

Weal Proposal of indicators to measure local sustainability

GLOB01: MUNICIPAL URBAN PLANNING (MUP)	
Definition	Existence of municipal urban planning (General Urban Development Plans, Subsidiary Rules, etc.)
Sustainable Development Goal	11-UN, SSDS, 100103-SIAS_CYL, 16.1-FMP-CLM
Calculation formula	Existence/absence
Measurement unit	YES/NO
Information sources	Ministry of Public Works, Urban Planning Departments, Town Councils
Desirable trend	Existence
Type of indicator	Response
Dimension	Environmental, Economic and Social
Category	Urban planning
References	- FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla-La Mancha, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf - JUNTA DE CASTILLA Y LEÓN, 2015. Sistema de indicadores ambientales y de sostenibilidad de Castilla y León, 2015, http://www.medioambiente.jcyl.es/web/jcyl/MedioAmbiente/es/Plantilla100/1218521587650/_/_/ - Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 - UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	Voluntary European indicator

EN01: PROPORTION OF NON-ARTIFICIAL LAND (PNAL)	
Definition	Proportion of non-artificial land
Sustainable Development Goal	15-UN, B9-CE, SSDS, 90105-SIS_CYL, 25-FMP-CLM, T5-T15-CBD, 8.6-OSE, MAGRAMA
Calculation formula	$PNAL = \frac{NAL18 \times 100}{munA}$ <i>NAL18 = Non – artificial land in 2018, in hectares</i> <i>munA = municipal area, in hectares</i>
Measurement unit	% of non-artificial land to municipal area
Information sources	CORINE-Land Cover 2018 & GIS
Desirable trend	Increase
Type of indicator	State
Dimension	Environmental
Category	Land Use-Land Cover
References	- European Communities, 2000. Towards a local sustainability profile: European common indicators, Office for Official Publications of the European Communities: Luxembourg, 2000. https://op.europa.eu/es/publication-detail/-/publication/33eba485-e1e3-4748-9358-0d66ef86bcc3/language-en/format-PDFA1B - FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla-La Mancha, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf - JUNTA DE CASTILLA Y LEÓN, 2015. Sistema de indicadores ambientales y de sostenibilidad de Castilla y León, 2015, http://www.medioambiente.jcyl.es/web/jcyl/MedioAmbiente/es/Plantilla100/1218521587650/_/_/ - Spanish Ministry for Ecological Transition 2019. Environmental Profile of Spain 2018. Indicator-based Report. https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/publicaciones/pae2018en_tcm30-504011.pdf - UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	Non-artificial land is considered to be the summation of CORINE Land Cover classes 2, 3, 4 and 5.

EN02: CHANGE IN ARTIFICIAL LAND (CAL)	
Definition	Change in the proportion of artificial land
Sustainable Development Goal	15-UN, 8.5.1-EU-SDS, SSDS, 16.2-FMP-CLM, T10-T15-CBD, BIO16-LU1-NR1-EEA, 8.6-OSE, MAGRAMA
Calculation formula	$CAL = 100 - \left[\frac{\left(\frac{artA18 \times 100}{munA} \right) - \left(\frac{artA06 \times 100}{munA} \right)}{t} \right]$ <i>artA18 = Artificial land in 2018, in hectares</i> <i>artA06 = Artificial land in 2006, in hectares</i> <i>munA = Municipal area, in hectares</i> <i>t = number of years in the time series</i>
Measurement unit	%
Information sources	CORINE-Land Cover2006, 2018 & GIS
Desirable trend	Maintain current status
Type of indicator	Pressure
Dimension	Environmental
Category	Land Use-Land Cover
References	• EEA, 2020. European Environment Agency indicators. http://www.eea.europa.eu/data-and-maps/indicators/#c0=10&b_start=0 • EUROSTAT, 2016. EU Sustainable Development Strategy (Indicators). Progress towards the EU SDS objectives and targets is evaluated using a set of about 130 sustainable development indicators (EU SDI set), http://ec.europa.eu/eurostat/web/sdi/ • FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla-La Mancha, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf • OSE, 2012, Indicadores de sostenibilidad de los municipios españoles y portugueses. • Spanish Ministry for Ecological Transition 2007. SSDS, Spanish Sustainable Development Strategy. https://www.miteco.gob.es/es/ministerio/planes-estrategias/estrategia-espanola-desarrollo-sostenible/09047122800cfd5b_tcm30-88639.pdf • Spanish Ministry for Ecological Transition 2019. Environmental Profile of Spain 2018. Indicator-based Report. https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/publicaciones/pae2018en_tcm30-504011.pdf • UNEP-CBD, 2010, Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting X/2. The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets, https://www.cbd.int/doc/decisions/cop-10/cop-10-dec-02-en.doc • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	Artificial land is considered to be the area occupied by all of CORINE Land Cover class 1

EN03: CHANGE IN AGRICULTURAL LAND (CAGL)	
Definition	Change in the proportion of agricultural land
Sustainable Development Goal	15-UN, OE2-EMDS, T7-T15-CBD, MMA
Calculation formula	$VSAGR = \left(\frac{Sagr18 \times 100}{Smun} \right) - \left(\frac{Sagr06 \times 100}{Smun} \right)$ <i>Sagr18 = Agricultural land in 2018, in hectares</i> <i>Sagr06 = Agricultural land in 2006, in hectares</i> <i>munA = Municipal area, in hectares</i>
Measurement unit	%
Information sources	CORINE-Land Cover 2006 and 2018 & GIS
Desirable trend	Maintain current status or reduce to increase natural areas
Type of indicator	State
Dimension	Environmental
Category	Land Use-Land Cover
References	• CIHEAM-PLAN BLEU-MARM, 2009, TerraMED: Nuevas perspectivas para el Desarrollo Rural en el Mediterráneo, Madrid, CIHEAM-Plan Bleu-MARM, 420pp. • MINISTERIO DE MEDIO AMBIENTE, 1996, Indicadores ambientales. Una propuesta para España, Madrid, Ministerio de Medio Ambiente, 146pp. • UNEP-CBD, 2010, Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting X/2. The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets, https://www.cbd.int/doc/decisions/cop-10/cop-10-dec-02-en.doc • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	Agricultural land is considered to be the area occupied by all of CORINE Land Cover class 2

