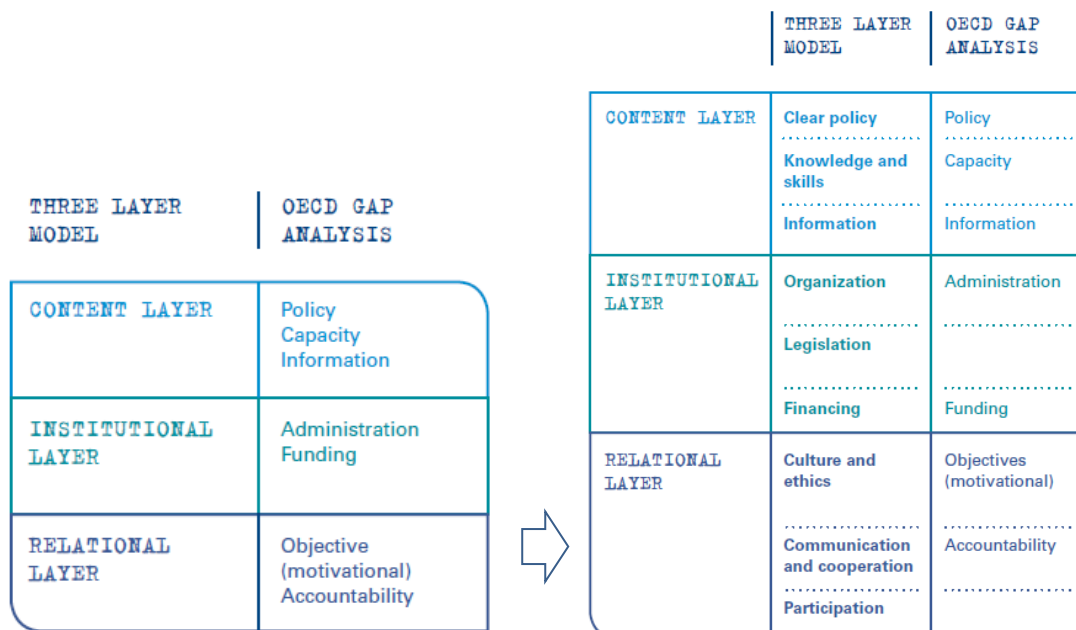


Figure 1.5 – Arrangement of OECD Multi-level Governance gap analysis according to the three layer model (HOFSTRA, Maarten, 2016)



As a first step BINGO looks into the current situation at the six research sides. The initial input is based on interviews using the **questionnaires on water Policy and Governance from the Water Governance Centre** adapted to BINGO (Figure 1.6).

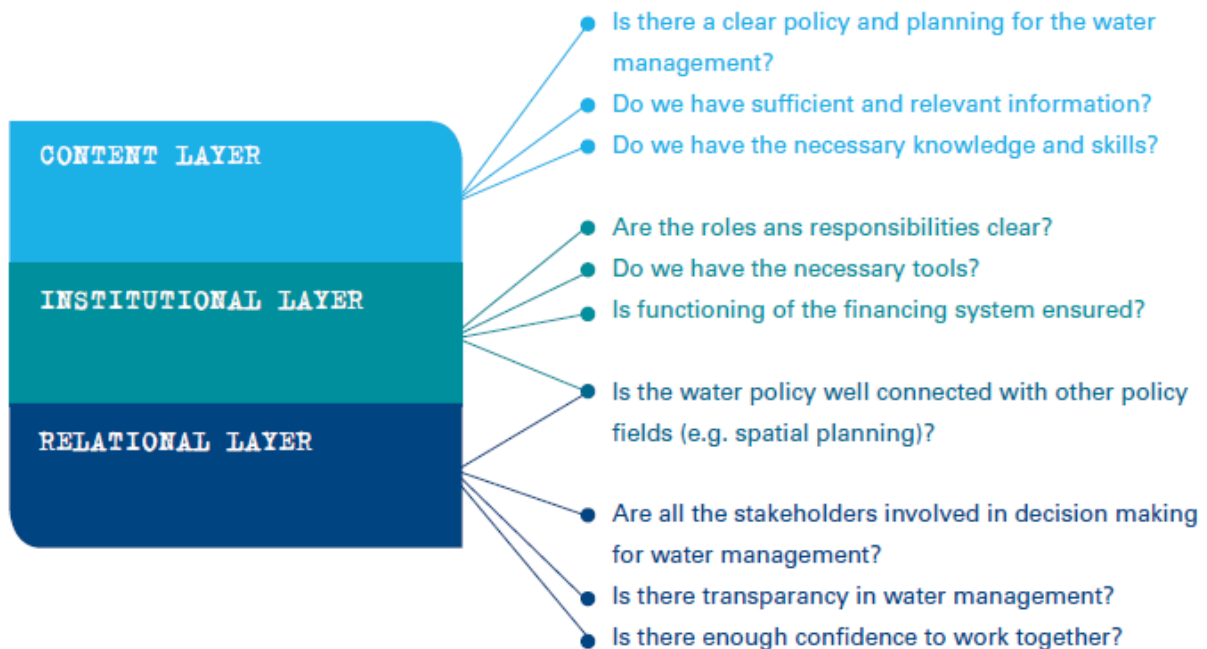


Figure 1.6 – The three layer model of water governance with related questions (HOFSTRA, Maarten, 2016)

BINGO is committed to build a community of practice (CoP) between researchers and end users, to construct win-win cooperation with stakeholders and on setting up an “Actionable Research Lab” (WP6). The questionnaire is targeted to this community of practice.

The adapted questionnaire and filling in guidelines were produced by the BINGO WP5 leader team. The main adaptation to BINGO project consisted on adding a risk management layer. The questionnaire was translated into Portuguese before delivering to the Portuguese community of practice (CoP) (Annex I).

To complement the opinions of the stakeholders provided by the questionnaire, interviews to some policy makers and researchers were also foreseen. Once again, the questions and guidelines to perform the interviews were produced by the BINGO WP5 leader team (Annex II)

The findings and recommendations will be discussed with the relevant stakeholders and based on the analysis of interviews, recommendations for improvement will be provided in BINGO.

## 2 | Portuguese Tagus research site contextualization

### 2.1 BINGO Portuguese research site

Climate change is the driving force for adaptation in BINGO. Deviations from average climatic conditions lead to two main potential extreme scenarios - droughts and inundations either by river flooding or by marine origin as storm surges, spring tides and sea level rise, with different time scale of events and different types of adaptation strategies.

BINGO Tagus research site addresses specific climate change adaptation cases in the lower Tagus. One concerns an important public water service, public water supply, the other concerns the most relevant economic activity in the region, agriculture.

Being water the central resource in BINGO, the climate change adaptation concerns, essentially, how changes in water resources availability and quality compromises both sectors and how these sectors should prepare themselves to deal with this changes.

Reduction in water availability and quality degradation associated with more frequent and intense droughts are the main concerns to both sectors but, in some specific cases, inundations are also of concern, essentially if they are due to storm surges in the estuary, or other events that increase the salt water intrusion in the water abstraction points or cause inundations with high salinity content of farming lands (Figure 2.1).

Although people safety and property protection against flooding are of utmost importance they are not the main climate change adaptation issue being addressed in BINGO Portuguese research site.

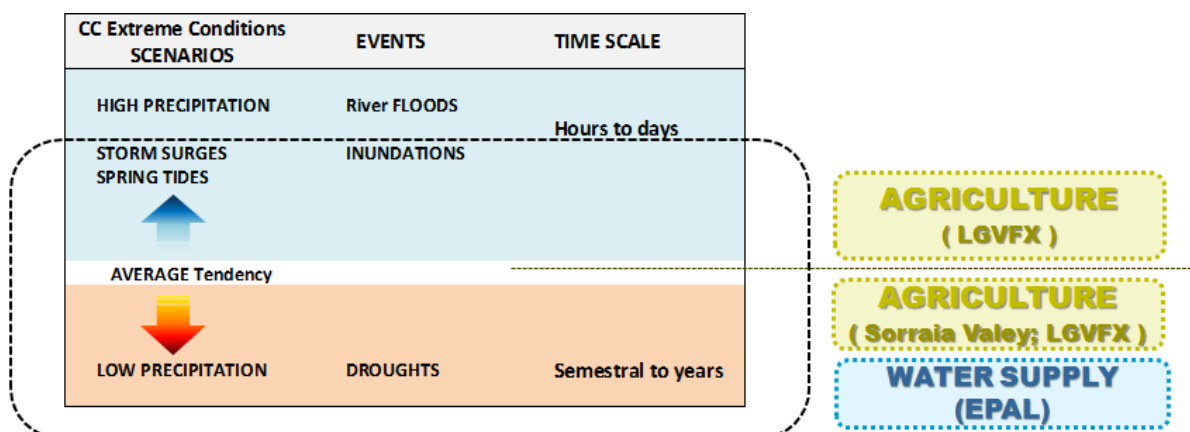


Figure 2.1 – Case studies addressed in BINGO: Public water supply (EPAL) and agriculture (Sorraia Valley and Lezíria Grande de Vila Franca de Xira – LGVFX)

Water resources governance in Tagus basin affects directly both public water supply and agriculture sectors, although in different ways and extents. The level of dependence of each sector of external water governance practices, mainly when competitiveness for the same water resources with third parties exist, affects the view or perspective of the existing regional and national policy and governance.

In order to better understand the results of the questionnaire on policy and governance a brief description of the Portuguese BINGO research site regarding water resources sources is briefly provided.

The **public water supply sector** is represented in BINGO by EPAL, the oldest established water company of Portugal that supplies Lisbon city and other surroundings 35 municipalities of the right margin of the river Tagus. The BINGO climate change adaptation objective is to manage the risk of failure of water supply continuity, due to insufficient water availability or quality, caused by storage depletion of water sources (superficial or groundwater) or quality degradation caused by CC impacts in water resources. The main EPAL water sources and relevant characteristics to WP5.3 are summarised in Figure 2.2.

The **agriculture sector** in BINGO is focused in two different case studies, the Public Irrigation perimeters of Vale do Sorraia and of Lezíria Grande de Vila Franca de Xira, the first disposing of private storage capacity through damming, and the later totally dependent till very recently of the Tagus river flow and quality, as shown in Figure 2.3. A public irrigation perimeter means that the irrigations infrastructures (storage, transport and primary distribution) were built or funded by the Portuguese government, but farming lands and agriculture practices are private. Lezíria Grande de Vila Franca de Xira (LGVFX) is the area prone to salty inundations because its altitude is low, being totally surrounded by protection dikes.

The BINGO objective is to develop strategies for climate change adaptation for economic agriculture activity in the region, under low precipitation (droughts) and inundation scenarios due to spring storms and sea level rise.

EPAL and agriculture features and risk contexts are further described in Deliverable 4.1 – “Context for risk assessment at the six research sites, including criteria to be used in risk assessment” (BINGO, 2016).

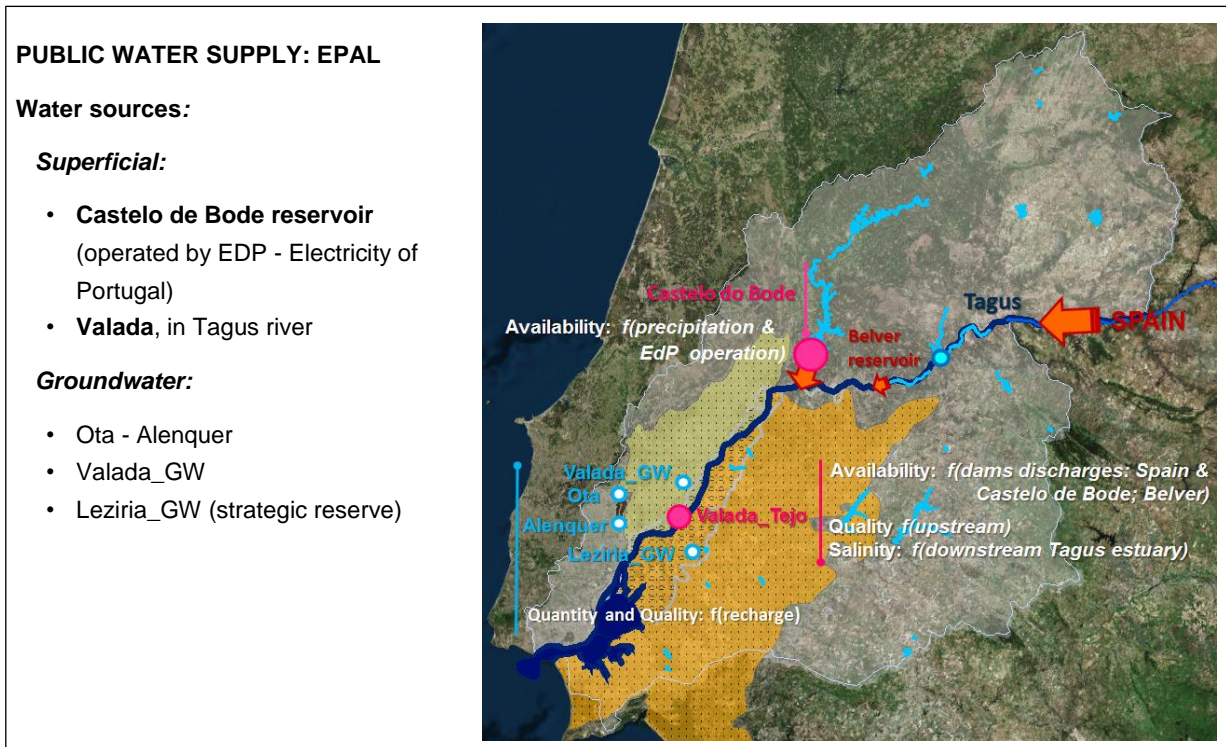


Figure 2.2 – EPAL water sources and relevant characteristics to WP5.3

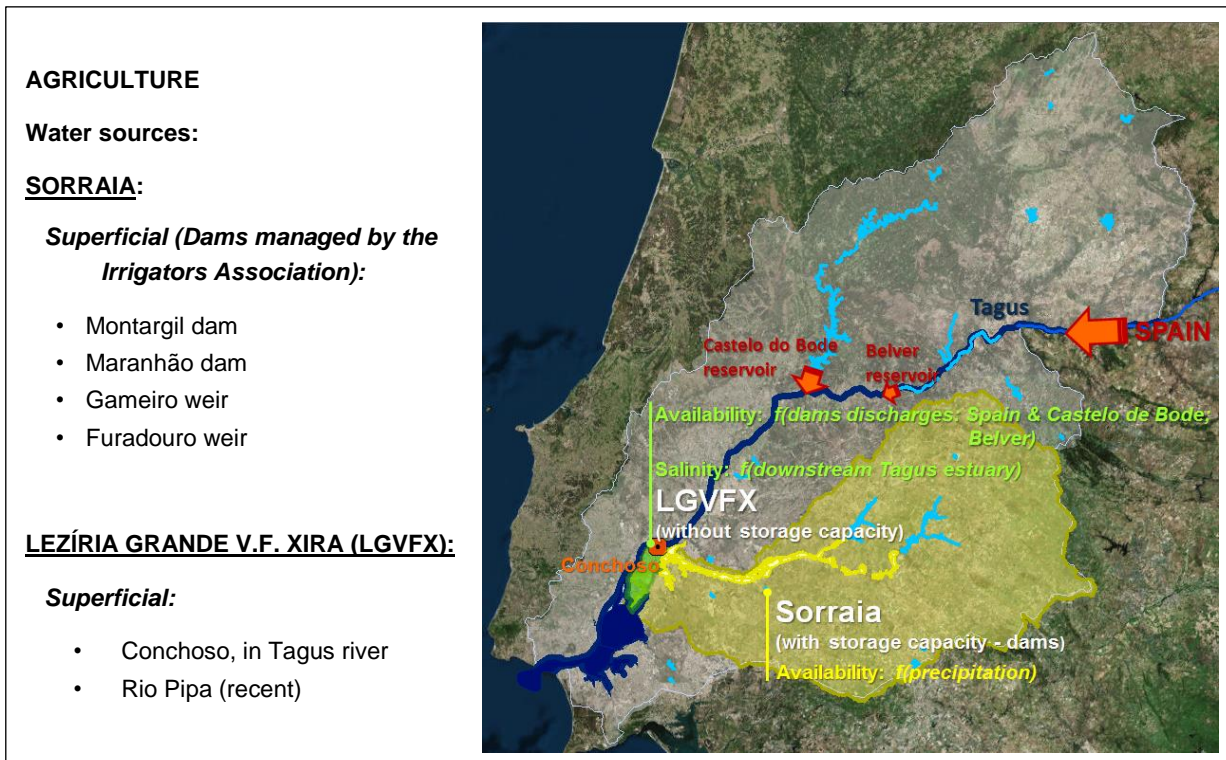


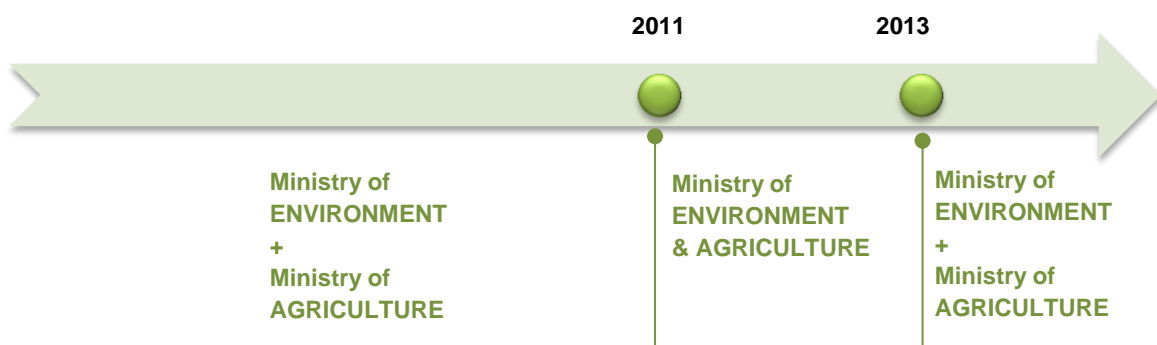
Figure 2.3 – Agriculture water sources and relevant characteristics to WP5.3

## 2.2 Portuguese Institutional framework concerning water resources

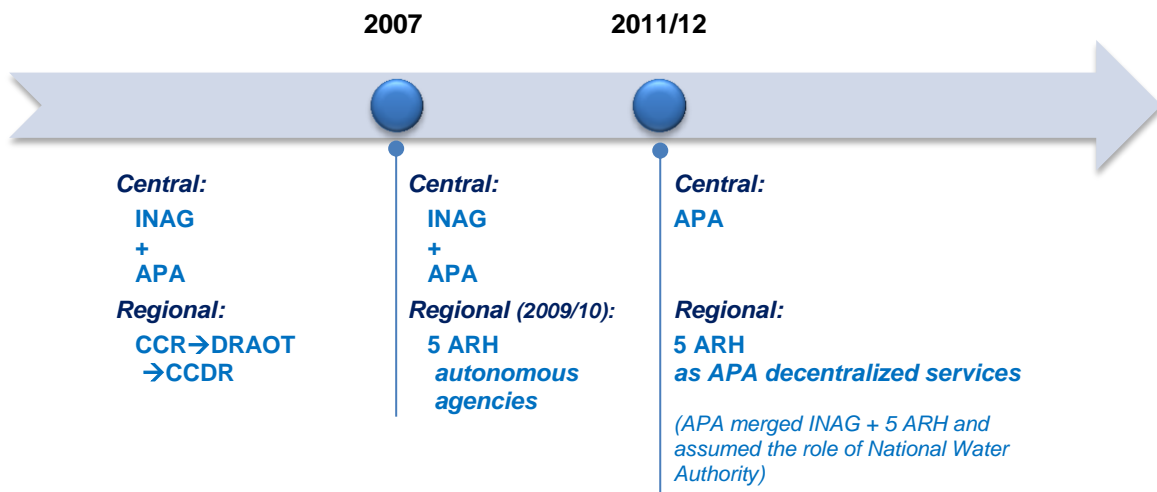
Portuguese institutional framework on water resources management has changed over time, both at administrative and legislative levels. Portugal's adhesion to the European Union (EU) in 1986 represented a significant milestone, with environmental concerns gaining a new importance. Since then the Portuguese institutional water management framework has been quite influenced by EU. The last significant milestone was the Water Framework Directive (WFD).

