GROUP ON EARTH OBSERVATIONS

Earth Observations for Sustainable Development Goals Annual Meeting 2019

Executive Secretary: Argyro Kavvada, USA [NASA/ BAH]

Co-Chairs: Lawrence Friedl, USA [NASA]
Paloma Merodio, Mexico [INEGI]
Chu Ishida, Japan [JAXA]

5 August 2019 / New York, U.S.A.

AGENDA

Session 1.1: Program Introduction, Recent Updates & Lessons Learned

Session 1.2: 2020-2024 EO4SDG Strategic Implementation Plan

Open Session: Earth Observation Solutions to Address the UN SDG

Session 2.1: Breakout Round A — Group A1, Good practice examples of methods for measuring and reporting on SDG indicators & Group A2, EO4SDG Federated Approach to GEO's overall service to the SDG

Session 2.2: Breakout Round B — Group B1, Strengthening Partnerships and Advancing EO Use in SDG Monitoring, Reporting & Decision Making, Group B2 — GEO Secretariat support for EO4SDG, Resources, and Prioritization of EO4SDG Deliverables

Adjourn

MEETING OBJECTIVES & ACTIONS

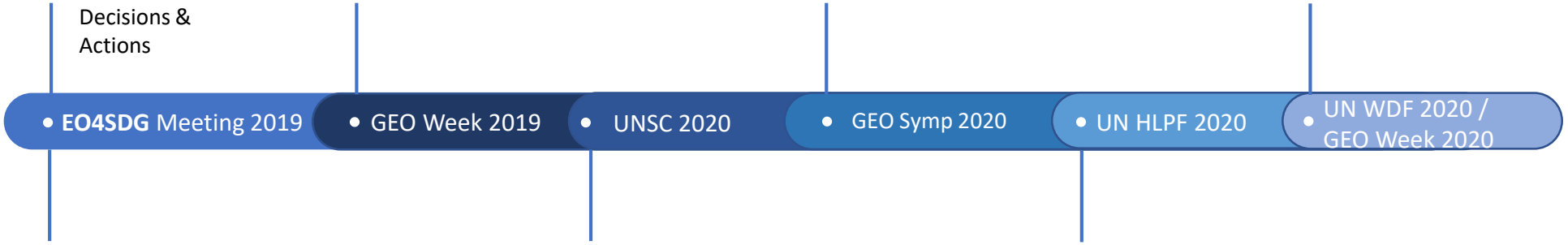
- Agreement on key successes of EO4SDG Initiative
- Increased confidence about the effectiveness of EO4SDG Initiative; reinforce the implementation plan
- Agreement on lessons learned (including success factors, existing gaps & items we need to do better, risks & opportunities)
- Agreement on desired functions for a SDG-focused expert at the GEO Secretariat.
- A process to coordinate across ongoing and new GEO Work Program Elements.
- Agreement on guidelines to package good practice examples of methods on SDG indicators
- Leads for this packaging, particularly with thematic GEO WP elements & GEO Member Countries
- Agreement on key items and associated leads to deliver these items by: 1) GEO Plenary; 2) during 2019-2020.

TO BE COMPLETED BY BREAKOUT GROUPS

GROUP ON EARTH OBSERVATIONS

EARTH OBSERVATIONS FOR SUSTAINABLE DEVELOPMENT GOALS

EO4SDG Deliverables Timeline – Breakout Group XX



Key Outcomes

1.

2.

3.

4.

5.

AGENDA

EO4SDG Annual Meeting	Monday, 5 August 2019
Location	**Conference Room D (CB Building)** **UN Headquarters, New York, USA**
Event	**EO4SDG Annual Meeting**
9:00AM - 10:00AM	Event Passes Pick Up & Security Screening for Entrance to UN Headquarters
10:00AM-12:30PM	***Work Session 1 (Closed)*** Session 1.0: Setting the Stage & Meeting Objectives Session 1.1: EO4SDG Successes, Challenges, Lessons Learned & Opportunities for the Future Session 1.2: 2020-2024 EO4SDG Strategic Implementation Plan
12:30PM - 1:30PM	***Lunch***
1:30 - 2:45	***Open Session: Earth Observation Solutions to Address the UN SDG*** Keynote: Mr. Steven Ramage, Head of External Relations, Group on Earth Observations Presentation: Mr. Ian Coady, Geospatial Advisor, Department for International Development, UK *Moderated Discussion*
2:45-3:00	***Break***
3:00-6:00	***Work Session 2 (Closed)*** Next Steps, Decisions & Actions to Pursue Session 2.1 Breakout Round A • Good practice examples of methods for measuring and reporting on SDG indicators • EO4SDG Federated Approach to GEO's overall service to the SDG Session 2.2 Breakout Round B • Strengthening Partnerships and Advancing EO Use in SDG Monitoring, Reporting, and Decision Making • GEO Secretariat support for EO4SDG, Resources, and Prioritization of EO4SDG Deliverables *Moderated Discussion and Adjourn*

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Adjourn

GROUP ON EARTH OBSERVATIONS

Earth Observations for Sustainable Development Goals - Recent Updates

Executive Secretary: **Argyro Kavvada, Ph.D.**

5 August 2019 / New York, U.S.A.

2018-2019 Timeline of Activities with EO4SDG Engagement

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August 2018 – October 2018

7/30-8/3 UN-GGIM 8, SDG Training

8/12, 15-17 RCMRD Conference, SDG 11.3.1 training

8/26-31 World Water Week

9/6 IAEG-SDG Virtual September Mtg.

9/ 17-19 UN/ Austria Symposium, Space for SDGs

9/24-25 73rd UNGA

10/16-18 32nd CEOS Plenary

10/22-24 UN World Data Forum 2018

10/29-11/2 GEO Week 2018

November 2018 – May 2019

11/5-8 8th IAEG-SDG Mtg.

11/7-9 UNEP SDG 6.6.1 Consultation Workshop, Lake Como, Italy

11/19-21 UN World Geospatial Congress

12/6-8 5th WGGI Mtg.

12/ 10-14 AGU Fall Meeting

3/5-8 50th Session - UN Statistical Commission

3/25-28 9th IAEG-SDG

4/2-4 CEOS SIT Mtg.

5/ 13-17 ESA Living Planet Symposium

5/ 20 GEO SDG Awards Issuance

5/26-29 GEO Symposium

June 2019 – December 2019

7/9, 16, 23 SDG 11.3.1 & 15.3.1 Webinar

8/5-6 EO4SDG Annual Mtg. & GEO SDG Review Panel

8/7-9 UN-GGIM9

8/19-23 AmeriGEO Week 2019

9/3 GEO PB Mtg. w/ UN Habitat

9/9-12 CEOS SIT TW

10/6-11 ISRSE-38/Pecora-21 Conference

10/21-25 IAC 2019

11/4-8 GEO Week 2019

12/ 9-13 AGU Fall Meeting

2018-2019 Timeline of Activities with EO4SDG Engagement

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EARTH OBSERVATIONS FOR SUSTAINABLE DEVELOPMENT GOALS

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December 2019

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Key Results Achieved in 2017-2019

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EO Integration in SDG Methodologies

- SDG indicators 6.6.1, 6.3.2, 11.3.1, 11.7.1, 15.3.1
- Feasibility studies, pilot projects, in-depth endeavors
- Focus on scalability & replicability of methods

Capacity Development

- In-person trainings: UN-GGIM 8, RCMRD Intern. Conf. 2018, AMERIGEO 2019
- Webinars (SDG Awareness; thematic webinars)
- Contribution to UN Habitat, UNEP, UNCCD activities

Stakeholder Engagement

- UN IAEG-SDG WGGI, UN-GGIM, UN Custodian Agencies
- Line ministries, NSOs, Mapping Agencies, GEO Community
- Non-public sector

End User Needs, Data & Information Products

- Survey to GEO Member Countries on EO data use with SDG
- Satellite data requirements, data acquisition, access, discovery and usability (with CEOS, GEOGLAM)

SDG 6.6.1 Technical Brief, http://eo4sdg.org

GEO Report, 'Earth Observations and Sustainable Development Goals'

EO4SDG website: http://eo4sdg.org

CEOS EO Handbook on SDGs, http://eohandbook.com

SDG 11.3.1 Retrieved from: Training Module by UN Habitat

EO4SDG Session: 2018 UN World Data Forum

EO4SDG Side Event – GEO Week 2018

EO Integration in SDG Methodologies

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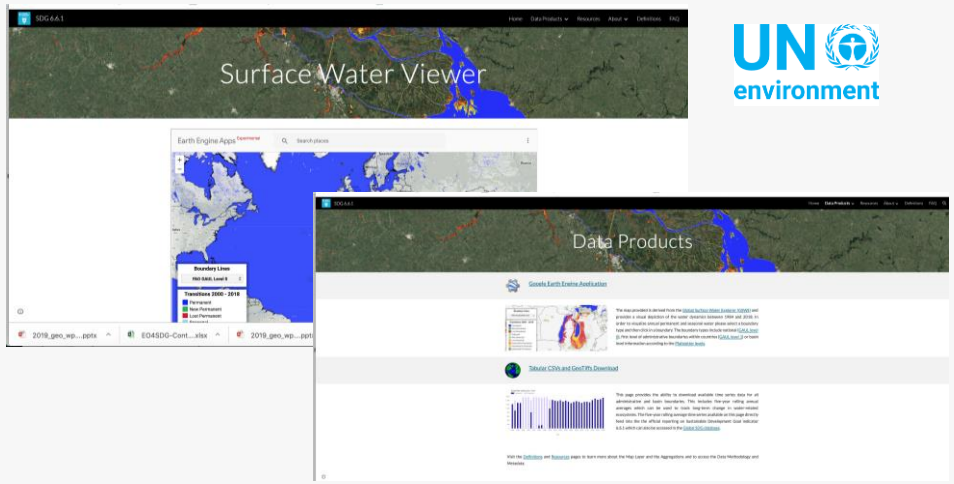
EARTH OBSERVATIONS FOR SUSTAINABLE DEVELOPMENT GOALS

The Water-Related Ecosystems platform, https://www.sdg661.app/



UN environment

SDG 6.6.1 Methodology: Moved from Tier III to Tier I

(internationally accepted methodology, data regularly produced)

- Contributed to revised monitoring methodology: explicit references to EO on spatial extent of open waters / vegetated wetlands and WQ
- Pilot tested use of EO for official monitoring on mangroves, wetlands and WQ
- Joined capacity development efforts w/ UNEP to promote EO use for national policy making

Regional workshop on SDG 6.6.1 convened by UNEP with EO4SDG participation, Bogota, Colombia. **Countries:** Colombia, Peru, Venezuela, Bolivia, Panama, Costa Rica, Ecuador

Country consultation workshop convened by UNEP, Italy on 7-9 Nov 2018

6 CLEAN WATER AND SANITATION

EO Integration in SDG Methodologies

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EARTH OBSERVATIONS FOR SUSTAINABLE DEVELOPMENT GOALS

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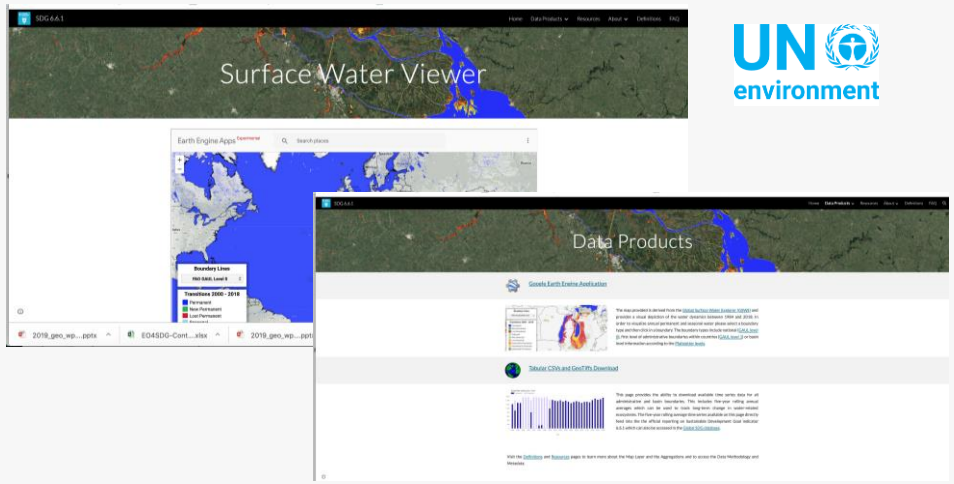


UN environment

Moving Forward ..