EN04: CHANGE IN FOREST AND NATURAL LAND (CFNL)	
Definition	Change in the proportion of forest and natural land
Sustainable Development Goal	15-UN, 14-OECD, B9-CE, OE7-EMDS, 1.2-EESUL, 25.1-FMP-CLM, T5-T7-T15-CBD, BIO17-CGL27-LU1-NR1-EEA, 17-EEA-SEBI, MMA, MAGRAMA, EBV
Calculation formula	$CFNL = \left(\frac{fnA18 \times 100}{munA} \right) - \left(\frac{fnA06 \times 100}{munA} \right)$ <i>fnA18 = Forest and natural land in 2018, in hectares</i> <i>fnA06 = Forest and natural land in 2006, in hectares</i> <i>munA = Municipal area, in hectares</i>
Measurement unit	%
Information sources	CORINE-Land Cover 2006 and 2018 & GIS
Desirable trend	Increase
Type of indicator	State
Dimension	Environmental
Category	Land Use-Land Cover
References	• CIHEAM-PLAN BLEU-MARM, 2009, TerraMED: Nuevas perspectivas para el Desarrollo Rural en el Mediterráneo, Madrid, CIHEAM-Plan Bleu-MARM, 420pp. • EEA, 2012. Streamlining European biodiversity indicators 2020: Building a future on lessons learnt from the SEBI 2010 process, Luxembourg, EEA Technical Report 11/2 http://www.eea.europa.eu/publications/streamlining-european-biodiversity-indicators-2020 • EEA, 2020. European Environment Agency indicators. http://www.eea.europa.eu/data-and-maps/indicators/#c0=10&b_start=0 • European Communities, 2000. Towards a local sustainability profile: European common indicators, Office for Official Publications of the European Communities: Luxembourg, 2000. https://op.europa.eu/es/publication-detail/-/publication/33eba485-e1e3-4748-9358-0d66ef86bcc3/language-en/format-PDFA1B • EUROSTAT, 2016. EU Sustainable Development Strategy (Indicators). Progress towards the EU SDS objectives and targets is evaluated using a set of about 130 sustainable development indicators (EU SDI set), http://ec.europa.eu/eurostat/web/sdi/ • FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla-La Mancha, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf • FOREST EUROPE-UNECE-FAO, 2011. State of Europe's Forests 2011. Status and Trends in Sustainable Forest Management in Europe, http://www.foresteurope.org/documentos/State_of_Europes_Forests_2011_Report_Revised_November_2011.pdf • Maes, W.H., Fontaine, M., Rongé, K., Hermy, M., Muys, B., 2011. A quantitative indicator framework for stand level evaluation and monitoring of environmentally sustainable forest management. Ecological Indicators 11, 468-479. • MAGRAMA-MINISTERIO DE FOMENTO, 2011, Estrategia española de sostenibilidad urbana y local (EESUL), http://www.fomento.gob.es/NR/rdonlyres/1668CD1E-0B11-4C9E-84E2-E664DD3464C1/111503/EESULWEB2011.pdf

	• Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 • Martínez-Vega, J., Samir, M., Echavarría, P. 2016. Assessing forest sustainability: Evidence from Spanish provinces. Geoforum 70:1-10. • MINISTERIO DE MEDIO AMBIENTE, 1996, Indicadores ambientales. Una propuesta para España, Madrid, Ministerio de Medio Ambiente, 146pp. • OECD 2001, Environmental Indicators 2001: Towards Sustainable Development, http://www.oecd.org/site/worldforum/33703867.pdf • OSE, 2012, Indicadores de sostenibilidad de los municipios españoles y portugueses • Pan T.C., Kao, J., 2009. Inter-generational equity index for assessing environmental sustainability: an example on global warming. Ecological Indicators 9, 725-731 • Pereira HM, Ferrier S, Walters M, Geller GN et al., 2013. Essential Biodiversity Variables, Science 339: 277-278. • Pintus, F., Giraud, J.P., 2009. Measuring agricultural and rural development. In: Hervieu, B., Thibault, H.L., (Eds.) Mediterra 2009: Rethinking rural development in the Mediterranean. CIHEAM and Blue Plan. Presses de Sciences Po, Paris, pp. 333-351. • Spanish Ministry for Ecological Transition 2007. SSDS, Spanish Sustainable Development Strategy. https://www.miteco.gob.es/es/ministerio/planes-estrategias/estrategia-espanola-desarrollo-sostenible/09047122800cfd5b_tcm30-88639.pdf • Spanish Ministry for Ecological Transition 2019. Environmental Profile of Spain 2018. Indicator-based Report. https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/publicaciones/pae2018en_tcm30-504011.pdf • UNEP-CBD, 2010, Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting X/2. The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets, https://www.cbd.int/doc/decisions/cop-10/cop-10-dec-02-en.doc • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	Forest and natural land is considered to be the summation of CORINE Land Cover classes 3, 4 and 5

