Together4Water project

Implementing an open-source database to monitor water-related SDG in Tunisia

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Prof. Kim Mens

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Sustainable Development Goals have been launched by the United Nations in September 2015 in the framework of the 2030 Agenda

SDG-6 aim to ensure availability and sustainable management of water and sanitation for all
Context – Study area

80% of the surface represents agricultural fields.
Approach

Customize a high-quality Medjerda database

Open source online platform

Data Fusion

Robust and reliable outcomes

Basis for decision making

SDG-6 indicators measurement and monitoring
<table>
<thead>
<tr>
<th>Indicator Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1.1</td>
<td>Proportion of population using safely managed drinking water services</td>
</tr>
<tr>
<td>6.2.1</td>
<td>Proportion of population using safely managed sanitation and hygiene services</td>
</tr>
<tr>
<td>6.3.1</td>
<td>Proportion of Wastewater safely treated</td>
</tr>
<tr>
<td>6.3.2</td>
<td>Proportion of bodies of water with good ambient water quality</td>
</tr>
<tr>
<td>6.4.1</td>
<td>Change in water use efficiency</td>
</tr>
<tr>
<td>6.4.2</td>
<td>Level of water stress: freshwater withdrawal as a proportion of available freshwater resources</td>
</tr>
<tr>
<td>6.5.1</td>
<td>Integrated water resources management</td>
</tr>
<tr>
<td>6.5.2</td>
<td>Transboundary basin area with an operational arrangement for water cooperation</td>
</tr>
<tr>
<td>6.6.1</td>
<td>Change in the extent of water-related ecosystems over time</td>
</tr>
<tr>
<td>6.a.1</td>
<td>Amount of water- and sanitation-related official development assistance that is part of a government coordinated spending plan</td>
</tr>
<tr>
<td>6.b.1</td>
<td>Participation of local communities in water and sanitation management</td>
</tr>
</tbody>
</table>
High quality data to meet SDG-6

- 6.1 Drinking water
- 6.2 Sanitation and hygiene
- 6.3 Wastewater and water quality
- 6.4 Water use and scarcity
- 6.5 Integrated resources management
- 6.6 Water-Related ecosystems
Data acquisition and analysis

Different data sources

- Difficult to collect
- Different quality levels
- Different Metadata standards

Ministry of Agriculture
Surface and groundwater
Irrigation
...

Ministry of Environment
Drinking Water and Sanitation
Water Quality
Wastewater reuse

Regional Water-Related Institutions (10)
Precipitation
River flow
...

Data acquisition and analysis

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Data acquisition and analysis

Google Earth Engine: Cloud-based open remote sensing analysis
## Data acquisition and analysis

<table>
<thead>
<tr>
<th>Data</th>
<th>Raw data status</th>
<th>Improved data status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking water &amp; Sanitation</td>
<td>• Metadata issues</td>
<td>• Reinforced metadata</td>
</tr>
<tr>
<td></td>
<td>• No geodatabase</td>
<td>• Creation of geodatabase</td>
</tr>
<tr>
<td></td>
<td>• Metadata issues</td>
<td>• Reinforced metadata</td>
</tr>
<tr>
<td></td>
<td>• No geodatabase</td>
<td>• Creation of geodatabase</td>
</tr>
<tr>
<td></td>
<td>• Data gaps</td>
<td>• No data gaps</td>
</tr>
<tr>
<td></td>
<td>• Short Temporal Resolution</td>
<td>• Standardized TR</td>
</tr>
<tr>
<td>Wastewater Quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wastewater reuse</td>
<td>• No geodatabase</td>
<td>• Creation of geodatabase</td>
</tr>
<tr>
<td></td>
<td>• Data gaps</td>
<td>• No data gaps</td>
</tr>
<tr>
<td>Weather data</td>
<td>• Metadata issues</td>
<td>• Reinforced metadata</td>
</tr>
<tr>
<td></td>
<td>• Data gaps</td>
<td>• No data gaps</td>
</tr>
<tr>
<td>Remote sensed data</td>
<td>• Missed data</td>
<td>• Available data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reinforced metadata</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Full Spatial Distribution</td>
</tr>
</tbody>
</table>
Together4Water Database architecture

- Web Services
- Data
  - Encoding
  - WaterML 2.0
  - Storage
- Processing
  - Services
  - Implementations
- Visualisation
  - Interfaces

WaterML 2.0

Online Platform

WPS

WMS
Data visualization to understand

OpenGIS® Web Map Service (WMS) Standard (WMS)

Source: wikipedia.org

CLIENT APPLICATIONS: BROWSER (IE, Firefox, Opera, ...), MapInfo, ArcGIS, ...

Source: opengeospatial.org

Source: wikipedia.org

VECTOR DATA

Oracle Locator or Spatial

PostGIS

ESRI ArcSDE

MIF/MID SHAPE/GML

GeoTIFF/BIL/HDF/...

RASTER DATA
Data standardization to share

WaterML 2.0:

The importance of Metadata, Exchanging, and Open-source
Conclusions

• The Medjerda database moved from raw, scarce, and low quality data to robust and consistent information.

• Data quality is critical to meet the SDGs, in particular, SDG-6:
  ✓ Efficient assessment
  ✓ Accurate reporting
  ✓ Reliable outcomes

• Data visualization and standardization are key elements to deliver high quality data, and to foster exchange of open-source information
What’s next ...

2018 – Launch of the Citizen Science campaign in Tunisia to reinforce data availability in the near future ...

We involve: school students, NGO and a company (farmers and stakeholders).
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