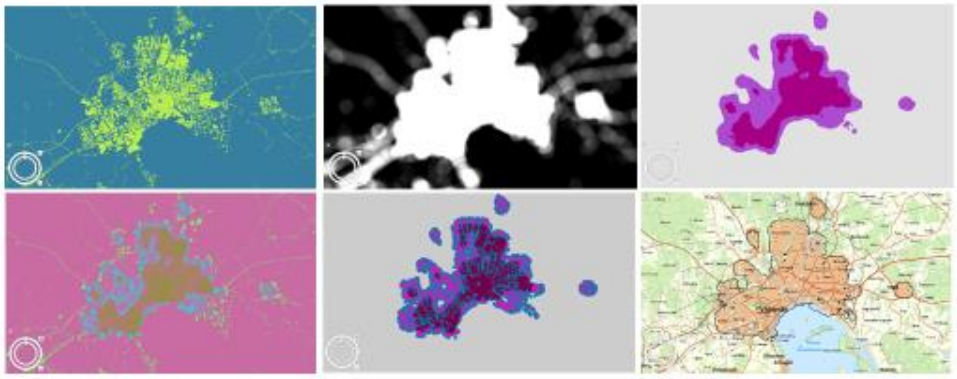
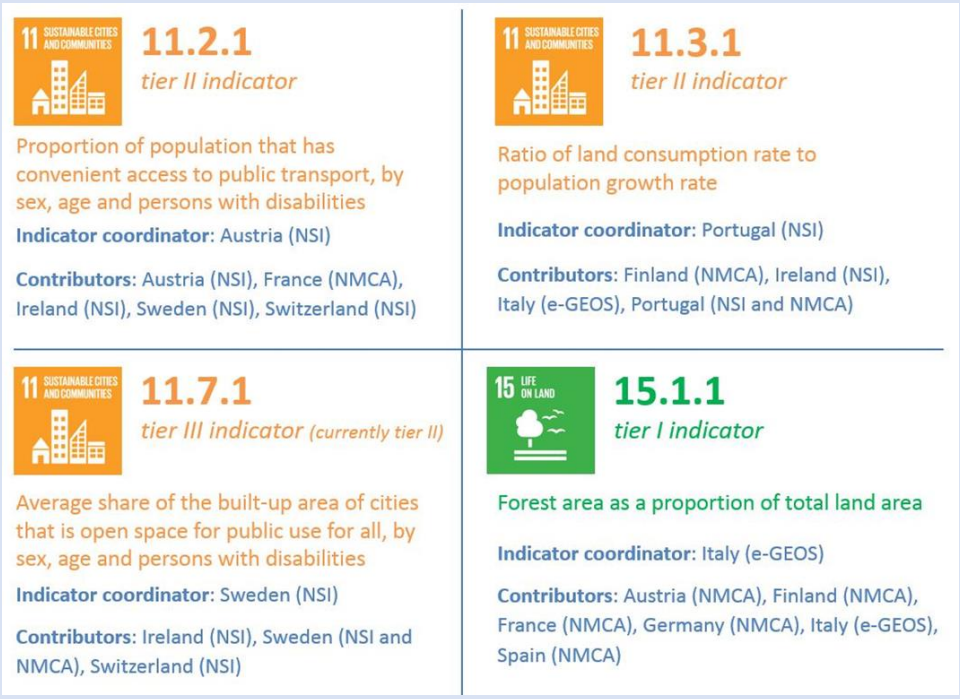
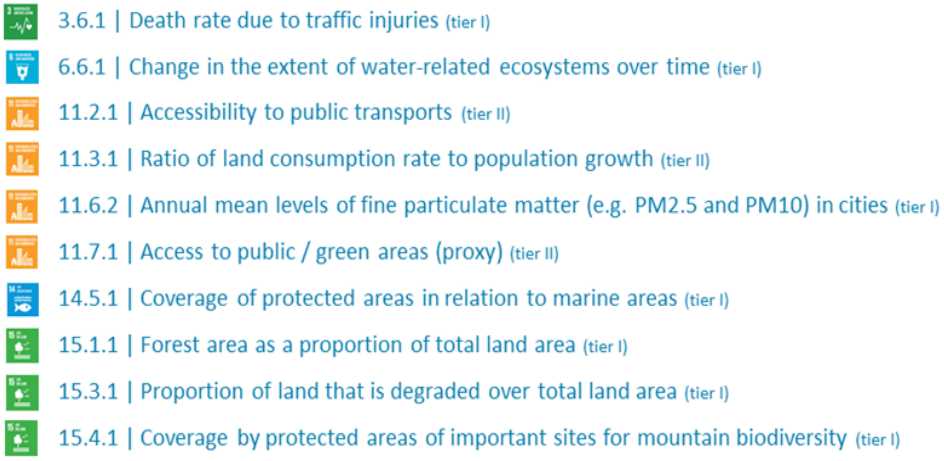
Country Use Case of EO for SDG Indicator	
SDG Indicator/Sub-indicator	**Indicator 11.3.1:** Ratio of land consumption rate to population growth rate
Country or region	Sweden
Status (please check)	X being used in official SDG Indicator reporting _ being verified or tested by country _ studying feasibility
Earth Observation Data Used and its links	Copernicus High Resolution Layer Imperviousness https://land.copernicus.eu/pan-european/high-resolution-layers/imperviousness Imperviousness data is available for the reference years 2006, 2009, 2012 and 2015, and contains two types of products: 1. Status layers The percentage of sealed area is mapped for each status layer for any of the 4 reference years (e.g. degree of Imperviousness 2012). The status layers are available in the original 20m spatial resolution, and as aggregated 100m products. 2. Change layers Two types of change products are available for each of the 3-year periods between the 4 reference years (2006-2009, 2009-2012, 2012-2015), and in addition, for the period 2006-2012 (that is in line with the 6-year period between two Corine Land Cover products): a) A simple layer mapping the percentage of sealing increase or decrease for those pixels that show real sealing change in the period covered. This product is available in 20m and 100m pixel size. b) A classified change product that maps the most relevant categories of sealing change (unchanged no sealing, new cover, loss of cover, unchanged sealed, increased sealing, decreased sealing). This product is available in 20m pixel size only.
Additional/ Other Data Used and its links	Geocoded population data (address location).
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	1. Download and preparation of Copernicus High Resolution Layer Imperviousness available for the reference years 2006, 2009, 2012 and 2015. For each reference years, a subset for Sweden was created 2. Creation of “urban areas” from Copernicus High Resolution Layer Imperviousness