Water targets and indicators of the SDGs

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Water and sanitation at the core of sustainable development

Integrated management – across sectors and regions – balancing competing needs

Industry – Food – Energy

Climate change
Scarcity – Flooding

Pollution
Recycling
Reuse

Ecosystems - Resilience

Human health and well-being

Risks related to famine, epidemics, migration, inequalities, political instability

Water and sanitation at the core of sustainable development
“By 2030, achieve universal and equitable access to safe and affordable drinking water for all”

6.1.1 Proportion of population using safely managed drinking water services
Target 6.2
Sanitation and hygiene

“By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations”

6.2.1 Proportion of population using safely managed sanitation services, including a handwashing facility with soap and water
Target 6.3
Water quality and wastewater

“By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally”

6.3.1 Proportion of wastewater safely treated
6.3.2 Proportion of bodies of water with good ambient water quality
“By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity”

6.4.1 Change in water use efficiency over time

6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources
Target 6.5
Water resources management

“By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate”

6.5.1 Degree of integrated water resources management implementation (0-100)

6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation
Target 6.6
Water-related ecosystems

“By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes”

6.6.1 Change in the extent of water-related ecosystems over time
<table>
<thead>
<tr>
<th>No</th>
<th>SDG 6 global indicators (short title)</th>
<th>Custodian</th>
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<tbody>
<tr>
<td>6.1.1</td>
<td>Safely managed drinking water services</td>
<td>WHO UNICEF</td>
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<tr>
<td>6.2.1</td>
<td>Safely managed sanitation services</td>
<td>WHO UNICEF</td>
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<td>6.3.1</td>
<td>Wastewater safely treated*</td>
<td>WHO UN-Habitat</td>
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<td>6.3.2</td>
<td>Good ambient water quality*</td>
<td>UNEP</td>
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<tr>
<td>6.4.1</td>
<td>Water use efficiency*</td>
<td>FAO</td>
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<td>6.4.2</td>
<td>Level of water stress</td>
<td>FAO</td>
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<td>6.5.1</td>
<td>Integrated water resources management</td>
<td>UNEP</td>
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<td>6.5.2</td>
<td>Transboundary basin area with an operational arrangement for water cooperation*</td>
<td>UNECE UNESCO</td>
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<td>6.6.1</td>
<td>Water-related ecosystems*</td>
<td>UNEP</td>
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<td>6.a.1</td>
<td>Water- and sanitation-related official development assistance that is part of a government coordinated spending plan</td>
<td>WHO UNEP OECD</td>
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<tr>
<td>6.b.1</td>
<td>Participation of local communities in water and sanitation management</td>
<td>WHO UNEP OECD</td>
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</table>
Process and time-line

- Draft methodologies developed (2016 Q1)
- Pilot test of technical feasibility and of institutional setup in 5 – 7 countries (2016 Q2 – Q4)
- Revision/adjustment of methodologies (2017 Q1)
- Global roll-out (2017)
- Baseline and SDG-6 synthesis reports
- UN HLPF to review SDG-6 (2018)
Importance of data and data gaps

- Member States own SDG monitoring and reporting → should build on national data
- Regional and global can supplement and reinforce national monitoring
- Flexible stepwise methods
Thank you
EO for Sustainable Development
The Water Case – SDG 6

Benjamin Koetz
European Space Agency, Earth Observation Directorate
Role of Earth Observation in SDG 6

SDG 6 Indicators

6.1.1 Proportion of population using safely managed drinking water services

6.3.2 Proportion of bodies of water with good ambient water quality

6.4.1 Change in water use efficiency over time

6.6.1 Change in the extent of water-related ecosystems over time
Sentinels watching over Water

0 days 00 hours 00 minutes
Sentinel-2 constellation: summer solstice
Sentinels – New Era of Observations
EU-ESA Copernicus Space Programme

Long-term Continuity & Access to Earth Observation data

Free and open data policy

(*)

Sentinel 1 – SAR imaging
All weather, day/night application e.g. floods, water bodies, wetlands
2014 & 2016

Sentinel 2 – Multi-spectral imaging
Land applications: urban, forest, agriculture, water quality
Continuity of Landsat, SPOT
2015 & 2017