Figure 2.4 depicts the most relevant alterations at administrative level in the last decade.

### Ministerial level:



### Central and Regional Administration organization (concerning water management):



#### Legend:

- APA - Portuguese Environment Agency
- ARH - River Basin District Administration
- CCR - Regional Coordination Commission
- CCDR - Commission for Coordination and Regional Development
- DRAOT - Regional Directorate for Environment and Spatial Planning
- INAG - Institute for Water (National Water Authority)

Figure 2.4 – Relevant changes in the Portuguese institutional water management framework over the last decade

### **Summary of Portuguese institutional evolution concerning water resources management**

Before 2005 the Ministry of Environment area, from the political point of view, had a period of several years with frequent changes of the Environment Ministers, resulting in no stable high political policy making. Between 2005 and 2011 the political stability in place allowed significant progresses to be achieved. In 2011 a new government merged the ministries of environment and agriculture. Splitting of those ministries to the former state occurred two years later, in 2013.

These political changes had impacts at legal and administrative organizational levels. The WFD entered into force in EU by the end of 2000. Member States should have brought into force till 2003 the laws, regulations and administrative provisions necessary to comply with it. The existing ministerial instability at the time didn't provide the necessary conditions to accomplish final deadline. The Water Law (Lei da Água), transposing WFD into the Portuguese law, was only implemented on October of 2005. The regulatory complementary legal framework was released along the following years.

At the administrative organisational level, the Portuguese Institute for Water (INAG), assumed the role of National Water Authority till 2011 (previously under different names). At the same time, the Portuguese Environment Agency (APA) had some accountabilities regarding water quality, as monitoring, among others.

At regional level, promotion of articulation of sectoral public policies with a territorial view for development was a concern since long ago. In fact, the predecessor of the current Commission for Coordination and Regional Development (CCDR) was implemented in 1969 (CPR and later CCR). After Portugal's adhesion to the former EEC (current EU), they acquired new responsibilities regarding the environment. In 1994 the Regional Directorates for Environment and Spatial Planning (DRAOT) were created as autonomous agencies, bringing the regional water environmental responsibilities from the predecessor of the current CCDR and from the predecessor of INAG, including the regional water management. However, the geographical regional coverage didn't follow up the river basins. In 2003 the DRAOT(s) were merged again with CCR, becoming now formally the CCDR(s) and recovered water domain competences.

In **2007** it were legally established the creation of five River Basin District Administrations (ARH), as regional water authorities, aiming at implementing an integrate water resources governance at river basin district level, in articulation with INAG, that should provide guidance on policies for national harmonization. The water domain responsibilities of the CCDR(s) were transferred to the five ARH at that time. One of the main goals was to ensure proximity with the water users, bridging at regional level the local society with the central administration. In fact, it took two to three years to get the five ARH operationally implemented (2009/10). Finally, in **2012** a new institutional restructuring merged the Portuguese Environment Agency (APA) with the Institute for Water (INAG) and the River Basin District Administrations (ARH). The five ARH became decentralized services of APA, without autonomy.

During these transitions large human and financial resources were allocated to institutional reorganization, reducing the resources availability for water management.

## **Present Portuguese institutional framework (since 2012)**

### ***Administrative organization***

Presently, the water resources management in Portugal is undertaken at national and regional government level.

At **national** level, through the central government (the Ministry of Environment, Regional Planning and Regional Development - MAOTDR) and the national water authority, the Portuguese Environment Agency (APA), are responsible for national water resources policy. Central government also bears responsibilities on dam safety and on the coastline.

At **regional** level, the five Administrations of River Basin District (ARH), that are APA decentralized services, have the responsibilities of assuring water management at river basin district level, as well as permits issuing.

At **municipal** level the responsibilities are only focused on conservation and rehabilitation of hydrographic network, coastal zone and estuaries within urban agglomerations and on rainwater run-off drainage also in urban areas.

The National Water Council (CNA) is the independent consultation body of the Portuguese Government in the field of sustainable water planning and management and the River Basins District Councils (CRH) are APA consultation and supporting bodies of APA.

The majority of river basins in Portugal are dammed. Although water resources management in Portugal is public, centred in the Portuguese Environment Agency (APA) and their decentralised services (ARHs), the operation and exploitation of dam/ reservoir infrastructures is **outsourced** to the Electricity of Portugal Company (EDP), to the agriculture sector (some irrigators associations) and to some public water supply entities. Many reservoirs are multipurpose. The reservoir operation is not performed at the hydrographic basin level, but according to private and sectorial objectives.

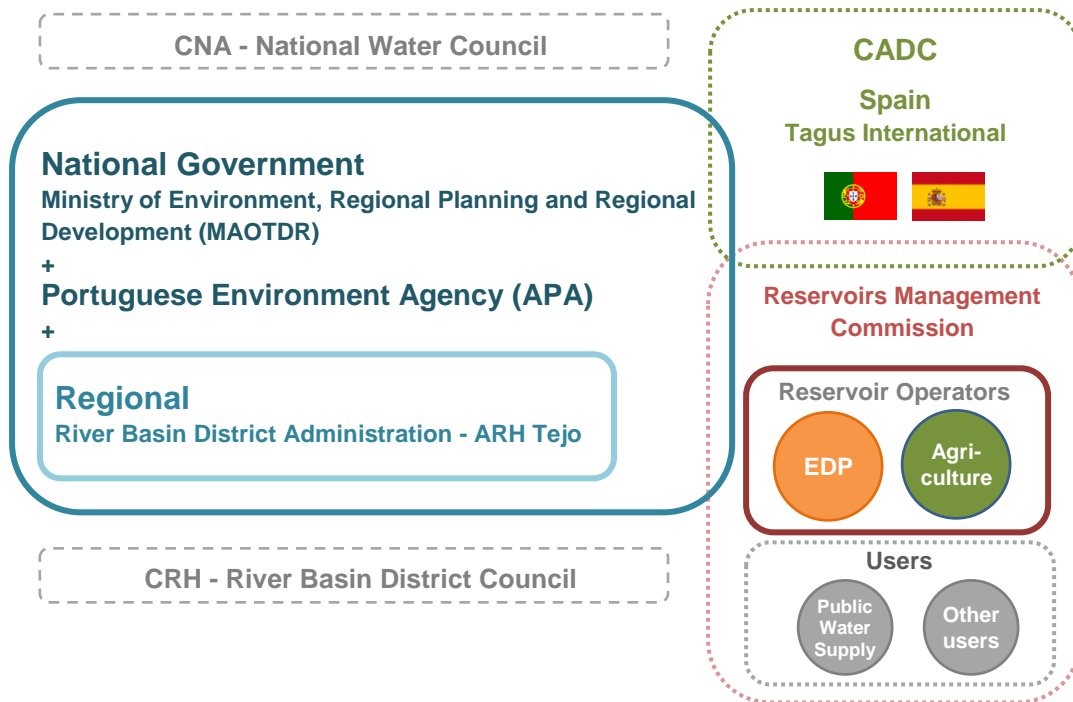
Located in the international Guadiana basin, Alqueva multi-purpose undertaking (EFMA), composed by the largest reservoir in Portugal (Alqueva) and a set of smaller reservoirs, is presently the single case in Portugal being managed by a public limited company (with an exclusively public share capital and belonging to the state corporate sector) - EDIA. It is the largest multipurpose water resources management entity in Portugal, comprising a significant part of Alentejo region (20 municipalities in 4 districts).

Conflicts of interests among the different users involved may arise, mostly during extreme weather events (floods or droughts), that need to be harmonized. The Reservoirs Management Commission (CGA) has the attribution of coordination of the planning and the exploitation of reservoirs. Its head is the president of the Portuguese Environment Agency. During emergencies its Committee has enforcement power.

In international basins, as the Tagus river basin, the water resources management needs to be articulated between Portugal and Spain. This articulation is assured by the Commission for the

Implementation and Development of the Convention on Cooperation for the Protection and Sustainable Use of Luso-Spanish Water Watersheds (CADC).

For the Tagus river basin BINGO research site, the administrative water management organization is summarised in Figure 2.5.



CADC - Commission for the Implementation and Development of the Convention on Cooperation for the Protection and Sustainable Use of Luso-Spanish Water Watersheds

EDP – Electricity of Portugal

CNA - National Water Council (consultation body of the Portuguese Government)

CRH - River Basins District Councils (APA consultation and supporting bodies)

Figure 2.5 – Administrative water management organization in Tagus river basin

### Legal instruments

The Water Law (Lei da Água - Lei n.º 58/2005, 29 December), and related legislation, is the legal instrument ruling water management in Portugal. It results from the transposition of the Water Framework Directive into the national law.

### Planning instruments

Several plans exist at national or regional level, either water management oriented or specifically targeting a water related issue. These instruments comprehend the National Water Plan (PNA), the River Basin District Management Plans (PGRH), some specifically oriented regional plans (e.g. land and water reservoir management plans) and thematic specific plans as, for example, the National Plan for Efficient Use of Water (PNUEA), the Strategic Plan for water supply and sewerage (PEAASAR II now PENSAAR 2014 - 2020) and other sectorial.

In general, plans in Portugal are not legally binding.



### 3 | Application of the Questionnaire on Policy and Governance to the Portuguese research site community

#### 3.1 Entities and personalities addressed

The questionnaire of Annex I, both in English and in Portuguese, was sent to the most relevant stakeholders related to the public water supply and agriculture in lower Tagus. Those include the Water Supply Company (EPAL) and their municipal customers, other water supply entities of the lower Tagus (Águas do Ribatejo supplying the lower left Tagus margin), irrigators and agricultures associations, the Electricity of Portugal, central and regional administration entities, an inter-municipal community and the academic community, in a total of thirty entities, as summarised in Table 3.1.

Table 3.1 – List of entities that were requested to fill in the questionnaire on policy and governance

SECTOR	ENTITY	ANSWER	BINGO PARTNER
AGRIC / ADMIN	DGADR	✓	Yes
AGRIC / ADMIN	DRAP LVT – Direcção Regional de Agricultura e Pescas LVT	✓	
AGRIC / Public Irrig. Assoc.	ARBVS - Associação de Regantes e Beneficiários do Vale do Sorraia		
AGRIC / Public Irrig. Assoc.	ABLGVFX - Associação de Beneficiários da Lezíria Grande de Vila Franca de Xira	✓	
AGRIC / Private Irrig. Assoc.	AGROTEJO		
AGRIC / Agric. Confeder.	CAP – Confederação dos Agricultores de Portugal	✓	
AGRIC / Agric. Confeder.	CNA – Confederação Nacional de Agricultura		
AGRIC / Agric. Associat.	CONFAGRI		
AGRIC / Agric. Associat.	FENAREG		
AGRIC / Technological Centre	COTR – Centro Operativo e de Tecnologia de Regadio		
AGRIC / Big Farmer	Companhia das Lezírias		
AGRIC / Big Farmer	Gestipinheiro (Grupo Ortigão Costa)		
PWS	EPAL	✓	Yes
PWS	Câmara Municipal de Alcanena		
PWS	Câmara Municipal de Cartaxo		
PWS	Câmara Municipal de Constância		
PWS	Câmara Municipal de Santarém		
PWS	Câmara Municipal de Vila Franca de Xira		
PWS	SMAS de Sintra	✓	
PWS	SMAS de Loures e Odivelas		
PWS	SMAS de Oeiras e Amadora		
PWS	Águas de Cascais		
PWS	Águas do Ribatejo	✓	
ENERGY	EDP (Electricity of Portugal)		
Community of MUNICIPALITIES	CIM LT (Lezíria do Tejo)	✓	Yes
ADMINISTRATION	ARH - Tejo /APA – Agência Portuguesa do Ambiente	✓	
ADMINISTRATION	CCDR LVT - Comissão de Coordenação e Desenvolvimento Regional of Lisbon and Tagus Valley		
ADMINISTRATION	ICNF – Instituto da Conservação da Natureza e das Florestas		
ADMINISTRATION	DGT - Direcção Geral do Território		
RESEARCH	CES – Centro de Estudos Sociais (Universidade de Coimbra)	✓	
		<b>30</b>	<b>10</b>
			<b>3</b>

The interviews followed the questionnaire form of Annex II, and were realised to four personalities identified in Table 3.2.

Table 3.2 – List of personalities interviewed

Interviewed Description	Interviewed Name	Interview conducted by
Works at Tagus River Basin District Administration of APA, the Environment Portuguese Agency and national water authority. Former head of division in charge of many WFD implementation themes	Helena Alves	Fernanda Rocha & Teresa Viseu
Professor at the University of Coimbra and expert in risk management from the Centre for Social Studies (CES)	Alexandre Tavares	Fernanda Rocha & Teresa Viseu
Water resources individual expert consultant and former President of the Institute for Water (INAG)	Pedro Serra	Rafaela Matos (BINGO coordinator)
Principal researcher at the National Laboratory of Civil Engineering (LNEC) and former President of the Portuguese Regulatory Authority on Water and Waste services (ERSAR),	Jaime Melo Baptista	Rafaela Matos (BINGO coordinator)

### 3.2 Results of the questionnaires and interviews

From the questionnaires addressed to 30 entities a set of ten answers was received, three of them form BINGO partners. Nine of the answers were filled in Portuguese and then translated into English. The answers provided from:

- Agricultural sector: 4 (including associations and Irrigation Authorities / Administration)
- Water supply sector: 2
- Administration/ Water authority: 1
- Community of Municipalities: 1
- Academic: 1.

The results of the ten questionnaire answers were exhaustively analysed. When doing so it was realised that the guidance supporting the questionnaire was not being clearly interpreted by all the interviewed in what concerns the underlying definitions or concepts for each cell. As concepts were sometimes misunderstood, some answers were provided in not the most adequate cells. According to Figure 1.4 and Figure 1.5 the questions match the correspondence of Table 3.3.

It was produced a questionnaire compiling and summarizing the main conclusions of the set of ten answers received, according to Table 3.3. The outcome is presented in Annex III. In Table 3.4 is presented the summary of the compilation summary. It reflects the majority of answers, although some differences could be detected when analysing each questionnaire individually.

Table 3.3 – Correspondence between questionnaire questions and underlying concepts

Three-Layer-Model		Layer/Question
<b>CONTENT Layer</b>	<b>Clear policy</b>	Is there a clear policy and planning for water management in your region?
	<b>Information</b> <i>(Basic data and information)</i>	Is there sufficient and relevant information available?
	<b>Knowledge and skills</b> <i>(Knowledge of the water systems and of the nature of the problems; Experience and skills to be able to solve the problems)</i>	Are the necessary knowledge and skills available?
<b>INSTITUTIONAL Layer</b>	<b>Organization</b> <i>(Organizational framework)</i>	Are the roles and responsibilities clear?
	<b>Legislation → Administration resources</b> <i>(Legal instruments and other tools)</i>	Are the necessary tools available?
	<b>Financing</b> <i>( Financing structure)</i>	Is functioning of the financing system ensured?
<b>RELATIONAL Layer</b>	<b>Communication and cooperation</b> <i>(Communication and cooperation between different actors and with the public)</i>	Is the water policy well connected with other policy fields (e.g. spatial planning)?
	<b>Participation</b> <i>(Stakeholder participation)</i>	Are all stakeholders involved in decision making for water management?
	<b>Culture, ethics</b> <i>(Transparency and trust, ...)</i>	Is there transparency in water management? Is there enough confidence to work together?

In order to understand individual answers it is made notice that:

- Each type of entity answered according to its own profile and field of activity;
- The larger the dependence of the entity of competitiveness for the same water resources with other users, the more involved and in-depth answering was provided by the entity;
- The entities represented in the BINGO national research site (agriculture, public water supply), as well as the remaining BINGO Community of Practice, have a high level of academic education. Their vicinity to Lisbon, the fact that EPAL is operating for over a century and the fact that the agriculture sector beneficiates from public irrigation perimeters, contributed to easier access to information, knowledge and development. The awareness showed up on the subject and the level of knowledge may not be representative of all Portugal;

It is our belief that the results of interviews corroborate the answers receives in the questionnaires, confirming the awareness and level of knowledge of stakeholders involved in the BINGO project.

