



Gobierno
de España

Ministerio
de Transportes
y Movilidad Sostenible

IGN-INE collaboration
**LCLU and Settlement information systems for
SDG indicators (11.3.1 & 11.7.1)**

Julián Delgado Hernández

Motivation: Geo-stats integration

- Separate competences **IGN (National Mapping Agency)** and **INE (National Statistical Institute)** but common interest to contribute to the SDG indicators generation
- General framework
 - UN-GGIM & SDG: **Global Statistical Geospatial Framework** for production of standardized and integrated geospatially enabled statistical data <https://ggim.un.org/UNGGIM-expert-group/>
 - Eurostat/GISCO <https://ec.europa.eu/eurostat/web/gisco>
 - **National Statistic Plan (PEN)**: NSI identifies and compile yearly any statistic operation → IGN projects included (i.e. LCLU system, National Atlas, etc.)
- **Collaboration agreement** signed between IGN and INE:
 - Generation of (some) indicators for the Sustainable Development Goals
 - Co-production of the cartography of the settlements
 - ...



UN-GGIM GSGF

Standing start: References & context

- UN SDG Indicators **Metadata Repository. (Goal 11. UN-Habitats)**

<https://unstats.un.org/sdgs/metadata/>

- UN-GGIM Europe: **Work Plan SDG**

<https://un-ggim-europe.org/working-groups/low-sustainable-development-goals/>

- Organization for Economic Cooperation and Development (**OECD**): Toolkit for a Territorial approach to the SDGs <https://www.oecd.org/publications/oecd-toolkit-for-a-territorial-approach-to-the-sdgs-2913bae2-en.htm>

- **Ministry of Social Rights, Consumption and Agenda 2030 + Spanish Federation of Municipalities and Provinces (FEMP):** http://femp.femp.es/Portal/Front/Atencion_al_asociado/Comision_Detalle/_9CJy9Y2ZCoETgWRH4c6o9YEoT1T55nPaRE4B_W8YYPibYelhy5ffsYeY407INDJ8Z0QKYSLhT-rkCAyIS7M8v8KQHGS5Vdy3joDOSZXW-8

- **INE**

<https://www.ine.es/dyngs/ODS/es/index.htm>



Methodology (main aspects for indicators 11.3.1 & 11.7.1)

UN Metadata

- Spatial delineation of cities/urban area based on grid [**DEGURBA**, 1km²]
- Identification of open spaces and built-up from image processing, only LC [**GHS-Built**, GSD 10-30m]
- Population stats from grid [**GHS-POP**, GSD 100m]
- EO significantly contribution
- Release 3-5 years
- <https://unstats.un.org/sdgs/metadata/>
- <https://human-settlement.emergency.copernicus.eu/index.php>

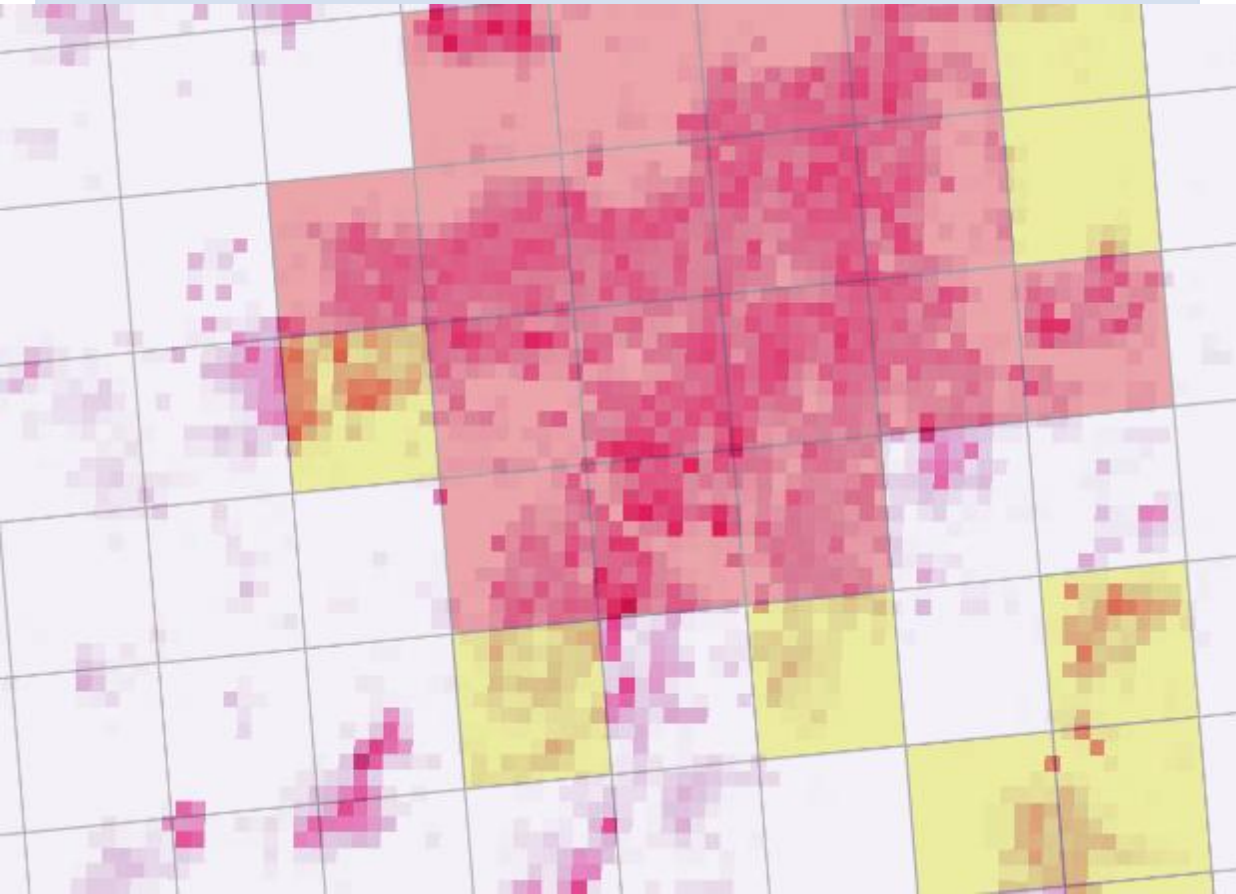
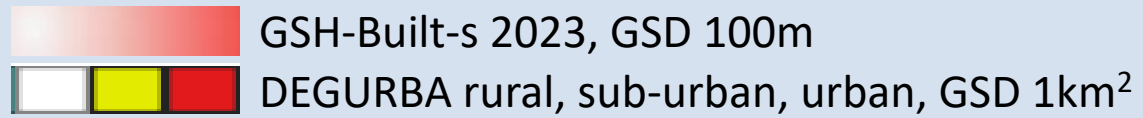
National

