Albufeira Convention on Cooperation for the Protection and Sustainable Use of Waters in Portuguese-Spanish River Basins: Infrastructure Management in a Transboundary Context

Second workshop. "River Basin Commissions and Other Joint Bodies for Transboundary Water Cooperation"

Geneva, the 9th-10th of April 2014
OBJECTIVE:
Searching for a balance between environmental protection and use of the necessary water resources for a sustainable development of both countries.
Need to coordinate their respective efforts for a better knowledge and water management of the shared river basins.

SCOPE OF APPLICABILITY: transboundary water basins of Minho, Limia, Douro, Tagus and Guadiana rivers.

INSTITUTIONAL REGIME: 2 joint bodies: Commission for the Implementation and Development of the Albufeira Convention (CADC) and Conference of the Parties.

WIDENING THE MATERIAL RANGE.- It concerns every activity related to the use of resources including water quality protection.

COOPERATION BETWEEN PARTIES.- It is structured around four key elements:
• Exchange of information, regularly and systematically
• Consultations to be developed through specific bodies.
• Measures that enable the approval of the administrative and legal systems of both countries
• Flow regime

RECONCILING THE COMMITMENTS of the previous Conventions (1964 and 1968) with the current regulations of the Albufeira Convention.

GUIDING PRINCIPLES
ESSENTIAL CONTENT

- Exchange of Information
- Transboundary Impacts
- Quality and Pollution
- Uses of Water
- Floods and Droughts
- Emergencies. Infrastructures Security
- Flow Regime
- Institutional Regime
- Guarantees Regime

- Working group of Information Exchange and Emergency Situations
- Working group of Hydrological Planning
Guaranteed flow rates are set at certain points, enabling the maintenance of the hydrological and environmental functions of rivers.

The determination of the flow regime is based on the following criteria:

a) Geographical, hydrological, climatic and other natural characteristics of each river basin.

b) Needs of water to guarantee the quality of the waters, according to their ecological characteristics.

c) Needs of water to guarantee current and expected uses, appropriate for a sustainable use of the hydrological resources in each river basin.

d) Existing infrastructures, especially those with ability to usefully regulate the current flow regime.

e) The 1964 and 1968 Conventions will be amended in every aspect contradicting the implementation of the conditions agreed on the protocol of the Convention revision.
The hydrological regime of Portuguese-Spanish rivers is utterly irregular.

CONDITIONS FOR DEROGATION TO THE COMPLIANCE OF THE FLOW REGIME
based on the precipitation taken as a reference in every basin (applicable to all the control stations) and on the volume stored in the reservoirs taken as reference (only for the Guadiana basin control station). There is no obligation to fulfill the flow regime.
<table>
<thead>
<tr>
<th>WATER LEVEL MONITORING STATION</th>
<th>MIÑO</th>
<th>DUERO</th>
<th>TAJO</th>
<th>GUADIANA</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRIEIRA</td>
<td>MIRANDA AND BEMPOSTA</td>
<td>SAUCELLE-ÁGUEDA RIVER</td>
<td>CRESTUMA</td>
<td>CEDILLO</td>
</tr>
<tr>
<td></td>
<td>MIÑO</td>
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</tr>
</tbody>
</table>

**ANNUAL FLOW REGIME (hm³/year)**

<table>
<thead>
<tr>
<th></th>
<th>3.700</th>
<th>3.500</th>
<th>5.000</th>
<th>2.700</th>
<th>4.000</th>
<th>300-600</th>
</tr>
</thead>
</table>

**QUARTERLY FLOW REGIME**

<table>
<thead>
<tr>
<th>Period</th>
<th>440 hm³</th>
<th>510 hm³</th>
<th>580 hm³</th>
<th>770 hm³</th>
<th>295</th>
<th>150 hm³</th>
<th>32-63 hm³</th>
</tr>
</thead>
<tbody>
<tr>
<td>October the 1st to December the 31st</td>
<td>440</td>
<td>510</td>
<td>580</td>
<td>770</td>
<td>295</td>
<td>150</td>
<td>32-63</td>
</tr>
<tr>
<td>January the 1st to March the 31st</td>
<td>530</td>
<td>630</td>
<td>720</td>
<td>950</td>
<td>350</td>
<td>180</td>
<td>37-74</td>
</tr>
<tr>
<td>April the 1st to June the 30th</td>
<td>330</td>
<td>480</td>
<td>520</td>
<td>690</td>
<td>220</td>
<td>110</td>
<td>21-42</td>
</tr>
<tr>
<td>July the 1st to September the 30th</td>
<td>180</td>
<td>270</td>
<td>300</td>
<td>400</td>
<td>130</td>
<td>60</td>
<td>16-32</td>
</tr>
</tbody>
</table>