Table 3.4 – Main conclusions of the questionnaire on policy and governance

	<i>This column is about current practices to the extent that they are successful.</i>	<i>This column is about missing or unsuccessful practices.</i>	<i>This column is about ideas for improvement of the water governance.</i>
<b>Layer/Question</b>	<b>What do we have that works</b>	<b>What is missing?</b>	<b>How can water governance be improved?</b>
<b>Content Layer</b>			
<b>Is there a clear policy and planning for water management in your region?</b>	<ul style="list-style-type: none"> <li>– Water policy is regulatory, defined in the Water Law, based on the WFD objectives and in planning instruments, set at different geographic levels or for specific regions or purposes, aiming to achieve the environmental water body's objectives.</li> <li>– Includes mechanism to deal with extreme meteorological events.</li> <li>– The legal framework is complex, inconsistent and confusing.</li> </ul>	<ul style="list-style-type: none"> <li>– Simplification and harmonization of water legislation in Portugal;</li> <li>– A conducting line guiding on how to jump from the legal framework to the implementation of strategies and policies, as specific water policy guidelines and principles, In particular, a water uses policy;</li> <li>– Articulation at several levels, between different: plans and the programme of measures; geographic levels; sectoral policies and countries (Portugal-Spain).</li> </ul>	<ul style="list-style-type: none"> <li>– Codification of all the legislation into a single Water Code;</li> <li>– Improve the economic analysis of water, regulate water uses policy, reform licensing process and economic regime and rules for exceptions, according to it);</li> <li>– Legislation linking the different sectors for a sustainable management of water resources;</li> <li>– Shift from a governmental WR management model to a governance model.</li> </ul>
<b>Is there sufficient and relevant information available?</b>	<ul style="list-style-type: none"> <li>– Available data is considered not to be enough and often not updated;</li> <li>– Exist data, spread out by many different administration and private entities, and not always accessible,</li> <li>– Exist several state-of-the-art information systems in the Administration, but they are not always updated or loaded with the necessary information.</li> </ul>	<ul style="list-style-type: none"> <li>– Fulfilment of administration obligations of quality and quantity monitoring, as well as of self-control emissions monitoring obligations by stakeholders;</li> <li>– Public available cadastre of the water resources uses;</li> <li>– Easy, transparent and fast access to the most updated data and information, and sharing and of existing information produced by stakeholders.</li> </ul>	<ul style="list-style-type: none"> <li>– Overcome lack of fulfilment monitoring obligations by: adjusting the monitoring requirements to the reality; improving communication with stakeholders; encouraging the legalization of illegal abstractions; allocating more financial resources;</li> <li>– Make access to data and information easy and transparent, integrate of already existing platforms, allowing governance to be improved and get legitimacy.</li> </ul>
<b>Are the necessary knowledge and skills available?</b>	<ul style="list-style-type: none"> <li>– <u>Administration</u>: Have some technicians with adequate experience and knowledge, but resources are limited. Awareness of limitations exist and several activities are outsourced;</li> <li>– <u>Stakeholders</u>: some have technical resources with knowledge, experience and expertise;</li> <li>– <u>Academic and research</u>: They are involved with Administration to improve these skills (oriented training activities).</li> </ul>	<ul style="list-style-type: none"> <li>– Knowledge about the impact of pressures over water bodies and on how each user contributes to the current water body status;</li> <li>– Management tools, as integrated modelling of the Tagus River;</li> <li>– Overcome the existing large gap between the knowledge at academic and sectorial levels and the current practice in the Administration;</li> <li>– Make existing knowledge reach the decision-making process.</li> </ul>	<ul style="list-style-type: none"> <li>– Increase and strengthen the Administration resources at human, technical and logistic and levels;</li> <li>– Deepens evaluation methodologies;</li> <li>– Implement efficient tools to support water resources management (integrated simulation models...);</li> <li>– Invest in training and public dissemination;</li> <li>– Redesigned the decision making process to match the knowledge level to each kind of decision.</li> </ul>

Layer/Question	What do we have that works	What is missing?	How can water governance be improved?
<b>Institutional layer</b>			
<b>Are the roles and responsibilities clear?</b>	<ul style="list-style-type: none"> <li>Water resources planning and management are centred at governmental level. Framed by the legislation, several entities exist, acting at different geographic levels, with assigned responsibilities.</li> <li>Some Commissions (river basin council; reservoir management and Luso-Spanish convention) are an ensemble of entities with roles mainly related to public participation, emergency management and international cooperation.</li> </ul>	<ul style="list-style-type: none"> <li>Stability in the institutional framework;</li> <li>Elimination of overlapping competencies between entities;</li> <li>Sufficient interinstitutional cooperation attitude and articulation among entities at different geographic level,</li> <li>Uniformity of procedures, to avoid different positions / decisions;</li> <li>A governance model of cooperation between administration and water users entities for sustainable water resources management.</li> </ul>	<ul style="list-style-type: none"> <li>Provide an efficient and stable institutional framework (after reconfiguring the water management agencies by reconstituting an independent national water authority and autonomous Administrations of River Basin Districts) and</li> <li>Evolve to a governance management model, in a clear and workable cooperation, defining the roles and responsibilities of the administration and of the water user's entities</li> </ul>
<b>Are the necessary tools available?</b>	<ul style="list-style-type: none"> <li>The legal and instrumental tools exist;</li> <li>Institutions, with decentralized services at regional level that facilitate the articulation, harmonization and integration of interventions;</li> <li>Priorities for water use in case of a crisis;</li> <li>Information systems / monitoring networks available;</li> <li>Agricultural Advisory Service;</li> <li>Agro-Environmental Measures.</li> </ul>	<ul style="list-style-type: none"> <li>Updated monitoring networks in order to assess the state of the water bodies and the effectiveness of the measures and support the decision-making; facilitation of the use of SiliAmb by users and their organizations;</li> <li>Application of integrated water resources simulations models;</li> <li>An overall licensing and inspection procedure is missing ;</li> <li>Effective instruments of public collaborative participation.</li> </ul>	<ul style="list-style-type: none"> <li>Administrative organization for better articulation between APA and regional services (ARHs);</li> <li>Use of integrated water resources management simulation tools;</li> <li>Through integrated monitoring systems accessible to the different competent entities;</li> <li>Articulated licensing acts among environmental, economic activities and land use perspectives;</li> <li>Internalization of academic CC knowledge in the practice of the Administration;;</li> <li>Implement instruments of public participation.</li> </ul>
<b>Is functioning of the financing system ensured?</b>	<p>Financing is assured through:</p> <ul style="list-style-type: none"> <li>Governmental administration organisms financing;</li> <li>The Water Resources Protection Fund (FPRH), resulting from the Water Resources Taxes revenues and licenses</li> <li>The EU financing programmes, that differs according to sectors:</li> </ul> <p><b>Agriculture:</b></p> <ul style="list-style-type: none"> <li>RDP2020 (EAFRD) funding is in place for investments in irrigation, water use efficiency and farming counselling;</li> </ul> <p><b>Public water supply:</b></p> <ul style="list-style-type: none"> <li>EU structural funding programmes and the EU Investment Bank programmes.</li> </ul>	<ul style="list-style-type: none"> <li>Resources for administration to fulfil its obligations;</li> <li>Public information on how the FPRH is being applied and transparent access to it;</li> <li>The real affectation of the FPRH to the WR management and protection;</li> <li>Reorientation of FPRH funding to strategic objectives, rather than mitigation responses and unworked conflicts;</li> <li>More transparency in what concerns criteria for accessing to EU funds.</li> </ul>	<ul style="list-style-type: none"> <li>Affect the FPRH to management and protection of WR, in a transparent way, as preconized in the legislation;</li> <li>Apply water services recovery costs and consider adjustment of rates (TURH /tariffs/ permit fees).</li> <li>Enhance the allocation of RDP2020 funds, if possible and necessary using alternative sources of funding (e.g. Juncker Plan);</li> <li>Remove exiting uncertainty in what concerns access to EU funds.</li> </ul>

Layer/Question	What do we have that works	What is missing?	How can water governance be improved?
<b>Relational Layer</b>			
<b>Is the water policy well connected with other policy fields (e.g. spatial planning)?</b>	<ul style="list-style-type: none"> <li>– Water policy is connected with other sectoral policies at top level. Example is the RDP2020 giving priority to investments located in areas susceptible to desertification;</li> <li>– At bottom level some legal instruments of interface between the policies of water and sectors exist (mainly related with water taxes and regime of water uses of permits).</li> </ul>	<ul style="list-style-type: none"> <li>– A two-way relationship. Create in society in general a cross liability with regard to water issues;</li> <li>– Improved communication and articulation among different sectors and geographic levels;</li> <li>– Reduction of ambiguities caused by the excess of sectoral instruments and regulations and the proliferation of plans;</li> <li>– Reduced bureaucracy;</li> <li>– Better land-use planning.</li> </ul>	<ul style="list-style-type: none"> <li>– Improve inter-agency cooperation and planning between water resources, land use and sectorial activities;</li> <li>– Manage interests and inter sectorial conflicts (e.g. electricity production vs contracts to the agricultural seasonality), establish priorities, harmonize policies;</li> <li>– Regulation and implementation of User Associations foreseen in the legislation, make efficient already existing Councils;</li> <li>– Improve the governance and licensing models.</li> </ul>
<b>Are all stakeholders involved in decision making for water management?</b>	<ul style="list-style-type: none"> <li>– In theory yes, since the consultation mechanisms are foreseen by law;</li> <li>– Participation is formally supported through several Commissions and Councils (CAN; CRH; CGA);</li> <li>– The participation of stakeholders takes place during the process of public consultation of the River Basin District Management Plans (PGRH) and Flood Risk Management Plans (PGRI).</li> </ul>	<ul style="list-style-type: none"> <li>– Engagement of stakeholders in the planning process rather than consultation of already elaborated plans;</li> <li>– Equal treatment for equal rank/role entities;</li> <li>– Directed consultation to specific sectors/stakeholders. Public consultation is generally addressed to civil society and to the central, regional and local administration;</li> <li>– Time for real participation;</li> <li>– Avoid devaluation of existing participation by the technical decision makers.</li> </ul>	<ul style="list-style-type: none"> <li>– Provide the institutions with tools and means to establish channels of communication between the administration and the community;</li> <li>– Engage in a targeted way the different stakeholders, enhancing their participation in the planning processes prior to decisions;</li> <li>– Acknowledge and overcome different sectorial treatment (predominance of the interests of hydroelectric sector over other users);</li> <li>– Empower the River Basin District Council with influence over the management decisions.</li> </ul>
<b>Is there transparency in water management?</b>	<ul style="list-style-type: none"> <li>– In general terms, the feeling is that there is not much transparency or is marked by nonconformities.</li> <li>– The management of hydroagricultural infrastructures established through the application of the legal regime is an example of transparency in the management of WR.</li> </ul>	<ul style="list-style-type: none"> <li>– Clear application of TRH;</li> <li>– Economic and financial regulation of the management agencies;</li> <li>– Sharing of data and information about current and future water use needs;</li> <li>– Discussion about topics of interest between the central administration (Water Authority (APA) and water users.</li> </ul>	<ul style="list-style-type: none"> <li>– Increase access to easily available information;</li> <li>– Create a practice of discussion and consultation among the Administration, the water users and the scientific community.</li> <li>– Disclosure of reports (e.g. application of the FPRH);</li> <li>– Refocusing governance not on regulatory instruments of access and use of water but on communication tools for different users.</li> </ul>
<b>Is there enough confidence to work together?</b>	<ul style="list-style-type: none"> <li>– In theory, there is confidence. In practice no, as long as do not change the relations between the parties and the top down view of the administration.</li> <li>– Stakeholders are open and willing for it.</li> </ul>	<ul style="list-style-type: none"> <li>– Availability /Will;</li> <li>– Improved communication with the different planning sectors of Portugal stakeholders;</li> <li>– The weight of public institutions marks the relations among the parties interested in the decision-making power or in the application of funding, and by not being supported by a strategic communication.</li> </ul>	<ul style="list-style-type: none"> <li>– Submit to the scrutiny of water users the important issues (e.g. Taxes; ...);</li> <li>– Enhance and publish the work/ intervention of the Hydrographic Region Council (CRH);</li> <li>– A multilevel approach, with formal power of political decision, after valuing the academic, technical and legal competences.</li> </ul>

Layer/Question	What do we have that works	What is missing?	How can water governance be improved?
<b>Risk management</b>			
<p><b>What are the <u>CURRENT</u> risks your water system is facing?</b></p> <p><b>Risks:</b></p> <ul style="list-style-type: none"> <li>- <u>Droughts</u> and consequent: <ul style="list-style-type: none"> <li>o Water scarcity and water quality degradation</li> <li>o Upstream salt water intrusion</li> </ul> </li> <li>- <u>High temperatures; Forest fires</u> Loss of cultures, property and lives; oils erosion.</li> <li>- <u>Floods</u> and consequent: <ul style="list-style-type: none"> <li>o Inundations; Bank erosion;</li> <li>o Damage in hydraulic infrastructure and irrigation equipment;</li> </ul> </li> <li>- <u>Pollution</u>, due to contamination by other sectors.</li> </ul>	<p><b>What do we have that works:</b></p> <p><b>Structural:</b></p> <ul style="list-style-type: none"> <li>- Reservoirs with storage capacity;</li> <li>- Embankments;</li> <li>- Inundation protection dykes.</li> </ul> <p><b>Non Structural:</b></p> <ul style="list-style-type: none"> <li>- Knowledge about CC related risks does exist in the sectors studied in PT_RS (but the same does not happen in general);</li> <li>- Reservoirs management contributing for the flooding risk mitigation.</li> </ul>	<ul style="list-style-type: none"> <li>- Practical knowledge in what concerns CC related risks regarding the extent of its potential impacts on water systems and in particular on water sources points, either in quantity and quality;</li> <li>- Knowledge about the topic and diffuse sources of pollution, as well as the implementation of effective monitoring and control of emissions;</li> <li>- Rhythm. Risks related to CC are known, but are treated at a rhythm that is not the most appropriate.</li> </ul>	<ul style="list-style-type: none"> <li>- Get better knowledge about climate change evolution;</li> <li>- Study potential local impacts on water sources - bridge from general theory to in place knowledge (to be performed by the Central Administration as well as by other stakeholders);</li> <li>- Develop a complete risk assessment, with the identification of all potential sources of pollution and the respective substances, as well as the implementation of control measures and the creation of barriers to risk, in its various aspects.</li> </ul>
<p><b>Do you feel these are dealt with sufficiently?</b></p>	<ul style="list-style-type: none"> <li>- NOT AT ALL, in general, in what concerns governmental entities, despite the fact of having been produced a document with a National Strategy for Climate Change Adaptation (ENAAC);</li> <li>- YES up to some extent, in what concerns agricultural and public water supply BINGO entities (note: Sectors consider that CC will be an intensification of already existing climate variability).</li> <li>- As an example: EPAL, have carried out relevant studies in the area of risk related with present water sources.</li> </ul>	<ul style="list-style-type: none"> <li>- Imbuement in governmental agencies of CC risks, consequences and need for measures;</li> <li>- Awareness of some sectorial entities in what concerns CC related risks;</li> <li>- Assertiveness, focuses, supporting implementation mechanisms of planning instruments regarding CC (although always generally referred);</li> <li>- Sectorial participation and acknowledgment of the existing document for National Strategy for Climate Change Adaptation (ENAAC) but considered to be detached from reality;</li> <li>- A real adaptation strategy. Risk mitigation strategies are carried out in response to disturbances and not in an integrated and strategic way;</li> <li>- A strategic vision of mitigation, based on local scale and vulnerabilities;</li> <li>- Definition of accountabilities and action programs and tasks of entities;</li> <li>- Information systems with risks and their impacts, to support efficient decision-making;</li> <li>- Infrastructure maintenance (such as dykes) to face the present flooding risks;</li> <li>- Land use planning;</li> </ul>	<ul style="list-style-type: none"> <li>- Imbue in governmental agencies of CC risks culture;</li> <li>- Development of civil society awareness of CC related risks;</li> <li>- Develop risk assessment studies;</li> <li>- Improve information systems, credible and efficient for the decision-making;</li> <li>- Define objectives, how to achieve and monitor them, set realistic;</li> <li>- Develop a Multilevel Risk Management Model;</li> <li>- Develop a National and Sectorial Strategy for CC Adaptation (ENAAC) acknowledge by the economic sectors, and create adequate implementation mechanisms;</li> <li>- Improve articulated land uses planning;</li> <li>- Create an entity that actually manages the different components of water resources. different components of water resources;</li> </ul>

Layer/Question	What do we have that works	What is missing?	How can water governance be improved?
<b>Risk management</b>			
<b>Which measures are already in place?</b>	<p><b>For DROUGHTS:</b></p> <p><b>At PT_RS sectoral level:</b></p> <ul style="list-style-type: none"> <li>- Individual sectoral entities preparedness from agriculture and public water supply sectors regarding : <ul style="list-style-type: none"> <li>o Search for alternative sources of water;</li> <li>o Efficient water use, either in water transport and distribution as well as in application of good practices (exist a remarkable recent evolution in PT_RS);</li> <li>o Farmers training;</li> </ul> </li> <li>- In EPAL, internalization of knowledge about the CC risks and adoption of a risk management approach in the company;</li> </ul> <p><b>At regional level:</b></p> <ul style="list-style-type: none"> <li>- Creation of COTR (Operative Centre and of Irrigation Technology) providing technical support to farmers and certifying irrigation equipment regarding efficiency of water usage;</li> </ul> <p><b>At governmental level due to EU requirements:</b></p> <ul style="list-style-type: none"> <li>- The implementation of certification for irrigation equipment and for forest management,</li> <li>- The certification of irrigation in order to obtain EU support funding;</li> <li>- EU support frameworks which impose environmental rules;</li> <li>- Application of tariffs that discourage the growth of water consumption.</li> </ul> <p><b>Some governmental studies:</b></p> <ul style="list-style-type: none"> <li>- Study of the vulnerability of coastal aquifers to saline intrusion (ENAAC Progress Report).</li> </ul> <p><b>For FLOODS:</b></p> <ul style="list-style-type: none"> <li>- Monitoring, forecast and alert systems (SNIRH, SILiAmb, Numerical models that allow us to anticipate critical situations - Climate Portal);</li> <li>- Identification of flooding zones and assessment of risk factors for floods (PGRI - Flood Risk Management Plans).</li> </ul>	<ul style="list-style-type: none"> <li>- Prevention and adaptation to rising temperatures and reduced rainfall;</li> <li>- Intensive adoption of measures for the efficient use of water and strategies for water saving;</li> <li>- Knowledge the regime of usage / exploitation of the Tagus basin (water uses quantification and public information);</li> <li>- Interacting with stakeholders, sectorally and globally;</li> <li>- Specific measures in the River Basin District Plan (PGRH) concerning the risks associated with CC instead of some very generic measures;</li> <li>- Regarding the salt water intrusion, there is a lack of precautionary measures (adequate monitoring and surveillance of its evolution, planning of adaptation measures);</li> </ul>	<ul style="list-style-type: none"> <li>- Strengthen the prevention and adaptation to rising temperatures and reduced rainfall by diversifying the forest species and reinforcing prevention (cleaning of forest, vigilance, etc.);</li> <li>- Increase storage capacity;</li> <li>- Promote hydraulic infrastructuration as a measure of adaptation to climate change (floods and droughts);</li> <li>- Fully implement the National Plan for the Efficient Use of Water, both in what concerns maintenance and modernization of storage infrastructures, transport and distribution and good practices;</li> <li>- Promote a more efficient and concerted water management, particularly by hydroelectric production sector;</li> <li>- Provide information about the regime of usage / exploitation of the Tagus basin. Provide water balances constantly updated;</li> <li>- Develop a complete pollution risk assessment, with the identification of all potential sources of pollution and the respective substances, as well as the implementation of control measures and the creation of barriers to risk, in its various aspects;</li> <li>- Develop better links between nature conservation and development of economic activities;</li> <li>- Irrigators certification, that prove the application of good practices;</li> <li>- Review water tariffs;</li> <li>- Establishment of contingency plans in situations of drought and forest fires;</li> <li>- Monitor the implementation of the National Strategy for Climate Change Adaptation regarding Water Resources (ENAAC-HR) .</li> </ul>