- Spatial delineation of settlements vector format [**GRI Settlements** fitted to cadastral parcels, and Spanish answers for UN-GGIM Global Fundamental Data Theme on Settlements]
- Identification of any kind of LC or LU from national systems [**SIOSE** fitted to cadastral parcels, and Spanish answers for UN-GGIM Global Fundamental Data Theme and INSPIRE on Land Cover and Land Use]
- **Population stats from NSI at settlement level** (disaggregated by age & gender)
- Focus to re-use authoritative data complemented with EO
- Release 3 years
- <https://www.ign.es/>
- <https://www.ine.es/>

Methodology (main aspects for indicators 11.3.1 & 11.7.1)

Real visual example: city of Girona (Spain), images at same scale

UN Metadata



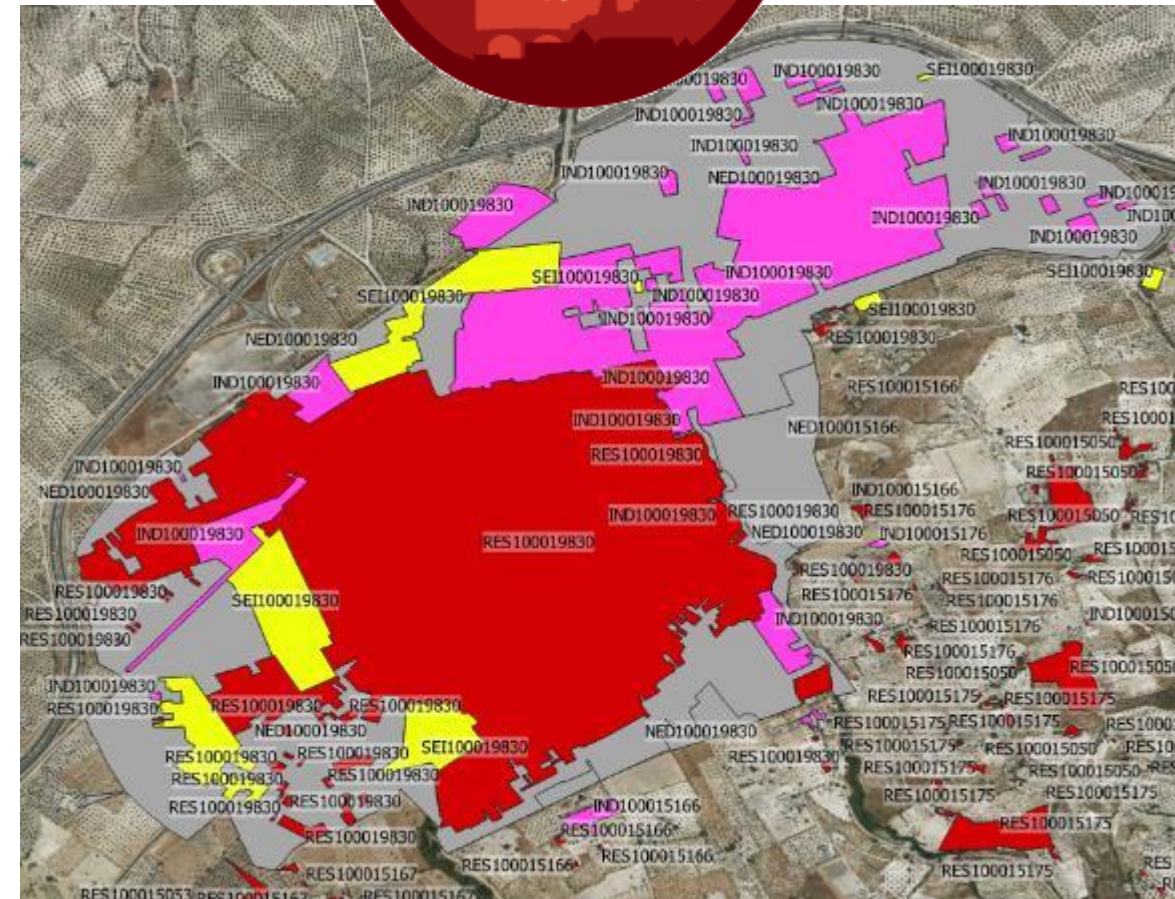
National



DATA SOURCE: GRI Settlements



- **High-resolution georeferenced population dataset** that allows the management and maintenance of the location and geometric characters of settlements. Generated from the **cadastral parcels**, identified with a **statistical code** and **official name**.
- Binding framework
 - UN-GGIM Global Fundamental Geospatial Data Themes
 - INSPIRE Directive 2007/2/CE y National Law 14/2010 on spatial data and services infrastructures <http://www.idee.es/>
 - National Royal Decree 308/2022
 - Directive PSI 2019/1024 y Royal Decree 24/2021 of open data and reuse public data infrastructure
- Collaborative project between public administrations, coordinated by IGN much focused for statistics applications
- In line with UN-GGIM Global Fundamental Data Theme on Buildings and Settlements



