



Earth Observations for the Sustainable Development Goals (EO4SDG)

Progress Report

Background

As highlighted in the GEO Strategic Plan for 2016-2025, and included in the Mexico City Ministerial Declaration, GEO advocates the role of Earth observations (EO) in supporting the implementation, monitoring and evaluation of the Sustainable Development Goals (SDGs). EO4SDG, a GEO initiative whose purpose is to extend EO uses for sustainable development and enable societal benefits through achievement of the SDGs, is working with GEO Members, participating organizations, and other GEO initiatives, to integrate EO in national SDG monitoring and implementation processes. EO4SDG was launched in 2016, is chaired by Japan (JAXA), Mexico (INEGI), and the U.S. (NASA), and places key emphasis on engaging with user stakeholders such as national statistical offices and ministries, as well as UN specialized agencies, who already use, or would significantly benefit from using EO to ensure implementation and monitoring of SDGs. Beyond broadening interest and awareness of EO support to the SDGs, and increasing skills and capabilities in uses of EO for the SDGs and their broader benefits, the EO4SDG initiative focuses on developing country examples, and expanding successful use cases, of EO adoption and integration in SDG monitoring and implementation.

Assessments by GEO and the Committee on Earth Observation Satellites (CEOS) have highlighted a strong potential of EO for SDGs: 2 ("Zero Hunger"), 3 ("Good Health and Well-being"), 6 ("Clean Water and Sanitation"), 7 ("Affordable and Clean Energy"), 11 ("Sustainable Cities and Communities"), 12 ("Sustainable Consumption and Production"), 13 ("Climate Action"), 14 ("Life Below Water") and 15 ("Life on Land").

Achievements at a glance

EO4SDG continued its engagement with the United Nations (UN) Inter-Agency and Expert Group on the Sustainable Development Goals (IAEG-SDGs) Working Group on Geospatial Information (WGGI) and is actively involved in supporting a task stream of this working group led by two UN Member States, Colombia and Sweden. This task stream aims to develop guidance to enable national statistical offices (NSOs) and line ministries to mainstream "analysis-ready" EO – EO data that can be processed by the relevant agencies – and "production-ready" EO – more elaborate EO data, which can be directly integrated in the production of SDG indicators.

The initiative participated in several UN events including meetings of the UN IAEG-SDGs WGGI, the UN Statistical Commission Meeting (UNSC) in March 2018, the UN High Level Political Forum (HLPF) in July 2018, and the Eighth Session of the UN Committee of Experts on Global Geospatial Information Management (UN-GGIM 8), among other events. EO4SDG contributed input to the Committee on Earth Observation Satellites (CEOS) [EO Handbook on SDGs](#), which was released at the UNSC in March with a focus on EO contributions to the realization of the 2030 Agenda for Sustainable Development. The [HLPF](#) - an annual event during which several countries report on their progress on the SDGs – focused on "transformation towards sustainable and resilient societies", this year, providing an opportunity to review progress on 5 Goals: Goal 6, water and sanitation; Goal 7, affordable and clean energy; Goal 11, sustainable cities and communities; Goal 12, responsible consumption and production; Goal 15, life on land; and, Goal 17, partnerships for the Goals. Australia was one of the countries that provided



its [Volunteer National Review report](#), this year; this included references to [Digital Earth Australia \(DEA\)](#) and [Open Data Cube \(ODC\)](#) projects using and promoting satellite data. To complement its efforts, the Australian Government organized a special side-event around EO and SDGs. The side meeting, followed by two hands-on workshops, was designed to consult with, and inspire, more governments and organizations to take action on using EO with the SDGs, while providing necessary knowledge on how and where to begin with.



Country representatives from Australia, Greece, Vietnam, Namibia, Switzerland, and Vietnam present their perspectives on EO uses for the SDGs during the Australia-led side meeting as part of the 2018 HLPF. Credit: EO4SDG

Hungary was another country that submitted its [Volunteer National Review report](#) at the 2018 HLPF. Efforts aiming to emphasize opportunities and challenges for geospatial data stakeholders in the SDG context in Hungary include activities by a committed team of volunteers mandated by the Hungarian Society of Surveying, Mapping and Remote Sensing (MFTTT) to contribute to the implementation of the SDGs by identifying and promoting the use of geospatial and EO data. These efforts, inspired partly by EO4SDG and the Global Spatial Data Infrastructure Association, have focused on enhancing multi-stakeholder partnerships – for instance, between the MFTTT, the Hungarian Space Office, and the Hungarian Central Statistical Office, in support of geospatial/EO integration in national SDG monitoring and implementation.

