Country Use Case of EO for SDG Indicator 11.7.1

1. Abstract:

The calculations for indicator 11.7.1 were based on the document "Metadata on SDGs Indicator 11.7.1, Indicator category: Tier II, Developed by: UN-HABITAT" (Status: December 2018). The methodology proposed was adapted to the German data sets used. The processing was carried out semi-automatically with a Python script developed exclusively at BKG for this calculation, which can also be used for further calculations for the coming years. The calculations are mainly based on the data of the digital land cover model Germany 2015 and 2018 (LBM-DE 2015 and 2018).

The document "Metadata on SDGs Indicator 11.7.1, Indicator category: Tier II, Developed by: UN-HABITAT" recommends the step-by-step derivation of the built-up area. Different classes are formed based on their build-up density in a circle with an area of 1 km² (according to the metadata description: radius of a 1 km² circle, i.e. 564m).

2. Country or region

The calculations were performed for the entire area of Germany and mainly based on the data of the digital land cover model Germany.

3. Additional/ Other Data Used and its links

Information on land cover/use categories was taken from land cover model for Germany (LBM-DE). The Digital Land Cover Model for Germany was developed in coordination with the Federal Environment Agency (UBA) for the purposes of the federal government and has been made available by the BKG since 2009 (then still under the name DLM-DE. It describes topographic objects of the landscape in vector format under the aspect of land cover and land use. In this way, the state of the environment at a certain point in time is recorded, thus enabling analyses according to different aspects. Furthermore, the LBM-DE serves as a basis for the derivation of the national CORINE Land Cover (CLC) data set, which in turn contributes to the uniform European land monitoring. The LBM-DE has been updated for the reference years 2012, 2015, and 2018 and covers the entire extension of the Federal Republic of Germany. Based on the boundaries of the spatial objects of the basic landscape model (Basis-DLM), data on land cover and land use in the sense of the European CLC nomenclature are derived from the respective reference year 2012, 2015 or 2018 by means of the evaluation of multi-spectral satellite image time series. Land cover models can be used in many different ways. The administrative sector in particular, which deals with environmental issues, has a strong interest in continuously recording landscape and environmental changes.

Links:

- https://gdk.gdi-de.org/geonetwork/srv/api/records/7387BFCE-72CD-442E-B268-D273DE1D61F8 (LBM-DE 2015)
- https://gdk.gdi-de.org/geonetwork/srv/api/records/ED7F6DE9-6433-41DA-928A-044837C6EDAA (LBM-DE 2018)

4. Description of data access, processing, and analysis, including methodology that was developed, associated tools or applications, and how these are applied to compute SDG Indicator

The data used for the derivation of the indicator values are national geospatial data sets provided and produced by the BKG. The used geospatial datasets are the German Land Cover Model (LBM-DE). The product is derived from remote sensing data and geospatial data. The data access for third parties is available paying a fee. Federal authorities and authorized users within the meaning of § 4 VGeoBund shall be provided with the data free of charge. The build-up areas are derived from Rapid Eye satellite data and stored as the LBM-DE feature attribute “degree of imperviousness”.

Then the following steps were carried out during the calculation:

1. Selection of all digital land cover model objects with a degree of sealing of more than 25% equivalent to the metadata description (Offical Indicator Methodology, Computation Method).

2. These objects were transformed into a grid with 10m grid widths (sentinel-2 resolution for future calculations).

3. A spatial analysis was performed for these pixels. Then, the pixels were divided into three groups according to their density, in a circle having a radius of 564m. Equivalent to meta-data description (Offical Indicator Methodology, Computation Method a.4. >25% is classified as either urban or sub-urban).: Urban; density >=50%.

- Suburban; density >=25% and <50
- Rural; density <25

4. The classes urban and suburban were combined to form an urban cluster equivalent to the metadata description (Offical Indicator Methodology, computation, a.5. Contiguous urban and suburban pixels form an urban cluster of built up pixels).

5. Appending a 100m buffer around the urban clusters and selecting the included open spaces whose contiguous areas are smaller than 200ha are equivalent to metadata description (Definitions and concepts c) Fringe open Space and Captured open Space.

6. The urban clusters determined are tailored to the administrative boundaries of the municipalities (administrative boundaries 1:250 000), according to "city proper boundary should be defined by the official administrative demarcation".