EN05: CHANGE IN THE LIVESTOCK DENSITY INDEX (CLDI)	
Definition	Change in the livestock density index
Sustainable Development Goal	2.4.5-EU SDS, OE2-EMDS
Calculation formula	$CLDI = \left(\frac{LU09}{GraA06} \right) - \left(\frac{LU89}{GraA90} \right)$ <i>LU09 = Livestock units in 2009</i> <i>LU89 = Livestock units in 1989</i> <i>GraA06 = Grazing area 2006, in hectares</i> <i>GraA90 = Grazing area 1990, in hectares</i>
Measurement unit	
Information sources	Agricultural censuses 1989 and 2009 and CORINE-Land Cover 1990 and 2006
Desirable trend	Maintain current status
Type of indicator	Pressure
Dimension	Environmental, Economic
Category	Livestock
References	• CIHEAM-PLAN BLEU-MARM, 2009, TerraMED: Nuevas perspectivas para el Desarrollo Rural en el Mediterráneo, Madrid, CIHEAM-Plan Bleu-MARM, 420pp. • EUROSTAT, 2016. EU Sustainable Development Strategy (Indicators). Progress towards the EU SDS objectives and targets is evaluated using a set of about 130 sustainable development indicators (EU SDI set), http://ec.europa.eu/eurostat/web/sdi/
Observations	Grazing area is considered to be the summation of CORINE-Land Cover classes 244 and 321

EN06: DEFOLIATION OF FOREST MASSES (DFM)	
Definition	Degree of defoliation of coniferous and deciduous forest masses assessed by the percentage of trees within each of the three established ranges or levels of defoliation: none (up to and including 10%), slight (11-25%) and moderate, severe and terminal (>25% loss of canopy foliage volume)
Sustainable Development Goal	15-UN, OE7-EMDS, T5-CBD, BIO9-EEA, MMA, MAPA
Calculation formula	16 x 16 km grid cells within Level I of the European Forest Damage Network
Measurement unit	%
Information sources	Department for Forest Health and Biological Balance, Ministry of Agriculture
Desirable trend	Reduction
Type of indicator	Pressure
Dimension	Environmental
Category	Forest
References	• CIHEAM-PLAN BLEU-MARM, 2009, TerraMED: Nuevas perspectivas para el Desarrollo Rural en el Mediterráneo, Madrid, CIHEAM-Plan Bleu-MARM, 420pp. • EEA, 2020. European Environment Agency indicators. http://www.eea.europa.eu/data-and-maps/indicators/#c0=10&b_start=0 • FOREST EUROPE-UNECE-FAO, 2011. State of Europe's Forests 2011. Status and Trends in Sustainable Forest Management in Europe, http://www.forest-europe.org/documentos/State_of_Europes_Forests_2011_Report_Reviewed_November_2011.pdf • Martínez-Vega, J., Samir, M., Echavarría, P. 2016. Assessing forest sustainability: Evidence from Spanish provinces. Geoforum 70:1-10. • MINISTERIO DE MEDIO AMBIENTE, 1996, Indicadores ambientales. Una propuesta para España, Madrid, Ministerio de Medio Ambiente, 146pp. • Spanish Ministry for Ecological Transition 2019. Environmental Profile of Spain 2018. Indicator-based Report. https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/publicaciones/pae2018en_tcm30-504011.pdf • UNEP-CBD, 2010, Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting X/2. The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets, https://www.cbd.int/doc/decisions/cop-10/cop-10-dec-02-en.doc • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	The value for each municipality will be a mean weighted by the size of each grid cell included in the municipality

EN07: CHANGE IN GROSS PRIMARY PRODUCTIVITY (CGPP)									
Definition	Change in gross primary productivity (GPP)								
Sustainable Development Goal	15-UN, OE7-EMDS, T5-CBD, BIO9-EEA, MMA, MITECO								
Calculation formula	Calculate 8-day GPP over a series of years at the start of the series (for example, 2000-2005) and compare it with a similar series from recent years (2015-2020), calculating changes in each 1 km² pixel. The product is based on the following equation: $8 - day\ GPP\ (GPP = \varepsilon_{max} \times Temperature_Scalar \times Water\ Stress_Scalar \times APAR)$ Another alternative is to calculate annual gross primary productivity over the whole period 2000-2020 and find the trend: <table><tr><th>HDF Science Data Sets</th><th>UNITS</th><th>VALID RANGE</th><th>SCALE FACTOR</th></tr><tr><td>Gridded 1 Km Annual Gross Primary Productivity</td><td>Kg C m⁻²</td><td>0-65500</td><td>0.0001</td></tr></table> This product is annual so is easier to calculate, but it does not register seasonal oscillations during each year which might be of interest for studying more detailed processes. The data for each pixel have to be divided by 10,000 to obtain units in kg C m⁻²	HDF Science Data Sets	UNITS	VALID RANGE	SCALE FACTOR	Gridded 1 Km Annual Gross Primary Productivity	Kg C m ⁻²	0-65500	0.0001
HDF Science Data Sets	UNITS	VALID RANGE	SCALE FACTOR						
Gridded 1 Km Annual Gross Primary Productivity	Kg C m ⁻²	0-65500	0.0001						
Measurement unit	Kg C m ⁻² year ⁻¹								
Information sources	MODIS-GPP https://modis.gsfc.nasa.gov/data/dataproduct/mod17.php								
Desirable trend	Increase								
Type of indicator	State								
Dimension	Environmental								
Category	Forest								
References	• CIHEAM-PLAN BLEU-MARM, 2009, TerraMED: Nuevas perspectivas para el Desarrollo Rural en el Mediterráneo, Madrid, CIHEAM-Plan Bleu-MARM, 420pp. • EEA, 2020. European Environment Agency indicators. http://www.eea.europa.eu/data-and-maps/indicators/#c0=10&b_start=0 • FOREST EUROPE-UNECE-FAO, 2011. State of Europe’s Forests 2011. Status and Trends in Sustainable Forest Management in Europe, http://www.foresteurope.org/documentos/State_of_Europes_Forests_2011_Report_Revisted_November_2011.pdf • MINISTERIO DE MEDIO AMBIENTE, 1996, Indicadores ambientales. Una propuesta para España, Madrid, Ministerio de Medio Ambiente, 146pp. • Spanish Ministry for Ecological Transition 2019. Environmental Profile of Spain 2018. Indicator-based Report. https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/publicaciones/pae2018en_tcm30-504011.pdf • UNEP-CBD, 2010, Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting X/2. The Strategic Plan for Biodiversity								

	2011-2020 and the Aichi Biodiversity Targets, https://www.cbd.int/doc/decisions/cop-10/cop-10-dec-02-en.doc • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/ • Zhao, M., Heinsch, F.A. Nemani, R.R. Running, S.W. 2005. Improvements of the MODIS terrestrial gross and net primary production global data set. Remote Sensing of Environment. 95: 164–176
Observations	A great effort is required to calculate 8-day GPP because many images have to be downloaded. The end value could be a mean of GPP for all the pixels, weighted by the proportion of each pixel included in each municipality.