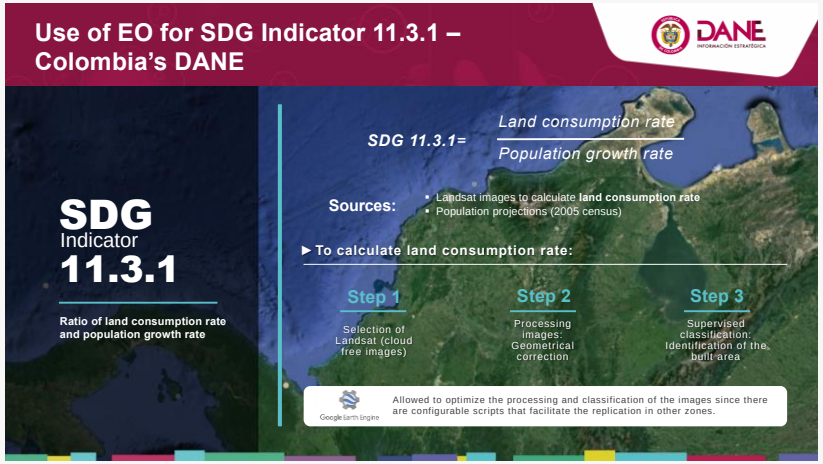
- Global / Regional EO products (UNEP 2020 data drive to countries, SDG661.app)
- Enhanced community engagement, country adoption of using EO (national experiences, good practice examples)
- Joined capacity development efforts w/ UNEP & countries to promote EO use for national policy making
- Guidance on EO fit for purpose datasets, tools & platforms

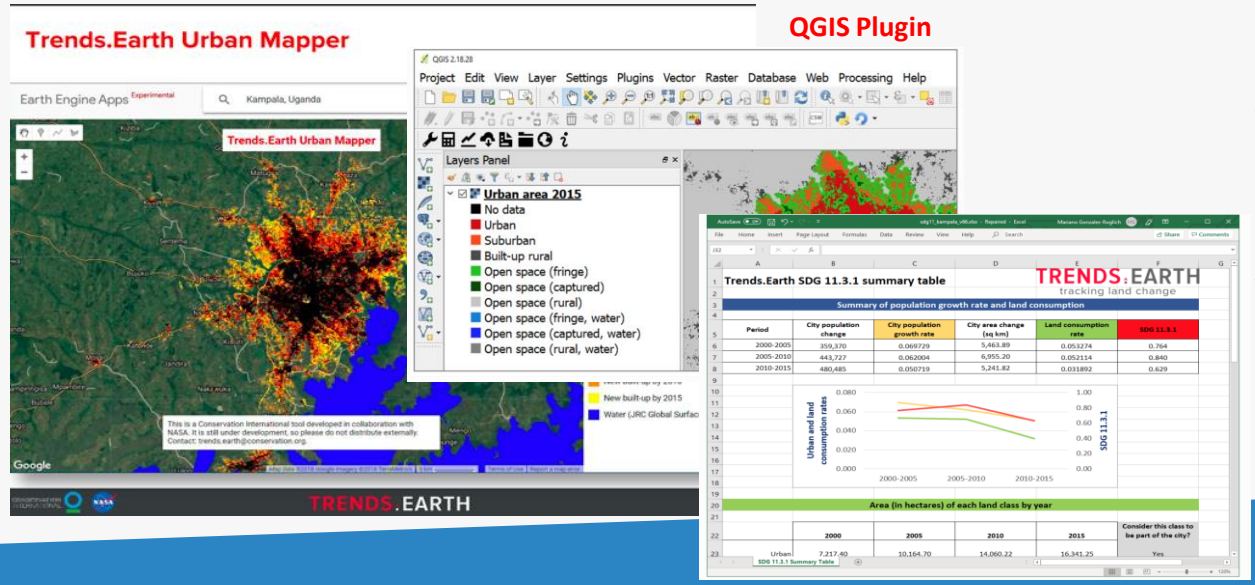
Regional workshop on SDG 6.6.1 convened by UNEP with EO4SDG participation, Bogota, Colombia.
Countries: Colombia, Peru, Venezuela, Bolivia, Panama, Costa Rica, Ecuador

Country consultation workshop convened by UNEP, Italy on 7-9 Nov 2018
Countries: Senegal, Uganda, Colombia, Afghanistan, UAE and Malaysia.

6 CLEAN WATER AND SANITATION

Scaling use of EO in support of 11.3.1





Sustainable Urbanization

- National experience from Colombia's DANE
- Pilot with Conservation International, NASA, UN Habitat, Colombia, Mexico, Morocco, Peru
- Capacity Development Efforts: Webinar Series on SDG 11.3.1 & 15.3.1 – July 2019 (in English & Spanish) [NASA ARSET, UN Habitat, Conservation International, UNCCD]

Moving forward

- EO4SDG wotk with Human Planet, GUOI, CEOS on guidance on global datasets, EO good practices, platforms & tools, national experiences, relevance of population data at city level, definition of cities, urban vs rural
- Leverage what ALREADY EXISTS!

http://trends.earth/docs/en/background/understanding_indicators11.html

https://unhabitat.org/wp-content/uploads/2019/05/Training-Indicator-11.3.1-Module_D.pdf

Capacity Development and Outreach Activities

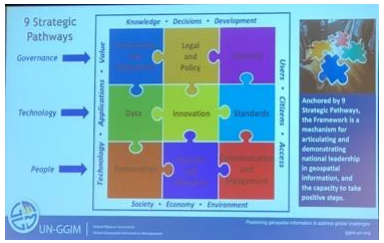
July 30-31 SDG Training at UN-GGIM 8

Workshop Highlights:

- Approximately 35 people from the Americas participated, with the majority from SIDS in the Caribbean.
- Focus on water management, land cover, and land degradation as part of the SDGs, including remote sensing techniques; overview of data portals and tools for visualizing and acquiring EO

SDG training workshop as part of the UN-GGIM 8 Meeting on July 30-31, 2018 at UN Headquarters, New York. ***Credit***: EO4SDG

Director, Geospatial Solutions, Australian Bureau of Statistics on use of EO data from a NSO perspective. ***Credit***: EO4SDG



UN-GGIM's Inter-Regional Advisor, Greg Scott on the overarching Strategic Statistical Geospatial Framework. ***Credit***: EO4SDG

Guest speaker Mariano Gonsalez of Conservation International provides remote presentation on Use of Trends.Earth tool with SDGs ***Credit***: EO4SDG

Presentation material: *https://arset.gsfc.nasa.gov/all/workshops/GGIM-SDGs-18*

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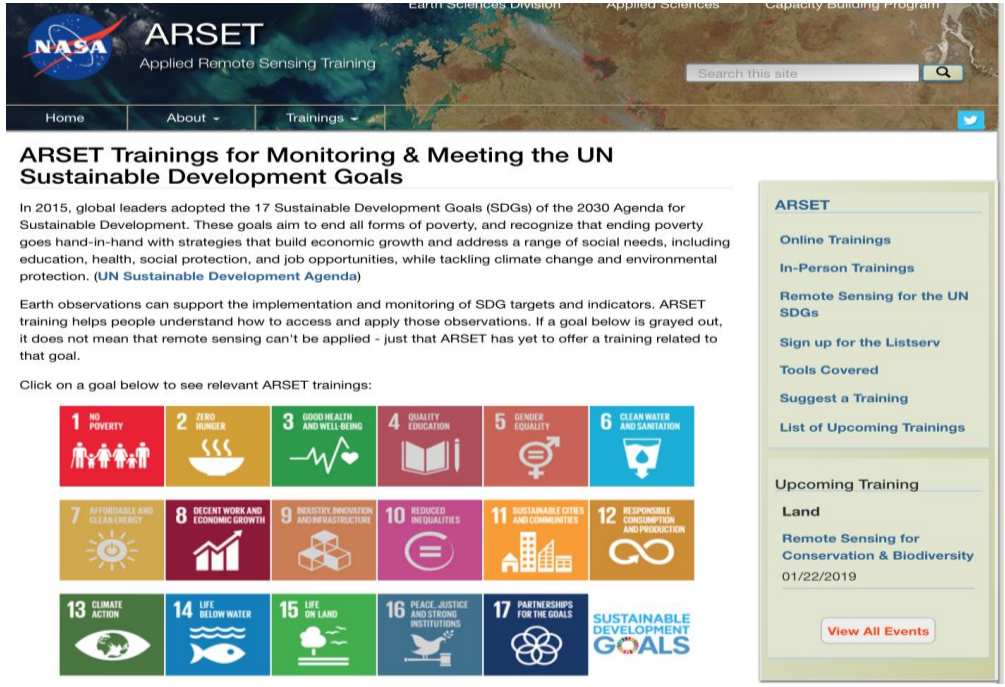
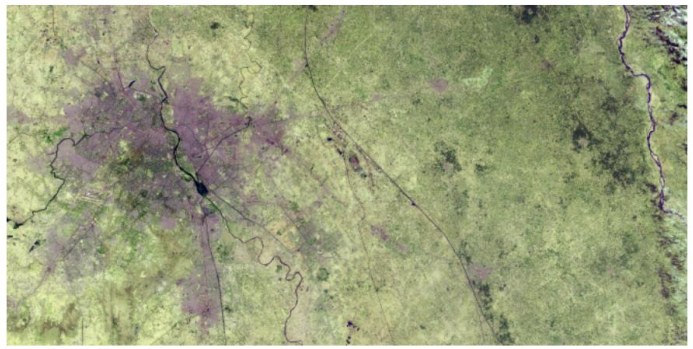
International: Trainings on Earth Observations & SDGs

https://arset.gsfc.nasa.gov/



Advanced Webinar: Remote Sensing for Monitoring Land Degradation and Sustainable Cities SDGs; Webinar Avanzado: Teledetección para el Monitoreo de los ODS sobre la Degradación de Tierras y Ciudades Sostenibles

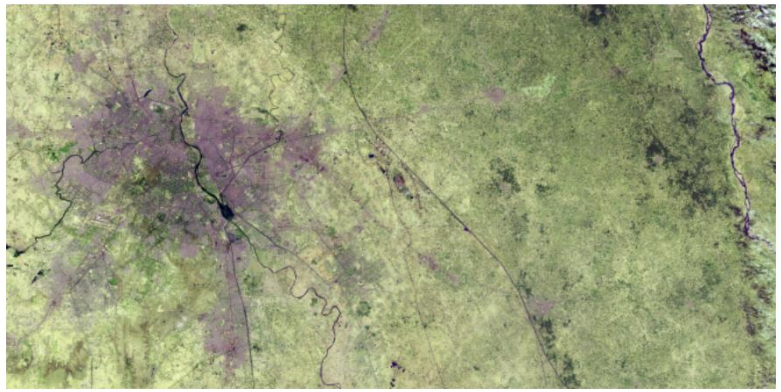


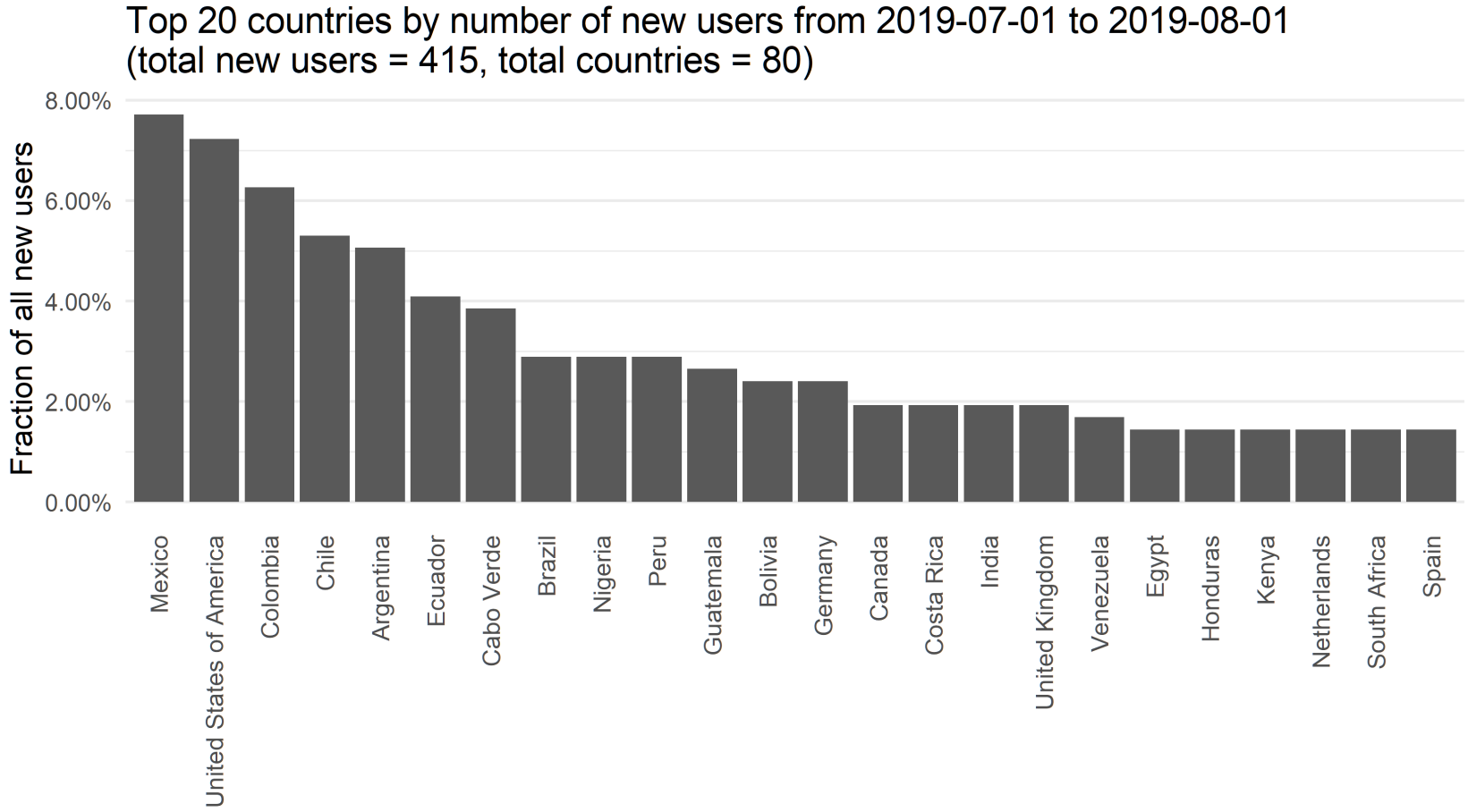
11.3.1 & 15.3.1 Webinars — NASA ARSET, Conservation International, UN Habitat, UNCCD

- **Engish & Spanish**
- **971 participants from 105 countries**
- **700 + Unique Organizations**

SDG Indicators 11.3.1 (Sustainable Cities) & 15.3.1 (Land Degradation) Webinars

Advanced Webinar: Remote Sensing for Monitoring Land Degradation and Sustainable Cities SDGs; Webinar Avanzado: Teledetección para el Monitoreo de los ODS sobre la Degradación de Tierras y Ciudades Sostenibles





Slide Credit: Conservation International — Mariano Gonzalez, Alex Zvoleff, Monica Noon

CEOS Work Plan (2019-2021)
AHT SDG Deliverables

#	Objective/Deliverable Description
SDG-2	Compile and maintain a **compendium of CEOS Agencies engagement** on SDGs
SDG-3	Review and assess the **contribution of EO to the SDG Targets and Indicators**. Produce an assessment and policy brief
SDG-4	CEOS **engagement plan on SDGs**
SDG-5	Analyze the **SDG satellite data requirements**
SDG-6	**Open Data Cube algorithms for the SDG**
CB-41	Collaboration between AHT-SDG and WGCapD to organize **SDG-related training and capacity building** related to the use of space-based EO to meet the data challenges of the 2030 Agenda for Sustainable Development

Task Stream with UN IAEG-SDG WGGI on EO and SDG

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- Develop expert advice and guidance to IAEG-SDG and the larger statistical community
- Document national experiences and good practices including case studies, elevate use of EO in national monitoring & reporting efforts / VNRs
- Provide recommendations on the role of NSOs on the uptake of Earth observations.