Sentinel 3 – Ocean & global land monitoring
Wide-swath ocean color, global vegetation, land/sea surface temperature, altimetry, lake water quality
2016 & 2017

* Joint EU/ESA Data Policy Principles adopted by ESA member states in Sep ‘09, EU announced in Nov. 2013
Copernicus Sentinel-1

- Launch: **S1a:** 3rd April 2014, **S1b:** 25th April 2016, ...
- Constellation of two satellites
- C-Band Synthetic Aperture Radar, weekly coverage (2 satellites)
- Nominal lifetime in orbit of 7 years (max. 12 yrs)
- Sees through cloud cover!
SDG 6.1/6.6 Water & Wetland Extent
Sudd wetland, South Sudan

Contains modified Copernicus Sentinel data [2015]
Copernicus Sentinel-2

- Launch: **S2a: June 23rd 2015**, Q1 2017
- 13 bands (VIS, NIR & SWIR)
- 290 km swath at 10, 20 and 60 m
- Systematic acq. of all land and coasts
- 5 days repeat cycle with 2 satellites
- 7 years design lifetime (max. 12 yrs)
SDG 6.3: Water Quality
Lake Turkana, Maximum Chlorophyll Index

Contains modified Copernicus Sentinel data [2016]
**Copernicus Sentinel-3**

- **Ocean and Land Colour Instrument (OLCI)**
  - 21 channels, 300 m resolution, 1270 km swath
- **Sea and Land Surface Temperature Radiometer (SLSTR)**
  - 9 channel, 500m – 1km resolution, 1675 km swath
- **Sea & Ice Topography Payload (SRAL, MWR, GNSS, DORIS, LRR)**

- Revisit at equator = 2 days (or daily with 2 satellites)
- 7 year lifetime (max. 12 yrs)
- S3A launched on 18 February 2016, S3B in Q3 2017
SDG 6.4: Water Efficiency
Namibia, Land Surface Temperature

Contains modified Copernicus Sentinel data [2016]
From Information to Decisions
EO for sustainable development

- Continuous & Reliable Observations (EO & in-situ)
- Knowhow & Technical Expertise
- Technical Capacity for Data Processing & Management
- Integration in Decision Making Processes

- Sustainable (Free) & Operational Data
- Training and R&D
- Software tools & Infrastructure
- Institutional Capacity & User Engagement
Monitoring of SDG 6 from Space
Benefits of satellite Earth Observation

🔥 **Consistency** – monitoring over space and time
🔥 **Transboundary** – from national to basin scale
🔥 **Transparency** – for independent reporting
🔥 **History** – long term trend analysis, e.g. climate change
🔥 **Sustainability** – open & free operational data

🔥 **EO for SDG 6 Partnerships** – UNEP, Ramsar, FAO, UN-Water, UNDP-CapNet, GEF/Development Banks, GEO-Water, GEO-Wetlands
Supporting SDG monitoring with Earth Observation

Christian Tottrup
Senior Project Manager
DHI GRAS
Background

• Need to extract information on water related issues over large spatial domains and time periods to support water resource management and the SDG monitoring requirements.

• There is a growing awareness that EO data has the potential to provide robust monitoring for several of the water indicators because of their consistency, accessibility, repeatability, and global coverage.
Earth Observation of water resources

Most major components of the hydrological cycle can be estimated with Earth Observation including:

- Precipitation
- Evapotranspiration
- Soil moisture
- Vegetation
- Surface water
- Water Quality
- Water Level
- Snow cover
- Water storage dynamics
- ...

Potential to support monitoring of SDG Goal 6 on Clean Water and Sanitation
The Water Cycle in the Sustainable Development Goals

11.5 Water-related disasters

6.4 Water use and scarcity

6.5 Water resources management

6.6 Ecosystems

6.3 Water quality and wastewater

6.1 Drinking water

6.2 Sanitation and hygiene

6.0 Cooperation & participation

© DHI
Earth Observation for Target 6.3: Water Quality

**Target 6.3**

“Water quality and wastewater”

**Indicator 6.3.2**

Proportion of bodies of water with good ambient water quality

**EO support**

EO can support the delineation of surface water bodies and partly the monitoring requirements for a limited number of parameters
Water quality mapping

Previously restricted to coastal waters and large lakes but now feasible also for inland water bodies and river systems.