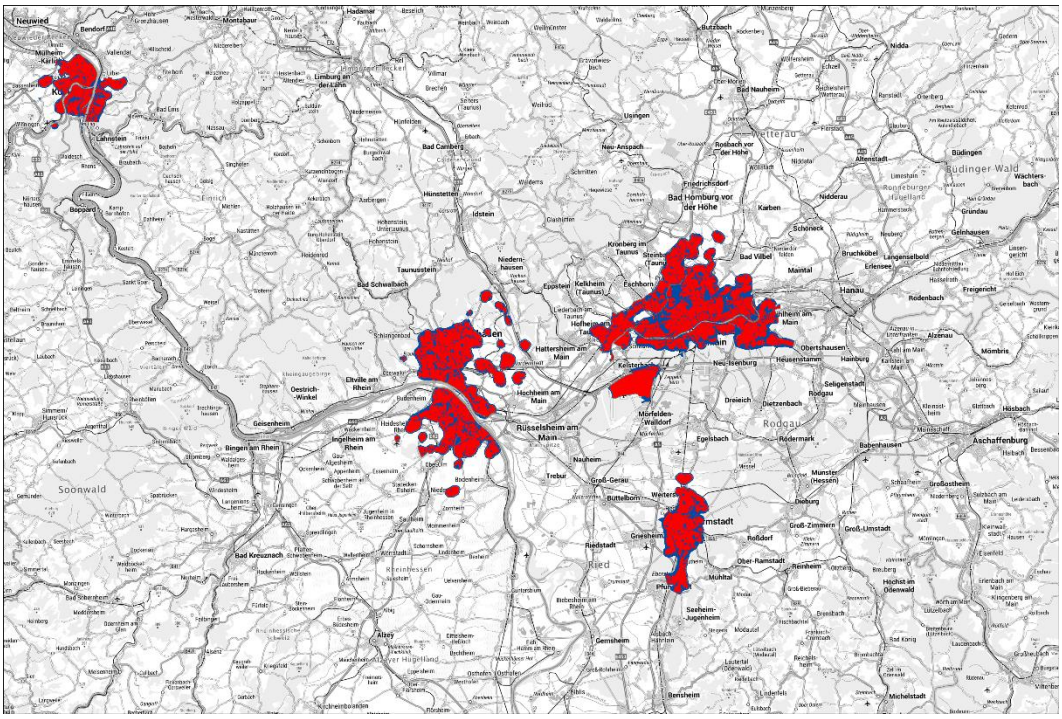


Figure 1: Example of Urban Cluster (red) and Potential Open Public Spaces (blue inside the official administrative boundaries).

For the derivation of the indicator it is necessary to determine the "total surface of open public space" as well as the "total surface of land allocated to streets", to then calculate the total area. By using the LBM-DE, the two areas can be surveyed together in one step. This is done by selecting the objects according to land use, which also includes streets.

8. It has to be mentioned that it cannot be determined which of these areas are accessible to the public and are free of charge, i.e. 24/7. Therefore, only potential open public spaces can be identified here, similar to the official metadata document of the UN ("Spatial analysis to identify potential open public spaces").

5. Lessons learned, any gaps, key issues and recommendations

European coordination: The outcomes and findings of the coordinated analysis carried out on the SDG indicators by the ‘UN-GGIM: Europe Working Group on Data Integration‘ according to the Work Plan 2017-2019 have allowed to agree on the following set of recommendations to enhance the contribution of geospatial data analysis and its integration with statistical data to address the SDG indicators:

1. Harmonize relevant geospatial data themes
2. Implement Cadastral and Land Cover data as key national authoritative data
3. Use geospatial layers generated from Earth Observation data
4. Create capacity building initiatives for NSI to take full advantage of EO based data
5. Define and implement NSDIs having in mind the requirements for statistical production
6. Implement consistent and stable sub-national spatial units
7. Develop and use population grids and other grid-based statistics
8. Adopt harmonised and comparable concepts, definitions and classifications and build consensus among Geospatial Agencies and National Statistical Institutes
9. Ensure availability and accessibility of processing workflows, including open formats of programming codes
10. Develop initiatives that promote availability, accessibility and usability of geospatial data

11. Increase the collaboration with researchers and data providers
12. Increase cooperation between National Statistical Institutes and Geospatial Agencies

Lessons learned, gaps and key issues on (1) ‘concepts’, (2) ‘data sources’, (3) ‘computation and algorithm’ and (4) ‘challenges regarding the use of geospatial data’ have been compiled for four specific SDG indicators (11.2.1, 11.3.1, 11.7.1 and 15.1.1).

6. Supporting material about this use case. Include links, publications, etc.

The indicator values will be soon available via the official national platform on the agenda 2030.

Link: https://sustainabledevelopment-germany.github.io/

European coordination: Concerning the coordinated elaboration of the UN-GGIM: Europe Working Group on Data Integration a Final Report on ‘The territorial dimension in SDG indicators: geospatial data analysis and its integration with statistical data’ was published in July 2019 within the Work Plan 2017-2019. The report focuses on the contribution of geospatial data analysis and its integration with statistical data at a global, European and national perspective based on the analysis of four selected SDG indicators.

