**Transboundary Aquifer Information Sheet**

### AS31 - South-Pred-Ural

#### Geography
- Total area TBA (km$^2$): 88 000
- No. countries sharing: 2
- Countries sharing: Kazakhstan, Russian Federation
- Population: 1,800,000
- Climate Zone: Subartic
- Rainfall (mm/yr): 540

#### Hydrogeology
- Aquifer type: Multiple-layered hydraulically connected
- Degree of confinement: Mostly confined, but some parts unconfined
- Main Lithology: Sediments - sands and sedimentary rocks - sandstone

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**Map and cross-section are only provided for illustrative purposes. Dimensions are only approximate.**
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TWAP Groundwater Indicators from Global Inventory

<table>
<thead>
<tr>
<th></th>
<th>Recharge (mm/y) (1)</th>
<th>Renewable groundwater per capita (m³/y/capita)</th>
<th>Natural background groundwater quality (%) (2)</th>
<th>Human dependency on groundwater (%)</th>
<th>Groundwater depletion (mm/y)</th>
<th>Groundwater pollution (%) (3)</th>
<th>Population density (Persons/km²)</th>
<th>Transboundary legal framework (Scores) (5)</th>
<th>Transboundary institutional framework (Scores) (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kazakhstan</td>
<td>30</td>
<td>980</td>
<td>0</td>
<td>31</td>
<td>10</td>
<td>D</td>
<td>E</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>0</td>
<td>19</td>
<td></td>
<td></td>
<td>19</td>
<td></td>
<td>E</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>TBA level</td>
<td>0</td>
<td>21</td>
<td></td>
<td></td>
<td>21</td>
<td>D</td>
<td>E</td>
<td>D</td>
<td>E</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></th>
<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 type of porosity (or voids)</th>
<th>Predominant aquifer lithology</th>
<th>Secondary Porosity</th>
<th>Transmissivity (m²/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kazakhstan</td>
<td>5</td>
<td>5</td>
<td>170</td>
<td>Aquifer mostly confined, but some parts unconfined</td>
<td>High primary porosity fine/medium sedimentary deposits</td>
<td>Sediment - Sand</td>
<td>No secondary porosity</td>
<td>940</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>5</td>
<td>5</td>
<td>60</td>
<td>Aquifer mostly confined, but some parts unconfined</td>
<td>High primary porosity fine/medium sedimentary deposits</td>
<td>Sediment - Sand</td>
<td>No secondary porosity</td>
<td></td>
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<td>TBA level</td>
<td></td>
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<td></td>
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* Including aquitards/aquicludes

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Aquifer description

Aquifer geometry
Regionally this is multiple-layered hydraulically connected system consisting of 4 main layers. The average depth to the piezometric water level is 5m. The average depth to the top of the shallower aquifer is 5m. The average thickness of the aquifer system varies from 60m within Russia to 170m within Kazakhstan. The aquifer is mostly confined, but some parts are unconfined.

Hydrogeological aspects
The predominant lithology is sediments – sands that is underlain by sedimentary rocks – sandstone. The formations have a low to high primary porosity and no secondary porosity and a high horizontal and a low vertical connectivity. The average transmissivity value is 940 m²/day (Kazakhstan). The total groundwater volume is 110 km³. The mean annual recharge is 280 Mm³/annum.

Linkages with other water systems
Recharge is predominantly through precipitation over the aquifer area, while the predominant discharge mechanism is through river base flow.

Environmental aspects
Within Russia the natural quality of the groundwater on some sites does not satisfy drinking water standards due to the high natural salinity levels but the percentage of the aquifer affected was not quantified. The level of anthropogenic pollution is still low in Russia. No information is available on shallow groundwater and on groundwater-dependent ecosystems. No such environmental information is available for Kazakhstan.

Socio-economic aspects
During 2010 the annual groundwater abstraction from the system was 22 Mm³/annum and that was mainly used for domestic purposes within Kazakhstan, whereas that in Russia was 250 Mm³/annum. The total amount of fresh water that was abstracted over the aquifer area was not recorded. There appear to be no signs of groundwater depletion.

Legal and Institutional aspects
No information was recorded with regard to the current status of transboundary legal and institutional matters. Information was also not recorded with regard to the status of the mandate and capacity for groundwater management of national institutions.

Emerging Issues
Groundwater abstraction in Russia is much higher than in Kazakhstan and is close to the estimated mean annual recharge of the aquifer. However, the countries report that both within Russia and Kazakhstan, no significant groundwater abstraction is taking place close to the border and so no major issues have been listed. Steps for joint monitoring of abstraction, water levels and water quality of this productive and vulnerable transboundary resource should however be taken as a matter of urgency and a bilateral agreement on joint use should be reached.

Contributors to Global Inventory

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
<th>Country</th>
<th>E-mail</th>
<th>Role</th>
</tr>
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<td>Contributing national expert</td>
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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.

Both countries have provided data to describe the aquifer adequately, but there was not enough numerical information to allow calculation of groundwater indicators at the transboundary level.

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 km^2 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.

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: December 2015