14C - Esquipulas-Ocotepeque-Citalá

**Geography**
- Total area TBA (km²): 1400
- No. countries sharing: 3
- Countries sharing: El Salvador, Guatemala, Honduras
- Population: 130,000
- Climate zone: Highlands
- Rainfall (mm/yr): 1600

**Hydrogeology**
- Aquifer type: Multiple layers hydraulically connected
- Degree of confinement: Mostly unconfined
- Main Lithology: Sediment - Silt - Clay

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

**14C - Esquipulas-Ocotepeque-Citalá**

### 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) (3)</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>El Salvador</td>
<td>84</td>
<td>920</td>
<td></td>
<td></td>
<td>92</td>
<td></td>
<td>110</td>
<td>50</td>
<td>A</td>
</tr>
<tr>
<td>Guatemala</td>
<td>200</td>
<td>1900</td>
<td>80</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Honduras</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TBA level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>85</td>
<td></td>
<td></td>
<td>93</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></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 aquifer lithology</th>
<th>Predominant type of porosity (or voids)</th>
<th>Secondary porosity</th>
<th>Transmissivity (m²/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>El Salvador</td>
<td>12</td>
<td>40</td>
<td>80</td>
<td>Aquifer mostly unconfined, but some parts confined</td>
<td>Sediment - Silt - Clay</td>
<td>High primary porosity fine/medium sedimentary deposits</td>
<td>Secondary porosity: Fractures</td>
<td></td>
</tr>
<tr>
<td>Guatemala</td>
<td>8</td>
<td>7</td>
<td>65</td>
<td>Whole aquifer unconfined</td>
<td></td>
<td>High primary porosity fine/medium sedimentary deposits</td>
<td>No secondary porosity</td>
<td>25</td>
</tr>
<tr>
<td>Honduras</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

2
Aquifer description

**Aquifer geometry**
It is a multiple 2 to 3-layered, hydraulically connected aquifer system. The aquifer mostly unconfined, but in some parts confined. Average distance to groundwater level is 12m and depth to the top of the aquifer is 7m in Guatemala and 40m in El Salvador. El Salvador reports a vertical thickness of the aquifer system of 80 m.

**Hydrogeological aspects**
It consists of sedimentary deposits of Quaternary alluvial valleys, with a high primary porosity, in fine to medium grain sediments with a high horizontal connectivity. Only El Salvador reports on secondary porosity: fractured. The total amount of groundwater volume within Guatemala is 0.72km³. The average transmissivity within Guatemala is 25m²/d. The average annual recharge, which is 100% due to natural recharge, within El Salvador and Guatemala is 100 Mm³/annum. Extreme recharge events are known to occur within the area but this was not quantified.

**Linkages with other water systems**
Groundwater recharge is through precipitation over the aquifer area and the discharge mechanism is through springs and river base flow.

**Environmental Aspects**
About 20% of the natural groundwater quality within Guatemala is unsuitable for drinking water but the reasons have not been recorded. Some anthropogenic contamination, resulting in high coliform bacteria counts, has been identified in the superficial layers of the aquifer. 75% of the aquifer area in Guatemala has shallow groundwater and 20% of the area has groundwater dependent ecosystems.

**Socio-economic aspects**
The primary use is domestic and agricultural. Guatemala reports annual groundwater abstraction as 11 Mm³/annum, compared to a total fresh water abstraction of 28 Mm³/annum.

**Legal and Institutional aspects**
There is a specific Multi-lateral legal agreement with full scope between the countries - the Commission Trinacional del Plan Trifinio, 1997. Only El Salvador reports on its National Institution which still has a limited mandate and capacity for groundwater management.

**Emerging issues**
The alluvial aquifer is vulnerable to pollution and all three countries need to initiate water quality monitoring and where necessary, pollution control measures.
Contributors to Global Inventory

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

A reasonable description of the aquifer system was possible from the data provided by two of the three TBA countries. Calculation of TBA indicators was not possible.

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.

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:
Transboundary Aquifer Information Sheet

14C - Esquipulas-Ocotepeque-Citalá

- 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).

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