Layer/Question	What do we have that works	What is missing?	How can water governance be improved?
<b>Risk management</b>			
<p><b>What <u>FUTURE</u> risks are you currently aware of?</b></p>	<p><b>Future risks</b>, are the Intensification of the current risks and some more (as economic sectors are being addressed in PT_RS the referred risks that not only concern the water system but also how they compromise economic activities or property):</p> <ul style="list-style-type: none"> <li>- Droughts (main agriculture and PW Supply concern) and consequent:                             <ul style="list-style-type: none"> <li>o Water scarcity, water quality degradation and ecosystems deterioration;</li> <li>o Overexploitation (hydric stress);</li> <li>o Upstream salt water intrusion from estuary</li> <li>o Desertification;</li> <li>o Depopulation;</li> <li>o Agricultural abandonment;</li> </ul> </li> <li>- Floods and storm surges and consequent:                             <ul style="list-style-type: none"> <li>o Inundations;</li> <li>o Soils salinity;</li> <li>o Bank erosion;</li> <li>o Damage in hydraulic infrastructure and irrigation equipment;</li> </ul> </li> <li>- Intense off season rainfall (undermine agriculture production, threatening the viability of maintenance of the current systems of cultures);</li> <li>- Higher temperatures;</li> <li>- Forest fires and consequent:                             <ul style="list-style-type: none"> <li>o Loss of cultures, property and lives;</li> <li>o Soils erosion.</li> </ul> </li> <li>- Pollution, due to contamination by other sectors and consequent Impairment of water sources;</li> <li>- Reduction of Spanish flow discharges.</li> </ul>	<ul style="list-style-type: none"> <li>- To make credible the existing information;</li> <li>- Knowledge of up to what extent will we be economically affected;</li> <li>- Proper working of the watercourses monitoring network, allowing frequent evaluation of possible impacts of climate change and establishment of trends;</li> <li>- Timing, meaning lack of knowledge on CC evolution, or when the situation will become serious;</li> </ul>	<ul style="list-style-type: none"> <li>- Anticipate the knowledge about the near future (CC predictions and impacts);</li> <li>- Cross short-term information with trend of recent years;</li> <li>- Make available updated water resources monitoring data allowing the stakeholders to perform risk analyses with great added-value for the planning of the respective activities;</li> <li>- Promote the setup of a shared dynamic geo-referenced data base on water pollution (referencing polluters) with information produced by the different stakeholder's studies.</li> </ul>
<p><b>Do you feel there is sufficient preparation to deal with these?</b></p>	<ul style="list-style-type: none"> <li>- EPAL has already implemented a set of measures that will face the current and future risk of decreased water quality and quantity, as for example the interconnections between systems or improvement of Water Treatment Plants (WTP).</li> </ul>	<ul style="list-style-type: none"> <li>- Data and information allowing a joint response;</li> <li>- Knowledge about the right moments to implement the measures.</li> <li>- <b>A strategy...!</b></li> </ul>	<ul style="list-style-type: none"> <li>- Set a water use policy, where future threats (risks management) are contemplated;</li> <li>- Consolidate a policy for CC that stakeholders can acknowledge in order to be able to adapt;</li> <li>- Define priorities and rank and allocate resources in function of the risks, phasing and programming interventions along time and by levels of risks;</li> <li>- Re-negotiate affluences from Spain;</li> <li>- Draw up plans on how to act for each type of risk and how it could harm each economic activity.</li> </ul>

### 3.3 Analysis of the results from the questionnaires and interviews

Based on the questionnaires and interviews responses it is possible to identify the main existing issues regarding water resources management in Portugal. Conclusions are presented according to the three layers questionnaire and themes on water governance and its relation to the climate change risk management layer.

#### 3.3.1 Water policy and governance

##### 3.3.1.1 Content layer

###### 3.3.1.1.1 Content of policy framework

National water policy is based in Water Framework Directive (WFD) in terms of objectives and principles. WFD aims to establish a framework for the protection of all categories of waters, by:

1. protecting against pollution, through control of discharges and emission of pollutants;
2. by promoting sustainable water use based on a long-term protection of available water resources,

and thereby, contributing to assure provision of sufficient supply of good quality surface water and groundwater as needed for sustainable, balanced and equitable water use, and to mitigate the effects of floods and droughts. WFD aims a fair balance between nature and human activities.

The Water Law (Lei da Água - Lei n.º 58/2005, 29 December), and related legislation, is the legal instrument regulating water management in Portugal. It results from the transposition of the Water Framework Directive into the national law.

The Water Law provides the principles of planning and frames a set of planning and control instruments to achieve the goals for improvement of the water body's status. Water resources management in Portugal is performed at public/Administration level, with a regulatory, top-down character. At national level, the National Water Plan (PNA) provides the framing objectives. At regional level, the Tagus River Basin District Management Plan (PGRH) outlines measures to improve the water bodies' status. There are also plans for specific regional units (e.g. reservoirs protection – Land and Water Reservoir Management Plans), or for specific thematic purposes, as for example, the National Plan for Efficient Use of Water (PNUEA).

Being essentially the transposition of Water Framework Directive into the national legal frame, the Water Law provides the framework but lacks the implementation policy, means and mechanisms to achieve the environmental objectives and a sustainable, balanced and equitable water use.

In fact, as neither water uses policy exist nor specific water policy guidelines for strategic options and intervention priorities in the water domain (as examples), it is missing a conducting line guiding on how to jump from the legal framework to the concrete implementation of strategies and policies.

Due to the legal European framework prior to WFD, some mechanisms to prevent pollution are already in place in Portugal, but the lack of water uses policy and adequate implementing mechanisms didn't allow yet Portugal to embrace the WFD challenges and achieve a sustainable, balanced and equitable water use, while achieving environmental objectives.

Mechanisms to deal with extreme events exist, mainly floods but also droughts up to a certain extent. So far, water resources management in Portugal has been essentially oriented to pollution control and emergency management.

The main suggestions on how to improve water resources management include:

- Being considered by some players as complex and abstract, water legislation in Portugal could benefit from simplification and harmonization, for instance the codification of all the legislation into a single Water Code;
- Be less persecutory and more conciliatory;
- Improve the economic analysis of water (recognizing the economic, social and environmental importance of different types of water uses);
- Complement Water Law with the clear regulation of missing specific water implementation policies and strategies, allowing to step forward from the general framework to real water resources planning and management practices, like regulation of: water uses policy (hydropower and others) and accordingly licensing regulated procedures; economic regime in place (polluter-pays principle; water resources taxes and recovery of costs) and rules for exceptions, among others;
- Based on the previously refereed specific policies, make the River District Basin Plans more strategically operational and less prescriptive and evaluative, with measures defined according to objectives. Ultimately, it would allow each water user to better understand how it relatively contributes to the water bodies' environmental objectives. Adopting cost-benefit analysis on measures, envisaging equitable and fair efforts, would contribute to better engage stakeholders;
- Legislation linking the different sectors for a sustainable management of water resources;
- Removal of inter-sectorial legal conflicts (e.g. environmental and economic licensing);
- Improve planning and management with Spain (considered essential to allow a sustainable uses of the Tagus water resources in the long term).

In summary, the definition of the missing implementation polices, as well as a better joint articulation among the various planning instruments, the link between those plans and the program of measures, along with the involvement of the stakeholders in the planning processes, would allow Portugal to fully embrace the WFD paradigm. Or it put in other words, shifting from a governmental water resources management model to a governance model is considered desirable.

#### *3.3.1.1.2 Information and data on impacts of climate change*

In Tagus basin, and in Portugal, water related information is abundant but spread out by several public and private entities (websites, etc.), and considered not enough or not well updated. The lack of in-depth information about the characterization of anthropogenic pressures (quantitative and qualitative)

and of the water bodies status (insufficient monitoring) leads to the lack of knowledge about the impact of pressures on water bodies, resulting in insufficient knowledge about the water systems and the nature of their problems.

Portugal has several state-of-the-art information systems (e.g. Water Resources National Information System - SNIRH) but needing update or to be loaded with additional information. Anyhow, it is considered to be easier to access to water body data than to pressures characterization and impacts, being not possible, at this stage, to relate how each water user contributes to the current water body status. Information on water uses is not publicly available. As a result, the path to achieve environmental objectives cannot be clearly outlined.

Less knowledge exist about the impacts of climate changes in water systems and in dependent economic activities, although several studies concerns climate changes have already been performed. It was developed in Portugal the project "*Climate Change in Portugal. Scenarios, Impacts and Adaptation Measures (SIAM)*", that performed an integrated assessment of impacts and adaptation measures to climate changes. The first phase of the study (started in 2000) was based on future climate scenarios derived from models of general circulation of the atmosphere and focused on a set of socio-economic sectors and biophysical systems including: water resources, coastal zones, agriculture, human health, energy, forests and biodiversity and fisheries. It was also carried out a sociological analysis on the issue of climate change in Portugal. The second phase of the project SIAM (SIAM II) began in January 2002. It was focused on the case study of the Sado estuary, having been extended studies to the autonomous regions of Madeira and the Azores. The SIAM II also included the dissemination of the results obtained at SIAM I to various stakeholders, obtaining inputs still to SIAM II, through the organisation of meetings in which it participated teams in the sectors considered relevant for the chosen region and its stakeholders.

At sectoral level, part of water supply sector of the research site region (EPAL, a BINGO partner) has already been involved in research process related to climate changes. An example is the ClimAdaPT.Local project, with the goal of developing in Portugal a continuous process leading to the elaboration of Municipal Strategies for Adaptation to Climate Change (EMAAC) and its integration in municipal planning tools. Another example is the PREPARED project, a predecessor of BINGO project.

Information about climatic variables evolution in the country is available at the website of the Portuguese Institute for Sea and Atmosphere (IPMA): "Portal clima -<http://portaldoclima.pt/pt/>.

Besides, professional associations and scientific community have promoted numerous events regarding water management and climate change potential impacts, but they are considered general and difficult to "translate" into concrete situations.

The better information is obtained by real observed impacts, as salt water migration to upstream in Tagus River. However, it is difficult to know if it is due to Spanish discharge regime, to damming and national hydropower generation discharge regime or to climate changes.

It was referred that an easy, transparent and fast access to relevant updated data and information to all parties interested should be provided, allowing decisions and performance to be questioned and governance models to get more legitimacy. Access to information is recognised to play a key role.

Definition of the responsibilities of each intervenient in the characterization process must be fully clarified and adequate resources allocated (financial, etc.). Inter-sectorial platforms should gather disseminated existing information, and made available to all relevant organisms and agencies contributing to water body's status and management.

#### *3.3.1.1.3 Skills*

National and regional administration entities of water resources are becoming older, having difficulties in recruiting and renovating human resources. There is need to outsource activities in a routine basis, as monitoring, among others. This type of routine procedure develops a high degree of dependence of the Administration to academic entities. At the same time, these experts dependence limits the Administration analysis skills, often leading to the use of simplified approaches. Besides, the Administration lacks the knowledge and time for using integrated simulation models that are developed within the framework of studies promoted by the Administration itself. Integrated models are acknowledged as being the right type of tool to support water resources management and conflicts solving.

Part of water supply sector of the research site region (EPAL, a BINGO partner) is involved in research process. In agriculture sector there have been significant improvements in the products, techniques and technologies available to water use efficiency and fertilization and plagues control ("precision farming").

There is a gap between the knowledge at academic level and the Administration current practice. Moreover, in the Tagus region some water users from agriculture and public water supply sectors are well informed, being also often verified a gap between them and the Administration. Being water management centred at governmental basis, with a top-down approach, these gaps do not contribute to smooth governance.

The decision making process should be probably improved and redesigned to match the proper knowledge level to each kind of decision-making.

It should be enhanced an institutional promotion of knowledge transfer from academic to the public agencies. Conditions should be created in order to guarantee that other stakeholders from the water supply sector, besides EPAL, internalize the knowledge produced in water management and of associated risks (e.g. climate changes).

### *3.3.1.2 Institutional layer*

#### *3.3.1.2.1 Institutional Organization*

Water resources planning and management are centred at governmental level (chapter 2.2), with responsibilities framed by the legislation.

Respondents refer the large instability of the institutional framework, weakening agencies and their performance. Also refer the existence of overlapping responsibilities and conflicting rules. Despite the formal division of roles, the interinstitutional cooperation is insufficient.

It was suggested to:

- Provide an efficient and stable institutional framework. Some suggested reconfiguring the water management agencies and reconstituting an independent national water authority and autonomous Administrations of River Basin Districts, as well as by eliminating overlapping competences among entities and by improving an interinstitutional cooperative attitude, and
- Evolve to a governance management model, in a clear and workable cooperation, defining the roles and responsibilities of the administration and of the water user's entities concurring to a sustainable, balanced and equitable water use and to the achievement of environmental objectives.

#### *3.3.1.2.2 Administration tools and resources*

An institutional framework exists, although needing improvement. Decentralized services at regional level facilitate the articulation, harmonization and integration of interventions. They face a lack of human resources. Portuguese law provides a set of planning and control instruments to achieve the goals for improvement of the water body's status. It also sets the priorities for water use in case of a crisis.

There are very advanced information systems (e.g. Water Resources National Information System - SNIRH), although not always loaded with updated data. A monitoring network exists with data being publically available. There are difficulties in the practical application of the monitoring instruments due to lack of human and financial resources. Updated data in order to assess the state of the water bodies and the effectiveness of the measures would be an improvement.

Institutions should be provided with the tools and means to interact with stakeholders.

Integration of existing information's systems/platforms from the Administration providing free and universal geographic information concerning water abstractions, water bodies' status, pressures, and meteorological information, etc. would constitute a great benefit.

Administration misses an important tool, a water simulation models allowing for integrated Tagus water resources and uses management.

#### *3.3.1.2.3 Financing structure*

The financing structure is assured through the Governmental financing of the public institutes, through the national Water Resources Protection Fund (FPRH), resulting from the Water Resources Taxes (TRH) revenues and permits, and through the European Union funding programmes that differ according to sectors of activity.

Governmental administration organisms financing is insufficient, since administration do not dispose of the necessary resources to fulfil its monitoring, control, inspection and other obligations.

The Water Resources Protection Fund (FPRH) mission is to contribute to the rational use and protection of water resources, through the allocation of resources to projects and investments necessary for their best use.

It is consensual among the interviewed the lack of public knowledge about the FPRH revenues and what is their application or destination or even if there is a real affectation to the water resources protection. It also exist limitations and lack of transparency in the access to the FPRH.

In what concerns national funds management (Governmental financing and FPRH), it is also consensual that it raises a certain sense of discrimination. In fact, it is referred, that the deficient knowledge about the water bodies' status and the lack of orientation of the FPRH to protection measures, as foreseen by law, tends to be compensated by Administration through demanding the water users to implement measures, whose effectiveness is unknown.

The administrative organization of the water services has direct impact in governmental investment and access to funds. The Sector Delimitation Law (Law 88-A/97 of 25 July) introduced multi-municipal water systems and defined them as systems that serve at least two municipalities and require a predominant investment from the State for reasons of national interest (considering all others to be municipal systems).

Important suggestions regarding national funding are:

- Affect the Water Resources Protection Fund (FPRH) to the management and protection of water resources, in a clear and transparent way, as preconized in the legislation in force;
- Establish a better criteria to access to the FPRH as, in practice, funding is decided on the basis of mitigation responses and unworked conflicts rather than on strategic objectives;
- Apply water services recovery costs preconized in Water Law and consider adjustment of rates (TURH /tariffs/ permit fees).

In what concerns European Union funds suggestions are the following:

*Agriculture sector:*

- RDP2020 (EAFRD) finances investments in irrigation, water use efficiency and farming counselling are in place.
- Enhance the allocation of RDP2020 funds, if possible and necessary using alternative sources of funding (e.g. Juncker Plan);

*Public water supply sector:*

- Structural funding programmes of the European Union, as well as the European Investment Bank programmes, do ensure an important role in the financing of the sector;
- Cohesion Fund, in the PO SEUR, funds climate change adaptation and prevention and risk management;
- It is necessary to remove exiting uncertainty in what concerns access to EU funds, defining clearly who can apply to these funds (in the current programme funding allocation appears to be too based on legitimacy of the applicants).

The existing financing structure is adequate but poorly implemented. Suggestions provided in the questionnaires, if implemented, would result in more stable, transparent and fair access to funding.

### *3.3.1.3 Relational layer*

#### *3.3.1.3.1 Links to other policy sectors*

The success of the WFD depends strongly on the good articulation between water resources policies and sectorial policies such as energy, transport, agriculture, fisheries, regional development and tourism, land planning, etc., as well as the cooperation among the administration organisms and public and private sectors entities.

Water policy is connected with other sectorial policies at top level. Example is the Rural Development Plan - RDP2020 giving priority to investments located in areas susceptible to desertification.

At bottom level some legal instruments of interface between the policies of water and sectors exist (mainly related with water taxes and regime of water uses of permits), but are far from being sufficient.

A good example of insufficient coordination is the difficulty of articulating the River District Basin Plans with the planning instruments, by the focus, methods and sectoral formulation.

Adequate articulation fails at different levels: society, in general, as deficit of cross liability with regard to water issues; deficient tradition of communication and articulation among different sectors; ambiguities due to the excess of instruments and regulations with sectoral character and the proliferation of plans related with territory and water management; insufficient technical grounds to justify why water policy imposing constraints, among others. Main suggestions are:

- Improve inter-agency cooperation and planning between water resources, land uses and sectorial activities;
- Reduce inter institutional bureaucracy;
- Manage interests and inter sectorial conflicts (e.g. electricity production versus agricultural seasonality or other sectors uses), manage different spatial planning perspectives, establish priorities, harmonize policies;
- Exploit the potential of compatibility between the conservation of natural resources and economic activities' practices;
- Regulate and implement the User Associations foreseen in the legislation,
- Elaborate the Irrigation Plan;
- Make efficient the already existing Councils and Commissions;
- Improve the governance model and cross licensing procedures.

#### *3.3.1.3.2 Participation*

Consultation and participation is foreseen by law. Participation is formally supported through several Commissions and Councils (CNA - National Water Council; CRH - River Basin District Council; CGA - Commission of Reservoirs Management)



In practice, the participation of stakeholders takes place during the process of public consultation of the River Basin District Management Plans (PGRH) and Flood Risk Management Plans (PGRI).

Participatory decision/planning processes goes beyond presentations and platforms to submit proposals. Its goal is to enhance engagement and scrutiny. Therefore it should grow from an equally informed basis, that doesn't happen yet.