As part of UN-GGIM 8, EO4SDG worked with UN-GGIM Americas, Mexico's National Institute for Statistics and Geography (INEGI), the NASA Applied Sciences Remote Sensing Training program (ARSET) and other CEOS and GEO contributors, to run a two-day training workshop focused on water, land cover, and land degradation and their related SDG indicators. The training included introduction to remote sensing techniques and overview of data portals and tools for visualizing and acquiring Earth observation (EO) data. This was attended by approximately 35 focal points from the Americas, including small island developing states (SIDS) from the Caribbean region, representing government and academia. Please click [here](#) for more details and presentation material.

Earlier in 2018, a workshop on "Implementing and Monitoring the Sustainable Development Goals in the Caribbean: The Role of the Ocean," was held in Saint Vincent and the Grenadines, as part of a broad collaboration of GEO Initiatives, governments of the Caribbean Small Island Developing States (SIDS), UN Agencies, and regional non-governmental organizations. This brought together forty-two participants from sixteen countries. Working with the SIDS governments and participating in their efforts to implement the 2030 Agenda is a novel approach, aiming to: identify the knowledge needs linked to the implementation and monitoring of the SDGs in the region; understand what ocean observations are required; and, identify what products are available to inform decision-making processes. Having a set of observational requirements provides a basis for a gap analysis to pinpoint those requirements that are currently not met, and help provide a prioritized overview of gaps.



SDG training workshop as part of the UN-GGIM8 Meeting on July 30-31, 2018 at UN Headquarters, New York. Credit: EO4SDG

The workshop resulted in a number of findings and recommendations (please click [here](#) for more details), which provided a basis for the development of a white paper on the role of the ocean for the



implementation and monitoring of the SDGs in the Caribbean SIDS. It also identified several candidate demonstration projects to showcase the use and benefits of EO in support of SDG monitoring and implementation in the Caribbean SIDS. Of particular interest was the development of a "geospace for SDGs", a grass-root driven, bottom-up approach complementary to the government-driven, top-down approach to the implementation of the 2030 Agenda. In collaboration with the government of Saint Vincent and the Grenadines, a first pilot geospace has been established on the eastern coast of Saint Vincent.



Participants of the "Implementing and Monitoring the Sustainable Development Goals in the Caribbean: The Role of the Ocean" workshop, St. Vincent and the Grenadines, January 17-19, 2018. Credit: Hans-Peter Plag

EO4SDG continued its engagement with the UN Environment, specialized (custodian) agency for several indicators under Goal 6, *ensure availability and sustainable management of water and sanitation for all*, and Goal 14, *conserve and sustainably use the oceans, seas, and marine resources for sustainable development*. To pilot the applicability of EO for supporting indicators 6.6.1, change in the extent of water-related ecosystems over time, and 6.3.2, change in ambient water quality¹, UN Environment initiated two pilot studies, in collaboration with the European Commission's Joint Research Center (JRC) and the U.S./ National Aeronautics and Space Administration (NASA) and UN Member States. Further, experts from EO4SDG and the broader GEO community contributed inputs to UN Environment on the revised SDG indicator 6.6.1 monitoring methodology. The updated methodology included a progressive monitoring approach, whereby different levels of country ambition allow for countries to monitor and report changes in water-related ecosystems using data generated by EO and validated by countries. The method also called for countries with higher levels of capacity to report additional data. A key milestone was the approval by the IAEG-SDGs, during 2018, of the updated 6.6.1 methodology as an internationally recognized Tier II² indicator monitoring methodology.

EO4SDG continues to work with UN Environment, the GEO community, partner nations, and other contributors to support a series of activities related to advancing the maturation and country adoption of EO for monitoring progress, and reporting on, 6.6.1. An example of an upcoming activity is a collaboration between UN Environment, the U.S. (NASA), the European Space Agency (ESA), and the European Commission's JRC in the organization of a workshop, intended to consult national stakeholders such as NSOs, water and environmental managers, to collaboratively discuss using EO to address data gaps, and identify associated training and capacity needs for monitoring and reporting on 6.6.1. This workshop will provide an overview of currently available EO data on water and land, and how these can complement in-situ data, and inform decisions on water resources management. Specific case studies on monitoring extent of inland surface water, water quality, and the state of wetlands from space will also be shared, as part of this meeting.

¹ In general, Indicator 6.6.1 lends itself to satellite-based EO, and Indicator 6.3.2 favors greater use of in situ EO.

² Tier Classification Definitions:

Tier I: Indicator is conceptually clear, has an internationally established methodology and standards are available, and data are regularly produced by countries for at least 50 per cent of countries and of the population in every region where the indicator is relevant.

Tier II: Indicator is conceptually clear, has an internationally established methodology and standards are available, but data are not regularly produced by countries.

Tier III: No internationally established methodology or standards are yet available for the indicator, but methodology/standards are being (or will be) developed or tested.