IAEG-SDG feedback (July 2019): "It is envisioned that the Working Group will build on existing work and ongoing working mechanisms among stakeholders, **especially the work of custodian agencies,** and will consult widely regarding the current status of methodologies and geospatial data collection and input tools as a starting point."
The membership of the group should be expanded to include experts in any country (not just those that are members of the IAEG or HLG)

EO for SDG Compendium and Policy Brief

A stepwise approach

Desktop Review

Step 1 : Screen the indicators

Step 2: Analyse indicator metadata

Step 3: Classify supported indicators

Step 4: Describe role of EO in each indicator (factsheets)

External consultation

Step 5: Consult EO experts and SDG stakeholders

Step 6: Iterate and refine factsheets

Collation of materials

Step 7: Compilation of materials:

(i) Compendium

(ii) Policy brief

Step 8: Review by GEO/CEOS/WGGI and disseminate

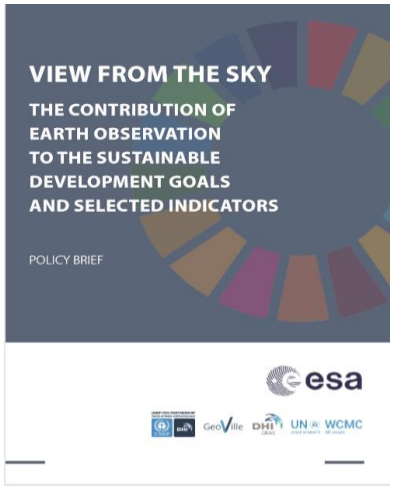
Assessing EO potential for indicators

National experience in using EO for selected indicators

Under Review

Compendium

Policy brief



esa

UN environment WCMC 40 years

GeoVille Information Systems and Data Processing GmbH

DHI GRAS

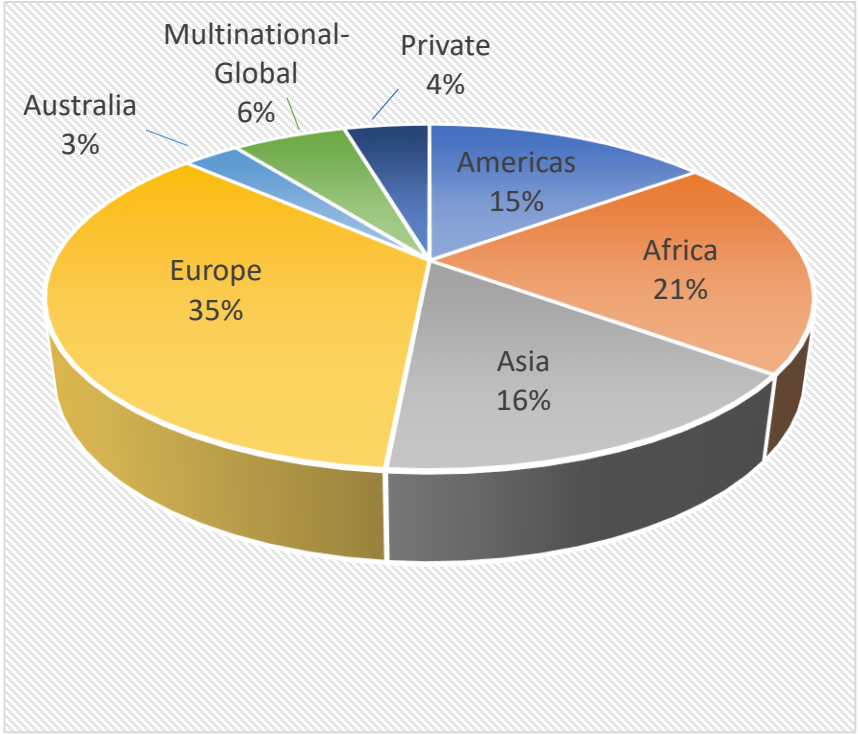
UNEP-DHI PARTNERSHIP Centre on Water and Environment

UNEP DHI

Survey on EO Uses for SDGs by GEO Member Countries

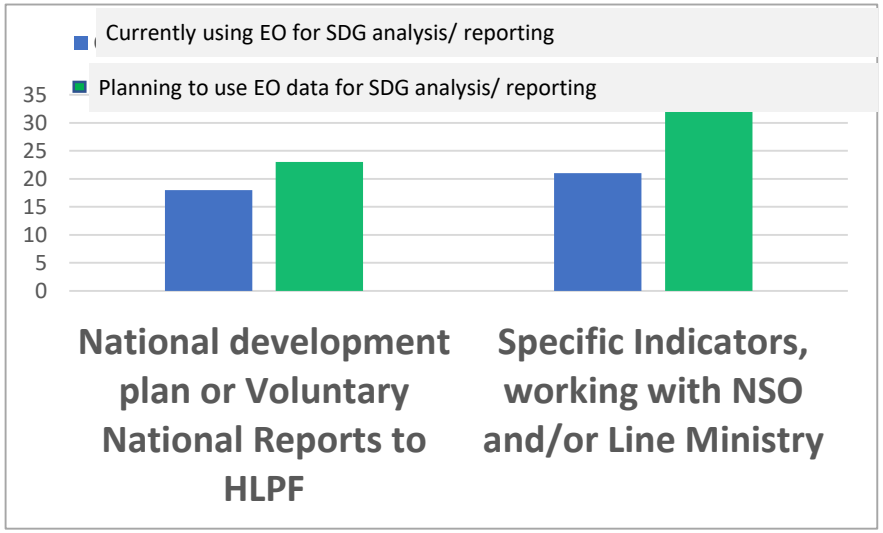
69 Unique Responses

Government, Multinational Research or Conservation Entities

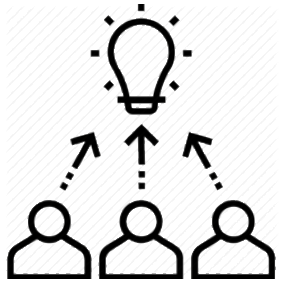


Current Use of EO for SDGs

- SDG 15 most commonly addressed, 15.1.1 (forest area), 15.3.1 (degraded land)
- **25 country examples** of use of EO for analyzing and reporting on SDG Indicators
- Additional good practice use cases



Survey on EO Uses for SDGs by GEO Member Countries (Cont.)



Recommendations for Action

– **Harmonization** of global best practices of EO uses with the SDGs
– **Toolkit of workflows** between EVs and SDG Indicators with **concrete examples and country use cases, including testimonials** about impact on cost, time, other resources
– Guidance on how to handle and process EO data (for different levels of geospatial expertise)
– A universal platform to enable use of EO for SDG monitoring, including **a library of workflows ready to replicate**
– A dedicated forum between countries to exchange EO best practices and address technical issues
– A process that demonstrates how EO data are used to achieve the Goals
– Workshops at national level to help promote local cross-institutional collaborations and promote skills to apply EO for SDG monitoring, analysis, and reporting
– At the GEO Ministerial Summit 2019, **showcase country success stories** of indicators and targets measured using data generated from EO

Acknowledgements:
This survey was conducted by EO4SDG Co-Chair Japan [JAXA] & S ymbios in cooperation with the GEO & EO4SDG Secretariat.

Issuance of Earth Observations for Sustainable Development Awards 2019

GROUP ON EARTH OBSERVATIONS

EARTH OBSERVATIONS FOR SUSTAINABLE DEVELOPMENT GOALS

Recognize excellence and innovation, generating examples that users can consider and pursue

25 Nominations

(*23 valid submissions*)

More information:
http://eo4sdg.org
http://earthobservations.org/
@ EO4SDG
@GEOSEC2025

Winners will be recognized at GEO Week 2019 in Canberra, Australia.

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EARTH OBSERVATIONS FOR SUSTAINABLE DEVELOPMENT GOALS

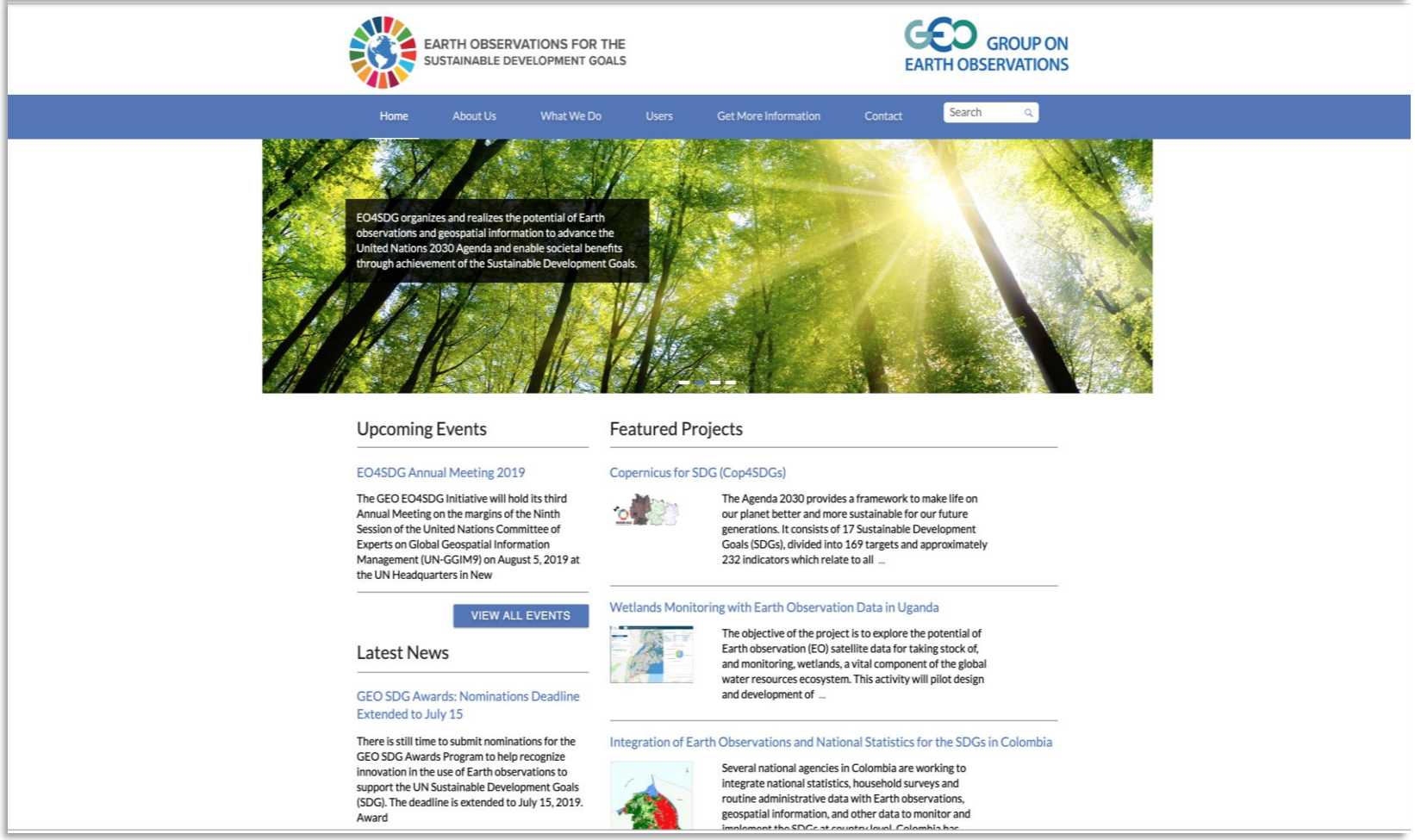
Select Publications

1. Anderson, K., Ryan, B., Sonntag, W., Kavvada, A., Friedl, A. Earth Observation in Service of the 2030 Agenda for Sustainable Development (2017)
2. Kavvada, A., Cripe, D., Friedl. L (book under review) Earth Observation Applications and Global Policy Frameworks, Geophysical Monograph Series, American Geophysical Union
3. Metternicht, Kavvada, A., Friedl, L., Kerblat, F., Held., A., Sonntag, W. (closed, editing phase) Remote Sensing of Environment Special Issue “Earth Observations for the Sustainable Development Goals”
4. Vekerdy, Z., Paganini M., Kavvada, A., Mlisa, A., Aubrecht, C. (closes Oct 31) Remote Sensing Special Issue "EO Solutions to Support Countries Implementing the SDGs”
5. Whitcraft, A., Becker-Reshef, I., Justice, C., Gifford, L., Kavvada, A., Jarvis, I. (under review). No Pixel Left Behind: Linking Earth Observations for Agriculture and the United Nations Sustainable Development Goals, Remote Sensing of Environment
6. Hakimdavar, R. et al. (under review). Monitoring Water-Related Ecosystems with Earth Observation Data in Support of SDG 6 Reporting. Remote Sensing of Environment
7. Dhu, T. et al. (under review). National Open Data Cubes and their Contribution to Country-Level Development Policies and Practices.
8. Kavvada, A. et al. (in progress). Earth Observations and the Sustainable Development Goals: Lessons Learned, National Use Cases, and Priorities to Advance the UN Agenda 2030. Remote Sensing of Environment

Initiative's Website

Twitter: @EO4SDG

http://eo4sdg.org



EO4SDG Logo

EARTH OBSERVATIONS FOR THE SUSTAINABLE DEVELOPMENT GOALS

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Good Practices and/or Lessons Learned

- As a result of work on Indicators, statisticians (at global to national level) now recognize that measuring and monitoring requires GI/EO to provide new and consistent data sources and methodologies to inform official statistics & the SDG.
- Need for guidance development to enable NSOs to mainstream EO into national statistical processes
- Need for data standards to enable EO/ GI use as official data in the generation of national statistics
- Capacity development through co-design of applications and functional tools is essential for country adoption & ownership
- Innovative partnerships & cross-cutting activities to encourage data integration from different sources and address challenges in operationalizing successful applications/ projects

Items for Consideration

- How to work with National and Regional GEOs to integrate Earth observations into the development, implementation, and monitoring of the SDG and coordinate with National Statistical Offices for effective reporting.
- Openly accessible and easily discoverable EO methodologies for SDG indicators, coupled with coordinated capacity development to enhance their adoption and sustained, long-term use.
- Key functions for a GEO Sec SDG Technical Expert.
- Reinforce engagement with GEO Member Countries, POs & GEO WP Elements to develop, scale, and/or document examples of EO uses with SDG

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EARTH OBSERVATIONS FOR SUSTAINABLE DEVELOPMENT GOALS

Report on SDGs Related Activities

Presented by: Chu Ishida, EO4SDG Co-chair, JAXA

EO4SDG Annual Meeting 2019
New York, USA
August 5, 2019

Contents

1. Follow-up of the Survey on EO data use for SDGs by GEO Member countries: Country use cases of EO data for SDG Indicators

2. Experimental computation of selected SDG Indicators using existing global/national datasets and tools (QGIS, Trends.Earth)

1. Follow-up of the survey on EO data use for SDGs by GEO Member countries: Country Use Cases of EO data for SDG Indicators

- GEO survey on EO data use for SDGs by Member countries in late 2018 to early 2019 indicated strong requirements by Member countries, particularly by NSOs, on concrete examples and country use cases with testimonials about impact on cost, time other resources, and guidance on how to handle and process EO data (for different levels of geospatial expertise).
- Follow-up request to share country use cases and project documentation was sent to the survey respondents who kindly indicated willing to share them in late March.
- So far received one input from New Zealand on developing national land use map using satellite data.
- A template for the country use case was prepared (thanks to Argie for the draft) and sent to those respondents in May.
- Planning to request GEOSEC to issue a request to GEO Member countries to share country use cases for reporting to GEO Plenary 2019.