The weight of public institutions is considered too heavy and marked by the decision-making power or by the application of funding to allow for a real collaborative participation. Suggestions are:

- Provide the institutions with tools and means to establish channels of communication between the public administration and the water users;
- Engage in a targeted way the different stakeholders, enhancing their participation in the planning processes and measures delineation prior to decisions. Attend to their concerns, manage interests and inter sectorial conflicts, establish priorities, harmonize policies and consider and prioritize the different interest (e.g. electricity production vs agricultural seasonality).
- Empower the River Basin District Council (CRH) with influence over the management decisions and make effective other councils as the National Council of Irrigation;
- Implement mechanisms of control and supervision of cross measures implementation accessible to all intervenient.

#### *3.3.1.3.3 Transparency and confidence to work together*

Transparency exists even if we can find very good examples to less good ones.

A good example is the management of hydro agricultural infrastructures established through the application of the legal regime being an example of transparency in the management of water resources.

The lack of easy access to available information, especially the one related with the private use of water uses and the clear application of the Water Resources Protection Fund (FPRH) are common referred examples of deficient transparency.

To increase access to easily available information, the disclosure of reports (application of the FPRH and others) and the need for refocusing governance not on regulatory instruments of access and use of water but on communication tools for different users are some of the examples to improve participation with stakeholders.

There is a top down view of the administration that does not promote enough confidence in working together. Improvement suggestions are similar to those related to transparency and public participation. The governance model should enhance strategic communication, involving all parties at a regular basis and submitting to the scrutiny of water users the important planning issues. In summary, adopt a multilevel approach, with formal power of political decision, after valuing the academic, technical and legal competences.

### 3.3.1.4 Summary

Water Law provides a good framework, based on Water Framework Directive, and planning principles, but lacks the strategies and mechanisms to implement it. Having a top-down regulatory approach, governmentally centred, the lack of these important components causes a scission between top planning policies and the bottom implementation measures.

General practice is to focus on immediate management priorities and not in long-term planning. Thus the climate change adaptation is not an issue among the priorities. Emergency management is the most developed water resources management issue in place.

As a conclusion, it is desirable to progress from a governmental management model to a water resources governance model, effectively engaging the society in the decision making process, as foreseen by WFD. Water governance focuses most explicitly on the institutional and relational layer, without neglecting the importance of and relations with the content layer. Several suggestions were provided to improve these layers.

### 3.3.2 Climate change risk management

Stakeholders involved in BINGO project are well informed and aware of climate change concerns. In fact, they already deal with the climate variability typical of southern European countries. They see climate changes as an increase of existing climate variability either in frequency as intensity. The major concerns rely in the uncertainty about the extent of the impacts on the water resources, and therefore in their sectorial activities, and how fast the process will evolve. Water availability is the major concern of agriculture sector as well as salt water intrusion in the lower Tagus. Water quality degradation and impairment of water sources is the main concern of public water supply entities.

The same level of awareness does not exist in all stakeholders of the BINGO region or in the country. The same happens with governmental entities, where an absence of climate change risk culture exists.

A document with a National Strategy for Climate Change Adaptation (ENAAC) was produced by the national administration. The sectors of activity do not acknowledge this top-down strategy, considering it detached from practical reality.

On the other hand, a set of adaptation measures is already being implemented by main sectors of activity in lower Tagus region, but solely at individual entity level (bottom-up). In fact, they consider these measures as an adaptation to climate variability that always existed in southern Europe countries. In the agriculture sector significant improvements in the products, techniques and technologies available, as well as practices implemented ("precision farming") have already been achieved. In the public water supply sector, EPAL has already internalized knowledge about the climate change risks, has adopted a risk management approach in company management and implemented a set of measures to face the current and future risk of decreased water quality and quantity.

Solely at individual entity level adaptation can only be accomplished up to a certain extent. The degree of rationalization of the use of water resources by each entity affects the other entities using the same water resources. Therefore, the next step towards a climate change adaptation requires linking of efforts in an integrated strategy and an optimization of water resources management among all parties interested in the same resources.

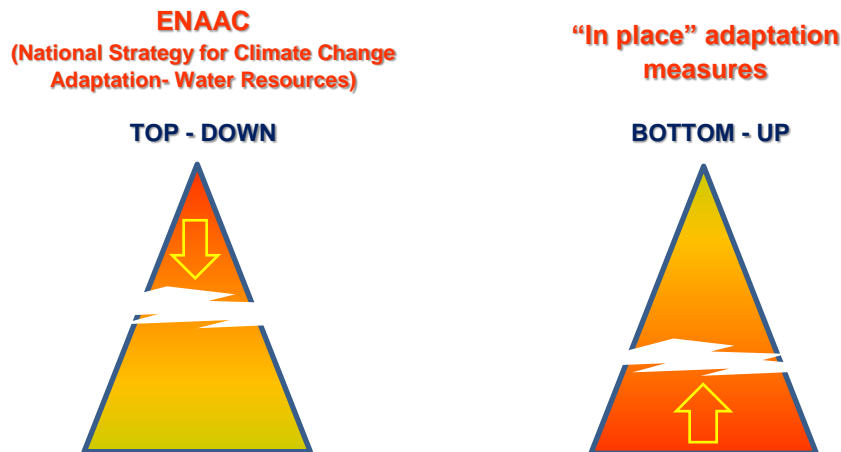


Figure 3.1 – Cleavage between top-down climate change administration approach and bottom-up sectorial adaptation

In order to accomplish this, a way to overcome the disruption between top and bottom (administration and sectors of activity) needs to be found (Figure 3.1). As sectorial entities are already finding their paths, as far as possible within their own fields of activities, it misses a governmental ability to overcome the gap between the top and bottom, starting by setting a real water management policy, including a water use policy, by establishing water resources allocation priorities according to the different types of uses.

Then, it is necessary to consolidate an effective, clear and pragmatic trans-sectorial climate change adaptation policy acknowledged by all sectors of activity (public, economic or others). It requires definition of clear objectives, goals, accountabilities, roles, and plans of action on how to achieve those objectives, specifying concrete ranked measures, allocating and prioritizing investments, implemented according to realistic trigger indicators. Implement facilitating and supporting mechanisms (legal, financial, etc.). This policy should have a strategic vision of mitigation, based on local scale and vulnerabilities, and be based on a Multilevel Risk Management Model.

The strategy to be defined needs to be based on updated, credible and continuous information in time on climate changes evolution and forecast as well as on its impacts, and be based in a risk assessment approach to allow ranking and prioritization. Inter-sectorial articulation is crucial.

ENAAC is being reviewed since 2015 in order to promote and assist the various sectors, the central, regional and local administration and policymakers find the means and the tools for the

implementation of the theoretical plan for the action plan through a greater focus on efficient implementation of adaptation measures and promoting their integration in the various sectoral policies and territorial planning instruments. Only the effective engagement of stakeholders in this process can assure its success.

In short, climate change adaptation would benefit from shifting from a governmental water resources management regulatory model to an effective governance model, with all levels of society participation.

## 4 | Conclusions

The present water resources governance analysis concerning the Portuguese case study is done from the perspective of the the adaptation of the public water supply (water service) and agriculture sectors to climate changes.

The water resources policy and governance was analysed ultimately aiming at understanding how it can affect climate change adaptation strategies.

Based on the questionnaires and interviews responses obtained, it was possible to identify the main existing issues regarding water resources management in Portugal. Chapter 3.3 presented the main conclusions according to the three-layer questionnaire and themes on water governance and to the risk management layer. This chapter summarizes the main conclusions according to the strengths and weaknesses identified by questionnaires and interviews.

### 4.1 Governance strengths

The main strengths of the Portuguese governance structure lie on a good basis.

The water resources policy in Portugal has a broad and sound national legal framework (Water Law) with several planning instruments at different geographical levels and at thematic oriented level.

There are mechanisms to deal with extreme events, mainly floods, but also droughts up to a certain extent.

Links between water policy and other policies exist already in the current legislation. At top level, the water policy is connected with agricultural policies, energy, sea, territorial planning, etc..

At sectoral level, there are differences between the water services and the agriculture sectors. Due to the existence of a Regulatory Authority on Water and Waste Services (ERSAR), the Portuguese policy on water services has a global and integrated approach and includes several instruments: adoption of strategic plans for the sectors (e.g. PENSAAR 2020 “A new strategy for water supply and wastewater services”); definition of the legislative framework; definition of the institutional framework; definition of the governance of the services; definition of the access targets and the quality of service goals; definition of the tariff policy; provision and management of the financial resources; construction of the infrastructure; improving the structural and operational efficiency; human resources capacity building; promotion of research and development; development of the economic activity; introduction of competition; protection, awareness and involvement of users; and provision of information.

The Portuguese agricultural policy has a strong link to the European Common Agricultural Policy. Relevant differences exist between the agriculture sector benefiting from public irrigation schemes and private irrigation and rain dependent agriculture.

The water resources planning and management responsibilities are essentially public/governmental. Portugal has institutional organizations that are water resources oriented, structured at national level (national water authority - APA) and at basin district level (through the River Basin District Administrations). The division of roles and responsibilities is defined by law and reflected in the different organizations that are active in water policy/management. These organizations have staff with the required technical skills. Additionally, agencies with a competence in water management also play a role in the different stages of land use policy (Commission for Coordination and Regional Development - CCDR). The Directorate General for Agriculture and Rural Development (DGADR), a partner in BINGO, is the National Public Irrigation Authority. DRAP(s) (Regional Directorate for Agriculture and Fishery of Lisbon and Tagus River Valley or other regions) are the regional entities supervising private irrigation.

In Portugal, the ownership of water services is always public (from Municipalities or Central State) and the management can be done directly by the owner, by delegation or by concession.

National efforts towards the engagement of water resources users in the planning process have already started. Stakeholder's involvement is preconized in law. Stakeholder's participation is formally foreseen through several councils and commissions (National Water Council-CNA; River Basin District Council or Hydrographic Region Council - CRH, and exist a platform for stakeholder discussion and cooperation.

The Portuguese national water authority has always made publicly available online data on water quality monitoring as well as river flows and reservoir storage volumes. Portugal also has several excellent information systems allowing consultation of different types of information (e.g. Water Resources National Information System – SNIRH; Siliamb). A lot of basic water related information exist and are made available by several public and private entities (websites, etc.) such as ERSAR (Regulatory Authority on Water and Waste Services - [http://www.ersar.pt/website\\_en/Home.aspx](http://www.ersar.pt/website_en/Home.aspx)) and APA (Portuguese Environment Agency, <https://www.apambiente.pt/index.php?ref=x178>).

With regard to climate changes, information on climatic variables evolution in the country is available at the website of the IPMA (Portuguese Institute for Sea and Atmosphere (<http://portaldoclima.pt/pt/>)).

Concerning climate changes impacts, it was developed an important study, the SIAM project (Climate Change in Portugal. Scenarios, Impacts and Adaptation Measures, dated from 2006) addressing a set of socio-economic sectors and biophysical systems including. The dissemination of the results was performed to groups of relevant stakeholders. The water supply sector has already been involved in European research projects related to climate changes as (ClimAdaPT.Local and PREPARED), and now in Bingo.

The Portuguese stakeholders involved in Bingo project are well informed and aware of climate change concerns. They already deal with the climate variability typical of southern European countries. They see climate changes as an increase of existing climate variability either in frequency or in intensity.

Regarding climate changes adaptation, Portugal approved in 2010 the National Strategy for Climate Changes Adaptation (ENAAAC).

A set of adaptation measures is already being implemented by main sectors of activity in the lower Tagus region. In fact, stakeholders consider these measures as an adaptation to climate variability that always existed in southern Europe countries.

In the agriculture sector significant improvements in the products, techniques and technologies available to water use efficiency, fertilization and plagues control, as well as practices implemented ("precision farming") have already been achieved.

In the public water supply sector, EPAL (a partner in BINGO) has already internalized knowledge about the climate change risks, has adopted a risk management approach in company management and implemented a set of measures to face the current and future risk of decreased water quality and quantity.

Portugal has an active scientific community as well as several active professional organizations with critical sense and advanced ideas concerning the best approach to water management. They have promoted numerous events regarding water management and climate change potential impacts.

Portugal has a financing structure based on European funding programmes and a national budget coming from the national Water Resources Protection Fund (FPRH), resulting from collection of Water Resources Taxes (TRH) revenues and permits, specifically targeting the use of water.

RDP2020 (EAFRD) finances investments in irrigation, water use efficiency and farming counselling are in place.

Structural funding programmes of the European Union, as well as the European Investment Bank programmes, have an important role in supporting the water services sector; Cohesion Fund, in the POSEUR, funds climate change adaptation and prevention and risk management.

## **4.2 Governance weaknesses**

The main weaknesses observed by the interviewed regarding water planning and management in Portugal rely in the difficulty to fill the gap between the top planning and objectives setting and the bottom implementation.

Water resources policy has a top-down character. According to some comments from the questionnaires, the legal national framework is complex and abstract, being consensual that it lacks some concrete and operational implementation policies, strategies and mechanisms, mainly those concerning a sustainable, balanced and equitable water use. Sectors of activity refer in particular the absence of a comprehensive water uses policy and insufficient policy coordination to achieve the WFD goals.

The existing water management plans are not very well linked. Their articulation with sectorial plans exists at top level but is not well taken to the implementation level. This insufficient articulation, along with the lack of some implementation polices, results in river basin plans proposing generic measures, and not pragmatically oriented to specific objectives.

It was also referred in the inquiries that different policy areas provide constraints for other policy areas. For instance, development of irrigation is constrained by nature policy, without technical or scientific backup. Environmental and economic licensing procedures are sometimes conflicting and not well articulated.

Water resources management in Portugal is essentially oriented to pollution control and to responses to emergency/critical occurrences such as floods. General practice is focused on the immediate management priorities and not to long-term planning.

Although existing institutional organization water resources oriented, respondents refer the large instability of the institutional framework along time, weakening the agencies and their performance. Administration entities are short in human resources, having difficulties in recruiting and renovating human resources. Due to the lack of human and material resources, there is a need to outsource routine activities, developing a high degree of dependence of the Administration from other entities (mainly academic) what weakens the Administration analysis skills.

The top-down approach does not promote enough and effective engagement of water users in the planning process, prior to decisions. Stakeholders are not really engaged in the planning process or measures outlined. They are rather called to present comments at a later stage of the decision process, with short time for it. Some respondents also referred that their proposals and comments are often devaluated by the Administration. Interests of different sectors are divergent and sometimes conflicting (for instance between agriculture and hydropower), mainly when resource are scarce, during droughts.

Public consultation is generally directed to civil society and not targeting sectors or stakeholders. Also, information is not sufficiently shared with stakeholders.

Although using very good technological information systems (e.g. Water Resources National Information System - SNIRH) the existing basic data is considered to be insufficient or not well updated. It misses in-depth characterization of anthropogenic pressures (quantitative and qualitative), of the water bodies status (insufficient monitoring), and therefore deficient understanding about the impact of pressures over water bodies. Public available information on water uses is inexistent. As a result, the path to achieve environmental objectives cannot be clearly outlined.

Administration misses an important tool, an integrated water simulation model, allowing for integrated water resources and uses management.

Regarding climate change, the major concerns rely in the uncertainty about the extent of the impacts on the water resources, and therefore in the sectorial activities, and how fast the process will evolve.

Bingo stakeholders are quite aware of climate changes but the same level of awareness does not exist in all stakeholders at the lower Tagus or in the country. The same happens with administration services that have not yet integrated a climate change risk culture in their activities.

Information about climate change impacts is frequently considered too general and difficult to "translate" into concrete local impacts.



The sectors of activity do not acknowledge the top-down approach of National Strategy for Climate Change Adaptation (ENAAAC), considering it detached from practical reality.

Governmental organisms financing is insufficient, since the Administration has not the necessary resources to fulfil all monitoring, control, inspection and other related obligations.

At sectoral level it is referred that effort demanded to water users self-control monitoring is too high and disconnected to the reality.

Financing is also not always easily accessible at sectoral level, neither from the Water Resources Protection Fund nor from European funds. It is unclear how the Water Resources Protection Fund - FPRH (resulting from the revenues of the Water Resource Tax) is allocated, and not all stakeholders can find the way to propose themselves to European funding. Since most funding is not part of structural government budgets, it is not guaranteed for the future.

Also, the administrative organization of the water services has direct impact in governmental investment and access to funds. Multi-municipal water systems (with at least two municipalities) require a predominant investment from the State for reasons of national interest. Single municipal systems are not covered.

### **4.3 Governance needs of improvement**

Being considered by some players as complex and abstract, the water legislation in Portugal could benefit from simplification and harmonization. For instance the codification of all the legislation into a single Water code that could be less persecutory and more conciliatory would be welcome.

It should also be complemented with the establishment of specific and clear water management implementation policies and strategies, allowing stepping forward from the general framework to real water resources planning and management practices, in order to achieve the environmental objectives and a sustainable, balanced and equitable water use.

Water uses policy (for hydropower, agriculture and others) is considered to be a very relevant missing component of the management process. It should be established based on an improved economic analysis of water uses (recognizing the economic, social and environmental importance of different types of uses). Once set, it would provide the basis for a revision of licensing procedures and for the improvement of the water economic regime in place (polluter-pays principle; water resources taxes and recovery of costs) and definition of rules for exceptions, among others.

It was also referred the need for legislation linking the different sectors, at bottom implementation level, for a sustainable management of water resources, as well as removal of inter-sectorial legal conflicts (e.g. environmental and economic licensing).

The involvement of stakeholders in the planning process, prior to decision, would very effectively improve water resources governance. Inter-agency cooperation would benefit adaptation efforts.

Improved articulated planning and management with Spain is also considered essential.

These improvements would allow making the River District Basin Plans less evaluative and more strategically operational, and with measures defined according to objectives.

In summary, shifting from a governmental water resources management model to a governance model is considered desirable.

Greater stability of the institutional framework should exist with an improved efficient model, eliminating overlapping competences among entities, and improving an interinstitutional cooperative attitude among Administration agencies.

There should be an increase in training of administration staff and strengthening of the administration resources at human, technical and logistics levels as for example integrated simulation models tools to support decision-making and conflicts management. More supervision, control and inspection and follow-up of programs of measures are also necessary.

Resources to improve knowledge of basic data (monitoring, pressures, and their impacts over the water bodies) need to be allocated, filling the existing gaps. Sharing of monitoring responsibilities between administration and water users needs to be improved in a fair and realistic way. Also, it was referred that an easy, transparent and fast access to relevant updated data and information to all parties interested should be provided, allowing decisions and performance to be questioned and governance models to get more legitimacy. Existing water uses is usually the missing relevant information referred, as well as other information allowing understanding the relative contribution of each water user to the water bodies' status. Access to information is recognised to play a key role. In this line, integration of existing platforms and information systems was also suggested, providing geographic information accessible to the public and stakeholders along with relevant information of licensed titles (water uses), existing constraints, etc.