As part of its federated approach, EO4SDG has collaborated with the GEO Blue Planet initiative, which aims to ensure the sustained development and use of ocean and coastal observations for the benefit of society, in aspects of preventing and significantly reducing marine pollution as part of Goal 14. Blue Planet has hosted several meetings between UN Environment and relevant GEO groups, including the Blue Planet, GEO Aquawatch, and EO4SDG initiatives, to discuss GEO's support for the development of an Index for Coastal Eutrophication Potential (ICEP) for SDG indicator 14.1.1, index of coastal eutrophication and floating plastic debris density, and to facilitate coherence between water quality efforts in relation to Goals 6 and 14. Blue Planet's Steering Committee is currently exploring potential pilot projects for this effort. Further, Blue Planet also provided input for the development of a Global Manual on Ocean Statistics, which was produced by UN Environment. To further support UN Environment and the Intergovernmental Oceanographic Commission (IOC)-UNESCO in this topic, GEO Aquawatch has been developing an inventory of eutrophication monitoring methods and projects.

In 2017, EO4SDG participated in the Task Team of the UN IAEG-SDGs WGGI on SDG indicator 15.3.1, *proportion of land that is degraded over total land area*. This team, in collaboration with contributors from the broader GEO community, provided recommendations to the UN Convention to Combat Desertification (UNCCD) Committee of the Parties on a reproducible, scalable combination of EO and traditional data sources to assist in the development of global implementation strategies. A key milestone was the approval by the IAEG-SDGs of the 15.3.1 methodology as an internationally recognized Tier II indicator monitoring methodology, in late 2017. This engagement created the dynamics for a precedent setting request from the UNCCD Committee of the Parties to partner with GEO on a global initiative regarding Land Degradation Neutrality (LDN). The LDN Initiative's Implementation Plan was approved for inclusion with all other updated elements of the GEO Work Programme at the GEO Plenary meeting in Fall 2018. EO4SDG has been participating in the LDN interim implementation committee to optimize synergy between the two initiatives, from early on.

Through the EO4SDG Initiative, GEO has been organizing Member Country resources to help demonstrate applied use of EO in pilot countries. Examples include continued work with Colombia, Ghana, Kenya, Uganda, Senegal, Tanzania, Sierra Leone, Greece, Albania, among others. Much of this country specific work leverages the activities of the Global Partnership for Sustainable Development Data, GPSDD, as well as those of several GEO Work Programme elements. Some examples of engagement at country-level, and use cases of EO with the SDGs include the following:

The Global Agricultural Monitoring Initiative (GEOGLAM) Rangeland and Pasture Productivity (RAPP) Activity, in collaboration with the CEOS Systems Engineering Office (SEO), GEO (including EO4SDG) and the CEOS SDG Ad-Hoc Team, organized a workshop in Nairobi, Kenya in May 2018. Participating countries included Kenya, Senegal, Ghana, Tanzania, and Sierra Leone. The meeting supported a number of users, including government ministries, NSOs, geographic institutes, research scientists, and civil society on issues of food security and agriculture, land use and land degradation, among others, and on the use and applications of analysis-ready EO data to address data gaps and challenges around the aforementioned themes. During this event, the Africa Regional Data Cube (ARDC) was launched in Nairobi, Kenya. The ARDC is a free and open data management concept, based on the Open Data Cube (ODC), that brings satellite data to five countries in Africa (Ghana, Kenya, Tanzania, Senegal, Sierra Leone) to improve their capacity to assess sustainable development goals and enable the creation of efficient and effective decision-making products.



Mexico (INEGI) is working jointly with Geoscience Australia (GA), to develop capacity for implementing the Mexican Geospatial Data Cube to enable processing and analysis of satellite images in an efficient and timely manner. The cube will feature a nationwide database for archived, and recent, satellite images, as well as the tool for their immediate digital analysis directly on the platform. Of particular interest is the cube's scalability, since it can perform on laptops, supercomputers or on the cloud. Such characteristics propel processes involved in exploiting EO, such as: updating information products, monitoring changes, and generating useful information for surveys and censuses. In 2018, a team of five experts from INEGI received guidance during a 4-week workshop at the GA Headquarters in Canberra, Australia. During this period, the team worked with 5 laptops, and started testing algorithms on selected regions of Mexico.

The South African National Space Agency (SANSA) has been working with the Statistics South Africa (STATSSA) towards derivation of spatial indicators for sustainable human settlements, water, forest and agricultural management goals using satellite image products and statistical data. SANSA acquires, processes and disseminates satellite imagery to government end-users. In addition to provision of satellite imagery to government users, SANSA also develops and maintains base layers on human settlements, water and vegetation. SANSA, together with other stakeholders is currently participating in the SDG sectorial working groups led and managed by STATSSA. The working groups are tasked with provision or identification of available reliable geospatial, statistical and other sources of data required during the computation of the spatial SDGs indicators.