**WEEKLY FLOW REGIME**

<table>
<thead>
<tr>
<th></th>
<th>10 hm³</th>
<th>15 hm³</th>
<th>20 hm³</th>
<th>7 hm³</th>
<th>3 hm³</th>
</tr>
</thead>
</table>

**DAILY FLOW REGIME**

<table>
<thead>
<tr>
<th></th>
<th>2 m³/s</th>
<th>2 m³/s</th>
</tr>
</thead>
</table>

October the 1st to December the 31st
January the 1st to March the 31st
April the 1st to June the 30th
July the 1st to September the 30th
### COMMITMENT TO MINIMUM VALUES

<table>
<thead>
<tr>
<th>Total contribution of the hydrological year</th>
<th>EXCEPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Precipitation (P) from the beginning of the year until a given month is some % less than the P average</td>
<td></td>
</tr>
<tr>
<td>- In the case of the Guadiana river, the volume stored in reservoirs influences too.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quarterly contribution</th>
<th>EXCEPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>- P during 6 months until the 1st day of the last month of the trimester is some % less than the P average for the same period</td>
<td></td>
</tr>
<tr>
<td>- In the case of the Guadiana, the volume stored in reservoirs influences too.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weekly contribution</th>
<th>EXCEPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average daily flow</th>
<th>EXCEPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2)</td>
<td>- No exceptions</td>
</tr>
</tbody>
</table>

(1) Only for Duero and Tagus river basins
(2) Only for the Guadiana river basin

### NEW FLOW REGIME

Represents an extension of the current flow regimes (annual and daily -only in the Guadiana river) to quarterly, weekly and daily flow regimes.
The Albufeira Convention has confirmed the hydroelectric division established in the 1964 Convention, so that the hydroelectric development of the international section between the source and the mouth of the Tormes river, corresponds to Portugal (Central de Miranda, and Bemposta Picote) along with the section between the mouth of the Huebra river and the international section. Moreover, the hydroelectric development of the stretch between the mouth of the Tormes river and the Huebra (Aldeadávila and Saucelle stations) belongs to Spain.

Great importance of water resource use in the international section for both countries:

• Spain (21% national hydroelectric production)
• Portugal (53% national hydroelectric production)

Other less significant demands: navigation, communications, supply.

Harmonization of legal and environmental criteria for different uses: responsible statement, invasive species, etc.

Restrictions of use:
respect for annual, quarterly and weekly flow rule of the Protocol of the Albufeira Convention Revision.
It has been confirmed that the attention of the demands on the scenarios of 2009, 2015 and 2021 does not breach the Albufeira Convention as for the Miranda-Bemposta control station and the Saucelle-Agueda river station.

It’s important to consider the impact of climate change on availability of water resources and on the compliance of Albufeira flow regime.

During the scenarios of 2015, 2021 and 2027, the tendency shows a decrease of the overall production in the basin as a result of the impact of the increased consumptive uses.
Valdecañas Reservoir. Its water level situation allowed, during the process, the storage of the contribution flows without emptying the reservoir, allowing to avoid an increase of the peak flows in the border with Portugal, which was in turn being heavily contributed by the precipitations that had occurred. This operation was able to reduce the severity of Alcántara’s rain flood and, at the same time, Cedillo’s and Portugal’s.

Alcántara Reservoir: the time lag values of the flows in and out of the Alcántara reservoir are very important to reduce the peak flows in Portugal.

Cedillo Reservoir: very high values were recorded during this episode. The peak flow recorded 4416.6 m³/s and the maximum flow drained from Portugal did not exceed 4,000 m³/s.