Source:
https://un-ggim-europe.org/wp-content/uploads/2019/05/UN_GGIM_08_05_2019-The-territorial-dimension-in-SDG-indicators-Final.pdf

According to the Work Plan 2019-2022 the UN-GGIM: Europe Working Group on Data Integration has accepted new tasks to provide methodological, operational and technical guidance in the use of geospatial data and statistics to compute SDG indicators, with a European and national perspective, and reflecting on solutions which may contribute to reduce statistical burden and increase the level of detail of SDG indicators. The new tasks comprise (1) a benchmarking of pan-European data sources, i.e. comparative analysis between pan-European and national methodologies, data sources and results as well as (2) an integration of pan-European data sources with national data sources, i.e. analysis of the combination of pan-European with national data sources to extract new relevant information for indicators computation.

The expected outputs will include:

1. The development of standard methodological/technical documents for each selected indicator compiling the solutions analysed and presenting normative methodological guidance on the use of EO for the computation of SDG indicators; and
2. The production of flyers/leaflets synthesising and illustrating the approaches analysed and the main results.

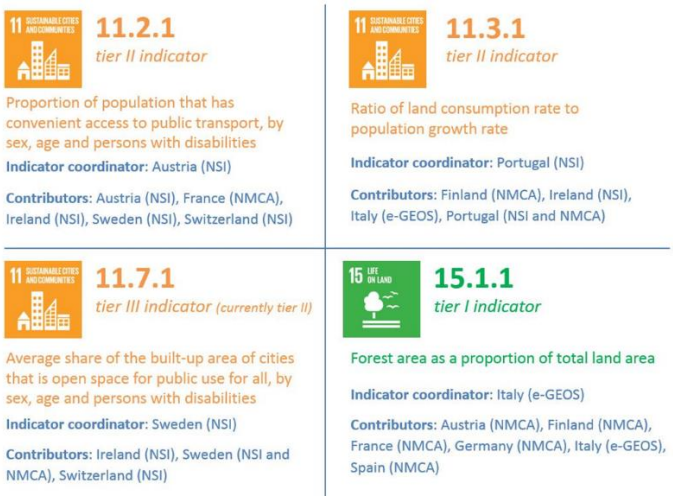
Based on this, the work has started by taking the following indicators as a reference:

- 3.6.1 | Death rate due to traffic injuries (tier I)
- 6.6.1 | Change in the extent of water-related ecosystems over time (tier I)
- 11.2.1 | Accessibility to public transports (tier II)
- 11.3.1 | Ratio of land consumption rate to population growth (tier II)
- 11.6.2 | Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (tier I)
- 11.7.1 | Access to public / green areas (proxy) (tier II)
- 14.5.1 | Coverage of protected areas in relation to marine areas (tier I)
- 15.1.1 | Forest area as a proportion of total land area (tier I)
- 15.3.1 | Proportion of land that is degraded over total land area (tier I)
- 15.4.1 | Coverage by protected areas of important sites for mountain biodiversity (tier I)

7. Collaboration with other agencies - agency names and activities

In 2017, the BKG, in cooperation with the Federal Statistical Office of Germany, began conducting feasibility studies regarding the integration of EO and national geospatial datasets for calculating selected SDG indicators. The indicators chosen were 11.7.1, 15.1.1, and 15.4.2.

European coordination: The selection and analysis of the SDG indicators should benefit from the different institutional background and technical expertise of members of the UN-GGIM: Europe Working Group on Data Integration. Additionally, this list should benefit from an articulation with the UNECE as well as the European Environment Agency (EEA) and Eurostat's SDG Working Group. Furthermore, the information exchange with the Inter- and Agency Expert Group on SDG Indicators – Working Group on Geospatial Information (IAEG SDG WG GI) will be continued. The same applies with the exchange and collaboration with the relevant global GEO initiatives and working groups, in particular, the EO4SDG initiative. On the European level, the exchange with the EuroGEO initiative has to be established as well.



8. Name(s) and email address of individual(s) involved in this effort. Please note the principal point(s) of contact (POCs).

POC: Dr. Patrick Knöfel, Patrick.Knoefel@bkg.bund.de

European coordination:

Pier-Giorgio Zaccheddu (Chair of the UN-GGIM: Europe Working Group on Data Integration), email: pier-giorgio.zaccheddu@bkg.bund.de

Francisco Vala (Leader of the Subgroup I – SDG Analysis of the UN-GGIM: Europe Working Group on Data Integration), email: francisco.vala@ine.pt