Transboundary Aquifer Information Sheet

25S - Litoral-Cretácico

**Geography**
- Total area TBA (km²): 33 000
- No. countries sharing: 2
- Countries sharing: Argentina, Uruguay
- Population: 410 000
- Climate zone: Humid Subtropical
- Rainfall (mm/yr): 1100

**Hydrogeology**
- Aquifer type: Multiple- to single-layered
- Degree of confinement: Confined to semi-confined
- Main Lithology: Sandstone and silt

Map and cross-section are only provided for illustrative purposes. Dimensions are only approximate.
Transboundary Aquifer Information Sheet

25S - Litoral-Cretácico

TWAP Groundwater Indicators from Global Inventory

<table>
<thead>
<tr>
<th></th>
<th>Argentina</th>
<th>Uruguay</th>
<th>TBA level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recharge (mm/y)(1)</td>
<td>95</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Renewable groundwater per capita (m³/y/capita)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural background groundwater quality (%) (2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human dependency on groundwater (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundwater depletion (mm/y) (3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundwater pollution (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population density (Persons/km²)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundwater development stress (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transboundary legal framework (Scores) (5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transboundary institutional framework (Scores) (6)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) Recharge: This is the long term average recharge (in m³/yr) divided by the surface area (m²) of the complete country segment of the aquifer (i.e. not only the recharge area).

(2) Natural background groundwater quality: Estimate of percentage of surface area of aquifer where the natural groundwater quality satisfies local drinking water standards.

(3) Groundwater pollution: A. No pollution has been identified; B. Some pollution has been identified; Positive number: Significant pollution has been identified (% of surface area of aquifer).

(4) Groundwater development stress: Annual groundwater abstraction divided by recharge.

(5) Legal framework: A. Agreement with full scope for TBA management signed by all parties; B. Agreement with limited scope for TBA management signed by all parties; C. Agreement under preparation or available as an unsigned draft; D. No agreement exists, nor under preparation; E. Legal Framework differs between Aquifer States (see data at National level).

(6) Institutional Framework: A. Dedicated transboundary institution fully operational; B. Dedicated transboundary institution in place, but not fully operational; C. National/Domestic institution fully operational; D. National/Domestic institution in place, but not fully operational; E. No institution exists for TBA management; F. Institutional Framework differs between Aquifer States (see data at National level).

X A value was provided in the questionnaire, but it was considered un-realistic and therefore removed from the table.

Key parameters table from Global Inventory

<table>
<thead>
<tr>
<th>Distance from ground surface to groundwater table (m)</th>
<th>Depth to top of aquifer formation (m)</th>
<th>Full vertical thickness of the aquifer (system)* (m)</th>
<th>Degree of confinement</th>
<th>Predominant aquifer lithology</th>
<th>Predominant type of porosity/voids</th>
<th>Secondary Porosity</th>
<th>Transmissivity (m²/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina 40</td>
<td>60</td>
<td>70</td>
<td>Whole aquifer confined</td>
<td>Sedimentary rocks - Sandstone</td>
<td>High primary porosity fine/medium sedimentary deposits</td>
<td></td>
<td>42</td>
</tr>
<tr>
<td>Uruguay 13</td>
<td>25</td>
<td>65</td>
<td>Whole aquifer semi-confined</td>
<td>Sedimentary rocks - Sandstone</td>
<td>High primary porosity fine/medium sedimentary deposits</td>
<td>Secondary porosity: Dissolution</td>
<td>53</td>
</tr>
</tbody>
</table>

TBA level

* Including aquitards/aquicludes

X A value was provided in the questionnaire, but it was considered un-realistic and therefore removed from the table.
Aquifer description

Aquifer geometry
This aquifer is a multiple-layered hydraulically connected system in Argentina and a single layer system in Uruguay. The average depth to the water table varies between 13m and 40m. The average depth to the top of the aquifer varies between 25m and 60m whereas the average thickness of the aquifer system varies between 65m and 70m. The aquifer is mostly confined to semi-confined.

Hydrogeological aspects
The aquifer lithology consists of conglomeratic sandstones, fine to medium at the base, with interbedded silt, near the top. It has a high primary porosity with secondary-dissolution porosity that seems to occur only in Uruguay. It has a low to high horizontal connectivity and a high vertical connectivity. The groundwater flow direction is from east to west. The average transmissivity varies between 42 – 53m²/d. The surface outcrop occurs in the territory of Uruguay, where the recharge, that is 100% through natural causes, occurs.