EN08: FOREST FIRE DENSITY (FFD)	
Definition	Forest fire density during the 2001-2010 time series
Sustainable Development Goal	15-UN, OE7-EMDS, SSDS, 110101-SIAS_CYL, T5-CBD, 11-EPI, BIO9-CGL33-EEA, 18-EEA-SEBI, 8.4-OSE, MITECO
Calculation formula	$FFD = \frac{\Sigma FF}{fA06}$ ΣFF = incipient and forest fires between 2001 and 2014 $fA06$ = forest area in 2006, in hectares
Measurement unit	Nº incipient fires + fires ha ⁻¹
Information sources	https://www.miteco.gob.es/es/biodiversidad/servicios/banco-datos-naturaleza/informacion-disponible/incendios-forestales.aspx
Desirable trend	Reduction
Type of indicator	Pressure
Dimension	Environmental
Category	Forest
References	• CIHEAM-PLAN BLEU-MARM, 2009, TerraMED: Nuevas perspectivas para el Desarrollo Rural en el Mediterráneo, Madrid, CIHEAM-Plan Bleu-MARM, 420pp. • EEA, 2012. Streamlining European biodiversity indicators 2020: Building a future on lessons learnt from the SEBI 2010 process, Luxembourg, EEA Technical Report 11/2 http://www.eea.europa.eu/publications/streamlining-european-biodiversity-indicators-2020 • EEA, 2020. European Environment Agency indicators. http://www.eea.europa.eu/data-and-maps/indicators/#c0=10&b_start=0 • Esty, D.C., Levy, M.A., Kim, C.H., de Sherbinin, A., Srebotnjak, T. y Mara, V. 2008. 2008 Environmental Performance Index. New Haven: Yale Center for Environmental Law and Policy. • JUNTA DE CASTILLA Y LEÓN, 2015. Sistema de indicadores ambientales y de sostenibilidad de Castilla y León, 2015, http://www.medioambiente.jcyl.es/web/jcyl/MedioAmbiente/es/Plantilla100/1218521587650/_/_/ • Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 • OSE, 2012, Indicadores de sostenibilidad de los municipios españoles y portugueses • Spanish Ministry for Ecological Transition 2007. SSDS, Spanish Sustainable Development Strategy. https://www.miteco.gob.es/es/ministerio/planes-estrategias/estrategia-espanola-desarrollo-sostenible/09047122800cfd5b_tcm30-88639.pdf • Spanish Ministry for Ecological Transition 2019. Environmental Profile of Spain 2018. Indicator-based Report. https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/publicaciones/pae2018en_tcm30-504011.pdf • UNEP-CBD, 2010, Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting X/2. The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets, https://www.cbd.int/doc/decisions/cop-10/cop-10-dec-02-en.doc

	UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	Forest area is considered to be CORINE-Land Cover class 244 and all categories within class 3 except for classes 331, 332 and 335. Although the FFD and IBFA (Index for Burnt Forest Area) indicators might seem to be closely correlated, some managers of Protected Areas are more interested in knowing the former than the latter. They argue that in some Protected Areas the burnt area is very small as a result of fast intervention by fire services, but that the occurrence of incipient fires and forest fires is relatively high and amounts to an indirect indicator of the pressure they are under (e.g. recreational use).

EN09: INDEX OF BURNT FOREST AREA (IBFA)	
Definition	Forest area burnt between 2001 and 2014
Sustainable Development Goal	15-UN, OE7-EMDS, SSDS, 110102-SIAS_CYL, T5-CBD, 11-21-EPI, BIO9-18-CGL33-EEA, 18-EEA-SEBI, 8.4-OSE, MMA, MITECO
Calculation formula	$IBFA = 100 - \left[\frac{\frac{BFA \times 100}{fA06}}{t} \right]$ <i>BFA = forest area burnt between 2001 and 2014, in hectares</i> <i>fA06 = forest area in 2006, in hectares</i> <i>t = number of years in the time series</i>
Measurement unit	Index ranging from 0 (worst value) to 100 (best value)
Information sources	https://www.miteco.gob.es/es/biodiversidad/servicios/banco-datos-naturaleza/informacion-disponible/incendios-forestales.aspx
Desirable trend	Reduction. In terms of the index, it would be desirable to raise the index value
Type of indicator	Pressure
Dimension	Environmental
Category	Forest
References	• CIHEAM-PLAN BLEU-MARM, 2009, TerraMED: Nuevas perspectivas para el Desarrollo Rural en el Mediterráneo, Madrid, CIHEAM-Plan Bleu-MARM, 420pp. • EEA, 2012. Streamlining European biodiversity indicators 2020: Building a future on lessons learnt from the SEBI 2010 process, Luxembourg, EEA Technical Report 11/2 http://www.eea.europa.eu/publications/streamlining-european-biodiversity-indicators-2020 • EEA, 2020. European Environment Agency indicators. http://www.eea.europa.eu/data-and-maps/indicators/#c0=10&b_start=0 • Esty, D.C., Levy, M.A., Kim, C.H., de Sherbinin, A., Srebotnjak, T. y Mara, V. 2008. 2008 Environmental Performance Index. New Haven: Yale Center for Environmental Law and Policy. • FOREST EUROPE-UNECE-FAO, 2011. State of Europe's Forests 2011. Status and Trends in Sustainable Forest Management in Europe, http://www.forest-europe.org/documentos/State_of_Europes_Forests_2011_Report_Review_November_2011.pdf • JUNTA DE CASTILLA Y LEÓN, 2015. Sistema de indicadores ambientales y de sostenibilidad de Castilla y León, 2015, http://www.medioambiente.jcyl.es/web/jcyl/MedioAmbiente/es/Plantilla100/1218521587650/_/_/ • Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 • Martínez-Vega, J., Samir, M., Echavarría, P. 2016. Assessing forest sustainability: Evidence from Spanish provinces. Geoforum 70:1-10. • MINISTERIO DE MEDIO AMBIENTE, 1996, Indicadores ambientales. Una propuesta para España, Madrid, Ministerio de Medio Ambiente, 146pp. • OSE, 2012, Indicadores de sostenibilidad de los municipios españoles y portugueses