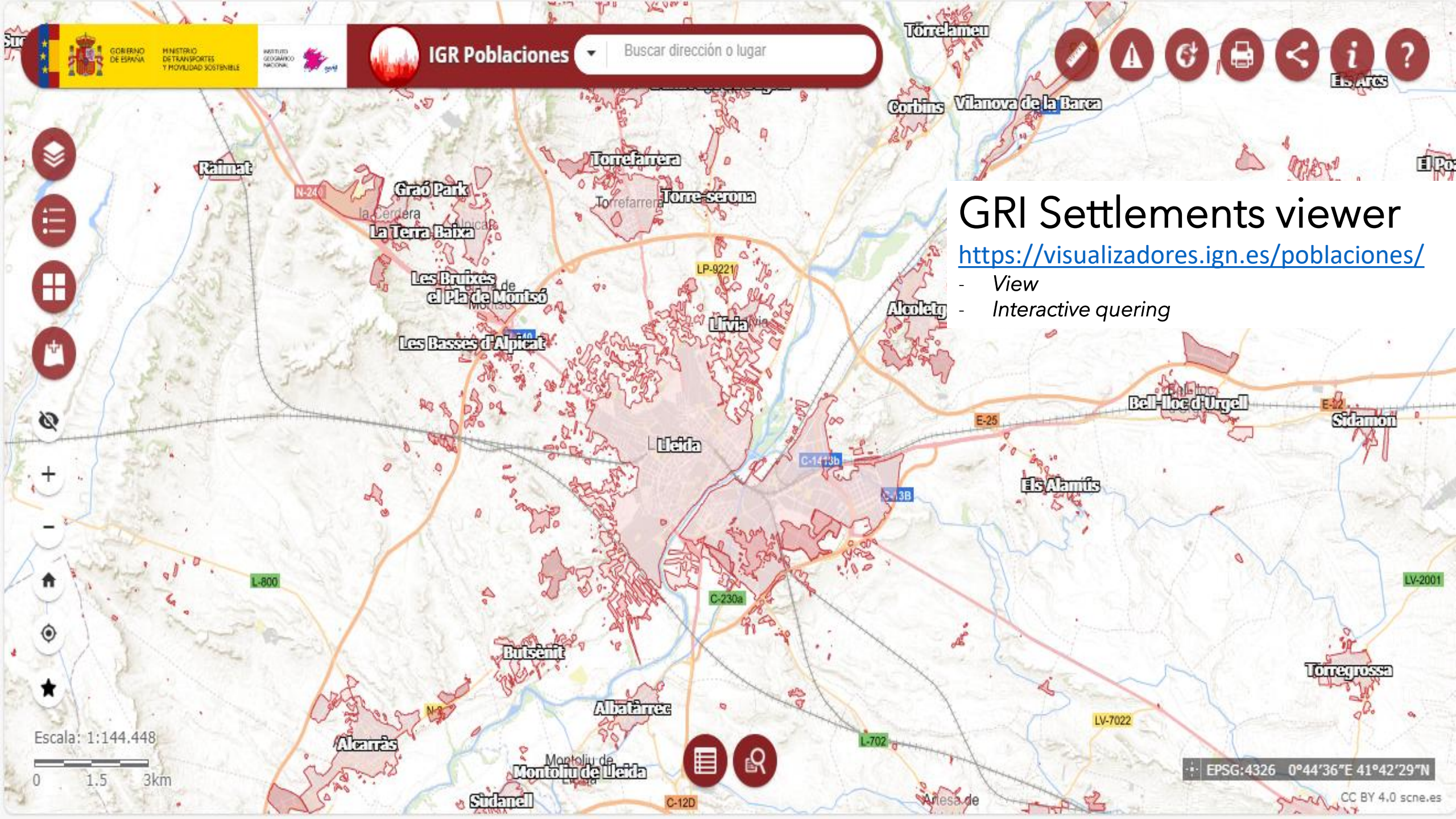
GRI Settlements

<https://www.ign.es/web/seccion-poblaciones>
poblaciones.ign@mitma.es

Download (CC-BY)