2. Experimental Computation of SDG Indicators Using Existing Global/National Datasets and Tools (QGIS, Trends.Earth)

Objectives

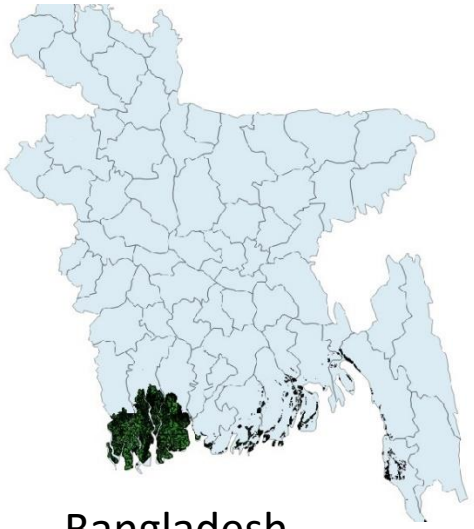
- Compute selected SDG Indicators on experimental-basis using existing global/national datasets and tools (QGIS, Trends.Earth) to identify usable datasets and develop a workflow for assessing applicability of datasets and tools and identify any gaps.

Computed SDG Indicators :

6.6.1 Spatial extent of water-related ecosystems*
9.1.1 Rural population within 2km distance from all-season roads*
11.3.1 Land consumption per population growth*
11.7.1 Share of built-up area of cities that is open space for public uses
15.1.1 Forest areas as a proportion of total land area
15.3.1 Proportion of degraded land per total land*
15.4.2 Mountain Green Cover Index

**WGGI Task Stream 2 indicators*

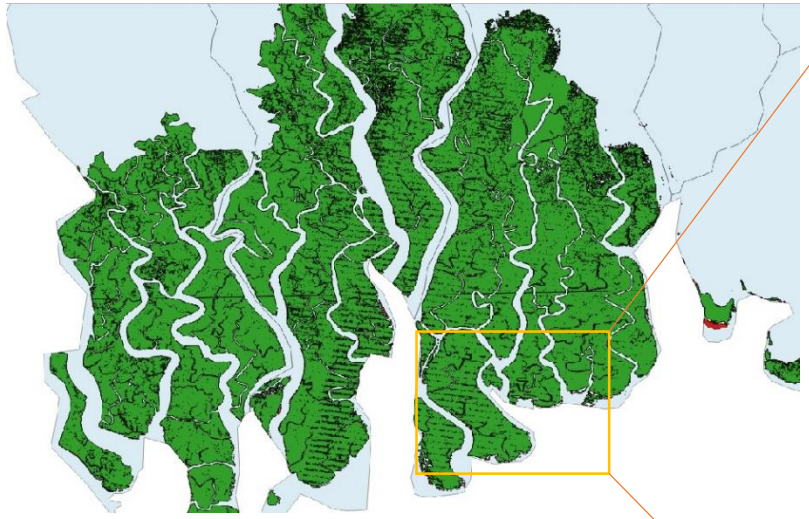
SDG6.6.1 Spatial Extent of Water-related Ecosystem—Mangrove

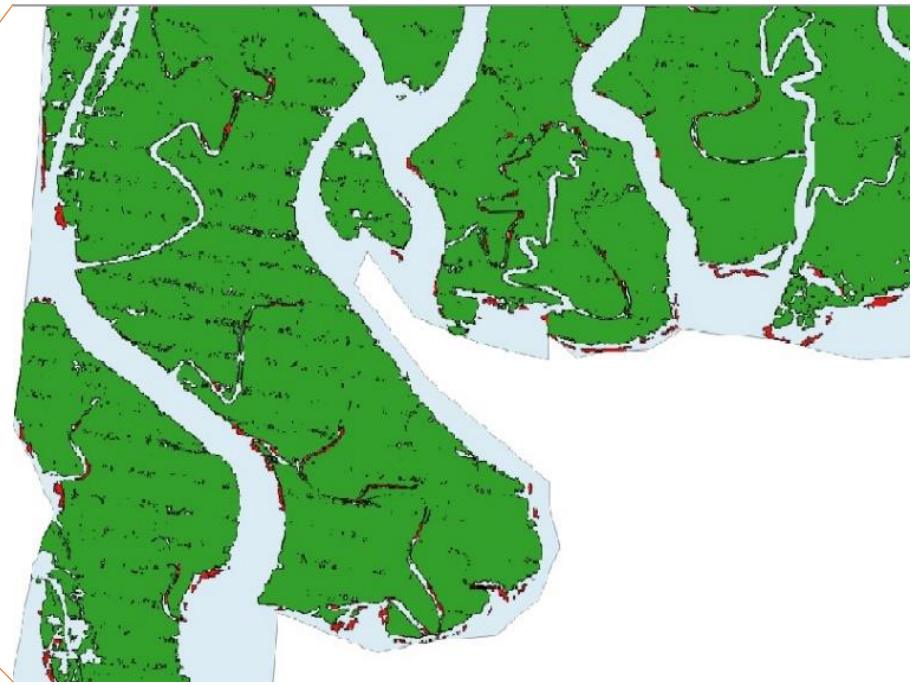


Bangladesh

Data: Global Mangrove Watch (GMW) data
2010 baseline data,
1996、2007、2008、2009、2015、2016 annual data
Change larger than 1ha is detectable.

http://data.unep-wcmc.org/datasets/45





Mangrove area estimation for Bangadesh

1996 4120.0 km^2 (red)
2010 4121.3 km^2 (green)

(Reference) Mangrove area estimation for Thailand

1996 2310.5 km^2
2010 2177.1 km^2

SDG 9.1.1 Rural Population within 2km Distance from All-season Roads

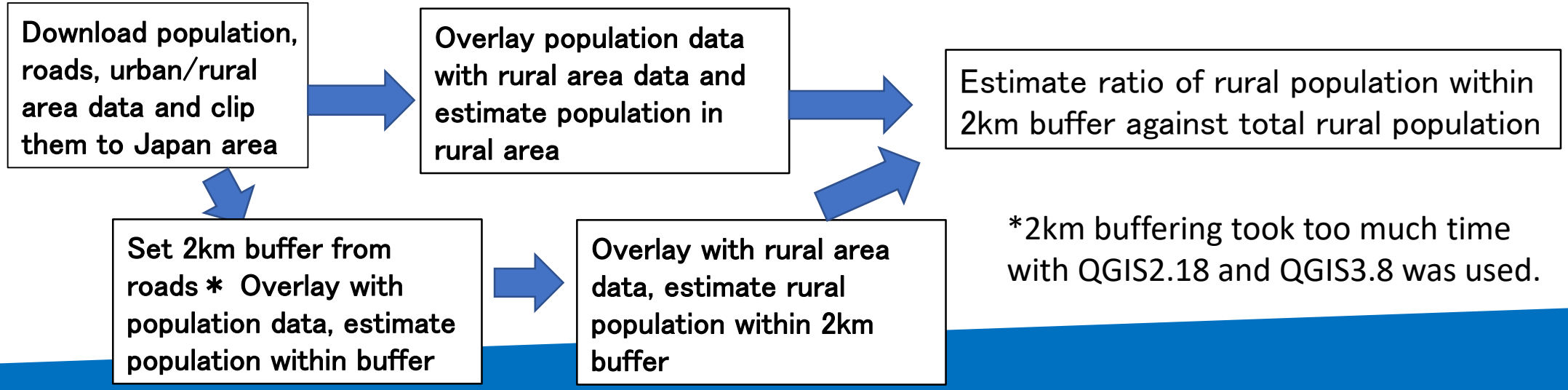
Data:

Population: WorldPoP, 100m grid Japan (2015) https://www.worldpop.org/project/categories?id=3

Roads: GRIP (Global Roads Inventory Project) data(2018)
https://datacatalog.worldbank.org/dataset/grip-global-roads-inventory-project-2018

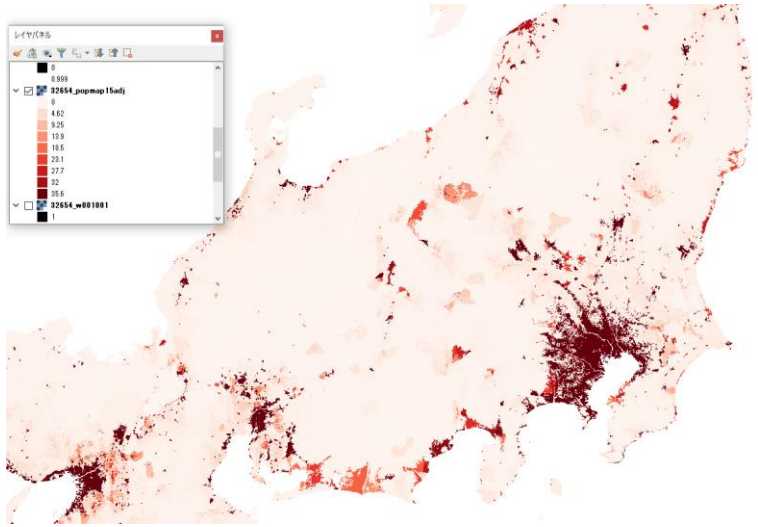
Rural/urban areas: Global Rural-Urban Mapping Project (GRUMP), v1(2014) https://sedac.ciesin.columbia.edu/data/collection/grump-v1 was initially used, but clipping to Japan area was not possible because of invalid data. As alternative, GHSL(Global Human Settlement Layers) BUILT data(2014) https://ghsl.jrc.ec.europa.eu/download.php?ds=bu was used to prepare rural/urban mask data.

Workflow:



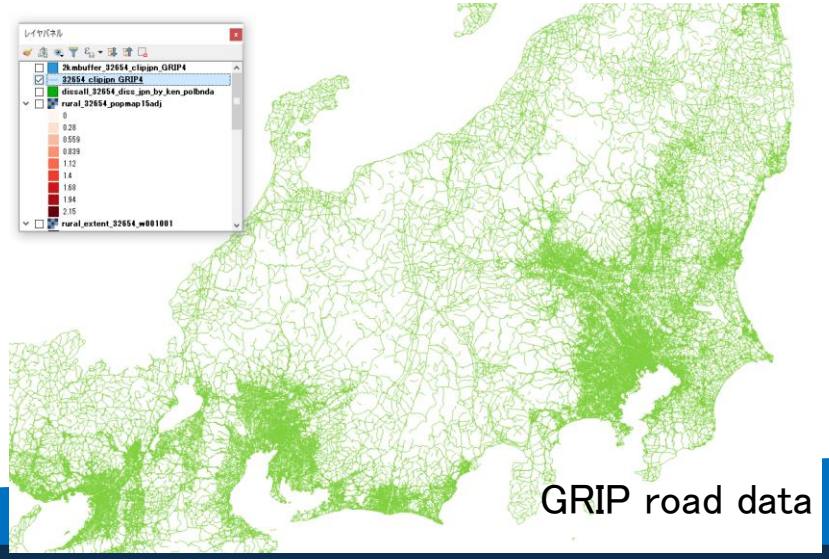
*2km buffering took too much time with QGIS2.18 and QGIS3.8 was used.