	• Rodrigues, G.S., Rodrigues, I.A., Buschinelli, C.C.A., de Barros, I., 2010. Integrated farm sustainability assessment for the environmental management of rural activities. Environmental Impact Assessment Review 30, 229-239. • Spanish Ministry for Ecological Transition 2007. SSDS, Spanish Sustainable Development Strategy. https://www.miteco.gob.es/es/ministerio/planes-estrategias/estrategia-espanola-desarrollo-sostenible/09047122800cfd5b_tcm30-88639.pdf • Spanish Ministry for Ecological Transition 2019. Environmental Profile of Spain 2018. Indicator-based Report. https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/publicaciones/pae2018en_tcm30-504011.pdf • UNEP-CBD, 2010, Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting X/2. The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets, https://www.cbd.int/doc/decisions/cop-10/cop-10-dec-02-en.doc • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	The measurement scale of 100 has been inverted to avoid null values in the data normalisation process and so that the result can be added to the environmental sustainability index. The burnt area includes both the area with trees and the forest area without trees. An alternative would be to use the fire perimeters, but this would not be advisable because data collection is the responsibility of the Regional Forest Services and comparability would not be guaranteed.

EN10: PROTECTED AREAS (PA)	
Definition	Proportion of Protected Areas to the municipal area
Sustainable Development Goal	15-UN, 18-OECD, 8.2.1-EU-SDS, B9-CE, EC, OE7-EMDS, 6.3-6.5-EOTA, 100101-100102-SIAS_CYL, 16.3-FMP-CLM, T11-CBD, 12-13-EPI, BIO3-11-35-NR2-PI1-EEA, 7-8-5-EEA-SEBI, 8.3-OSE, MMA, MITECO
Calculation formula	$PA = \frac{PA \times 100}{munA}$ <i>PA = protected Areas 2015, in hectares</i> <i>munA = municipal area, in hectares</i>
Measurement unit	%
Information sources	Nature Data Bank https://www.miteco.gob.es/es/biodiversidad/servicios/banco-datos-naturaleza/informacion-disponible/cartografia_informacion_disp.aspx
Desirable trend	Maintain current status or increase
Type of indicator	Response
Dimension	Environmental
Category	Biodiversity
References	• Butchart, S.H.M., Walpole, M., Collen, B., et al. 2010. Global biodiversity: indicators of recent declines. Science 328 (5982), 1164–1168. • CIHEAM-PLAN BLEU-MARM, 2009, TerraMED: Nuevas perspectivas para el Desarrollo Rural en el Mediterráneo, Madrid, CIHEAM-Plan Bleu-MARM, 420pp. • EEA, 2012. Streamlining European biodiversity indicators 2020: Building a future on lessons learnt from the SEBI 2010 process, Luxembourg, EEA Technical Report 11/2 http://www.eea.europa.eu/publications/streamlining-european-biodiversity-indicators-2020 • EEA, 2020. European Environment Agency indicators. http://www.eea.europa.eu/data-and-maps/indicators/#c0=10&b_start=0 • Elbakidze, M., Angelstam, P., Sobolev, N., Degerman, E., Andersson, K., Axelsson, R., OlleHöjer, O., Wennberg, S. 2013. Protected area as an indicator of ecological sustainability? A century of development in Europe's boreal forest. Ambio 42, 201–214. • European Communities, 2000. Towards a local sustainability profile: European common indicators, Office for Official Publications of the European Communities: Luxembourg, 2000. https://op.europa.eu/es/publication-detail/-/publication/33eba485-e1e3-4748-9358-0d66ef86bcc3/language-en/format-PDFA1B • EUROSTAT, 2016. EU Sustainable Development Strategy (Indicators). Progress towards the EU SDS objectives and targets is evaluated using a set of about 130 sustainable development indicators (EU SDI set), http://ec.europa.eu/eurostat/web/sdi/ • Esty, D.C., Levy, M.A., Kim, C.H., de Sherbinin, A., Srebotnjak, T. y Mara, V. 2008. 2008 Environmental Performance Index. New Haven: Yale Center for Environmental Law and Policy. • FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla-La Mancha, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf • Gobierno de Aragón, 2014, Estrategia de Ordenación Territorial de Aragón, Modelo Territorial, Tomo II: Indicadores, http://www.aragon.es/estaticos/GobiernoAragon/Departamentos/PoliticaTerritorialInt

[errior/Areas/01 Ordenacion territorio/EOTA/EOTA Aprobados Definitivos/05%20EO TA Indicadores AD BOA.pdf](#)