Also, channels of communication between the public administration and users should be improved. Effective engagement of stakeholders in the planning processes, prior to decisions, needs to be worked out, evolving from a governmental regulatory model to a water resources governance model. The work/intervention of the Hydrographic Region Council (CRH) should be enforced and published. It would allow a clear and workable definition of the roles and responsibilities as well as of the administration as of the water users, in particular in the design and implementation of measures for water body's protection and sustainable, balanced and equitable use.

Provide a more stable, transparent and fair access to funding. The application of the national Water Resources Protection Fund (FPRH ) should be oriented to finance necessary and useful measures to a good water resources management and their destiny and access from stakeholders needs to be transparent and equally/ fairly accessible. If a fairer framework is provided, some respondents referred that it could be considered the implementation of water services recovery costs preconized in Water Law and the adjustment of rates (TURH /tariffs/ permit fees).

The applications and procedures provided in European funds can be improved. For, example, by enhancing the allocation of RDP2020 funds, if possible and necessary using alternative sources of funding (e.g. Juncker Plan). In what concerns access to structural, cohesion EU funds remove exiting

uncertainty, defining clearly who can apply to these funds (in the current programme funding allocation appears to be too based on legitimacy of the applicants).

In summary, the definition of the missing implementation policies, a better joint articulation among the various planning instruments, along with the involvement of the stakeholders in the planning processes and the allocation of more resources, allowing for better monitoring and control and measures implementation, would allow Portugal to embrace the WFD challenges for an sustainable, balanced and equitable water use, while achieving the environmental objectives.

Solving the water resources management basic issues contributes for the improvement of climate change adaptation.

Solely at individual entity level adaptation can only be accomplished up to a certain extent. The degree of rationalization of the use of water resources by each entity affects the other entities using the same water resources. Therefore, the next step towards a climate change adaptation requires linking of efforts in an integrated strategy and an optimization of water resources management among all parties interested in the same resources. In order to accomplish this, a way to overcome the disruption between top and bottom (administration and sectors of activity) needs to be found. As sectorial entities are already finding their paths, within their own fields of activities, it misses a governmental ability to overcome the gap between the top and bottom, starting by setting a real water management policy, including a water use policy, by establishing water resources allocation priorities according to the different types of uses.

ENAAAC is being reviewed since 2015 in order to promote and assist the various sectors, the central, regional and local administration and policymakers find the means and the tools for the implementation of the theoretical plan for the action plan through a greater focus on efficient implementation of adaptation measures and promoting their integration in the various sectoral policies and territorial planning instruments. Only the effective engagement of stakeholders in this process can assure its success.

Regarding mitigation, Portugal approved the National Program for Climate Change 2020/2030 (PNAC). A new Environmental Fund was recently created and will start being operated on January 2017.

In short, climate change adaptation would benefit of shifting from a governmental regulatory model to an effective governance model, with all levels of society participation.

### **Summary**

In summary, Water Law provides a good framework, based on Water Framework Directive, and planning principles, but lacks the necessary strategies and mechanisms to implement it. Adequate Water Law implementation fails due to several other reasons related to the lack of necessary relevant information and skills, specific tools, financial resources, coordination at several levels (between

different plans and those and the programme of measures; geographic levels; sectoral policies; between Portugal-Spain) and proper articulation with water users.

Having a top-down regulatory approach, governmentally centred, the lack of these utmost important components causes a scission between top planning policies and the bottom implementation measures.

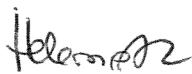
General practice is to focus on immediate management priorities and not in long-term planning. Thus the climate change adaptation is not an issue among the priorities. Emergency management is the most developed water resources management in place.

As a conclusion, it is desirable to evolve from a governmental management model to a water resources governance model, as foreseen by WFD, effectively engaging the society in the decision making process.

Lisbon, LNEC, December of 2016

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## Annexes

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## ANNEX I

### Questionnaire form and filling guidelines on Policy and Governance

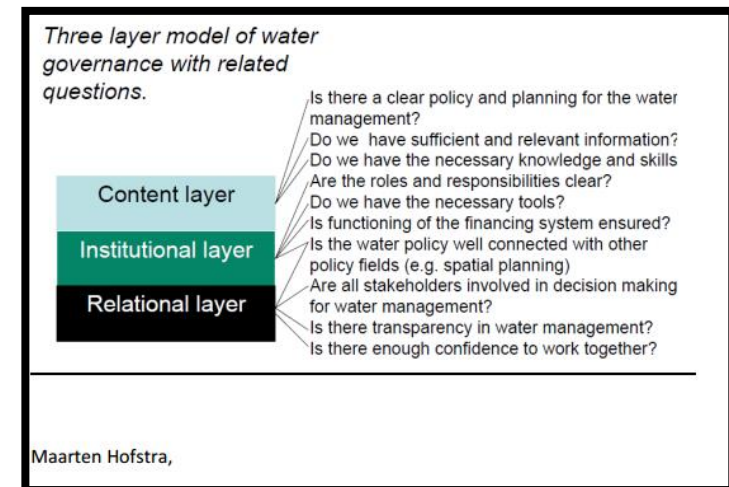
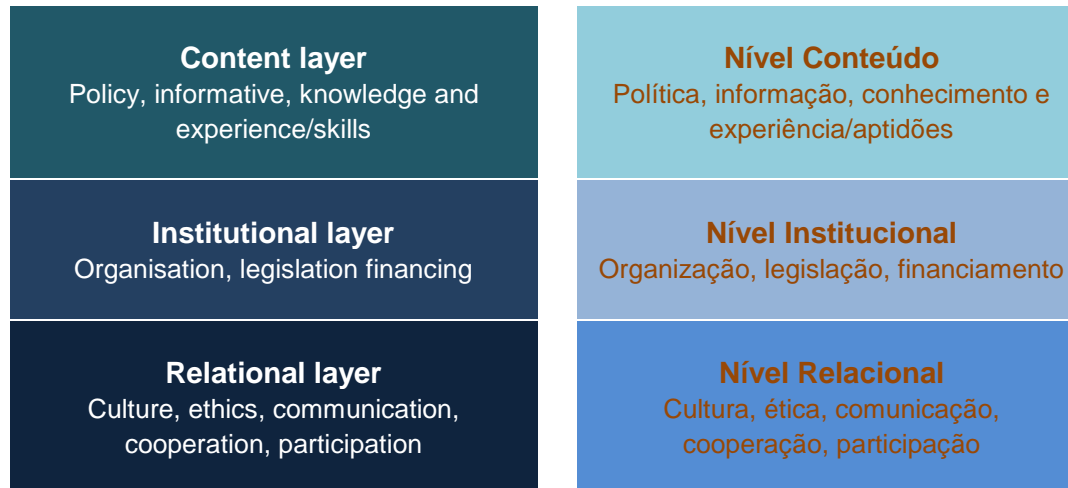


## Questionnaire form and filling guidelines on Policy and Governance

### The three layer framework / Estrutura em três níveis

To be able to make a good assessment of the important aspects of water governance it is useful to look more closely at the basic elements. For this the “Three layer model of water governance” can be used. Core element of this approach is that good water management comprises three layers, a **content layer**, an **institutional layer** and a **relational layer**, based on the standard questionnaire from the WGC (*Water Governance Centre*).

Para ser capaz de fazer uma boa avaliação dos aspetos importantes da gestão dos recursos hídricos é útil olhar mais de perto para os elementos básicos. Para tal, o "Modelo de três níveis de gestão da água" pode ser usado. O elemento central desta abordagem é que a boa gestão da água é composta por três níveis, um nível de conteúdo, um nível de institucional e um nível de relacional, baseado no questionário padrão do WGC (*Water Governance Centre*).



A **content layer**, while knowledge of the water systems and of the nature of the problems is essential as well as experience and skills to be able to solve the problems. Also it is important to dispose of the necessary basic data and information.

Um **nível de conteúdo**, enquanto o conhecimento dos sistemas hídricos e da natureza dos problemas é essencial, bem como a experiência e habilidade para ser capaz de resolver os problemas. Também é importante dispor de dados básicos e da informação necessária.

An **institutional layer**, because in most cases content is not enough to reach a good water status. An adequate organizational framework together with the necessary (legal) instruments and a good financing structure are fundamental requirements for successful integrated water resources management.

Um **nível de institucional**, porque na maior parte dos casos o conteúdo não é suficiente para alcançar um bom estado das águas. Um quadro organizacional adequado, juntamente com os instrumentos necessários (legais) e uma estrutura de financiamento são requisitos fundamentais para uma gestão integrada dos recursos hídricos bem-sucedida.

Besides that, a **relational layer** for successfully solving persistent water problems is required. Important elements of this layer are communication and cooperation between different actors and with the public, stakeholder participation, transparency and trust. Water governance focuses most explicitly on the institutional and relational layer, without overlooking the importance of and relations with the content layer.

Além disso, é necessário um **nível relacional** para resolver com sucesso os problemas de água persistentes. Aspectos importantes deste nível são a comunicação e a cooperação entre os diferentes intervenientes e com o público, a participação dos interessados, a transparência e confiança. A governança da água foca-se mais explicitamente nos níveis institucional e relacional, sem perder de vista a importância do nível de conteúdo.

Based on the three layers relevant questions can be formulated like shown here. A clear answer to these questions is essential to be successful in the execution of integrated water resources management.

Com base na estrutura de três níveis, questões relevantes podem ser formuladas como no questionário junto. Uma resposta clara a essas questões é essencial para ser bem-sucedido na execução da gestão integrada dos recursos hídricos.

Maarten Hofstra, Water Governance Centre (NL) / [www.watgovernancecentre.nl](http://www.watgovernancecentre.nl)

For BINGO, it was added questions on **risk management** as well, to get an assessment on **awareness and preparedness** in the different research sites.

Para o BINGO, foram ainda adicionadas perguntas sobre a **gestão de riscos** associados aos recursos hídricos (cheias, secas, etc.), visando obter uma avaliação sobre a **consciencialização e preparação** das instituições nas diferentes regiões abrangida pelo projeto (em Portugal, o baixo Tejo).

## Guideline to filling in this questionnaire /

### Orientações para o preenchimento deste questionário

This questionnaire is part of Work Package 5 of the BINGO research project. Work Package 5 focuses on *developing risk treatment and adaptation strategies for extreme weather events*.

Este questionário é parte da Atividade 5 do projeto BINGO, que se centra no desenvolvimento de estratégias para o tratamento de risco, mas especificamente, estratégias de adaptação a eventos climáticos extremos.

This questionnaire is designed to assess the overall quality of the water policy and governance situation in dealing with climate risks at the research site. This means the questions should be answered from the perspective of:

- The research site level;
- The water policy and governance, specifically in dealing with climate risks.

Este questionário foi concebido para avaliar a qualidade geral da política e gestão da água e sua capacidade de lidar com os riscos climáticos nas diferentes regiões abrangida pelo projeto (em Portugal, o baixo Tejo). Isso significa que as questões devem ser respondidas a partir da perspetiva:

- Da região abrangida (em Portugal, o baixo Tejo);
- A política e governança da água, especificamente para lidar com os riscos climáticos

Please fill in each of the cells as elaborately as needed, but with a maximum of 50 words. Note that the questions require answering in three different columns:

- Column 1 is about current practices to the extent that they are successful.
- Column 2 is about missing or unsuccessful practices.
- Column 3 is about ideas for improvement of the water governance.

Por favor preencher cada uma das células tão elaborada conforme necessário, mas com um máximo de 50 palavras. Note-se que as perguntas requerem atendimento em três colunas diferentes:

- A coluna 1 é sobre as práticas correntes na medida em que são bem-sucedidas.
- A coluna 2 é sobre as práticas em falta ou mal sucedidas.
- A coluna 3 é sobre ideias para a melhoria da gestão dos recursos hídricos

Answers can be put in the different cells in the table. We ask the CoP members to be complete, but concise. Max 50 words in each cell.

As respostas podem ser preenchidas nas diferentes células na tabela. Solicitamos para que a resposta seja completa, mas concisa. Máximo 50 palavras em cada célula.

**On behalf of the BINGO-team, thank you for your time! / Em nome da equipa do BINGO, obrigado pelo seu tempo!**

# BINGO Questionnaire on policy and governance

Answers can be put in the different cells in the table. We ask the CoP members to be **complete, but concise. Max 50 words in each cell.**

As respostas podem ser preenchidas nas diferentes células na tabela. Solicitamos para que a resposta seja **completa, mas concisa. Máximo 50 palavras em cada célula.**

Name	
Organization	

		<i>English:</i>	<i>Portuguese:</i>	<i>This column is about current practices to the extent that they are successful. Esta coluna é sobre práticas correntes bem-sucedidas.</i>	<i>This column is about missing or unsuccessful practices. Esta coluna é sobre práticas em falta ou mal sucedidas.</i>	<i>This column is about ideas for improvement of the water governance. Esta coluna é relativa a ideias para melhorar a gestão dos recursos hídricos.</i>
Layer/Question	Nível/Questão	What do we have that works O que temos que funciona	What is missing? O que falta?	How can water governance be improved? Como pode ser melhorada a gestão da água?		
<b>Content Layer</b>	<b>Nível Conteúdo</b>					
Is there a clear policy and planning for water management in your region?	Existe uma política e um planeamento de gestão de recursos hídricos claros na sua região?					
Is there sufficient and relevant information available?	Existe disponível a informação suficiente e relevante?					
Are the necessary knowledge and skills available?	Temos os conhecimentos e aptidões/ experiências necessários?					
<b>Institutional layer</b>	<b>Nível Institucional</b>					

Are the roles and responsibilities clear?	São os papéis e responsabilidades claras?			
Are the necessary tools available?	Existem disponíveis as ferramentas necessárias?			
Is functioning of the financing system ensured?	Está assegurado o funcionamento do sistema de financiamento?			
<b>Relational Layer</b>	<b>Nível Relacional</b>			
Is the water policy well connected with other policy fields (e.g. spatial planning)?	A política da água está bem interligada com as políticas de outras áreas (por exemplo de planeamento espacial)?			
Are all stakeholders involved in decision making for water management?	Estão todas as partes interessadas envolvidas na tomada de decisão da gestão dos recursos hídricos?			
Is there transparency in water management?	Existe transparência na gestão dos recursos hídricos?			
Is there enough confidence to work together?	Existe confiança suficiente para trabalhar em conjunto?			
<b>Risk management</b>	<b>Gestão de risco</b>			
What are the current risks your water system is facing?	Quais são os riscos atuais que o sistema hídrico da sua região está a enfrentar?			
Do you feel these are dealt with sufficiently?	Sente que esses riscos estão a ser devidamente tratados?			
Which measures are already in place?	Que medidas estão já em vigor?			
What future risks are you currently aware of?	De que riscos futuro está já ciente?			
Do you feel there is sufficient preparation to deal with these?	Sente que há uma preparação suficiente para lidar com esses riscos?			



## ANNEX II

### Guidance on Expert-interviews on policy and governance



## BINGO - Expert-interviews on policy and governance (WP5.3)

Dear research partners,

Within the BINGO project, WP5.3 analyzes the policy and governance context for adaptation to climate change at the six research sites. The aim of the work package is to assess the existing policy and governance context at the research sites (are climate-related risks sufficiently taken into account?) and, based on the adaptation strategies outlined under WP5.1, to provide recommendations for improvement at the research sites and beyond.

At present, we are working on the assessment of the existing policy and governance context. Data for this analysis is collected in three steps. First, the questionnaires on policy and governance that you already sent out to (CoP) stakeholders provide information on the policy and governance context at the research sites, which allows us to identify site-specific policy and governance needs for adaptation to climate change in the sectors under focus. Second, **we now ask you to conduct two in-depth interviews with national-level policy experts** to generate insight into the national-level policy and governance context that influences adaptation efforts at each research site. Third, information on the EU policy and governance context will be collected at a later stage.

The "expert-interviews" are to be held with **(1) a key policymaker and (2) a key scientist** working on national adaptation policy in your country. As to the policymaker, you could for example think about interviewing someone involved in the production of your country's "National Adaptation Strategy" (see EU website: [http://ec.europa.eu/clima/policies/adaptation/what/promoting/links\\_en.htm](http://ec.europa.eu/clima/policies/adaptation/what/promoting/links_en.htm) and related status report: <http://www.eea.europa.eu/publications/national-adaptation-policy-processes>), or someone working on adaptation within the water/environmental (or any other relevant) department of your government. For a scientist, it could be interesting to speak to a researcher or analyst who has worked on adaptation policy in your country (preferably with a focus on the sectors also being studied at the research sites).

The structure for the expert-interviews is outlined below. Like the questionnaire, the expert-interviews are structured along the "three layer" framework for water governance. The "content" layer deals with the content adaptation policies for water management themselves, the "institutional" layer with the organizational aspects that support the implementation of adaptation policies (in terms of administration, legislation and funding), and the "relational" layer deals with the underlying policy culture (what general values underpin water governance, and what does this mean for communication and participation).

The interviews are planned for M15-M16. This means that **the interviews should be conducted in September 2016, and reported back to us before or on 15 October 2016**. In this report, we would like to ask you to translate the interviewees' answers on each question to English. This does not have to be a literal transcription, but the information should contain all the relevant information offered by the respondent.


We hope this structure provides you with the guidance you need for conducting the interviews. In case there are any questions left, please do not hesitate to contact us at KWR.

We look forward to receiving your reports!

Kind regards,

The KWR-BINGO team

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## Structure for expert-interviews on policy and governance

### A. Introduction

- Introduce yourself: name, organization, function.
- Explain BINGO project: aims, focus (hydrological impacts), expected results.
- Explain WP5.3 and aim of the interview: WP5.3 assesses the existing policy and governance context for adaptation to climate change-related impacts at the research sites and makes recommendations for improvement per site (and beyond). The interview serves to grasp the national-level policy and governance situation and to identify its strengths and weaknesses for adaptation to climate change.
- Explain research site details: which types of risks are central.
- Explain practicalities. Interview will last about 1,5 hours. If needed: Interview will be recorded for personal use.
- Explain structure interview: question address three themes: the content of adaptation policies for water management, its organizational aspects, and the policy culture.

### B. Questions related to the content of adaptation policies for water management

1. What are the **main national policies and laws guiding water management** in your country? What type of policy instruments are used to govern water management (e.g. legal/regulatory, market-based/pricing, information provision)?

2. Is **information** on the **hydrological impacts** of climate change sufficiently available to responsible actors? What impacts are understood, which impacts are still largely unknown?

3. To the extent that these impacts are known, is there sufficient information on how to deal with these impacts in relevant (sub)sectors? For which risks have **adaptation measures** been devised, which risks remain (partly) "untreated"? What type of policy instruments are used for climate change adaptation?

### C. Questions related to the organization of adaptation governance

4a. In **general**, how is water management organized in your country? Are **responsibilities** largely governmental or are private sectors (also) involved? Is water management characterized by a top-down or decentralized responsibility structure? Are the roles and responsibilities of different parties clear?

b. For **adaptation** policies in particular, have responsibilities for implementing adaptation policies been outlined clearly? Which actors seem to carry the bulk of responsibility for climate change adaptation up to now, and which actors could potentially take on more responsibility?