SDG 9.1.1 Rural Population within 2km Distance from All-season Roads

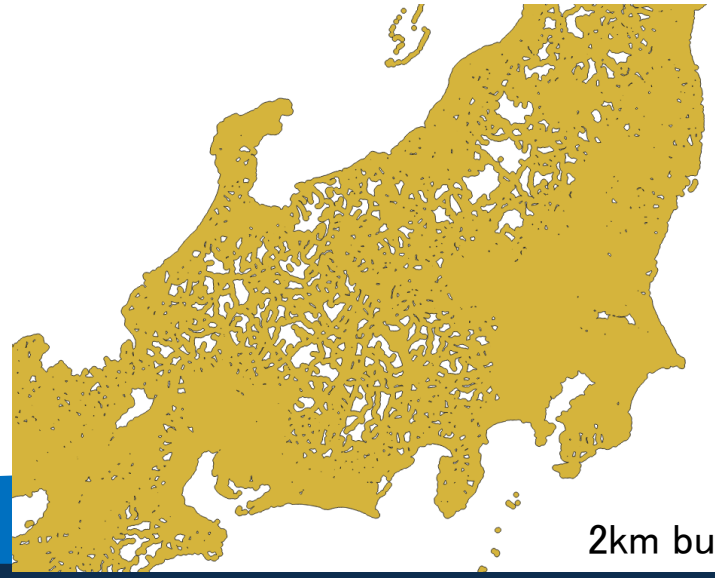


WorldPoP population grid data（100m resolution）

GHSL rural/urban area（1km）



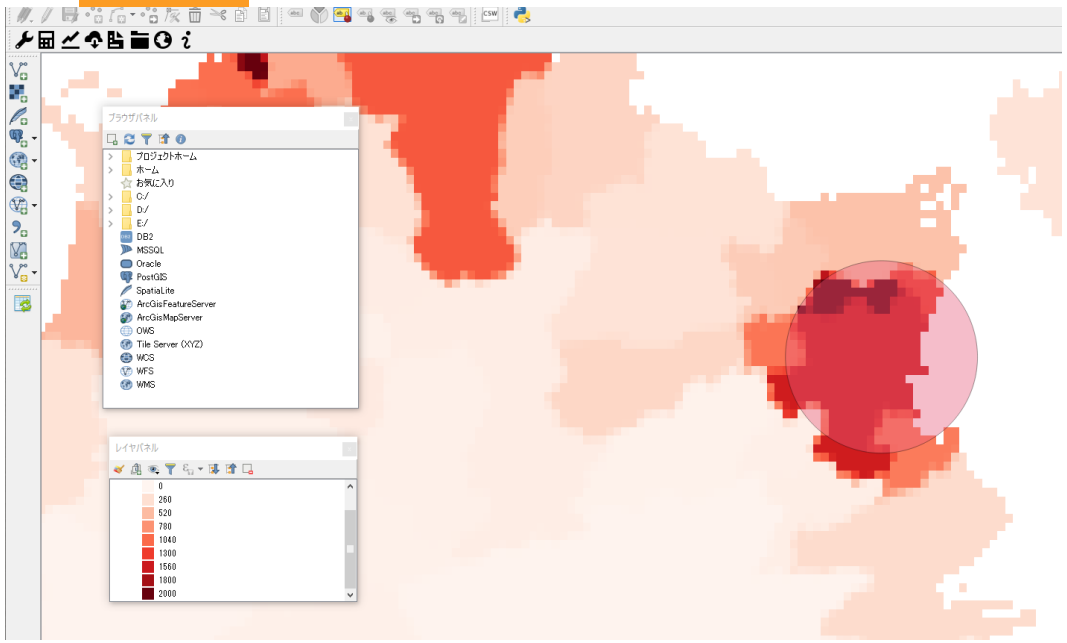
GRIP road data



2km buffer from roads

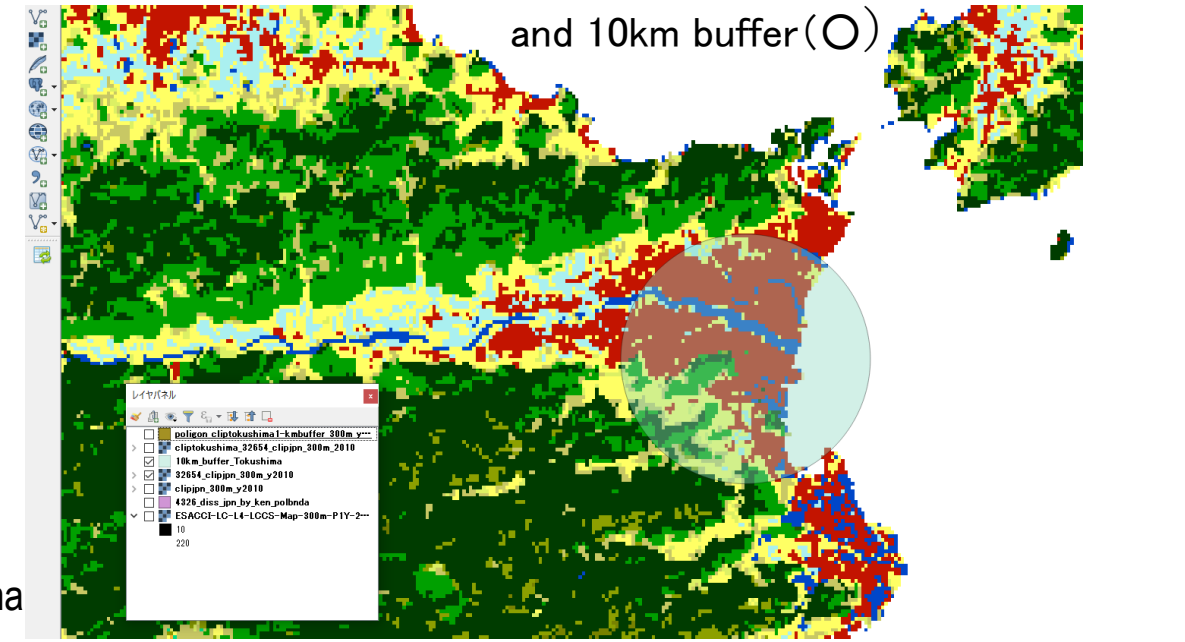
	Population	Density (number/ha)
National population	126,524,332	2.3
Rural area population	19,373,121	0.55
Within 2km from roads (national)	123,866,826	2.80
ditto（rural area）	18,304,900	0.63

SDG11.3.1 Land Consumption per Population Growth – Tokushima City



GPW Population grid data(1km、2000)and 1km buffer（〇） for Tokushima

ESA CCI land use data（300m、2010）and 10km buffer（〇）

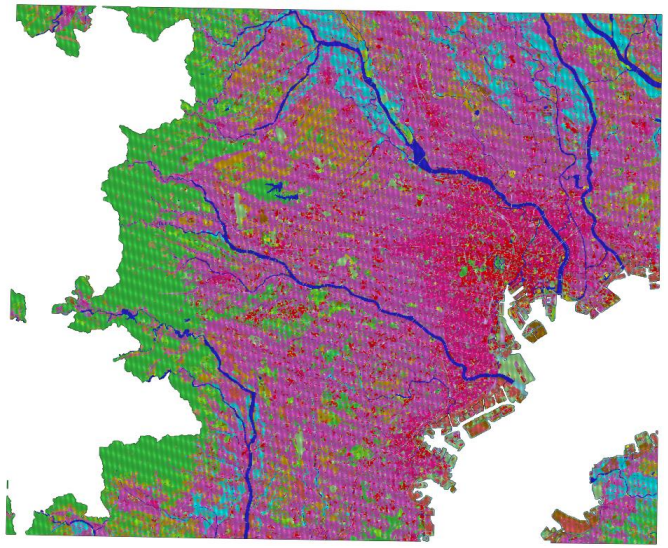


Talbe SDG15.3.1 computation based on GPW population and ESA CCI urban data (comparison with Trends.Earth results)

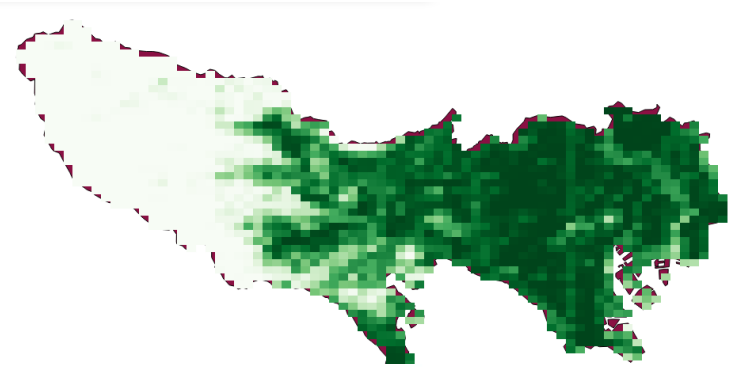
	City population change	City population growth rate	City areas change (km2)	Land consumption rate	SDG11.3.1
2000-2005	- 11100 (2588)	- 0.02271 (0.002556)	5.3 (317.38)	0.04783 (0.004758)	-2.106 (1.862)
2005-2010	-14527 (10981)	- 0.03042 (-0.011077)	16.2 (26.92)	0.13953 (0.000398)	-4.586 (-0.036)
2010-2015	- 18176 (2842)	- 0.03925 (-0.002969)	9.2 (12.50)	0.06953 (0.000185)	-1.771 (-0.062)

SDG11.7.1 Share of Built-up Area of Cities that is Open Space for Public Uses - Tokyo

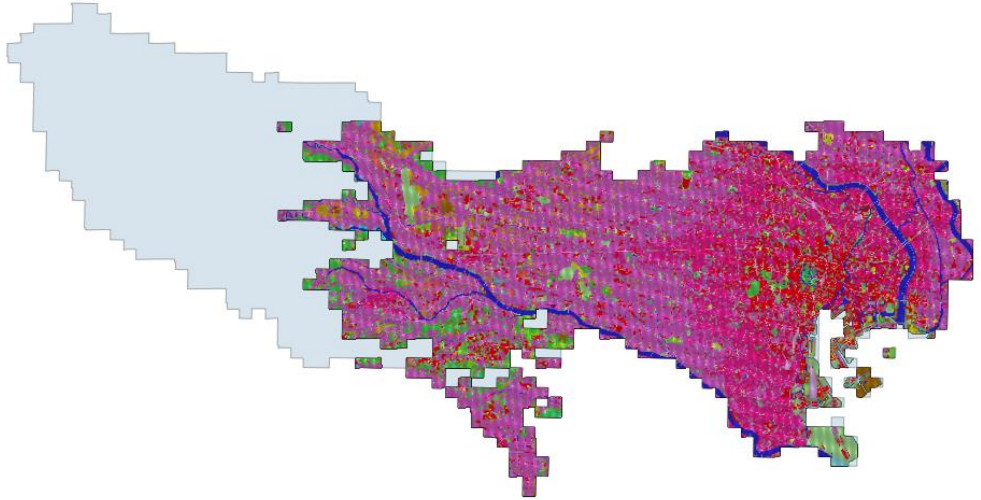
National Land Numerical Information Urban Land use 100m mesh data (2014)
GHSL (Global Human Settlement Layers) BuiltUp data (1km, 2015)



Tokyo City 100m land use data



GHSL BuiltUp area

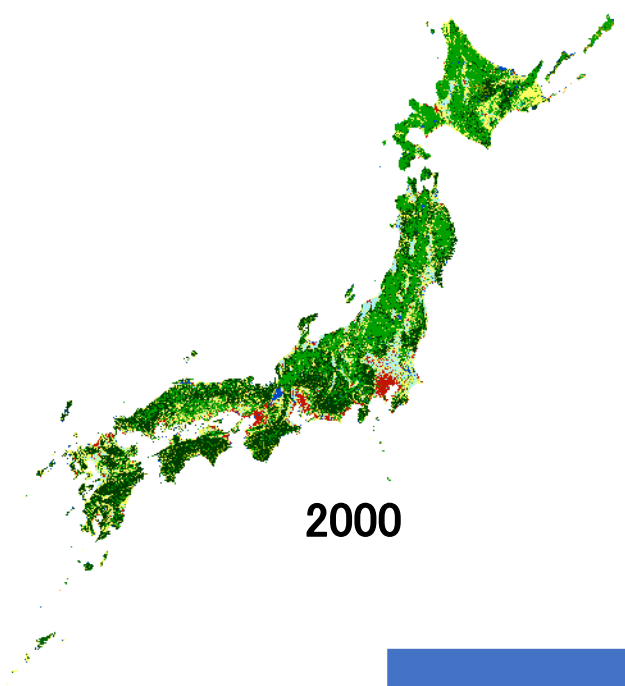


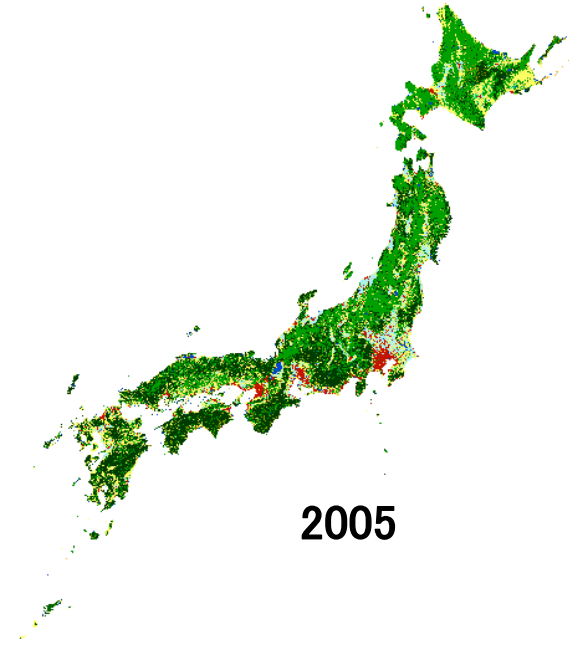
Tokyo City BuiltUp area land use data

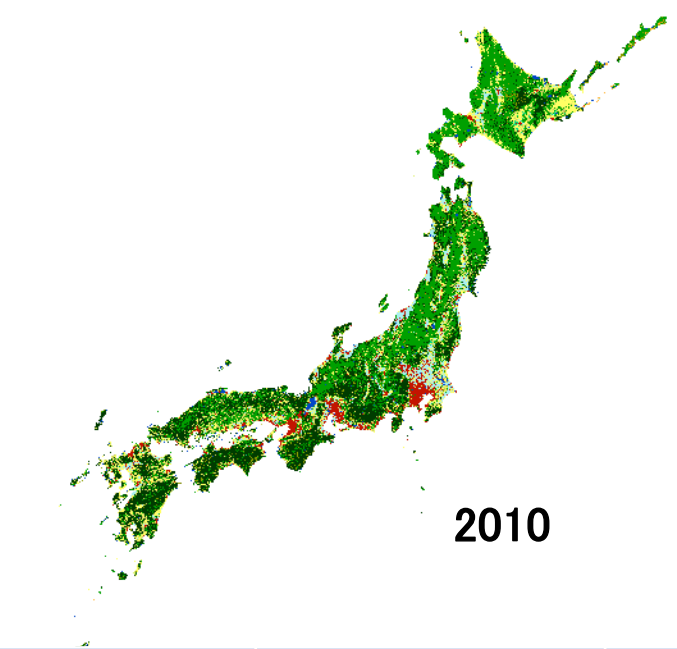
	UN-Habitat urban pulic space DB (Tokyo)	Estimation by National Numerical Information
Built Up area	NA	1159.78km2
Road area	25%	3.9% (44.91km2)
Park/vegetation cover area	30%	0.86% (9.9km2)
Open public space ratio	55%	4.8% (54.8km2)

