An introduction to the UNEP GEMS/Water Data Centre (GWDC)

Data Storage Solution Workshop

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GEMS/Water is established to collect world-wide water quality data for assessments of status and trends in global inland water quality.

The GEMS/Water mandate was renewed and strengthened by UNEA 1 (Res. 1/9) and it was restructured with new partners and donors from the Governments of Ireland and Germany.
Overview of GEMS/Water

Global Environment Monitoring Unit
Nairobi, Kenya

GEMS/Water Data Centre
Koblenz, Germany

GEMS/Water Capacity Development Centre
Cork, Ireland

Assessments
- Data
- Water quality monitoring
- Capacity development

Networks
National and Collaborating Focal Points
GEMS/Water works globally with the assistance of government nominated National Focal Points, River Basin Commissions and Collaborating Focal Points for specific monitoring programmes.

The GEMU in Nairobi is re-establishing old focal points and encouraging new focal points where none existed before.
Meeting the global water quality challenge
Under the umbrella of the UN-Water Integrated Monitoring Initiative for SDG 6, GEMS/Water coordinates the global monitoring of SDG Indicator 6.3.2.

GEMS/Water supports the UN Member States in increasing their capacity to monitor and assess the quality status of their water bodies.

www.sdg6monitoring.org
GEMS/Water supports global water quality assessments

2016
A snapshot of the World’s Water Quality

2017
World Water Quality Assessment
• World Water Quality Alliance
• Stakeholder driven co-design and co-production of a global water quality baseline assessment integrating in situ, remote sensing and modelling data

2023

Baseline
Status Quo
Scenarios

In situ
Remote sensing
Modelling
GLOBAL WATER QUALITY DATABASE GEMSstat

GEMSstat is hosted, operated, and maintained by the International Centre for Water Resources and Global Change (ICWRGC) in Koblenz (Germany) within the framework of the GEMS/Water Programme (UN Environment), and in cooperation with the Federal Institute of Hydrology.

www.gemstat.org
GEMStat/GRDC system architecture

Specialists
Government, Authorities, Research partner

Interfaces
Open standards, Industry standards
Calculations
Quality checks
Data analysis
Load calculations

Consumer
Private public
Engineers, Industry, Politics

Interfaces
Open standards, Industry standards
Products
Reports, Statistics, Maps

Meta data
Samplings
Discharge data

Desktop
Browser
GEMStat data acquisition and sharing

- Data providers: mostly national water agencies, sometimes research programmes
- Data collection: reporting templates or (more often) in available formats
- Data sharing (data policy)
  - **Open**: Data is publicly available
  - **Limited**: Data is shared on request for non-commercial research
  - **Restricted**: Data is not shared but used for UN assessments and data products
<table>
<thead>
<tr>
<th></th>
<th>River</th>
<th>Lake/Reservoir</th>
<th>Groundwater</th>
<th>Wetland</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong># Stations</strong></td>
<td>4261</td>
<td>754/187</td>
<td>479</td>
<td>9</td>
<td>5690</td>
</tr>
<tr>
<td><strong>Physical</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong># Parameters</strong></td>
<td>24</td>
<td>8</td>
<td>145</td>
<td>123</td>
<td>330</td>
</tr>
<tr>
<td><strong># Values</strong></td>
<td>1000672</td>
<td>204578</td>
<td>1572743</td>
<td>3291795</td>
<td>7378215</td>
</tr>
</tbody>
</table>

**GEMStat data availability**

- Physical: 24 parameters, 1000672 values
- Biological: 8 parameters, 204578 values
- Organic: 145 parameters, 1572743 values
- Inorganic: 123 parameters, 3291795 values

- Total: 330 parameters, 7378215 values

**Parameter Groups**

- Inorganic
- Nutrients
- Organic
- Oxygen Demand
- Feces
- COD
- Temperature
- Suspended Solids
- Coliforms
- Phosphate
- Nitrate
- NO3
- Others

**Most recent data**

- 2016-2018
- 2005-2009
- 1990-1999
- 1980-1989
- 1972-1979

- Countries contributing to GEMStat
- Stations reported, no data submitted
In most countries there are NFPs but only three countries have shared data so far:
- South Africa
- Tanzania
- Zimbabwe

<table>
<thead>
<tr>
<th>Country</th>
<th>Temporal Coverage</th>
<th># of Years</th>
<th># of Stations</th>
<th># of Parameters</th>
<th># of Values</th>
</tr>
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<tr>
<td>South Africa</td>
<td>1990-2010</td>
<td>21</td>
<td>29</td>
<td>23</td>
<td>220372</td>
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<tr>
<td>Tanzania, United</td>
<td>1978-2016</td>
<td>23</td>
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<td>52</td>
<td>21999</td>
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<td>Republic of Zimbabwe</td>
<td>2008-2009</td>
<td>2</td>
<td>10</td>
<td>7</td>
<td>280</td>
</tr>
</tbody>
</table>
GEMStat data and products

Available at https://gemstat.org

Data portal:
Explore available water quality data and view statistical visualisations at different spatial scales.

Metadata catalogue:
Access standardised metadata for all monitoring programmes and monitoring stations provided in GEMStat.

Maps:
Visualise the status of freshwater bodies worldwide by means of water quality classification maps.

Statistic reports:
Retrieve aggregated statistics of GEMStat water quality data, for the spatial coverage and the aggregation level you need.

The Global Freshwater Quality Database GEMStat provides scientifically-sound data and information on the state and trend of global inland water quality. As an operational part of the GEMS/Water Programme of the United Nations Environment Programme (UNEP), GEMStat is hosted by the GEMS/Water Data Centre (GWDC) within the International Centre for Water Resources and Global Change (ICWRGC) in Koblenz, Germany.
GEMStat data portal – data search
GEMStat data portal – visualizations

SINGLE PARAMETER VISUALIZATION
By selecting one station and one parameter the user can display the results in different graphs.

BOXPLOT GRAPH

SAMPLE GRAPH

SCATTERPLOT MATRIX
Thank you for your attention!

GEMS/Water Data Centre

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