5a. In **general**, is water management in your country backed by sufficient **financial and administrative resources**?

b. For **adaptation** in particular, are policies supported by sufficient financial and administrative resources, and how does this impact on their implementation?

6a. In **general**, is water management in your country **linked to other policy sectors**? In what way - what do these relationships entail?

b. For **adaptation** in particular, do adaptation policies require new or stronger linkages with other policy sectors? To what extent have these linkages been made?

**D. Questions related to the policy culture in adaptation governance**

7. In general, what **norms and values** underpin water management in your country? (E.g. technocratic, bureaucratic, integrative/intersectoral, collaborative, etc.)? Do similar principles underlie adaptation governance?

8. Are **stakeholders** sufficiently involved in adaptation governance? Which stakeholder-groups are involved, and in which phases (e.g. goal-setting, policy development, implementation of policies)? Are there stakeholder-groups that have not been involved sufficiently?

9. Would you describe the adaptation governance in your country as **transparent**? To what extent and in what way can responsible parties be held **accountable** for their adaptation tasks (e.g. are adaptation goals legally anchored, do responsible actors have reporting duties, etc.)?

10. Is adaptation governance your country confronted with **equity** issues (e.g. in relation to land-use entitlements or the allocation of water(-related) resources)? To what extent do you think existing adaptation policies sufficiently recognize and deal with these issues?

**E. Closing remarks**

- Ask if there is anything the respondent would like to add to the interview.
- Thank the respondent for his or her time.
- Explain further steps: interview will be worked out in a report, report will be sent back to the respondent for a final check (please respond before October ...), after which it will be sent to KWR (deadline is October 15, 2016).



**ANNEX III**  
Summary compilation of main answers of Questionnaire on Policy and Governance





## Summary compilation on Questionnaire on policy and governance

	<i>This column is about current practices to the extent that they are successful.</i>	<i>This column is about missing or unsuccessful practices.</i>	<i>This column is about ideas for improvement of the water governance.</i>
Layer/Question	What do we have that works	What is missing?	How can water governance be improved?
<b>Content Layer</b>			
<b>Is there a clear policy and planning for water management in your region?</b>	<ul style="list-style-type: none"> <li>- Water policy I Portugal is regulatory, defined in the Water Law, that transposes the WFD objectives and framework into national law;</li> <li>- The Water Law establishes the objectives and principles of planning to achieve the goals for improvement of the water body's status.</li> <li>- The planning instruments cover:                             <ul style="list-style-type: none"> <li>o Different geographic levels; national (National Water Plan - PNA); river basin (River Basin District Management Plan - PGRH) or specific regional units (e.g. reservoir land and water management; vulnerable zones);</li> <li>o Specific purposes: e.g. PNUEA (National Plan for Efficient Use of Water), etc.</li> </ul> </li> <li>- Includes mechanism to deal with extreme events, mainly floods, but also droughts up to certain extent ( priorities for water uses, ...).</li> <li>- The existing legal framework is considered by some as complex, inconsistent and confusing.</li> </ul>	<p><b><i>It is missing:</i></b></p> <ul style="list-style-type: none"> <li>- Simplification and harmonization of water legislation in Portugal;</li> <li>- A conducting line guiding on how to jump from the legal framework to the implementation of strategies and policies, as specific water policy guidelines and principles, In particular, a water uses policy;</li> <li>- Articulation at several levels:                             <ul style="list-style-type: none"> <li>o Lack of a good joint articulation among the various planning instruments and in particular in the link among those plans and the programme of measures;</li> <li>o Better articulation and dissemination among different geographic Administration levels (central and regional/local).</li> <li>o Better coordination among sectoral policies and the different local actors, intervenient and stakeholders;</li> <li>o Better coordination with Spain.</li> <li>o Removal of conflicts. As an example, the "Unique Environmental Licensing" exists. But economic activities are also licensed apart and "uniquely". Land use licensing also issues permits. An overall licensing and inspection procedure is missing.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Codification of all the legislation into a single Water Code;</li> <li>- Define water policy guidelines and principles, strategic options and intervention priorities in the water domain;</li> <li>- Improve the economic analysis of water uses (recognizing the economic, social and environmental importance of different types of uses); Set a water uses policy and reform licensing processes based on it;</li> <li>- Allow each water user to understand its relative contribution to the water bodies' objectives and make the River Basin Plans more operational and less evaluative; make cost-benefit analysis of the measures proposed for equitable efforts;</li> <li>- Refocuses on more strategic and consensual objectives among sectors, valuing conflicts and transfers of knowledge to political decision-making and, eventually, consider in management a case/action based approach rather than a general goal setting based approach;</li> <li>- Apply with transparency and equitability the polluter-pays principle and the recovery of costs, eliminating the possibilities of non-compliance;</li> <li>- Improve cooperation among public institutions, sectoral entities and society;</li> <li>- Improve articulation of planning processes and integrated management with Spain, through the exchange of information, the definition of common objectives and the implementation of an integrated program of action;</li> </ul>

Layer/Question	What do we have that works	What is missing?	How can water governance be improved?
<b>Content Layer</b>			
<b>Is there sufficient and relevant information available?</b>	<ul style="list-style-type: none"> <li>- A general characterization of the river basin was made in River Basin District Plan (PGRH) with the information available, but in some situations, only macro information exist;</li> <li>- Regional and national efforts, led by APA, have been developed to ensure monitoring, in terms of water bodies quantity and quality, and identification of pressures over water bodies;</li> <li>- Ministries and public or private organism have a lot of information, but it is disseminated and not all the information is accessible;</li> <li>- Exist some state-of-the-art information systems in the Administration, but they are not always updated or loaded with the necessary information;</li> <li>- For stakeholders up to day operation exist weather information and forecast; irrigation warnings;</li> </ul> <p>In summary, existing available data is considered not to be enough and often not updated.</p>	<p><b><i>It is missing:</i></b></p> <ul style="list-style-type: none"> <li>- Fulfilment of administration monitoring, control and inspection (supervision) of the quality and quantity of the water bodies, as well as exhaustive risk identification in the more vulnerable areas, due to lack of resources;</li> <li>- Fulfilment of monitoring obligations of stakeholders, in particular by the agricultural sector; that consider requirements for diffuse pollution monitoring inadequate to the current reality;</li> <li>- Easy, transparent and fast access to the most updated data and information;</li> <li>- Public available cadastre of the water resources uses, as a result the existing territorial restrictions are not visible or accessible to the applicant when requesting the licensing of the use of water resources;</li> <li>- Sharing among the stakeholder and the community of interest of existing information and results of studies performed by each of them;</li> </ul> <p><b><i>At PT_RS level:</i></b></p> <ul style="list-style-type: none"> <li>- Updated cartographic information, especially on the bed of the River Tagus;</li> <li>- In-depth characterization of groundwater, both quantitative and qualitative.</li> </ul>	<ul style="list-style-type: none"> <li>- Encourage the legalization of several illegal abstractions form water resources in order to better know the water uses (e.g. make symbolic the price of licenses);</li> <li>- Improve communication with stakeholders about users self-control monitoring and adjust the monitoring requirements of to the reality;</li> <li>- Make access to data and information easy and transparent, allowing decisions and performance to be questioned and governance models to get more legitimacy. It plays a key role;</li> <li>- Improve access from stakeholders and general public to basic knowledge, data and information, through: <ul style="list-style-type: none"> <li>- establishment of partnerships for the exchange of hydrometric data, water quality and other type of data</li> <li>- making available to all parties the relevant information on water uses licensees (Siliamb - integrated licensing environment system) and the existing constraints;</li> <li>- the integration of already existing platforms for sharing all interested of dynamic geo-referenced system with relevant updated information to allows analysis of pressures and their impacts;</li> </ul> </li> </ul>

Layer/Question	What do we have that works	What is missing?	How can water governance be improved?
<b>Content Layer</b>			
<b>Are the necessary knowledge and skills available?</b>	<ul style="list-style-type: none"> <li>- <u>Administration</u>: has some technicians with adequate experience and knowledge, but resources are limited. Nevertheless, exist awareness of limitations and reconnaissance of the need to outsource activities;</li> <li>- <u>Stakeholders</u>: some of the entities have technical resources with knowledge, experience and expertise;</li> <li>- <u>Academic</u>: The academic and research entities are involved with Administration to improve these skills (oriented training activities);</li> <li>- <u>Private companies or consultants</u>: There is expertise and experience of private consultants that are involved in the studies and interventions. A good example is the COTR (Operative Centre and of Irrigation Technology) providing technical support to farmers besides certifying irrigation practices regarding efficiency of water usage;</li> </ul>	<ul style="list-style-type: none"> <li>- Knowledge about the impact of pressures over water bodies;</li> <li>- Knowledge on how each water user contributes to the current water body status;</li> <li>- Clarification about some concepts with impact on policy making, as for example, confusion between efficient use of water and water saving;</li> <li>- Management tools, as integrated modelling of the Tagus River, to ensure the sustainable management of water uses and the good status of the water bodies;</li> <li>- National and regional administrations entities of water resources are ageing and there is need to outsource, mainly to universities, to develop activities in a routine basis, namely monitoring;</li> <li>- On the other hand, the administration lacks the knowledge and the time for using simulation models, that are developed within the framework of studies promoted by the Administration itself. This type of routine procedure develops a high degree of dependence of the Administration to academic entities. It also limits the administration analysis skills, often leading to the use of simplified approaches;</li> <li>- At a supervisory or inspection level, lacks training oh those who work on the ground (for example, in forensic sampling and definition of parameters for analysis) in order to be assertive and rigorous in the collection of evidence.</li> <li>- In summary, it is necessary to overcome the existing large gap between the knowledge at academic and sectorial level and the current practice in the Administration;</li> <li>- When knowledge exists it does not always reach the decision making process.</li> </ul>	<ul style="list-style-type: none"> <li>- Increase training of Administration staff (water resources management environmental inspection) and strengthen the administration resources at human, technical and logistic levels;</li> <li>- Deepens evaluation methodologies;</li> <li>- Implement efficient tolls to support water resources management (integrated simulation models, etc.);</li> <li>- Invest in training and public dissemination ; promote the pedagogy of water use and hydric domain ("river-inspectors or surveillers"); create lines of telephone support that effectively enable the clarification of doubts;</li> <li>- Acknowledge that governance is about decision making. The decision making process should be redesigned to match the proper knowledge level to each kind of decision.</li> </ul>

Layer/Question	What do we have that works	What is missing?	How can water governance be improved?
<b>Institutional layer</b>			
<b>Are the roles and responsibilities clear?</b>	<p>Water resources planning in Portugal is centred at governmental level. Framed by the legislation, several entities exist contributing to the water resources planning and management at different geographic levels, with assigned responsibilities:</p> <ul style="list-style-type: none"> <li>- The Portuguese Environment Agency (APA) APA is the National Water Authority. It is the responsibility for the development of the National Water Plan (PNA), the PGRH (river basin plans), the PEGA ( Specific Management Plan for Reservoirs);</li> <li>- Is the ARH (River Basin District Administration) that have effective contact with regional and local problems. ARH, a regional department of APA, have responsibility in the attribution of licenses for water use of the public domain, taxes collection (user / payer);</li> <li>- The CCDR (Commission for Coordination and Regional Development) is responsible for protecting and enhancing water resources through territorial land planning;</li> <li>- DGADR (Directorate General for Agriculture and Rural Development) is the National Public Irrigation Authority.</li> </ul> <p>Some Commissions (river basin council . CRH; reservoir management - CGA and Luso-Spanish convention - CADC) are an ensemble of entities with assigned roles, mainly related to emergency management, public participation and international cooperation.</p>	<p><b>It is missing:</b></p> <ul style="list-style-type: none"> <li>- Stability in the water resources management institutional framework, with successive changes in organic institutional arrangements;</li> <li>- Sufficient interinstitutional cooperation;</li> <li>- Elimination of overlapping objectives and competencies between entities and conflicting rules (e.g. margins of rivers; REN/ margins of reservoirs);</li> <li>- Articulation between entities at different geographic level, strengthening the knowledge and the delimitation of intervention areas (e.g. municipalities and their licensing activities conflicting with national guidance);</li> <li>- Uniformity of procedures, to avoid different positions / decisions depending on the training of the technicians or the institutional framework;</li> <li>- A governance model of cooperation between administration and water users entities for sustainable water resources management, or, alternatively,</li> <li>- An information management process of the programs of measures, simple and accessible to all stakeholders, in order to promote participation and fulfilment of their direct responsibilities;</li> <li>- More supervision and performance of entities in case of risk to the good status of water bodies.</li> </ul>	<ul style="list-style-type: none"> <li>- Stabilize the institutional framework, after reconfiguring the water management agencies, by splitting the Portuguese Environment Agency (APA) in order to reconstitute the previous independent national water authority (INAG) and autonomous Administrations of River Basin Districts;</li> <li>- Clarify administrative organization for better articulation between central (APA) and regional services (ARHs) (e.g. setting the Public Hydric Domain , monitoring and supervision/ inspection of uses);</li> <li>- Improve coordination among administration agencies, according to their specific skills;</li> <li>- Improve cooperation among Administration, private sectors and society. Aiming the design and implementation of measures for water body's protection establish a clearer and workable cooperation, defining of the roles and responsibilities of the administration and of the water user's entities;</li> </ul> <p>As a summary, provide an efficient and stable institutional framework and evolve from a governmental management model to a governance model, in order to achieve sustainable water management.</p>

Layer/Question	What do we have that works	What is missing?	How can water governance be improved?
<b>Institutional layer</b>			
<b>Are the necessary tools available?</b>	<ul style="list-style-type: none"> <li>- The legal and instrumental tools exist;</li> <li>- Institutions, with decentralized services at regional level that facilitate the articulation, harmonization and integration of interventions;</li> <li>- Priorities for water use in case of a crisis;</li> <li>- Information systems / monitoring networks available;</li> <li>- Agricultural Advisory Service;</li> <li>- Agro-Environmental Measures.</li> </ul>	<ul style="list-style-type: none"> <li>- Updated monitoring networks in order to assess the state of the water bodies and the effectiveness of the measures and support the decision-making; Improved free and universal information systems concerning water abstractions, water bodies and meteorological information or facilitation of the use of SiliAmb by users and their organizations;</li> <li>- Better training of environmental inspection/supervision agents;</li> <li>- Application of integrated water resources simulations models;</li> <li>- An overall licensing and inspection procedure is missing (There are now the "Unique Environmental Licensing". Economic activities are also licensed apart and "uniquely". Land use licensing also issues permits.);</li> <li>- The instruments of public participation from collaborative forms do not exist or are devalued by the technical decision makers, which influence the decision and the political execution;</li> <li>- A National Strategy for Climate Change Adaptation knowledge by the stakeholders;</li> </ul>	<ul style="list-style-type: none"> <li>- Administrative organization for better articulation between APA and regional services (ARHs);</li> <li>- Better and clearer legal instruments as well as integrated water resources management modelling tools;</li> <li>- With systems for control and sharing of information among various water users to guide the decisions and to safeguard the main interests defined in the law;</li> <li>- Articulate the licensing acts among environmental, economic activities and land use perspectives;</li> <li>- Internalization of academic knowledge in the practice of the Administration;</li> <li>- Implement dissemination and training programs aimed to professionals as well as to the general population;</li> <li>- Create lines of telephone support that effectively enable the clarification of doubts;</li> <li>- Through integrated monitoring systems accessible to the different competent entities;</li> <li>- Provide a reviewed and territorially participated National Strategy for Climate Change Adaptation.</li> </ul>
<b>Is functioning of the financing system ensured?</b>	<p>According to legal framework, the financing of the system is assured through:</p> <ul style="list-style-type: none"> <li>- Governmental administration financing;</li> <li>- The national Water Resources;Protection Fund (FPRH), resulting from the Water Resources Taxes (TRH) revenues and licenses and;</li> <li>- The European Union financing programmes, that differs according to sectors of activity:</li> </ul>	<ul style="list-style-type: none"> <li>- Sufficient financial resources for administration to fulfil its monitoring, control, inspection and other obligations;</li> <li>- More stable financing;</li> <li>- Public information on how the Water Resources Protection Fund (FPRH) is being applied, through a report with revenues and their application or destination);</li> <li>- The real affectation of the FPRH to the water resources management and protection;</li> <li>- Reduce major limitations and lack of</li> </ul>	<ul style="list-style-type: none"> <li>- Affect the Water Resources Protection Fund (FPRH) to the monitoring, management and protection of water resources, in a transparent way, as preconized in the legislation in force;</li> <li>- Apply water services recovery costs preconized in Water Law;</li> <li>- Depending on the amounts needed and its programming, the rates (TURH /tariffs/ permit fees) might demand some adjustment.</li> </ul> <p>Agriculture sector:</p> <ul style="list-style-type: none"> <li>- Enhance the allocation of RDP2020 funds, if possible and necessary using alternative</li> </ul>

	<p><b>Agriculture sector:</b></p> <ul style="list-style-type: none"> <li>– RDP2020 (EAFRD) finances investments in irrigation, water use efficiency and farming counselling;.</li> </ul> <p><b>Public water supply sector:</b></p> <ul style="list-style-type: none"> <li>– Structural funding programmes of the European Union, as well as the European Investment Bank programmes, do ensure an important role in the financing of the sector.</li> </ul>	<p>transparent access to FPRH;</p> <ul style="list-style-type: none"> <li>– Establish a better criteria do access to the FPRH as, in practice, funding is decided on the basis of mitigation responses and unworked conflicts rather than on strategic objectives;</li> <li>– More transparency in what concerns criteria for accessing to European Union funding;</li> </ul>	<p>sources of funding (e.g. Juncker Plan);</p> <p>Public water supply sector:</p> <ul style="list-style-type: none"> <li>– Remove exiting uncertainty in what concerns access to European Union funds, defining clearly who can apply to these funds (in the current programme funding allocation appears to be too based on legitimacy of the applicants).</li> </ul>
Layer/Question	What do we have that works	What is missing?	How can water governance be improved?
Relational Layer			
<p><b>Is the water policy well connected with other policy fields (e.g. spatial planning)?</b></p>	<ul style="list-style-type: none"> <li>– The success of the WFD depends on the cooperation of other policies such as energy, transport, agriculture, fisheries, regional development and tourism.</li> <li>– Water policy is connected with other sectoral policies at top level. Example is the RDP2020 giving priority to investments located in areas susceptible to desertification;</li> <li>– At bottom level some legal instruments of interface between the policies of water and sectors exist (mainly related with water taxes and regime of water uses of permits).</li> </ul>	<ul style="list-style-type: none"> <li>– Improvement of communication and articulation among different sectors;</li> <li>– A two-way relationship. Create in society in general a cross liability with regard to water issues;</li> <li>– Strategic environmental assessment does not have a positive effect on articulation, narrowing common competences;</li> <li>– A good example of missing articulation is the difficulty of articulating the River Basin Plans with the planning instruments, by the focus, methods and sectoral formulation.</li> <li>– Reduction of ambiguities and difficulties caused by the excess of instruments and regulations with sectoral character and the proliferation of plans related with territory and water management;</li> <li>– Provide sufficient technical grounds to justify why water policy imposes constraints on agriculture (e.g. vulnerable areas; water resources taxes; new irrigation scheme);</li> <li>– Justify nature conservation policies are constraining of irrigation development;</li> <li>– Reduce bureaucracy;</li> <li>– Better land-use planning.</li> </ul>	<ul style="list-style-type: none"> <li>– Improve inter-agency cooperation;</li> <li>– Given the interdependence between the water resources policy and other activity sectors, a coordination entity at Administration level could exist to better coordinate sectoral policies with the water resource plans;</li> <li>– Concentrate on the River Basin Plans the dimensions of strategic articulation and leave to the Regional Plan of Territory Planning (PROTs) the multisectorial articulation;</li> <li>– Regulation and implementation of User Associations foreseen in the legislation;</li> <li>– Manage interests and conflicts, establish priorities, define policies and establish planning instruments, as for example: <ul style="list-style-type: none"> <li>o Adjust the system of electricity supply contracts to the seasonality of water use by agriculture;</li> <li>o Harmonize methodologies for monitoring and assessing water uses needs;</li> <li>o Exploit the potential of compatibility between irrigation practices with the conservation of natural resources;</li> </ul> </li> <li>– Improve the governance model through the use of IT platform for coordinated licensing.</li> </ul>