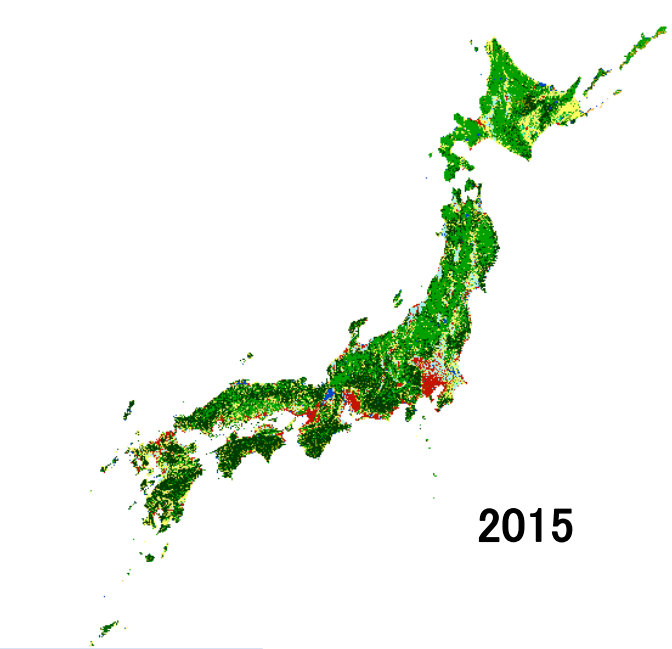
SDG15.1.1 Forest Area

ESA CCI land use data (300m resolution, 1992–2015)
https://maps.elie.ucl.ac.be/CCI/viewer/download.php







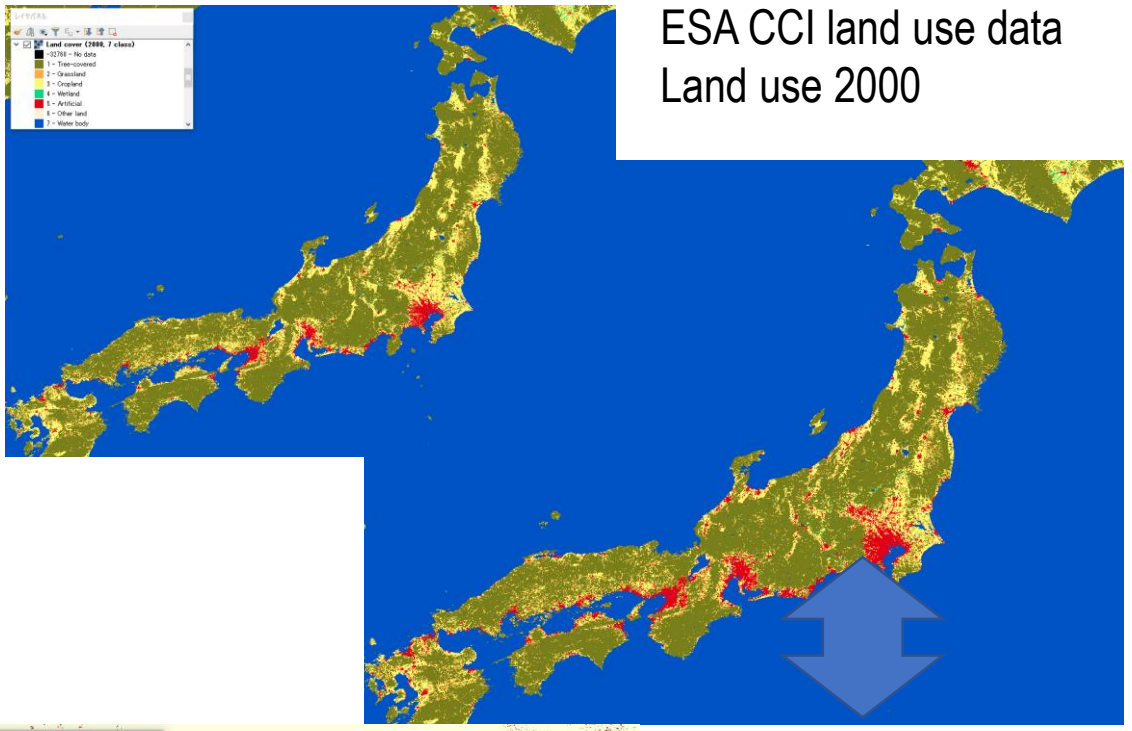


	2000	2005	2010	2015
Forest area(km^2)	275394	274000	273833	273000
Ratio	72.48%	72.11%	72.07%	71.84%
(reference) FRA	248760	249350	249660	249580

Estimated total land area of Japan: 379949km2

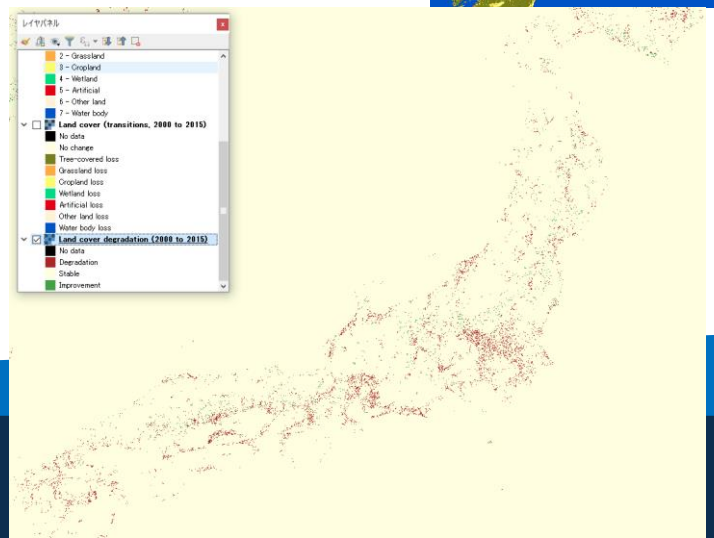
SDG15.3.1 Proportion of Degraded Land per Total Land

Land use change analysis by Trends.Earth and comparison with analysis using ESA CCI land use data



ESA CCI land use data
Land use 2000

Land use 2015



Land use change
2000-2015

Land use changes by Trends.Earth

Land cover type in baseline year	Land cover type in target year						
	Tree-covered areas	Grasslands	Croplands	Wetlands	Artificial areas	Other lands	Water bodies
Tree-covered areas	245,443.20	1,196.81	2,052.29	69.55	437.85	0.00	12.03
Grasslands	1,934.76	17,166.05	1.63	0.16	230.55	0.00	7.05
Croplands	657.21	0.00	70,930.34	0.28	9,191.08	0.00	3.21
Wetlands	15.94	0.97	4.44	802.60	3.69	0.00	0.00
Artificial areas	0.00	0.00	0.00	0.00	14,219.89	0.00	0.00
Other lands	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water bodies	5.10	2.03	4.01	0.23	150.96	0.00	8,961.92

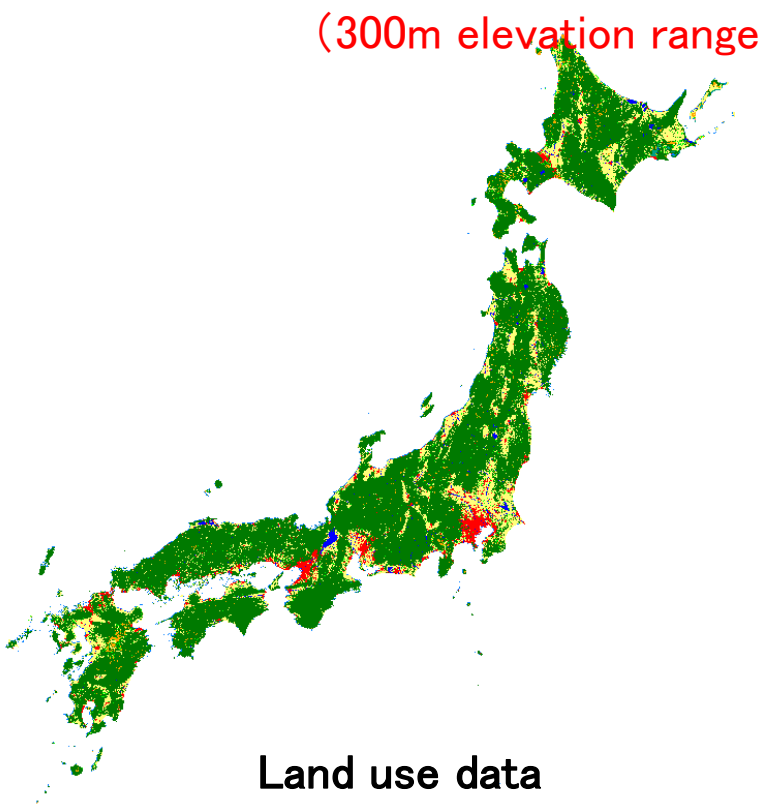
Good agreement

Land use changes by ESA CCI data

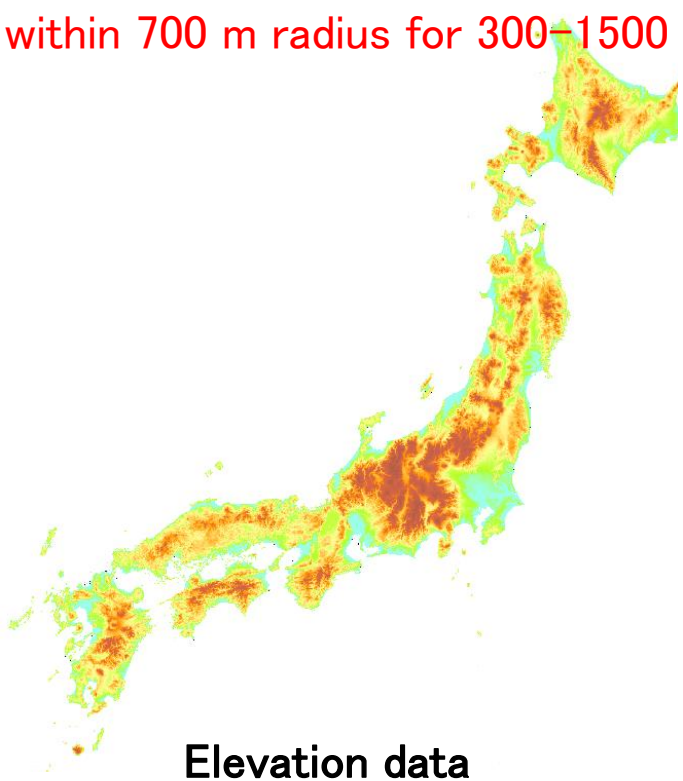
Land cover type in baseline year	Land cover type in target year						
	Tree-covered areas	Grasslands	Croplands	Wetlands	Artificial areas	Other lands	Water bodies
Tree-covered areas	272,564.00	776.00	2,070,00	70.80	667.00	0.00	20.00
Grasslands	5.05	730.00	0.00	0.07	144.00	0.00	0.70
Croplands	670.60	0.00	72,250.00	0.40	9,367.00	0.00	3.20
Wetlands	16.00	49.60	45.00	832.60	55.40	0.00	0.00
Artificial areas	0.00	0.00	0.00	0.00	14,479.00	0.00	0.00
Other lands	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water bodies	9.47	0.5	4.8	0.38	133	0.07	5820

15.4.2 Mountain Vegetation Cover Index

GSI/Global Map data (1km, land use, elevation and administrative boundary)
Mountain area was delineated considering elevation and slope
(300m elevation range within 700 m radius for 300–1500 elevation has not been considered.)



Land use data



Elevation data

Mountain green coverage

	Mountain area	Mountain Green Coverage
Analysis by FAO	44.9%	97%
Computation using Global Map	72.2%	96.71%

Summary

- SDG Indicators were computed on experimental basis using global/national datasets and tools (QGIS and Trends.Earth).
- It took some time to get used to handling datasets and QGIS. But once a workflow is established, it is rather straight forward to compute the Indicators using existing datasets and tools.
- Trends.Earth provides very simple and efficient means for countries to compute 11.3.1 and 15.3.1.
- Satellite data is large and complex. It is often challenging to preprocess data before analysis. But, it provides great means to make a time-series change analysis at different scales.
- It needs further analysis and consultation with NSOs and line ministires, in particular, to assess applicability of datasets and tools for SDG Indicator reporting.

EO4SDG Annual Meeting 2019
New York, USA
August 5, 2019

GROUP ON EARTH OBSERVATIONS
EARTH OBSERVATIONS FOR SUSTAINABLE DEVELOPMENT GOALS

Report from GEO Blue Planet

Prepared by: Daniel Takaki, Emily Smail, Paul DiGiacomo, Sophie Seeyave

Mission

- **Advance and exploit synergies** among the many observational programmes devoted to ocean and coastal waters
- **Improve engagement** with a variety of stakeholders for enhancing the timeliness, quality and range of services delivered
- **Raise awareness** of the societal benefits of ocean observations at the public and policy levels.

BLUE PLANET Oceans and Society

SDG Support (14.1.1)

- Working with UN Environment on the methodology for coastal eutrophication & with Esri on the development of a global data product of coastal chlorophyll-a deviations and anomalies

- Developing a white paper for UN Environment

"A Global Platform for Monitoring Marine Litter and Informing Action"

- Marine Litter/Debris working group

Key Results Achieved in 2017-2019 (Workshops)

- **Workshop on Implementing and Monitoring the Sustainable Development Goals in the Caribbean: The Role of the Ocean –** St. Vincent and the Grenadines, 2018
- **Workshop on Understanding Flooding on Reef-lined Island Coasts –** Honolulu, HI, USA, 2018
- **Workshop on Sargassum and Oil Spills Monitoring for the Caribbean Sea & Adjacent Regions –** Mexico City, Mexico, 2018
- **Workshop on Technologies for Observing and Monitoring Plastics in the Oceans –** Brest, France, 2018
- **Workshop on Ocean and Coastal Information in Support of Marine Resources and Biodiversity in the Macaronesia and Sao Tome and Principe region –** Mindelo, São Vicente Island, Cape Verde, 2019

Key Results Achieved in 2017-2019 (Publications)

S. Seeyave, et al. (2017). Writing a Communication Strategy: A Step-by-Step Guide and Template, Tailored for International (Marine) Science Organisations.