- JUNTA DE CASTILLA Y LEÓN, 2015. Sistema de indicadores ambientales y de sostenibilidad de Castilla y León, 2015, http://www.medioambiente.jcyl.es/web/jcyl/MedioAmbiente/es/Plantilla100/1218521587650//_/
- Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308
- Martínez-Vega, J., Samir, M., Echavarría, P. 2016. Assessing forest sustainability: Evidence from Spanish provinces. Geoforum 70:1-10.
- MINISTERIO DE MEDIO AMBIENTE, 1996, Indicadores ambientales. Una propuesta para España, Madrid, Ministerio de Medio Ambiente, 146pp.
- OECD 2001, Environmental Indicators 2001: Towards Sustainable Development, <http://www.oecd.org/site/worldforum/33703867.pdf>
- OSE, 2012, Indicadores de sostenibilidad de los municipios españoles y portugueses
- Science for Environment Policy, 2018. Indicators for sustainable cities. In-depth Report 12. European Commission DG Environment-Science Communication Unit, UWE, https://ec.europa.eu/environment/integration/research/newsalert/pdf/indicators_for_sustainable_cities_IR12_en.pdf
- Spanish Ministry for Ecological Transition 2019. Environmental Profile of Spain 2018. Indicator-based Report. https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/publicaciones/pae2018en_tcm30-504011.pdf
- UNEP-CBD, 2010, Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting X/2. The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets, <https://www.cbd.int/doc/decisions/cop-10/cop-10-dec-02-en.doc>
- UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

Observations

EN11: FORESTS OF PUBLIC UTILITY (FPU)	
Definition	Proportion of Forests of Public Utility to municipal area
Sustainable Development Goal	15-UN, B9-CE, EC, OE7-EMDS, 17.3-EOTA, 16.3-FMP-CLM, T11-CBD
Calculation formula	$FPU = \frac{fpuA \times 100}{munA}$ <i>fpuA = Forests of Public Utility, in hectares</i> <i>munA = Municipal area, in hectares</i>
Measurement unit	%
Information sources	Forestry Map of Spain, AF field https://www.miteco.gob.es/es/biodiversidad/servicios/banco-datos-naturaleza/informacion-disponible/mfe50_descargas_ccaa.aspx
Desirable trend	Maintain current status or increase
Type of indicator	Response
Dimension	Environmental
Category	Biodiversity
References	• CIHEAM-PLAN BLEU-MARM, 2009, TerraMED: Nuevas perspectivas para el Desarrollo Rural en el Mediterráneo, Madrid, CIHEAM-Plan Bleu-MARM, 420pp. • European Communities, 2000. Towards a local sustainability profile: European common indicators, Office for Official Publications of the European Communities: Luxembourg, 2000. https://op.europa.eu/es/publication-detail/-/publication/33eba485-e1e3-4748-9358-0d66ef86bcc3/language-en/format-PDFA1B • FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla-La Mancha, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf • Gobierno de Aragón, 2014, Estrategia de Ordenación Territorial de Aragón, Modelo Territorial, Tomo II: Indicadores, http://www.aragon.es/estaticos/GobiernoAragon/Departamentos/PoliticaTerritorialInterior/Areas/01_Ordenacion_territorio/EOTA/EOTA_Aprobados_Definitivos/05%20EOTA_Indicadores_AD_BOA.pdf • Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 • Martínez-Vega, J., Samir, M., Echavarría, P. 2016. Assessing forest sustainability: Evidence from Spanish provinces. Geoforum 70:1-10. • UNEP-CBD, 2010, Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting X/2. The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets, https://www.cbd.int/doc/decisions/cop-10/cop-10-dec-02-en.doc
Observations	

EN12: SPECIES RICHNESS (Flora and fauna) SR	
Definition	Richness of flora and fauna species
Sustainable Development Goal	15-UN, OE7-EMDS, BIO13-19-36-EEA, 1-EEA-SEBI
Calculation formula	Field inventory based on species count.
Measurement unit	Number of species per grid cell
Information sources	Nature Data Bank Spanish Inventory of Terrestrial Species https://www.miteco.gob.es/es/cartografia-y-sig/ide/descargas/biodiversidad/ieet.aspx
Desirable trend	Maintain current status or increase
Type of indicator	State
Dimension	Environmental
Category	Biodiversity
References	• CIHEAM-PLAN BLEU-MARM, 2009, TerraMED: Nuevas perspectivas para el Desarrollo Rural en el Mediterráneo, Madrid, CIHEAM-Plan Bleu-MARM, 420pp. • EEA, 2012. Streamlining European biodiversity indicators 2020: Building a future on lessons learnt from the SEBI 2010 process, Luxembourg, EEA Technical Report 11/2 http://www.eea.europa.eu/publications/streamlining-european-biodiversity-indicators-2020 • EEA, 2020. European Environment Agency indicators. http://www.eea.europa.eu/data-and-maps/indicators/#c0=10&b_start=0 • UNEP-CBD, 2010, Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting X/2. The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets, https://www.cbd.int/doc/decisions/cop-10/cop-10-dec-02-en.doc • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	10x10 km mesh. The aim is to calculate a sum weighted by the proportion of each grid cell in the target municipality.

EN13: HIGH VOLTAGE POWER LINES IN PROTECTED AREAS (HVPL)	
Definition	Density of high voltage power lines in Protected Areas
Sustainable Development Goal	15-UN, OE7-EMDS, 13.6-EOTA, T11-CBD
Calculation formula	$HVPL = \frac{LHVPL \times 100}{PA}$ <i>LHVPL = length of high voltage power lines, in km</i> <i>PA = protected Areas in 2015, in km²</i>
Measurement unit	Km/km ²
Information sources	Nature Data Bank https://www.miteco.gob.es/es/biodiversidad/servicios/banco-datos-naturaleza/informacion-disponible/cartografia_informacion_disp.aspx Digital Cartographic Base 1:100,000, National Geography Institute
Desirable trend	Maintain current status or reduce. The purpose above all is to keep their areas of influence clear to minimise the risk of forest fires. Erection of power lines in Protected Areas should be limited to reduce their visual impact, prevent collisions by birds and avoid the risk of electrocution.
Type of indicator	Pressure
Dimension	Environmental
Category	Biodiversity
References	• CIHEAM-PLAN BLEU-MARM, 2009, TerraMED: Nuevas perspectivas para el Desarrollo Rural en el Mediterráneo, Madrid, CIHEAM-Plan Bleu-MARM, 420pp. • Gobierno de Aragón, 2014, Estrategia de Ordenación Territorial de Aragón, Modelo Territorial, Tomo II: Indicadores, http://www.aragon.es/estaticos/GobiernoAragon/Departamentos/PoliticaTerritorialInterior/Areas/01_Ordenacion_territorio/EOTA/EOTA_Aprobados_Definitivos/05%20EOTA_Indicadores_AD_BOA.pdf • UNEP-CBD, 2010. Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting X/2. The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets, https://www.cbd.int/doc/decisions/cop-10/cop-10-dec-02-en.doc • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	