Conclusion: It has been estimated that the recorded rain flood was of 7.205 m³/s and that its course was altered to a maximum outflow to the Cedillo reservoir in Portugal in a quantity not over 4,000 m³/s. Orange alert was activated by Portugal’s Civil Protection as a result of the flows circulating along the Tajo. At the same time, the Zezere river, in Portugal, carried discharges of 1,000 m³/s, which, together with the approximately 4,500 more that the Tajo was carrying, produced a rate of about 5,500 m³/s in the Portuguese town of Almourol.

The active information exchange between both countries and a precise management of infrastructures avoid significant damages in Portugal.
### FLOOD MANAGEMENT IN THE TRANSBOUNDARY CONTEXT (II)

#### Information exchange tools:

- Hydrological information common system of the transboundary section of the Tajo (SICOINFRONJO): [http://sicoinfronjo.chtajo.es/sicoinfronjo/list.html](http://sicoinfronjo.chtajo.es/sicoinfronjo/list.html)

#### Basin State (hm3) | Flood Volume (hm3) | Maximum Flow (m3/s) | Return Period
--- | --- | --- | ---
**Reservoir**
Valdecañas | Initial V: 1.089,91 | Final V: 1.341,89 | In V: 262,00 | Out V: 10,02 | In Q: 1.168,30 | Out Q: 229,47 | ~5
Torrejón-Tajo | Initial V: 156,16 | Final V: 155,93 | In V: 84,85 | Out V: 79,71 | In Q: 528,76 | Out Q: 339,21 | ~2
Alcázar | Initial V: 2.873,44 | Final V: 2.955,04 | In V: 807,52 | Out V: 727,23 | In Q: 4.314,33 | Out Q: 2.963,72 | ~25
Salor | Initial V: 14,408 | Final V: 14,052 | In V: 19,16 | Out V: 19,484 | In Q: 198,949 | Out Q: 185,64 | >25
Cedillo | Initial V: 247,793 | Final V: 226,902 | In V: 1.131,28 | Out V: 1.156,16 | In Q: 4.416,60 | Out Q: 4.000,00 | ~25

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**Note:** The data provided is a simplified representation and may not reflect the actual complexity and detail of the original document.
1. Creation of a Global Indicator System:
   - Definition of demanded units.
   - Selection of the indicator that represents the best the evolution of the available resources for each demanded unit: most appropriate hydrometeorological variable/s: reservoir storage capacity, fluvial discharges, etc.

2. Classification of the hydrological drought status and potential restrictions associated to them: for the purpose of arranging any progressive implementation of measures and actions depending on the evolution of drought.

3. Development of Special Plans of Action in Situations of Warning and Eventual Droughts, for the purpose of managing anything concerning the control, monitoring, evaluation of risks, decision making and implementation of measures.

4. Emergency Plans for urban water supplies for 20,000 inhabitants.
TYPOLOGY OF MEASURES GATHERED IN THE PES

**Strategic:** long or middle term actions of institutional or infrastructural nature within the hydrological planning. State of normality. Examples: Storage structures, gathering of new resources, desalination, current tariff changes, regulatory changes;

**Tactical:** short-term actions planned and ratified in advanced within Drought Management Plans. State of warning and early warning. Examples: Changes in operating rules, rearrangement of extractions, increasing exploitation of groundwaters…

**Emergency:** actions once the drought has advanced quite a long way, that vary depending on the severity and extension. State of emergency. Examples: restriction of usage, activation of IDC procedures, temporary overexploitation of aquifer resources, etc.

### TYPOLOGY OF MITIGATION MEASURES

<table>
<thead>
<tr>
<th>Indicator</th>
<th>0,5 - 1</th>
<th>0,3 – 0,5</th>
<th>0,15 - 0,3</th>
<th>0- 0,15</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>Normality</td>
<td>Early warning</td>
<td>Warning</td>
<td>Emergency</td>
</tr>
<tr>
<td>Aim</td>
<td>Planning</td>
<td>Control</td>
<td>Conservation</td>
<td>Restrictions</td>
</tr>
<tr>
<td>Type</td>
<td>Strategic</td>
<td>Tactical</td>
<td>Emergency</td>
<td></td>
</tr>
</tbody>
</table>
CURRENT DROUGHT MANAGEMENT: IMPACTS ON OPERATIONAL MODELS
Thank you very much

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