GEO Blue Planet (2018). What can the ocean tell us? Why ocean observation products and services are vital for us and our planet.

B. Mackenzie, et al. (2019). The role of stakeholders and actors in creating societal value from coastal and ocean observations. Frontiers in Marine Science.

GEO Blue Planet (in press). Ocean Observing for Societal Benefit. Journal of Operational Oceanography Supplemental issue.

Good Practices and/or Lessons Learned

- **Secretariat support** and project funding is required
- Information services should be developed based on **expressed user need** and users should be involved in the process early and often
- **Collaboration** is key
- Involve **operational agencies** early

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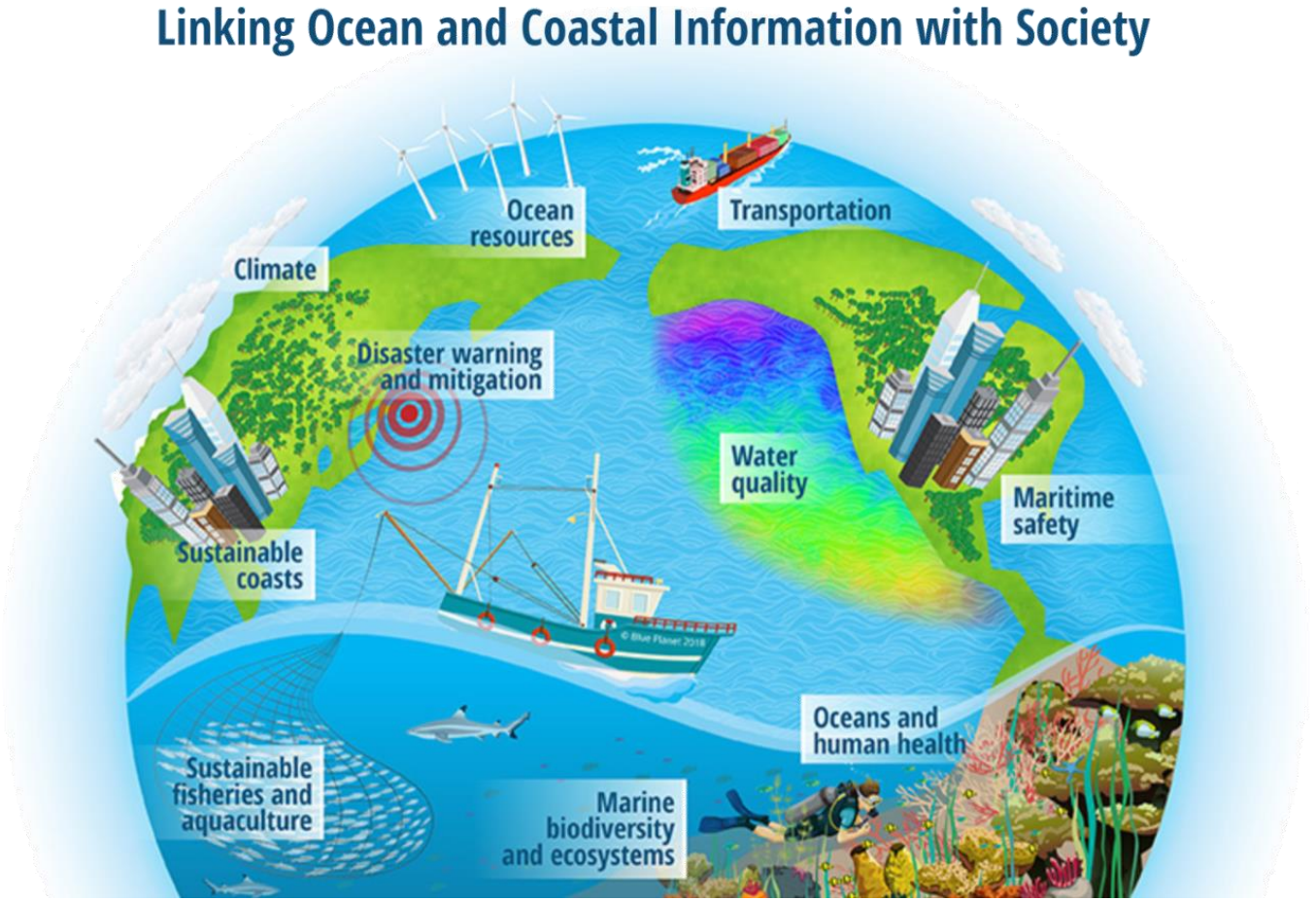
@geoblueplanet



GROUP ON EARTH OBSERVATIONS

EARTH OBSERVATIONS FOR SUSTAINABLE DEVELOPMENT GOALS

2nd Human Planet Forum

Presented by:
Robert S. Chen, co-chair, Human Planet Initiative; co-chair Data Sharing WG
Director, CIESIN, the Earth Institute, Columbia University
Manager, NASA Socioeconomic Data and Applications Center

EO4SDG Annual Meeting 2019
New York, USA
August 5, 2019

Global Fundamental Geospatial Data Themes

United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM)

- Adopted minimum list of 14 ***global fundamental geospatial data themes*** to facilitate measurement, monitoring, and management of sustainable development

Global Geodetic Reference Frame

Geographical Names

Addresses

Functional Areas

Buildings and Settlements

Land Parcels

Transport Networks

Elevation and Depth

Population Distribution

Land Cover and Land Use

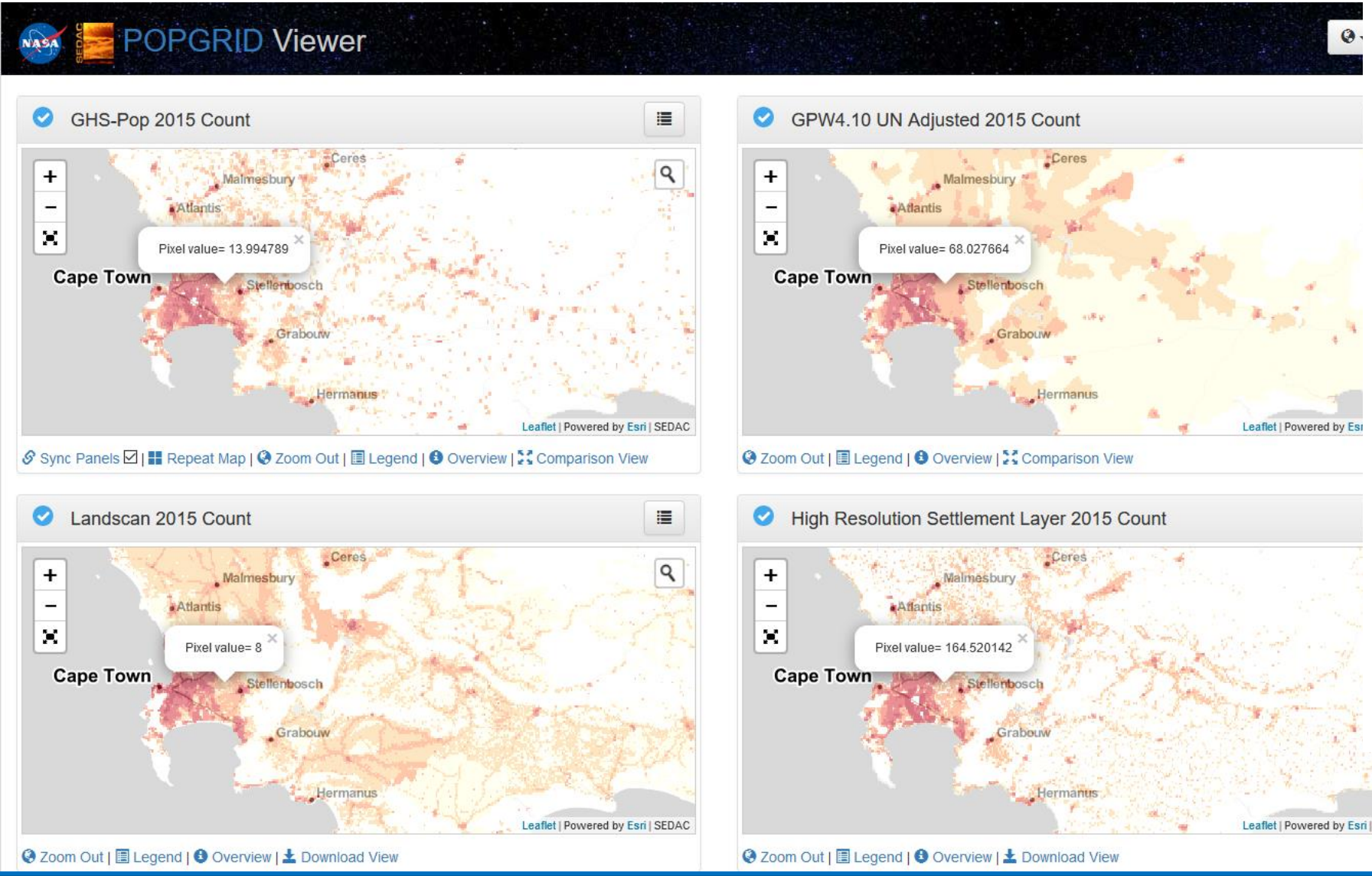
Geology and Soils

Physical Infrastructure

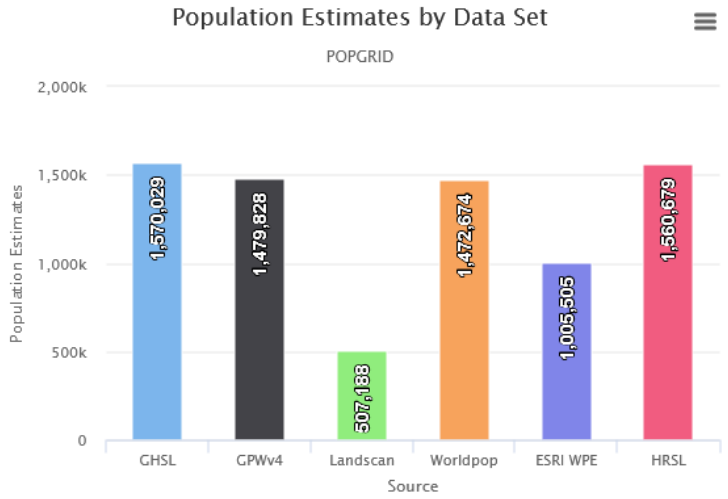
Water

Orthoimagery

POPGRID.ORG



Results



Population Estimates by Data Set

Source	Population Estimates
GHSL	1570029
GPWv4	1479828
Landscan	507188
Worldpop	1472674
ESRI WPE	1005505
HRSL	1560679

Data Quality Message(s)

- The average national WPE reliability ranking is 2
- The average size of national input units in GPW is 1588 square kilometers
- HRSL has coverage

2nd Human Planet Forum

Columbia University
Lamont campus, Palisades NY
September 30-October 2, 2019

1. Advances in slum mapping
2. Development of the Human Planet Atlases, 2020-22
3. Downscaled future scenarios of population & economic activity
4. Global definition of cities and rural areas
5. Mapping of secondary and tertiary administrative boundaries
6. Validation and intercomparison strategies for human settlement and population data
7. Applications, decision support, and stakeholder engagement

Center for International Earth Science Information Network
EARTH INSTITUTE | COLUMBIA UNIVERSITY

Global Partnership for Sustainable Development Data

TRENDS

ITC

WWHGD
WORLD-WIDE HUMAN GEOGRAPHY DATA
Working Group

JRC
EUROPEAN COMMISSION

NASA

GRID3
GEO-REFERENCED INFRASTRUCTURE AND DEMOGRAPHIC DATA FOR DEVELOPMENT

BILL & MELINDA GATES foundation

EO4SDG Annual Meeting 2019
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GROUP ON EARTH OBSERVATIONS
EARTH OBSERVATIONS FOR SUSTAINABLE DEVELOPMENT GOALS

Report from Cindy Schmidt, NASA

Ecological Forecasting

Supports decision makers by developing remote sensing-based tools to understand and *forecast* the impacts of environmental change on managed species and ecosystems.