EN14: HABITAT'S FRAGMENTATION INDEX (HFI)	
Definition	Fragmentation of natural and semi-natural habitats
Sustainable Development Goal	15-UN, T5-CBD, BIO2-EEA, 13-14-EEA-SEBI, 8.5-OSE
Calculation formula	$HFI = \frac{\sum_{j=1}^k np_{j,i} w_j}{\sum_{j=1}^k np_{j,i}}$ <i>k</i> = number of fragmentation categories <i>np_{j,i}</i> is the number of pixels in category <i>j</i> in municipality <i>i</i> <i>w_j</i> is the weight of fragmentation category <i>j</i>
Measurement unit	Index ranging between 1 (greater fragmentation) and 2 (less fragmentation)
Information sources	CORINE Land Cover 2018
Desirable trend	Maintain current status or reduce. In terms of the index, it would be desirable to maintain or increase the index value.
Type of indicator	Pressure
Dimension	Environmental
Category	Biodiversity
References	• Chuvieco E, Martínez S, Román MV, Hantson S, Pettinari, L 2013. Integration of ecological and socio-economic factors to assess global vulnerability to wildfire. <i>Global Ecology and Biogeography</i> 23 (2): 245-258, https://doi.org/10.1111/geb.12095 • Dantas de Paula M, Groeneveld J, Huth A, 2015. Tropical forest degradation and recovery in fragmented landscapes. Simulating changes in tree community, forest hidrology and carbon balance. <i>Global Ecology and Conservation</i> 3:664–677. https://doi.org/10.1016/j.gecco.2015.03.004 • EEA, 2012. Streamlining European biodiversity indicators 2020: Building a future on lessons learnt from the SEBI 2010 process, Luxembourg, EEA Technical Report 11/2 http://www.eea.europa.eu/publications/streamlining-european-biodiversity-indicators-2020 • EEA, 2020. European Environment Agency indicators. http://www.eea.europa.eu/data-and-maps/indicators/#c0=10&b_start=0 • Gallardo, M., Martínez-Vega, J. 2018. Modeling land-use scenarios in protected areas of an urban region in Spain. In: MT Camacho Olmedo, M Paegelow, JF Mas and F Escobar (Eds.) <i>Geomatic Approaches for Modeling Land Change Scenarios</i>, pp. 307-328. <i>Lecture Notes in Geoinformation and Cartography</i>, Springer, https://doi.org/10.1007/978-3-319-60801-3_15 • McGarigal K, Cushman SA, Neel MC, Ene E, 2002. FRAGSTATS: spatial pattern analysis program for categorical maps. University of Massachusetts, Amherst. http://www.umass.edu/landeco/research/fragstats/fragstats.html. Accessed 22 March 2016 • OSE, 2012, Indicadores de sostenibilidad de los municipios españoles y portugueses

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Observations	Natural and semi-natural areas are considered to be all the CORINE Land Cover classes 2, 3, 4 and 5. Although some of the National Parks are representative of mountain ecosystems and their main habitats are forests, others include agro-forestry systems, agricultural land and pasture land which form part of their landscapes and support their traditional activities. Maintenance of these land uses is encouraged. We can study the application of any alternative fragmentation index referred to in the scientific literature. The Spanish Ministry of the Environment proposes the habitat fragmentation indicator based on linear transport infrastructures: the actual size of the infrastructure mesh (TMI): https://www.miteco.gob.es/es/biodiversidad/publicaciones/sec_copiadelibro_parques_nacionales_tcm7-165477_tcm30-195795.pdf https://www.miteco.gob.es/es/biodiversidad/temas/ecosistemas-y-conectividad/fragmentacion_habitat_tcm30-284582.pdf However, we propose that HFI be calculated using the MSPA software, comparing the results of the index in 2018 with those of other years in order to find the spatial and temporal trend.

EN15: INDEX FOR CONSERVATION OF WATER DISTRIBUTION NETWORKS (ICWD)	
Definition	Percentage of the water supply network in poor condition
Sustainable Development Goal	6-UN, EC
Calculation formula	$ICWD = 100 - \left[\left(\frac{LWNps}{TLWN} \right) * 100 \right]$ <i>LWNps = length of the water supply network in poor state of repair</i> <i>TLWN = total length of the water supply network</i>
Measurement unit	%. The index ranges from 100 (best state of repair) and 0 (worst).
Information sources	Survey on Local Infrastructure and Facilities (SLIF), Ministry of Finance, 2005 https://ssweb.seap.minhap.es/descargas-eiel/index.php
Desirable trend	Increase
Type of indicator	State
Dimension	Environmental
Category	Water
References	• Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 • Science for Environment Policy, 2018. Indicators for sustainable cities. In-depth Report 12. European Commission DG Environment-Science Communication Unit, UWE, https://ec.europa.eu/environment/integration/research/newsalert/pdf/indicators_for_sustainable_cities_IR12_en.pdf • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	The scale of measurement of 100 has been inverted to avoid null values in the data normalisation process and so that the result can be added to the environmental sustainability index.