<http://centrodedescargas.cnig.es/>





GRI Settlements viewer

<https://visualizadores.ign.es/poblaciones/>

- View
- Interactive quering

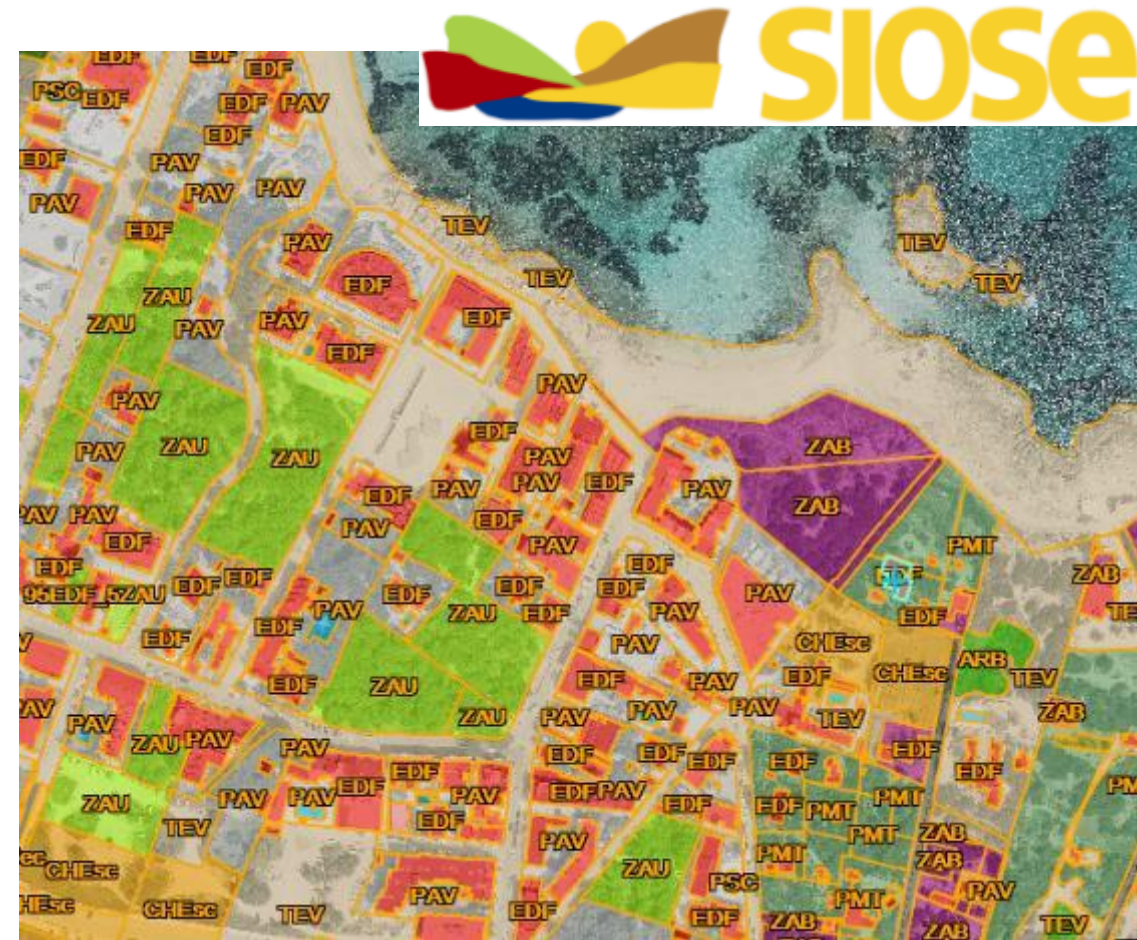
Escala: 1:144.448

0 1.5 3km

EPSG:4326 0°44'36"E 41°42'29"N

DATA SOURCE: SIOSE

- National Land Cover and Land Use information system. Official information for all themes together and integrated (agriculture, forestry, artificial, etc.) satisfying needs for national and international users, reducing efforts and costs
- Binding framework
 - Regulation UE 2021/696 Copernicus Programme. Copernicus Land Monitoring Service
 - Regulation CE 1210/90 and 41/2009 European Environment Agency and European Environment Information and Observation Network (EIONET)
 - UN-GGIM Global Fundamental Geospatial Data Themes
 - INSPIRE Directive 2007/2/CE y National Law 14/2010 on spatial data and services infrastructures <http://www.idee.es/>
 - National Royal Decree 308/2022
 - Directive PSI 2019/1024 y Royal Decree 24/2021 of open data and reuse public data infrastructure
- **Collaborative and decentralized project between public administrations, coordinated by IGN**
- Data source for INSPIRE and Copernicus Land
- In line with UN-GGIM Global Fundamental Data Theme on Land Cover and Land Use



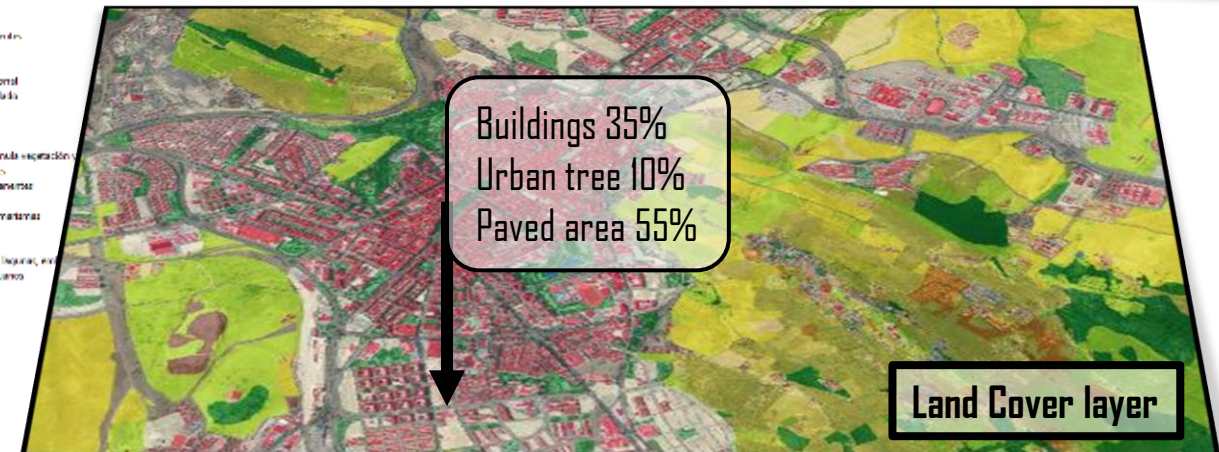
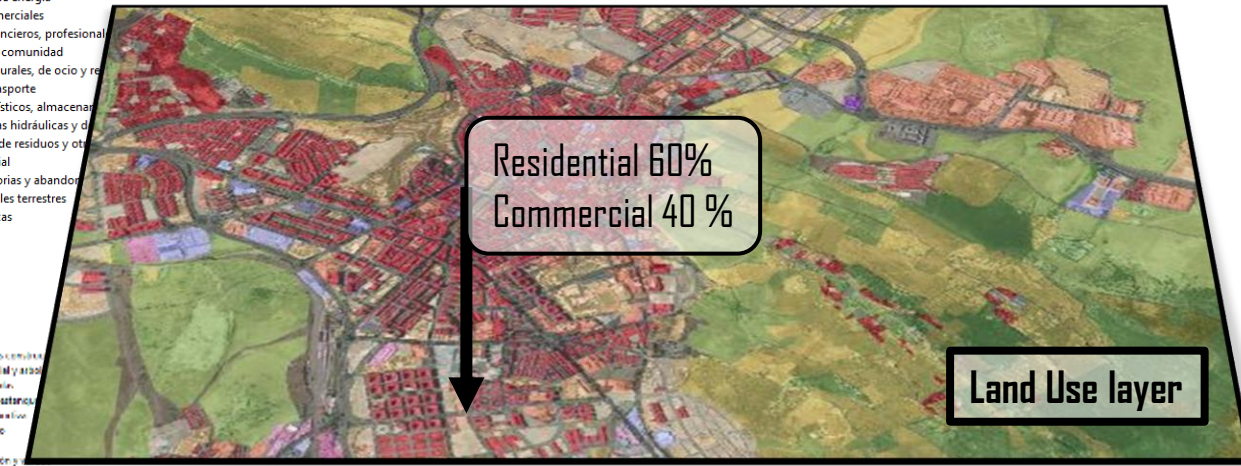
DATA SOURCE: SIOSE



- **Automatic data integration and revision:** cadastre, CAP AICS (parcel information and farmers declaration), national forest map, LiDAR, reference information on transport networks, settlement, hydrography, regional databases and photointerpretation. Scale 1:1.000-1:5.000
- Datamodel compliant INSPIRE, EIONET-EAGLE and **object oriented (by percentages)**
- Versions every 3 years since 2005

- Producción e infraestructuras agrícolas
- Silvicultura
- Industrias extractivas
- Acuicultura y pesca
- Dehesa y otras actividades primarias
- Producción secundaria
- Producción de energía
- Servicios comerciales
- Servicios financieros, profesional
- Servicios a la comunidad
- Servicios culturales, de ocio y recreo
- Redes de transporte
- Servicios logísticos, almacenes
- Infraestructuras hidráulicas y de saneamiento
- Tratamiento de residuos y otros
- Uso residencial
- Áreas transitorias y abandonadas
- Áreas naturales terrestres
- Áreas acuáticas

- Edificios y edificios sencillos
- Zona verde artificial y arbolado
- Zonas verdes bajas
- Plazas, plazas y parques
- Canchales de deportes
- Dado no clasificado
- Zona al aire libre
- Zonas de edificación y construcción
- Red de transporte terrestre
- Cultivos y cultivos herbáceos
- Tuercas y asociaciones
- Viveros y parques acuáticos
- Obras y asociaciones
- Otros edificios, puentes, etc.
- El agua
- Pavimento
- Parque y postal meteo
- Arbolado y zonas verdes
- Protección
- Cauces
- Montaña
- Terranos con nieve o mala vegetación
- El agua, nieve, hielo, etc.
- Glaciares, nieve permanente
- Canales, lagos, etc.
- Cobertura hielada, matamoscas
- Tuercas
- Dolmen
- Canales de agua, lagos, lagunas, etc.
- Montañas y picos y cumbres