following the methodological proposal from UN HABITAT (https://urban-data-guo-un-habitat.hub.arcgis.com/datasets/indicator-11-3-1-training-module-land-consumption-jan-2019) 3. Computing annual land consumption rate by comparing change in the layers created in step 2 4. Calculation of population growth rate by matching the layers created in step 2 with geocoded population data for each of the years. 5. Computing Ratio of land consumption rate to population growth rate + Urban land per capita using the results from step 2 and 4.

Work flow	
Lessons learned, any gaps, key issues and recommendations	<u>National monitoring</u> Limited access to high-resolution, high quality data on impervious land with good coherence over time. Though having a resolution of 20m, Copernicus data is the most accurate data available for time series. A new national land cover database has been developed in Sweden based on Sentinel-2 data with a resolution of 10m. The plan is to provide updates but as of today, it is only available for one reference year. <u>European coordination</u> 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).



Supporting material about this use case. Include links, publications, etc.	<u>National monitoring</u> Implementation of the 2030 Agenda in Sweden - Statistical Review 2019, Statistics Sweden: https://scb.se/hitta-statistik/statistik-efter-amne/miljo/miljoekonomi-och-hallbar-utveckling/indikatorer-for-hallbar-utveckling/pong/publikationer/implementation-of-the-2030-agenda-in-sweden---statistical-review-2019/ <u>European coordination</u> 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: 
Collaboration with other agencies - agency names and activities	<u>National monitoring</u> N/A <u>European coordination</u> 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.
Name(s) and email address of individual(s) involved in this effort. Please note the principal point(s) of contact (POCs).	<u>National monitoring</u> Jerker Moström, Statistics Sweden Email: jerker.mostrom@scb.se <u>European coordination</u> 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