Goal: Understand and save life on Earth with NASA technology

Topics: Conservation, Natural Resource Management, and Sustainable Development

- ~38 active projects
- Projects in Terrestrial, Freshwater, and Marine systems
- Emphases on Citizen Science, Funding Contributions from Partner/End User Organizations, GEO BON, and Earth Observations for Ecosystem Accounting
- Projects touch all 50 states and countries around the world

A.8

Sustaining Living Systems in a Time of Climate Variability and Change

PI	Organization	Title	Biome	Country
Gordon Luikart	U. of Montana	Projecting the Spread of Aquatic Invasive Species Using Remote Sensing, Genetics, and Climate Modeling	Freshwater	USA
Rebecca Lewison	SDSU	Climate-ready and resilient fisheries: using satellite data to conserve and manage life in the ocean and support sustainable fisheries	Marine	USA
Robert Jones	TNC	Earth Observations for Climate-Ready Aquaculture Management and Siting to Improve Food Security and Ocean Health in Palau, a Small Island Developing State	Marine	Palau
Robert Griffin	U. of Alabama	Climate-influenced Nutrient Flows and Threats to the Biodiversity of the Belize Barrier Reef Reserve System	Marine	Belize
Eric Sanderson	WCS	A near-real time integrated mapping and reporting system for critical biodiversity sites under Sustainable Development Goal 15: the tiger as model	Terrestrial	Indonesia, India, Nepal, Bhutan, Bangladesh, Myanmar, Thailand, Malaysia, China, Russia
Solomon Dobrowski	U. of Montana	Integrating Earth observations, ecohydrologic, and plant hydraulic models for forecasting recruitment failure in semi-arid forests: Decision support for adaptive forest management.	Terrestrial	USA
Andrew Hansen	Montana SU	Maintaining Life on Land (SDG 15) under Scenarios of Land Use and Climate Change in Colombia, Ecuador, and Peru	Terrestrial	Colombia, Ecuador, Peru
Erika Podest	JPL	A Sustainable Forest Management and Information System (SFMIS) Tool	Terrestrial	Panama
Danielle Wood	MIT	Designing applications to foster the health of terrestrial and wetland ecosystems in the coastal zone of West Africa	Terrestrial, Freshwater	Benin, Ghana

Maintaining Life on Land (SDG 15) Under Scenarios of Land use and Climate Change in Ecuador, Colombia and Peru

Project Inception Workshop

April 23-26, Ecuador

- Each country is at different levels of SDG reporting
- Necessary to have Ministries of Environment involved from the beginning
- Data validation (by countries) is important.
  - Process is variable, time frame is often unknown
- UNDP country coordinator needed, but funds not available

GROUP ON EARTH OBSERVATIONS

EARTH OBSERVATIONS FOR SUSTAINABLE DEVELOPMENT GOALS

MFTTT

The changing landscape of EO/GI4SDG-related stakeholders in Hungary

G. Remetey-Fülöpp, Sz. Mihály and T. Palya
Hungary / Hungarian Society of Surveying, Mapping and Remote Sensing WG4SDG / Goal 17: Partnership for the Goals

EO4SDG Annual Meeting 2019
New York, USA
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The emerging landscape of the SDG-related stakeholders and engaged actors in Hungary

Int'l drivers | *Legislation, governance* | *Implementation stakeholders & actors* | *Int'l links*

The UN 2030 Agenda on SD (25/09/2015)

Responsible ministries assigned (28/12/2017)

- Coord.: Foreign Affairs & Trade*
- Interior
- Agri-culture
- Human Resources
- Defense
- Justice
- National Econo-mics
- Innovation & Technology (*)
- Ministry of the Prime Minister

Change !

Voluntary report presented at UN HLPF on SDG in 2018

SDG Policy-related entities

- National Assembly
- President of the Republic
- Nat Council for Sust. Development
- Ombudsman for Future Generation
- Constitutional Court

SDG Policy-implementation

State managed institutions including

- **National Statistical Office**

Wide range of supportive civil societies including

- Nat.Soc of Conser-vationists
- HSoc Surv. Mapp. RS

MFTTT WG4SDG

Selected EO/GI Stakeholders & actors

- National Center of Land Management — New !
- Lechner Knowledge Center Nonprofit Ltd — New !

State financed development: EO information system for Public Administration (FIR) — New !

- KIFÜ

Consortium lead

Int'l Institutions & Organisations

Some relevant links

- FIG
- UN-GGIM
- ICA
- CEOS WGISS
- GEO
- ESA
- GEO EO4 SDG

Progress in 2019 with relevance to SDG: Partnership for the Goals (Goal 17)

Stakeholder engagement and capacity building

A comprehensive presentation on the sustainability of the surveyor's profession and the Agenda 2030 was delivered by the lead of WG4SDG for the community working in geoscience, geo-related engineering and land administration in June 2019
https://www.mfttt.hu/mftttportal/index.php/letoltes/eloadasok/doc_view/746

SDG-related activities and actors were presented in the Liaison report of the Hungarian Space Office at CEOS WGISS-47 plenary hosted by NOAA in May 2019. Link: www.ceos.org

Parallel developments having influence on SDGs implementation

Governance: a well-balanced institution and legal system exists for the implementation of SD laws and policies including international agreements (NCSD)
Institutional capacity building concentration of high volume of geospatial and Earth Observation information, airborne data, taking over the expertize and tasks in surveying, remote sensing, land registry and associated mapping at Lechner Nonprofit Ltd, the acknowledged knowledge center for built environment.
http://lechnerkozpont.hu
A new department responsible for space research and activities (actually the Hungarian Space Office) is active at the MoFAT. It is anticipated the global policy issues including SDGs will be addressed in the coming National Space Strategy.
Resources Projects on 'FIR - EO data infrastructure and services for the Public Administration' and '3D data infrastructure' are in progress lead by KIFŰ and Lechner Nonprofit Ltd. respectively.

Looking ahead: To ensure timely implementation of the SDGs there is imperative need for inter- and trans-disciplinary cooperation and collaboration among stakeholders of also on domestic level in line with UN guidelines, the national strategy on SD taking into account GEO EO4SDG, CEOS/ESA guides in Earth Observation, the good practices of the Sustainable Development Solution Network in capacity building and curricula development, the UN/GGIM and EFGS recommendations on the integrated use of geospatial information and statistical data for indicator monitoring and reporting. Setting up interoperable EO and spatial data infrastructures, exploitation of new, promising technologies (AI, 5G drones, new data architectures etc.) are inevitable and provides opportunities for benefit of the society.

GROUP ON EARTH OBSERVATIONS

EARTH OBSERVATIONS FOR SUSTAINABLE DEVELOPMENT GOALS

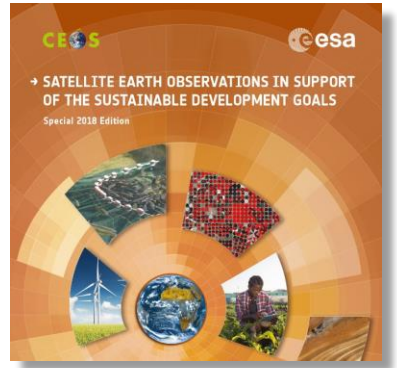
CEOS SDG-AHT contribution to GEO EO4SDG work program

Presented by: **CEOS Ad-Hoc Team on SDGs**

EO4SDG Annual Meeting 2019
New York, USA
August 5, 2019

2018-2019 tangible outputs from CEOS SDG-AHT

- **CEOS Earth Observation Handbook on SDGs**
  - Officially released in March 2018, at the **49th Session of the UN Statistical Commission**, during the "Statistical-Geospatial Integration Forum"
- **GEO/CEOS joint presence at UN High Level Political Forum (HLPF) 2018**
  - HLPF theme: "Transformation towards sustainable and resilient societies".
  - Australia with CSIRO/GA organised a **side event on the use of Earth observations for SDGs** followed by **two hands-on workshops** (Financing and Priority)
- **GEO/CEOS special issues on EO for SDGs in scientific journals**
  - **RSE Special Issue** on "Earth Observation for the Sustainable Development Goals" (UNSW, CSIRO, NASA, GEO) – editing phase
  - **RS Special Issue** on "EO Solutions to Support Countries Implementing the SDGs" (ITC, ESA, NASA, SANSA) – call for papers
- **Recognition of CEOS by the UN as a key partner to mobilise Space Agencies' efforts on SDGs**
  - CEOS represented in the **IAEG-SDGs Working Group on Geospatial Information (WGGI)**;
  - CEOS involvement in **UN Expert Teams** on Indicator monitoring guidelines.
  - CEOS participation to key **international events/panels on SDGs** (UN HLPF, WDF, UN GGIM annual sessions, GEO plenaries)



SDG-AHT deliverables in CEOS 2019-2012 Work Plan

#	Objective/Deliverable Description	Due date	Leading agency	Main Contributors	Status
SDG-2	Compile and maintain a **compendium of CEOS Agencies engagement** on SDGs	Q2 2019	CSIRO	All CEOS Agencies (11 so far)	Completed (to be regularly updated)
SDG-3	Review and assess the **contribution of EO to the SDG Targets and Indicators**. Produce an detailed assessment and a policy brief	Q3 2019	ESA	NASA, CSIRO	Draft completed (under review)
SDG-4	CEOS **engagement plan on SDGs**	Q2 2019	ESA	CSIRO, NASA	Draft circulated (to be finalized for SIT TW)
SDG-5	Analyse the **SDG satellite data requirements**	Q4 2019	NASA	SANSA, ESA, CSIRO, JAXA	Template circulated
SDG-6	**Open Data Cube algorithms for the SDGs**	Q4 2019	NASA (SEO)	NASA, CSIRO, GA, UKSA	on-going
CB-41	**SDG-related training and capacity building** related to the use of space-based EO to meet the data challenges of the 2030 Agenda for Sustainable Development	Q3 2019	NASA (WGCapD)	SDG AHT Members	Awareness webinars done Indicator-specific webinars under preparation

CEOS SDG-AHT Activity Prioritization

Focus on **CEOS unique role** and on a **few SDG Indicators** (start with 6.6.1; 11.3.1; 15.3.1)	The original goals of the SDG AHT were too broad in scope and not fully aligned with the CEOS mandate.
Complement rather than duplicate the GEO community efforts on SDGs	The AHT activities were too similar to the work of the GEO EO4SDG initiative, which brought some confusion on the respective roles of CEOS and GEO.
Encourage **more commitment and participation** from CEOS agencies	The impact of the CEOS activities on SDGs is commensurate to the level of resources available.
Leverage the **knowledge and expertise of CEOS bodies** (VCs, WGs, SEO) to maximise impact.	The SDG is a very broad and cross-cutting topic (land, marine, atmosphere) requiring different EO competences (satellite data, EO infrastructures, capacity building, accuracy assessment).
Identify the **key partners** with whom CEOS should primarily interface (IAEG-SDGs WGGI, Custodian agencies)	The UN has established a complex governance system on the SDG Global Indicator Framework with many stakeholders involved both at UN and national levels.

Given CEOS mandate to act as the “space-arm” of GEO, CEOS should focus its efforts on facilitating the exploitation of satellite observations by the SDG stakeholders, while GEO should prioritize its activities towards mainstreaming the use of Earth Observations (not limited to satellite observations) in the SDG systems and processes at UN and country levels.

CEOS Engagement on SDGs, a streamlined approach

UN Inter-Agency and Expert Group on SDG Indicators (**IAEG-SDGs**)

Working Group on Geo-Spatial Information (**WGGI**) Task Stream II Application of satellite data for the SDG indicators

UN Environment	UN Habitat	UNCCD
6.6.1 Water related ecosystems	11.3.1 Sustainable Urbanization	15.3.1 Land Degradation Neutrality
Surface Water Extent, Vegetated Wetlands, Water Quality	*Human Settlements, Population Density, urban/rural*	*Land Cover, Land Productivity, Carbon Stock*

CEOS SDG AHT

Satellite Data Availability (Observation requirements, ARD)	LSI-VC
EO Enabling Infrastructures (Platforms, Data Cubes)	WGISS SEO
Awareness & Capacity Building	WGCapD
EO Good Practice Guidance	
EO Quality Standards	WGCV

GEO EO4SDG			
	GEO Wetlands, Aquawatch GEO GLOWS	GEO Human Planet	GEO Land Degradation Neutrality

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Session 1.1: Program Introduction, Recent Updates & Lessons Learned

Session 1.2: 2020-2024 EO4SDG Strategic Implementation Plan

Open Session: Earth Observation Solutions to Address the UN SDG

Session 2.1: Breakout Round A — Group A1, Good practice examples of methods for measuring and reporting on SDG indicators & Group A2, EO4SDG Federated Approach to GEO's overall service to the SDG

Session 2.2: Breakout Round B — Group B1, Strengthening Partnerships and Advancing EO Use in SDG Monitoring, Reporting & Decision Making, Group B2 — GEO Secretariat support for EO4SDG, Resources, and Prioritization of EO4SDG Deliverables

Adjourn

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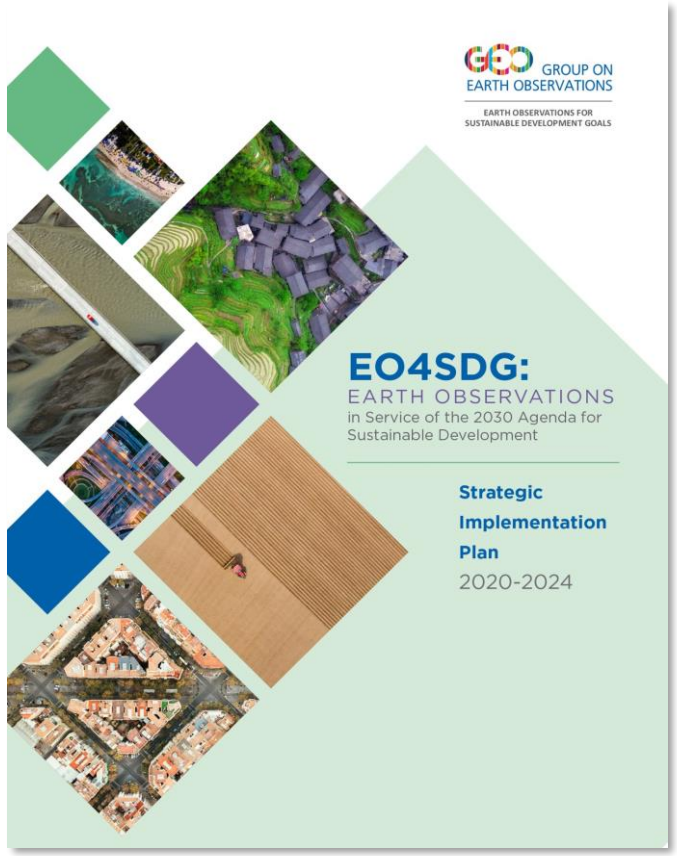
Session 1.2: Updated 2020-2024 Strategic Implementation Plan



GOAL I	Demonstrate how Earth observations, geospatial information, and socio-economic and other data contribute in novel and practical ways to support sustainable development efforts and the SDG.
GOAL II	Increase skills and capabilities in uses of Earth observations for SDG activities and their broader benefits.
GOAL III	Broaden interest, awareness, and understanding of Earth observations support to the SDGs and contributions to social, environmental, and economic benefits.

GEO PB Feedback

- Bring countries to a higher level of commitment that will lead to an operational integration of EO for SDG monitoring
- Integration and adoption of EO by national statistical agencies for the monitoring of SDGs should be one of the main objectives to achieve.

Lunch Break

12:30 -13:30

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