Linkages with other water systems
Recharge is from precipitation over the aquifer area where it outcrops and through infiltration from surface water. Discharge is by means of groundwater flow into another aquifer.

Environmental aspects
In terms of natural water quality, a significant part of the aquifer in Uruguay is unsuitable for human consumption due to elevated levels of fluorides and arsenic. In Argentina around 4% of the aquifer area within the surficial layers are affected by natural salinity. Groundwater pollution has been identified in both countries, in Argentina from municipalities and agricultural practices but only in surficial layers, whereas in Uruguay a significant part of the aquifer has been impacted. No information on shallow groundwater and groundwater dependent ecosystems has been recorded.

Socio-economic aspects
The total groundwater abstraction during 2010 from the aquifer on the Uruguay side was 12Mm³, with agriculture being the highest user.

Legal and Institutional aspects
There is no specific Transboundary legal agreement between the countries. Both countries make mention of a National Institution with a full mandate, but with limited capacity.

Priority issues
Water quality appears to be a priority issue, both from a natural quality point of view and as a result of pollution. This needs to be addressed by the National Institutions.

Contributors to Global Inventory

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
<th>Country</th>
<th>E-mail</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alberto Manganelli</td>
<td></td>
<td>Uruguay</td>
<td><a href="mailto:albertomanganelli@yahoo.com">albertomanganelli@yahoo.com</a></td>
<td>Regional coordinator</td>
</tr>
<tr>
<td>Verónica del Carmen</td>
<td>Universidad Nacional del Litoral.</td>
<td>Argentina</td>
<td><a href="mailto:musavero@yahoo.com.ar">musavero@yahoo.com.ar</a></td>
<td>Contributing national expert</td>
</tr>
<tr>
<td>Musacchio</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ofelia Clara Tujchneider</td>
<td>Universidad Nacional del Litoral.</td>
<td>Argentina</td>
<td>ofeliatujchneider</td>
<td>Lead National Expert</td>
</tr>
</tbody>
</table>
Considerations and recommendations

Most data in the tables and text above have been provided by national and regional experts (listed above) or have been derived from the global WaterGAP model. See colophon for more information, including references to data from other sources.

An adequate aquifer description was possible, because three of the four aquifer states reported. The information was not sufficient to calculate the groundwater indicators.

Data gaps and also differences between data from national experts (Global Inventory) and data derived from WaterGAP highlight the need for further research on transboundary aquifers.

Colophon

This Transboundary Aquifers information sheet has been produced as part of the Groundwater Component of the GEF Transboundary Water Assessment Programme (GEF TWAP). GEF TWAP is the first truly global comparative assessment of transboundary groundwater, lakes, rivers, large marine ecosystems and the open ocean. More information on TWAP can be found on: www.geftwap.org. The Groundwater component of TWAP carried out a global comparison of 199 transboundary aquifers and the groundwater systems of 41 Small Island Developing States. The data used to compile this transboundary aquifer information sheet has been made available by national and regional experts from countries involved in the TWAP Groundwater project. For aquifers larger than 20 000 km² and which are not overlapping, additional data are available from modelling done by the Goethe University Frankfurt (Germany) as part of TWAP Groundwater. All data were compiled by UNESCO-IHP and the International Groundwater Resources Assessment Centre (IGRAC – UNESCO Category II Institute). Values given in the fact-sheet represent an approximate guide only and should not replace data obtained from recent local assessments. The editors of this information sheet are not responsible for the quality of the data.
Transboundary Aquifer Information Sheet

25S - Litoral-Cretácico

For more information on TWAP Groundwater and for more data, please have a look at the TWAP Groundwater Information Management System which is accessible via www.twap.isarm.org or www.un-igrac.org.

Request:
If you have additional data or information about this transboundary aquifer that can improve the quality of this information sheet and the underlying database, please contact us via email at info@un-igrac.org. If appropriate, the information will be uploaded to the database of transboundary aquifers and will also be used in new versions of this information sheet.

References:
- Climate: Climate indicates the major climate zone which occurs in the aquifer area. If more than 1 climate zone is present the zone with the largest surface area was selected. Source climate data: ArcGIS Online (2015), Simplified World Climate zones. Owner: Mapping Our World GIS Education. Original map: National Geographic World Atlas for Young Explorers (1998).
- All other data: TWAP Groundwater (2015).

Version: October 2015