



2015 UN-Water Annual  
International Zaragoza  
Conference  
15–17 January 2015

Water and Sustainable Development  
**From vision to action**

UN WATER



# Applications of Earth observations in monitoring the Water SDG

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Richard Lawford, Morgan State University, US

## Summary

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The United Nations Open Working Group's (OWG) 2014 report on Sustainable Development Goals includes a water goal. Effective monitoring of this goal needs to be action-oriented, measuring progress objectively, and guiding global investments. Recently, as part of the UN Global Expanded Monitoring Initiative (GEMI), a Task Team on Earth observations (EOTT) has explored the potential role of Earth observations (EO) for indicator monitoring.

Earth observations, which include both satellite and in-situ data, can provide robust monitoring for indicators because of their geospatial consistency, accessibility, repeatability, and global coverage. EO data are being used to derive population density maps that support monitoring and could assist in monitoring Waste Water and Water Quality Management (WWQM) indicators. Geographical Information System (GIS) platforms enable EO data to be combined with socioeconomic and survey data for more complex indicators. Water Resources Management (WRM) indicators lend themselves to the use of water cycle data used in routine water management purposes. Emerging integration capabilities such as land data assimilation systems and the University of Tokyo's Water Cycle Integrator can also track WRM indicators. In addition, the present and future role of novel data, including new "Big Data" sources and citizen science will also play a significant role.

Two avenues for addressing sustainable development monitoring are being considered. The first avenue integrates Earth observations into the current monitoring framework through the recommended design of a more open system. The second avenue explores how a different approach to sustainable development could enable Earth observations to inform a near-real time monitoring and adaptive management system that would direct resources to resolving non-sustainable practices and emergencies.

## Keywords

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*Earth observations, indicators*

## Issues addressed

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### **Water resources management (water-use efficiency, integrated water resources management, transboundary cooperation, sustainable extraction and supply of freshwater)**

Earth observations can provide geospatially consistent data on a global basis offering a potential solution for transboundary data sharing.

### **Water quality (pollution, dumping of toxic materials, wastewater management, recycling, reuse, restore ecosystems and aquifers)**

Phytoplankton blooms would be monitored and their occurrence and expansion would trigger assessments using models to determine the phosphate and nitrate concentrations in streamflow.

Phosphates and nitrates in the runoff from land where intensive agricultural practices are occurring (e.g., extensive fertilizer usage) lead to alga; blooms in receiving waters.

## Tools for implementation

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**Financing/economic instruments:** Swiss Development Corporation (SDC): The SDC has provided funding to support the preparation of a proposal for an expanded monitoring system.

**Governance: Institutions / legal framework:** A number of UN Water Agencies (WHO, HABITAT, UNEP, FAO, UNICEF) are managing the development of the plan.

**Technology:** At present the plan is based on existing methodologies and currently accessible data bases. A more open process is being proposed which would call for routine inputs from national space agencies. Negotiations with national agencies have not yet taken place as the role of remote sensing in GEMI monitoring has not yet been clarified.

**Capacity Development:** Significant capacity building will be required to enable countries to utilize the data that could be provided through a new GEMI data processing system for establishing national baselines and other applications.

### **Who is involved?**

- WHO – lead on the Waste water component and lead on the Earth Observations Task Team (EOTT).
- UNEP – lead on the Water Quality and Water Resource indicators.
- GEO – Group on Earth Observations support for the EOTT

**What were the objectives?** To develop a framework for the expanded monitoring of indicators for sustainable water development following the Open Working Group's definition of Water SDG indicators. This framework would be inclusive involving UN agencies and national space and statistical agencies.

**Implementation challenges:**

To develop commitments by appropriate national agencies to contribute to the production of high resolution global data sets.

**Main task/activities undertaken /Tools used:**

Assessments of the use and benefits of Earth observations in indicator monitoring have been carried out. Two workshops and extensive consultations with approx. 45 experts were undertaken.

**Main outcomes / impacts (what has changed?):**

There is a growing acceptance by the stakeholders that satellite data can be used in monitoring the water SDG indicators.

## Lessons Learned:

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**Triggers:** New initiatives, such as the SDGs, provide new opportunities for engagement of the science community thereby allowing society to benefit from the most recent advances in technology.

**Drivers:** The need to ensure consistency in reporting on SDGs at national and global levels.

**Barriers:** Existing programmes which have developed legacy methodologies and archives may be reluctant to embrace novel data types and technologies unless new funding is available to facilitate these changes.

**What has worked well?** The consultations to develop a conceptual basis for the expanded use of Earth observations in monitoring Water SDG indicators.

**What can be improved?** Com Dedicated funding could be made available to sustain the development of initiatives that would expand the benefits of Earth observations in supporting SDGs.

**The way forward:** Focused research should be undertaken to develop sustainable development activities that benefit from Earth observations.

Consultations should be held with space agencies and national statistical agencies on their commitment to providing routine data for SDG monitoring at high temporal resolutions.

**Links:**

This activity has engaged UN Water in active dialogue with the academic community and experts from space agencies.