Layer/Question	What do we have that works	What is missing?	How can water governance be improved?
<b>Relational Layer</b>			
<b>Are all stakeholders involved in decision making for water management?</b>	<ul style="list-style-type: none"> <li>- In theory yes, since the consultation mechanisms are foreseen by law;</li> <li>- Participation is formally supported through several Commissions and Councils (CNA; CRH; CGA);</li> <li>- The participation of stakeholders takes place during the process of public consultation of the River Basin District Management Plans (PGRH) and Flood Risk Management Plans (PGRl).</li> </ul>	<ul style="list-style-type: none"> <li>- Engagement of stakeholders in the planning process rather than the consultation of already elaborated plans;</li> <li>- Instruments of public participation from real collaborative forms;</li> <li>- Directed consultation to specific sectors/stakeholders. The public consultation is generally addressed to civil society and to the central, regional and local administration;</li> <li>- Creation of working groups oriented to specific tasks. It was created the National Council of Irrigation but never worked;</li> <li>- Equal treatment for equal rank/role entities;</li> <li>- Civil society participation ( is generally reduced);</li> <li>- Time for real participation. The short time in which the river basin management plans have been developed leaves no room to a more effective involvement of water users;</li> <li>- Avoid devaluation of existing participation by the technical decision makers, which influence the decision and the political execution;</li> </ul> <p>The weight of public institutions is too heavy and marked by the decision-making power or by the application of funding to allow for a real collaborative participation.</p>	<ul style="list-style-type: none"> <li>- Provide the institutions with tools and means to establish channels of communication between the public administration and water users;</li> <li>- Engage in a targeted way the different stakeholders, enhancing their participation in the planning processes and measures delineation prior to decisions. Attend to their concerns, consider and prioritize the different interest;</li> <li>- Manage interests and inter sectorial conflicts. As it is considered to exist the predominance of the interests of hydroelectric sector over other users, improve communication among all the water users, ensuring integrated management of the uses in reservoirs, rivers and groundwater of the lower Tagus;</li> <li>- Empower the CRH-Tagus ( River Basin District Council of Tagus) with influence over the management decisions.;</li> <li>- Make effective the National Council of Irrigation;</li> <li>- Implement mechanisms of control and supervision of measures implementation;</li> <li>- Promote the pedagogy of water use and hydric domain ("river-inspectors or surveillers").</li> </ul>

Layer/Question	What do we have that works	What is missing?	How can water governance be improved?
<b>Relational Layer</b>			
<b>Is there transparency in water management?</b>	<ul style="list-style-type: none"> <li>- In general terms, the feeling is that there is not much transparency or is marked by nonconformities.</li> <li>- The management of hydro agricultural infrastructures established through the application of the legal regime is an example of transparency in the management of water resources.</li> </ul>	<ul style="list-style-type: none"> <li>- Clear application of TRH;</li> <li>- Economic and financial regulation of the management agencies;</li> <li>- Sharing of data and information about knowledge of current uses and future water use needs;</li> <li>- Discussion about topics of interest between the central administration (Water and Environment Authority (APA) and water users.</li> </ul>	<ul style="list-style-type: none"> <li>- Increase easy access to available information, especially the one related with the private use of water resources;</li> <li>- Create a practice of discussion and consultation among the Administration, the water users and the scientific community.</li> <li>- Clear means of settling of actual and potential conflicts among users;</li> <li>- Disclosure of reports (application of the FPRH and others);</li> <li>- Refocusing governance not on regulatory instruments of access and use of water but on communication tools for different users.</li> </ul>
<b>Is there enough confidence to work together?</b>	<ul style="list-style-type: none"> <li>- In theory, there is confidence. In practice no, as long as do not change the relations between the parties and the top down view of the administration.</li> <li>- Stakeholders are open and willing for it.</li> </ul>	<ul style="list-style-type: none"> <li>- Availability /Will;</li> <li>- Improved communication with the different planning sectors of Portugal stakeholders;</li> <li>- The weight of public institutions marks the relations among the parties interested in the decision-making power or in the application of funding, and by not being supported by a strategic communication.</li> </ul>	<ul style="list-style-type: none"> <li>- Submit to the scrutiny of water users the important issues (e.g. Taxes; National Irrigation Plan);</li> <li>- The governance model should promote strategic communication, involving all parties at a regular basis and, especially at an operative level, should promote cooperative licensing and field inspections processes;</li> <li>- Enhance and publish the work/ intervention of the Hydrographic Region Council (CRH);</li> <li>- A multilevel approach, with formal power of political decision, after valuing the academic, technical and legal competences.</li> </ul>



Layer/Question	What do we have that works	What is missing?	How can water governance be improved?
<b>Risk management</b>			
<b>What are the <u>CURRENT</u> risks your water system is facing?</b>	<p><b>Current risks:</b></p> <ul style="list-style-type: none"> <li>– <u>Droughts</u> (main agriculture and PW Supply concern) and consequent: <ul style="list-style-type: none"> <li>○ Water scarcity and water quality degradation for abstraction;</li> <li>○ Upstream salt water intrusion from estuary;</li> </ul> </li> <li>– <u>High temperatures</u>;</li> <li>– <u>Forest fires</u> and consequent: <ul style="list-style-type: none"> <li>○ Loss of cultures, property and lives;</li> <li>○ Soils erosion.</li> </ul> </li> <li>– <u>Floods</u> and consequent: <ul style="list-style-type: none"> <li>○ Inundations;</li> <li>○ Bank erosion;</li> <li>○ Damage in hydraulic infrastructure and irrigation equipment;</li> </ul> </li> <li>– <u>Pollution</u>, due to contamination by other sectors and consequent impairment of water sources.</li> <li>– Other risks not climate related, as <u>earthquakes</u>.</li> </ul> <p><b>What do we have that works:</b></p> <p><b>Structural:</b></p> <ul style="list-style-type: none"> <li>– Reservoirs with storage capacity;</li> <li>– Embankments;</li> <li>– Inundation protection dykes.</li> </ul> <p><b>Non Structural:</b></p> <ul style="list-style-type: none"> <li>– Knowledge about CC related risks does exist in the sectors studied in PT_RS (but the same does not happen in general);</li> <li>– Reservoirs management contributing for the flooding risk mitigation.</li> </ul>	<p><b>It is missing:</b></p> <ul style="list-style-type: none"> <li>– Practical knowledge in what concerns CC related risks regarding the extent of its potential impacts on water systems and in particular on water sources points, either in quantity and quality;</li> <li>– Knowledge about the topic and diffuse sources of pollution in the basins and their monitoring, as well as the implementation of effective monitoring and control of emissions;</li> <li>– Rhythm. Risks related to CC are known, but are treated at a rhythm that is not the most appropriate.</li> </ul>	<ul style="list-style-type: none"> <li>– Get better knowledge about climate change evolution;</li> <li>– Study potential local impacts on water sources for economic activities – bridge from general theory to in place knowledge (to be performed by the Central Administration as well as by other stakeholders);</li> <li>– Enhance awareness of some economic sub-sectors in what concerns the fact that water is a finite resource that might be reduced;</li> <li>– Develop a complete risk assessment, with the identification of all potential sources of risk affecting water resources and potential impairment of water sources, as well as the implementation of control measures and the creation of barriers to risk, in its various aspects.</li> </ul>

Layer/Question	What do we have that works	What is missing?	How can water governance be improved?
<b>Risk management</b>			
<b>Do you feel these are dealt with sufficiently?</b>	<ul style="list-style-type: none"> <li>- NOT AT ALL, in general, in what concerns governmental entities, despite the fact of having been produced a document with a National Strategy for Climate Change Adaptation (ENAAC);</li> <li>- YES up to some extent, in what concerns agricultural and public water supply BINGO entities (note: Sectors consider that CC will be an intensification of already existing climate variability).</li> <li>- As an example: EPAL, have carried out relevant studies in the area of risk related with present water sources.</li> </ul>	<p><b>Structural:</b></p> <ul style="list-style-type: none"> <li>- Infrastructure maintenance (such as dykes) to face the present flooding risks;</li> </ul> <p><b>Non Structural:</b></p> <ul style="list-style-type: none"> <li>- Imbuement in governmental agencies of CC risks, consequences and need for measures implementation;</li> <li>- Awareness of some sectorial entities in what concerns CC related risks, or of the extent of their impacts or when the situation will become serious. The level of awareness is not homogeneous in the region;</li> <li>- Assertiveness, focuses, supporting implementation mechanisms of planning instruments regarding CC (although always generally referred);</li> <li>- Sectorial participation and acknowledgment of the existing document for National Strategy for Climate Change Adaptation (ENAAC) but considered to be detached from reality;</li> <li>- A real adaptation strategy. Risk mitigation strategies are carried out in response to disturbances and not in an integrated and strategic way;</li> <li>- A strategic vision of mitigation, based on local scale and vulnerabilities;</li> <li>- Definition of accountabilities and action programs and tasks of entities;</li> <li>- Information systems with risks and their impacts, to support efficient decision-making;</li> <li>- Land use planning;</li> <li>- Better a liaison between stakeholders and the Central Administration.</li> </ul>	<ul style="list-style-type: none"> <li>- Imbue in governmental agencies of CC risks culture;</li> <li>- Development of civil society awareness of CC related risks, potential consequences and need for measures implementation;</li> <li>- Develop risk assessment studies;</li> <li>- Improve information systems, credible and efficient for the decision-making process;</li> <li>- Define objectives, how to achieve and monitor them, based on updated, credible and continuous information in time, as well as through realistic indicators that allow forecast and management of extreme situations;</li> <li>- Develop a Multilevel Risk Management Model;</li> <li>- Develop a National and Sectorial Strategy for Climate Change Adaptation (ENAAC) acknowledge by the economic sectors, and create adequate implementation mechanisms;</li> <li>- Improve articulated land uses planning;</li> <li>- Create an entity that actually manages the different components of water resources.</li> </ul>

Layer/Question	What do we have that works	What is missing?	How can water governance be improved?
<b>Risk management</b>			
<b>Which measures are already in place?</b>	<p><b>For DROUGHTS:</b></p> <p><b>At PT_RS sectoral level:</b></p> <ul style="list-style-type: none"> <li>- Individual sectoral entities preparedness from agriculture and public water supply sectors regarding : <ul style="list-style-type: none"> <li>o Search for alternative sources of water;</li> <li>o Efficient water use, either in water transport and distribution as well as in application of good practices (exist a remarkable recent evolution in PT_RS);</li> <li>o Farmers training;</li> </ul> </li> <li>- In EPAL, internalization of knowledge about the CC risks and adoption of a risk management approach in the company;</li> </ul> <p><b>At regional level:</b></p> <ul style="list-style-type: none"> <li>- Creation of the Operative Centre and of Irrigation Technology providing technical support to farmers and certifying irrigation equipment for efficiency of water usage;</li> </ul> <p><b>At governmental level due to EU requirements:</b></p> <ul style="list-style-type: none"> <li>- The implementation of certification for irrigation equipment,</li> <li>- The certification of irrigation in order to obtain EU support funding;</li> <li>- EU support frameworks which impose environmental rules;</li> <li>- Application of tariffs that discourage the growth of water consumption.</li> </ul> <p><b>Some governmental studies:</b></p> <ul style="list-style-type: none"> <li>- Study of the vulnerability of coastal aquifers to saline intrusion (ENAAAC Progress Report).</li> </ul> <p><b>For FLOODS:</b></p> <ul style="list-style-type: none"> <li>- Monitoring, forecast and alert systems (SNIRH, SILiAmb, Numerical models that allow us to anticipate critical situations - Climate Portal);</li> <li>- Identification of flooding zones and assessment of risk factors for floods (PGRI - Flood Risk Management Plans).</li> </ul>	<ul style="list-style-type: none"> <li>- Prevention and adaptation to rising temperatures and reduced rainfall;</li> <li>- Intensive adoption of measures for the efficient use of water and strategies for water saving;</li> <li>- Knowledge the regime of usage / exploitation of the Tagus basin (water uses quantification and public information);</li> <li>- Interacting with stakeholders;</li> <li>- Specific measures in the River Basin District Plan (PGRH) concerning the risks associated with CC instead of some very generic measures;</li> <li>- Regarding the salt water intrusion, there is a lack of precautionary measures (adequate monitoring and surveillance of its evolution, planning of adaptation measures);</li> </ul>	<ul style="list-style-type: none"> <li>- Strengthen the prevention and adaptation to rising temperatures and reduced rainfall by diversifying the forest species and reinforcing prevention (cleaning of forest, vigilance, etc.);</li> <li>- Increase storage capacity;</li> <li>- Promote hydraulic infrastructuration as a measure of adaptation to climate change (floods and droughts);</li> <li>- Fully implement the National Plan for the Efficient Use of Water, both in what concerns maintenance and modernization of storage infrastructures, transport and distribution and good practices;</li> <li>- Promote a more efficient and concerted water management, particularly by hydroelectric production sector;</li> <li>- Provide information about the regime of usage / exploitation of the Tagus basin. Provide water balances constantly updated;</li> <li>- Develop a complete pollution risk assessment, with the identification of all potential sources of pollution and the respective substances, as well as the implementation of control measures and the creation of barriers to risk, in its various aspects;</li> <li>- Develop better links between nature conservation and development of economic activities;</li> <li>- Irrigators certification, that prove the application of good practices;</li> <li>- Review water tariffs;</li> <li>- Establishment of contingency plans in situations of drought and forest fires;</li> <li>- Monitor the implementation of the National Strategy for Climate Change Adaptation regarding Water Resources (ENAAAC-HR)</li> </ul> <p>At PT_RS level:</p> <ul style="list-style-type: none"> <li>- Complete construction and modernization of collective distribution networks and improvement of the control and monitoring services;</li> <li>- Construction of alternative water abstraction sources to face deficits in water quantity and quality in Lezíria Grande de Vila Franca de Xira (LGVFX).</li> </ul>

Layer/Question	What do we have that works	What is missing?	How can water governance be improved?
<b>Risk management</b>			
<b>What FUTURE risks are you currently aware of?</b>	<p><b>Future risks</b>, are the Intensification of the current risks and some more (as economic sectors are being addressed in PT_RS the referred risks that not only concern the water system but also how they compromise economic activities or property):</p> <ul style="list-style-type: none"> <li>- Droughts (main agriculture and PW Supply concern) and consequent: <ul style="list-style-type: none"> <li>o Water scarcity, water quality degradation and ecosystems deterioration;</li> <li>o Overexploitation, conflicts of uses;</li> <li>o Upstream salt water intrusion from estuary</li> <li>o Desertification and Depopulation;</li> <li>o Agricultural abandonment;</li> </ul> </li> <li>- Floods and storm surges and consequent: <ul style="list-style-type: none"> <li>o Inundations;</li> <li>o Soils salinity;</li> <li>o Bank erosion;</li> <li>o Damage in hydraulic infrastructure and irrigation equipment;</li> </ul> </li> <li>- <u>Intense off season rainfall</u> (undermine agriculture production, threatening the viability of maintenance of the current systems of cultures);</li> <li>- Higher temperatures;</li> <li>- Forest fires and consequent <ul style="list-style-type: none"> <li>o Loss of cultures, property and lives;</li> <li>o Soils erosion.</li> </ul> </li> <li>- Pollution, due to contamination by other sectors and consequent Impairment of water sources;</li> <li>- <u>Reduction of Spanish flow discharges.</u></li> </ul>	<ul style="list-style-type: none"> <li>- To make credible the existing information;</li> <li>- Knowledge of up to what extent will we be economically affected;</li> <li>- Proper working of the watercourses monitoring network, allowing frequent evaluation of possible impacts of climate change and establishment of trends;</li> <li>- Timing, meaning lack of knowledge on CC evolution, or when the situation will become serious.</li> </ul>	<ul style="list-style-type: none"> <li>- Anticipate the knowledge about the near future (CC predictions and impacts);</li> <li>- Cross short-term information with trend of recent years;</li> <li>- Make available updated water resources monitoring data allowing the stakeholders to perform risk analyses with great added-value for the planning of the respective activities;</li> <li>- Promote the setup of a shared dynamic geo-referenced data base on water pollution (referencing polluters) with information produced by the different stakeholders studies.</li> </ul>
<b>Do you feel there is sufficient preparation to deal with these?</b>	<ul style="list-style-type: none"> <li>- EPAL has already implemented a set of measures that will face the current and future risk of decreased water quality and quantity, as for example the interconnections between systems or improvement of Water Treatment Plants (WTP)</li> </ul>	<ul style="list-style-type: none"> <li>- Data and information allowing a joint response;</li> <li>- Knowledge about the right moments to implement the measures.</li> <li>- <b>A strategy...!</b></li> </ul>	<ul style="list-style-type: none"> <li>- Set a water use policy, where future threats (risks management) are integrated in the water management policies and encouraged the creation of adaptation measures, including those that generate co-benefits to the various stakeholders;</li> <li>- Consolidate a CC policy that stakeholders can acknowledge in order to be able to adapt;</li> <li>- Define priorities and rank and allocate resources in function of the risks, phasing and programming interventions along time and by levels of risks;</li> <li>- Re-negotiate affluences from Spain (cooperation with Spain on water availability);</li> <li>- Draw up plans on how to act for each type of risk and how it could harm each economic activity (example: the Irrigation Perimeter of Lezíria Grande de Vila franca de Xira).</li> </ul>