Relevant parameters:
- Chlorophyll concentration
- Turbidity
- Secchi disc depth
- Water surface temperature
+ Water surface delineation

EO can also be used to monitor pollution sources and points of discharge into water bodies (cf. Target 6.3.1)
Earth Observation for Target 6.4: Water Use Efficiency

Target 6.4

“Water use and scarcity”

Indicator 6.4.1

Indicator: 6.4.1 Change in water-use efficiency over time

EO support

EO partly support the indicator by providing operational capacity for mapping irrigated water use efficiency
Water use efficiency in irrigation

- EO support mapping of:
  - Evapotranspiration
  - Irrigated crop area
  - Crop productivity

\[ WE = A_{we} + I_{we} + S_{we} \]

Where

- \( \text{WE} \) = Water efficiency
- \( A_{we} \) = Irrigated agriculture water efficiency [USD/m\(^3\)]
- \( I_{we} \) = Industrial water efficiency [USD/m\(^3\)]
- \( S_{we} \) = Services water efficiency [USD/m\(^3\)]

Source: DHI GRAS
Earth Observation for Target 6.6: Water-related Ecosystems

**Target 6.6**
“Water-related ecosystems”

**Indicator 6.6.1**
Indicator: 6.6.1 Change in the extent of water-related ecosystems over time

**EO support**
Water-related ecosystems that are most amenable to EO include the spatial extent of wetlands as well as open water surfaces*

* Forest and drylands are also suitable to EO but being considered under Goal 15: Life on Land (cf. Indicator 15.1.1 and 15.3.1)
Mapping wetland extent

- % of change in the extent of wetlands over time can be measured globally by earth observation looking at vegetation cover, soil moisture and inundation frequency

- More robust inventories expected when using a combination of multi-temporal optical- and radar derived indicators

- In addition the higher frequency of observation will contribute to the monitoring of seasonal dynamics which will help to provide a more accurate delineation of wetland areas

Source: UNEP

Source: GeoVille
Target 6.5

“Water resources management”

Indicator 6.5.1

Indicator: 6.5.1 Degree of integrated water resources management implementation (0-100)

EO support

EO does not increase the degree of IWRM but can provide indirect support by providing operational capacity to establish harmonized transboundary water related information for IWRM.
Integrated Water Resource Management with the Water Observation and Information System (WOIS)

- Provide operational capacity to produce EO-based harmonized/transboundary water information for IWRM
Enabling EO based national monitoring

- Member States own SDG monitoring and reporting but lack of data, appropriate information and challenges in human and institutional capacity put a serious constraint on effective monitoring and tracking of progress for SDGs in many low- and lower-middle income countries
- There is a need to recognize the critical importance of supporting developing countries in strengthening the capacity of national statistical offices and data systems to ensure access to high quality, timely and reliable data
- Flexible methodologies for Member States to enter monitoring in line with national capacity and resource availability i.e. start simple and advance progressively as capacity and resources increase (cf. progressive monitoring)
GlobWetland Africa

- GlobWetland-Africa is a 3-year project of the European Space Agency and Ramsar, started in 2015
- The project will develop an open-source and free of charge software toolbox with the full end-to-end image processing capabilities for the production of a number of Earth Observations products to better assess the conditions of wetlands and monitor their trends over time
- Focus on capacity building to allow for a full transfer of the methods, tools and products
- Contribute to the GEO Wetlands Initiative and the development of a Global Wetlands Observing System (GWOS) in line with SDG monitoring requirements
Conclusion and recommendations

• Earth observations can be used for cost-effective monitoring of many indicators needed to monitor the progress of targets under SDG 6 on Water and Sanitation

• Earth Observation is especially useful in many developing countries where reliable water information is scarce

• To ensure the sustainability at the national level there is a need to develop and building capacity in using best practice methodologies and tools which can be operated and maintained within the institutional, technical and financial means of low-income countries
Thank you