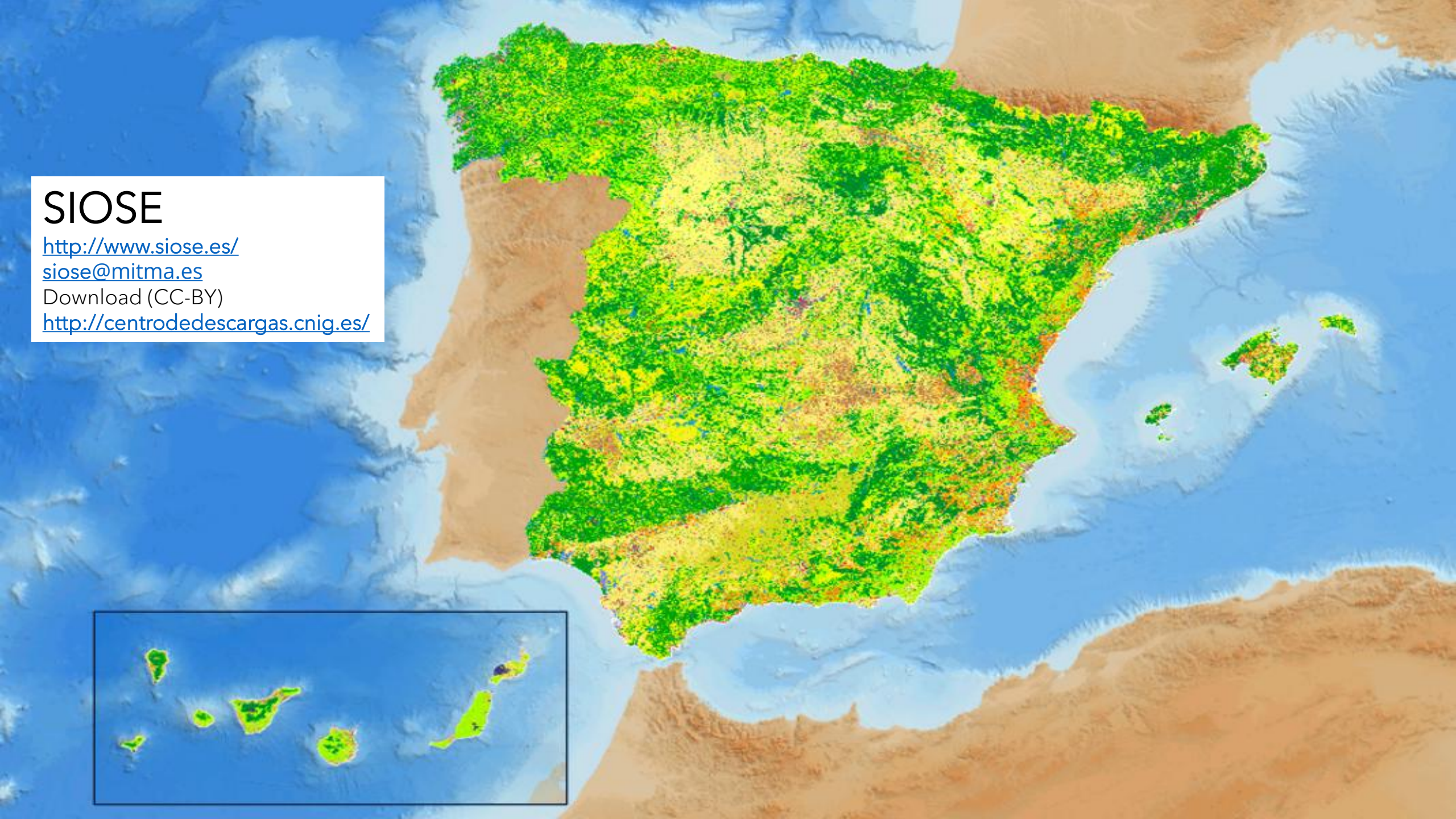


SIOSE

<http://www.siose.es/>
siose@mitma.es

Download (CC-BY)

<http://centrodedescargas.cnig.es/>



Estadísticas

SIOSE

Año: 2005 2014

CCAA: Extremadura Extremadura

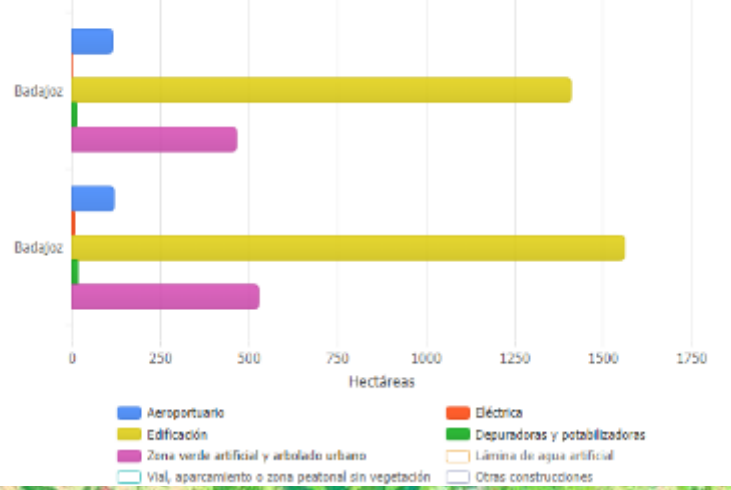
Provincia: Badajoz Badajoz

Municipio: Badajoz Badajoz

Ver estadísticas

Descargar datos estadísticos en CSV

Badajoz (2005) - Badajoz (2014) SIOSE



SIOSE viewer

<https://visualizadores.ign.es/siose/>

- View
- Interactive query
- Statistics
- Comparator

-2,639 41,217 Grados

20km



11.7.1 Indicator



- Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities
- Needed data (2017)
 - **GRI Settlements**
 - **SIOSE (LCLU)** (urban green, paved areas, sports & leisure, urban open areas)
 - **INE** (inhabitants per settlement, disaggregated by age and gender. No data available about persons with disability) Georeferenced at settlement level, no georeferenced at population place
 - **Cadaster**