The INEGI delegation during a 4-week training at the GA Headquarters in Canberra, Australia. Credit: Jimena Juárez

Several national agencies in Colombia have been working to integrate national statistics, household surveys and routine administrative data with EO, geospatial information, and other data to monitor and implement the SDGs at country level. During 2018, building on past engagement with Colombia's National Statistics Office (DANE), the U.S. (NASA) has been collaborating with DANE and colleagues at Conservation International (CI) and the UN Habitat on urban-related SDGs, and the unique value remote sensing and EO brings in monitoring urban SDG targets and indicators. Some key highlights include a technical training workshop, which was co-sponsored by CI and NASA, during the Regional Center for Mapping Resource for Development (RCMRD) 'International Conference on Space Science for Sustainable Development' during August 2018 in Nairobi, Kenya. The training focused on SDG indicator 11.3.1, ratio of land consumption rate to population growth rate, including topics of methodology, data sources, and the CI-developed 'Trends.Earth', a free and open source cross-platform geographic information system (GIS) and its applicability for measuring and reporting on 11.3.1. In addition, EO4SDG is exploring ways to collaborate with UN Habitat in 2018-2019, by integrating capacity building to extend methods, and help countries use EO to monitor and report on urban-related SDG indicators such as SDG 11.3.1, as part of a series of regional workshops on the definition of cities that UN Habitat and partners are organizing. Further, EO4SDG contributors from the KTH Royal Institute of Technology in Sweden, in partnership with UN Habitat, will hold on a joined session on 'Geospatial Information and Urban SDGs' as part of the UN World Geospatial Congress in late 2018.

The Japan International Cooperation Agency (JICA) and the Japan Aerospace Exploration Agency (JAXA) have launched the 'Forest Early Warning System in the Tropics ([JJ-FAST](#))', a web-based system that monitors tropical forests every 1.5 months using Phased Array type L-band Synthetic Aperture Radar



(PALSAR) -2 aboard ALOS-2 (50 m resolution). As of June 2018, the system's service coverage was expanded to include 77 countries.

The Global Mangrove Watch³ ([GMW](#)) is an activity developed under JAXA's Kyoto & Carbon Initiative framework, led by the Aberystwyth University (U.K.), solo Earth Observation (Japan) and Wetlands International. GMW is part of the Ramsar Science and Technical Review Panel work plan for 2016-2018, and a pilot project to the Ramsar Global Wetlands Observation System (GWOS), which is implemented under the GEO-Wetlands Initiative. The GMW has generated a global baseline map of mangroves for 2010 using ALOS PALSAR and Landsat data that is available for [public download](#). Maps for seven more epochs between 1996 and 2017 are scheduled for release in late 2018 and annual maps are planned from 2018 and onwards.

GEO Wetlands and EO4SDG colleagues are working with national partners in Rwanda, including the National Institute of Statistics, under a German (DLR) funded project, to improve methods for producing satellite-based wetland inventories on national scale, and strengthen the reporting capabilities towards the Ramsar Convention and the SDG process.

Additional information

In 2017, the UN Task Team on Satellite Imagery and Geospatial Data developed a guide for NSOs considering using satellite imagery data for official statistics. This report provides a brief introduction to the use of EO for official statistics, types of sources available, and methodologies for producing statistics from this type of data. It also summarizes results of four pilot projects produced by Task Team members; the Australian Bureau of Statistics (ABS), Mexico's INEGI, Colombia's DANE, and Google.

The 2018 European Association of Remote Sensing Companies ([EARSC](#)) Product Award went to Dust Frequency Maps (DFMs) by SILEX CLOUDS, which provides a historical analysis of dust storm occurrences over the last 12 years. This product will support SDGs related to energy (improving the efficiency in the management of renewable energy infrastructures), climate change (identifying changing weather patterns, real-time monitoring of extreme dust storm events), and finally, sustainable cities and communities (addressing challenges related to urban infrastructures and services).

Find out more at <http://eo4sdg.org> and via Twitter @EO4SDG

In Fall 2017, EO4SDG released a new website, which serves as a GEO and CEOS community resource; a resource for the UN SDG community; as well as a resource for national government institutions, including NSOs, line ministries, and other key stakeholders with a role in the SDG monitoring and implementation process. For more information, visit: <http://eo4sdg.org>. If you have an impact story on EO uses with the SDGs, we would like to hear from you and feature this on our website! The initiative also has an active Twitter account, @EO4SDG. Follow us!

³ The Global Mangrove Watch (GMW), originally formed as part of the JAXA Kyoto and Carbon initiative, aims to provide geospatial information about mangrove extent and changes to the Ramsar Convention, national wetland practitioners, decision makers, and non-governmental organizations.