<https://pixabay.com/es/photos/madrid-espa%C3%B1a-arquitectura-urbanos-4619556/>

$$\text{Share of the built – up area of the city that is open space in public use(\%)} = \frac{\text{Total surface of open public space} + \text{Total surface of land allocated to streets}}{\text{Total area of the city}}$$

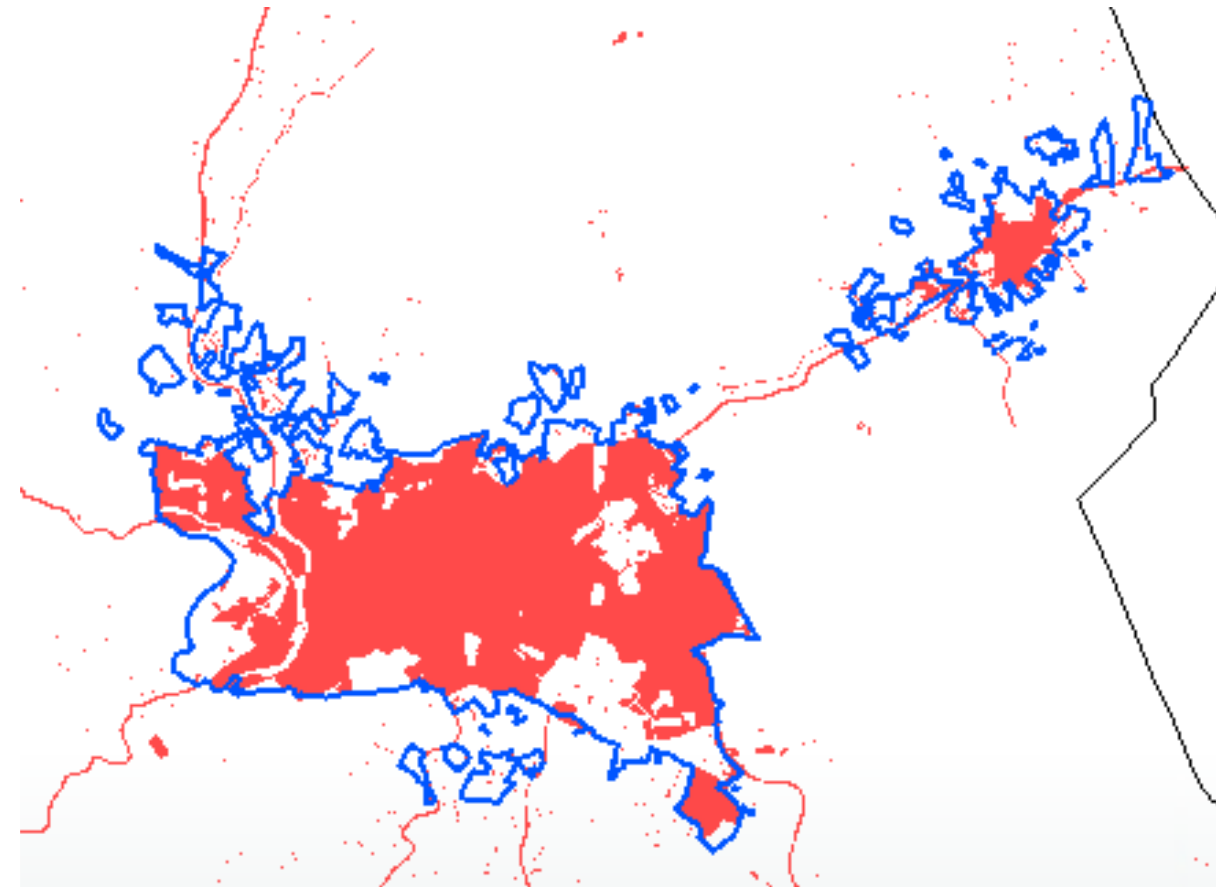
Source: <https://unstats.un.org/sdgs/metadata/files/Metadata-11-07-01.pdf>

Methodology

- Identification of LCLU types compatibles with SDG indicators
- Get polygons from SIOSE of selected LCLU types (**red**)
- Overlay these polygons with GRI Settlements delimitation (**blue**)

Note: no computation accessibility distance by streets from homes to parks

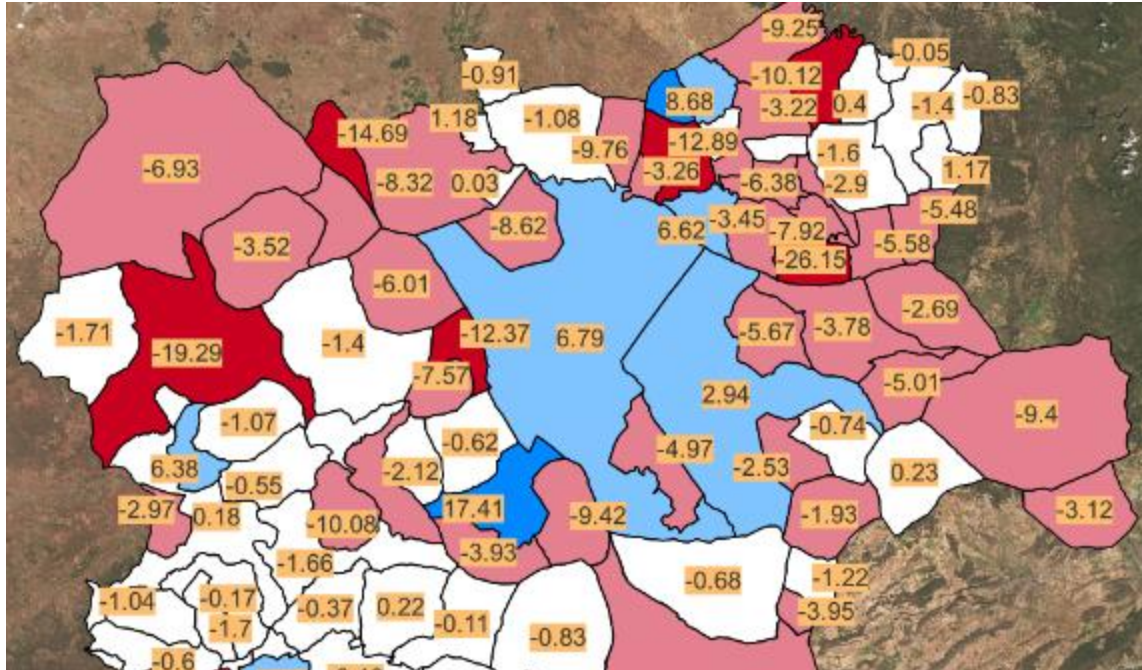
- Integration of statistical data of inhabitants by INE code (by shared codes between INE data and GRI Settlements)
- Indicator calculus at different land levels (settlements, municipality and provinces)
- Outputs: alphanumeric tables (xls) and graphic results (ESRI databases) per entire country



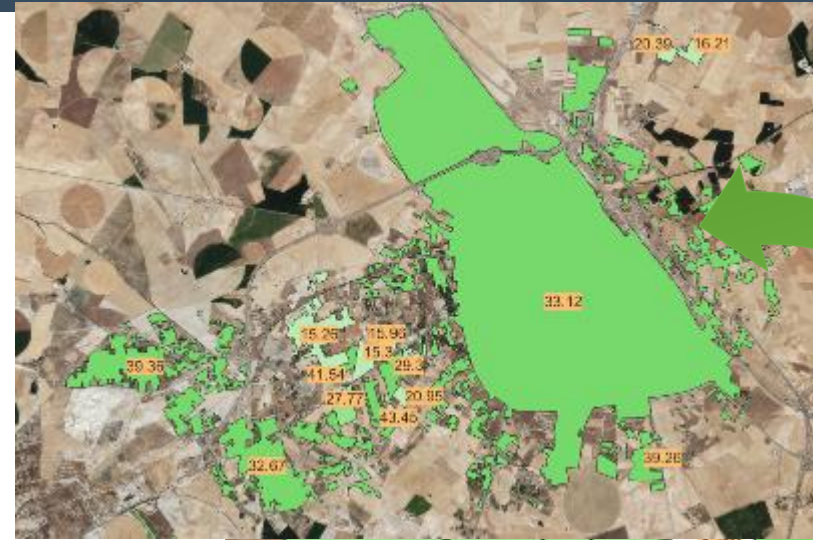
 GRI Settlements with INE statistical code

 SIOSE (LCLU) polygons for selected LU types

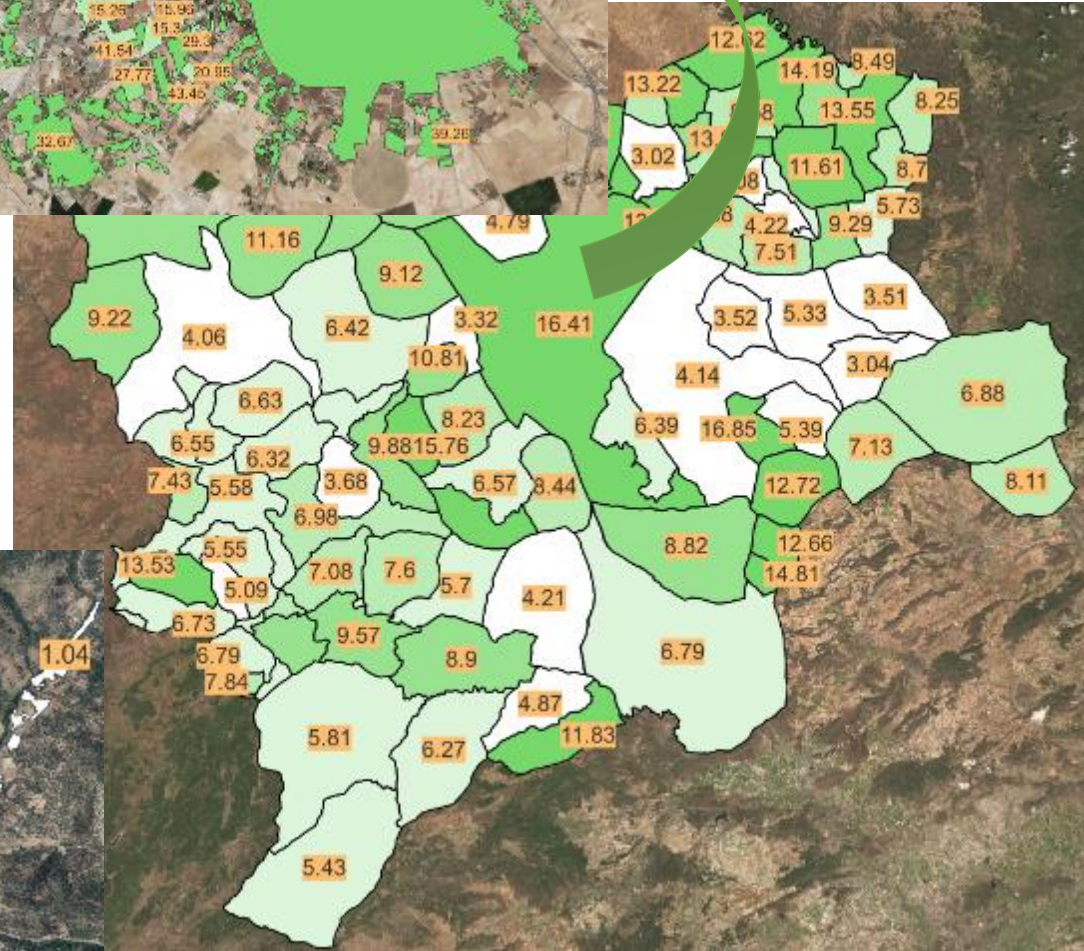
Results



11.3.1 per municipality
11.3.1 per settlement



11.7.1 per municipality
11.7.1 per settlement



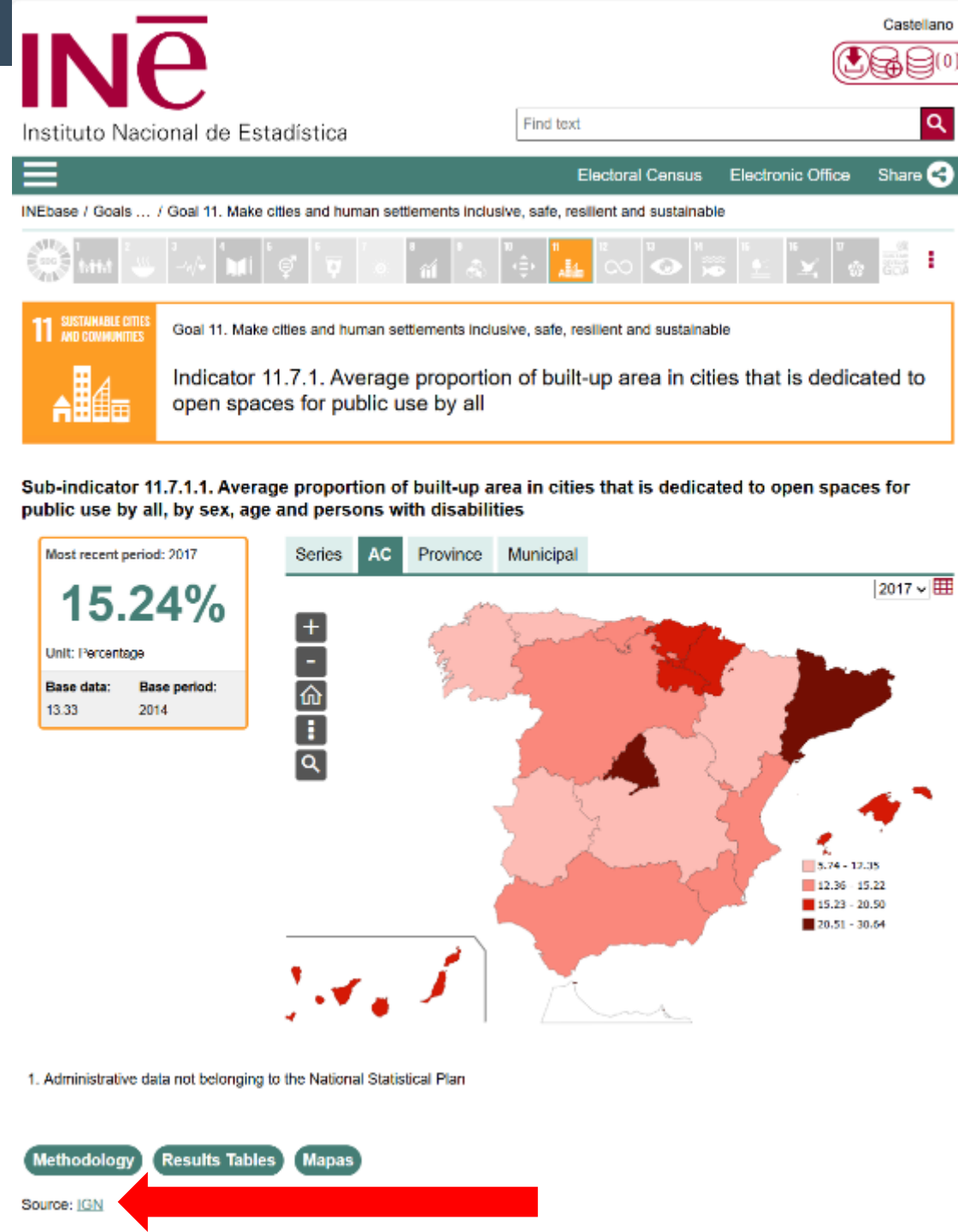
Results

cpro	codine	idpob	nombre	LCPR/PGR	Habitantes2014	Hombres2014	Mujeres2014	Habitantes2017	Hombres2017	Mujeres2017
8	08019000101	900001720	Barcelona	-1,32	1602386	758316	844070	1620809	766625	854184
8	08020000101	900001930	La Barceloneta	-9,47	1148	558	590	1202	586	616
8	08020000102	900002405	Bartró	-5,72	9	3	6	10	4	6
8	08020000103	900002421	la Bassa Blanca	1,39	66	33	33	79	40	39
8	08020000104	900001788	Begues	-1,14	2715	1331	1384	2785	1373	1412
8	08020000105	900001692	Bon Solei	-5,77	120	66	54	127	71	56
8	08020000106	900002882	Cal Viudo	7,21	109	60	49	106	54	52
8	08020000107	900002403	Ca n'amell	-6,35	69	39	30	76	39	37
8	08020000108	900002581	La Costeta	-0,65	134	70	64	176	97	79
8	08020000109	900001735	Raval Sant Martí	31,5	136	70	66	134	69	65
8	08020000110	900001934	La Rectoria	16,65	161	86	75	156	81	75
8	08020000111	900002694	Santa Eulàlia	14,99	430	216	214	435	213	222
8	08020000112	900002967	Bon Solei II	1,06	112	58	54	98	48	50

cpro	codine	idpob	nombre	SACUP	STAC_2017	STEP_2017	STDC_2017	Habitantes2014	Hombres2014	Mujeres2014	Habitantes2017	Hombres2017	Mujeres2017
8	08019000101	900001720	Barcelona	37,37	80503977,15	13022445,49	17062814,22	1602386	758316	844070	1620809	766625	854184
8	08020000101	900001930	La Barceloneta	30,15	338876,16	29908,56	72253,77	1148	558	590	1202	586	616
8	08020000102	900002405	Bartró		11219,34	771,92		9	3	6	10	4	6
8	08020000103	900002421	la Bassa Blanca	33,71	80596,31	2078,56	25091,57	66	33	33	79	40	39
8	08020000104	900001788	Begues	32,03	468693,35	38557,98	111582,26	2715	1331	1384	2785	1373	1412
8	08020000105	900001692	Bon Solei	37,11	163986,75	37171,82	23691,21	120	66	54	127	71	56
8	08020000106	900002882	Cal Viudo	36,23	43854,79	3948,29	11939,68	109	60	49	106	54	52
8	08020000107	900002403	Ca n'amell	32,73	99716,11	12599,81	20038,86	69	39	30	76	39	37
8	08020000108	900002581	La Costeta	48,42	215793,34	71413,06	33078,79	134	70	64	176	97	79
8	08020000109	900001735	Raval Sant Martí	25,03	92465,14	14323,24	8818,18	136	70	66	134	69	65
8	08020000110	900001934	La Rectoria	31,78	98055,03	11122,83	20036,38	161	86	75	156	81	75
8	08020000111	900002694	Santa Eulàlia	42,94	357000,29	80370,77	72913,86	430	216	214	435	213	222
8	08020000112	900002967	Bon Solei II	32,71	77568,69	2397,57	22974,87	112	58	54	98	48	50

Conclusions

- **Real massive demonstration** of geospatial and statistical official data integration for an entire country
- **Level of calculus detailer than municipality**, thanks to the existence of inhabitants stats and settlements geospatial information.
- Indicator and their components (directly related to n° of inhabitants) can be fuzzed or few representative in rural and small settlements. **Recommendation to use for settlement ≥ 20.000 inhabitants.**
- Documented in English
- IGN Spain does not publish SDG indicators values. INE has the competence to publish SDG indicators at <https://www.ine.es/dyngs/ODS/es/index.htm>
- Similar approaches can be applied in others SDG indicator with high geospatial dependence





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Questions & Thanks

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