EN16: WATER LOSS (WL)	
Definition	Proportion of drinking water lost through leaks, faults or other causes in the water distribution network
Sustainable Development Goal	6-UN, 11.1-EESUL, 27.3-FMP-CLM, MMA, MITECO
Calculation formula	Weighted sum of water loss (%) from distribution networks in each urban patch in the municipality in terms of the proportion of homes connected in each patch to total homes in the municipality.
Measurement unit	%
Information sources	Survey on Local Infrastructure and Facilities (SLIF), Ministry of Finance, 2005 https://ssweb.seap.minhap.es/descargas-eiel/index.php
Desirable trend	Reduce
Type of indicator	Pressure
Dimension	Environmental
Category	Water
References	- FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla-La Mancha, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf - MAGRAMA-MINISTERIO DE FOMENTO, 2011, Estrategia española de sostenibilidad urbana y local (EESUL), http://www.fomento.gob.es/NR/rdonlyres/1668CD1E-0B11-4C9E-84E2-E664DD3464C1/111503/EESULWEB2011.pdf - Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 - MINISTERIO DE MEDIO AMBIENTE, 1996, Indicadores ambientales. Una propuesta para España, Madrid, Ministerio de Medio Ambiente, 146pp. - Spanish Ministry for Ecological Transition 2019. Environmental Profile of Spain 2018. Indicator-based Report. https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/publicaciones/pae2018en_tcm30-504011.pdf - UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	The Federation of Municipalities and Provinces for the region of Castile-La Mancha (FMP-CLM 2009) proposes an alternative method of calculation: $[(\text{Total amount of drinking water supplied at source to the distribution network}) - (\text{Amount of water invoiced to the various consumer sectors} + \text{amount of water consumed by municipal facilities and public services}) / \text{Total amount of drinking water supplied at source to the distribution network}] * 100$. However, Table 17 in the SLIF indicates the percentage of water loss in the network of each urban patch of each municipality.

EN17: INDEX FOR WASTE WATER TREATMENT (IWWT)	
Definition	Proportion of treated water to total volume of waste water
Sustainable Development Goal	6-UN, SSDS, 12-EESUL, 2.4-12.4-EOTA, 20106-20107-SIAS_CYL, 30-FMP-CLM, 2-EPI, WAT13-EEA, 5.6-OSE, MMA
Calculation formula	$IWWT = \frac{popSer \times 100}{pop2005}$ <i>popSer = population served</i> <i>pop2005 = total population according to the 2005 Census</i>
Measurement unit	%
Information sources	Survey on Local Infrastructure and Facilities (SLIF), Ministry of Finance, 2005 https://ssweb.seap.minhap.es/descargas-eiel/index.php
Desirable trend	Increase
Type of indicator	Response
Dimension	Environmental
Category	Water
References	• EEA, 2020. European Environment Agency indicators. http://www.eea.europa.eu/data-and-maps/indicators/#c0=10&b_start=0 • Esty, D.C., Levy, M.A., Kim, C.H., de Sherbinin, A., Srebotnjak, T. y Mara, V. 2008. 2008 Environmental Performance Index. New Haven: Yale Center for Environmental Law and Policy. • FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla-La Mancha, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf • Gobierno de Aragón, 2014, Estrategia de Ordenación Territorial de Aragón, Modelo Territorial, Tomo II: Indicadores, http://www.aragon.es/estaticos/GobiernoAragon/Departamentos/PoliticaTerritorialInterior/Areas/01_Ordenacion_territorio/EOTA/EOTA_Aprobados_Definitivos/05%20EO_TA_Indicadores_AD_BOA.pdf • JUNTA DE CASTILLA Y LEÓN, 2015. Sistema de indicadores ambientales y de sostenibilidad de Castilla y León, 2015, http://www.medioambiente.jcyl.es/web/jcyl/MedioAmbiente/es/Plantilla100/1218521587650/_/_/ • MAGRAMA-MINISTERIO DE FOMENTO, 2011, Estrategia española de sostenibilidad urbana y local (EESUL), http://www.fomento.gob.es/NR/rdonlyres/1668CD1E-0B11-4C9E-84E2-E664DD3464C1/111503/EESULWEB2011.pdf • Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 • MINISTERIO DE MEDIO AMBIENTE, 1996, Indicadores ambientales. Una propuesta para España, Madrid, Ministerio de Medio Ambiente, 146pp. • OSE, 2012, Indicadores de sostenibilidad de los municipios españoles y portugueses • Spanish Ministry for Ecological Transition 2007. SSDS, Spanish Sustainable Development Strategy. https://www.miteco.gob.es/es/ministerio/planes-

	estrategias/estrategia-espanola-desarrollo-sostenible/09047122800cfd5b_tcm30-88639.pdf • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	Martínez-Vega et al. 2009 propose an alternative formula to be calculated from the data in the Survey on Local Infrastructure and Facilities: $IWWT = (\text{volume treated} / \text{winter consumption}) * (100 / 400)$

EN18: INDEX FOR CONSERVATION OF SEWAGE NETWORKS (ICSN)	
Definition	Proportion of the sewage network in poor condition
Sustainable Development Goal	6-UN-Goal2, 2-EPI
Calculation formula	$ICSN = 100 - \left[\left(\frac{LSNps}{TLSN} \right) * 100 \right]$ <i>LSNps = length of the sewage network in poor state</i> <i>TLSN = total length of the sewage network</i>
Measurement unit	% The index ranges from 100 (best state of conservation) and 0 (worst)
Information sources	Survey on Local Infrastructure and Facilities (SLIF), Ministry of Finance, 2005 https://ssweb.seap.minhap.es/descargas-eiel/index.php
Desirable trend	Increase
Type of indicator	State
Dimension	Environmental
Category	Water
References	• Esty, D.C., Levy, M.A., Kim, C.H., de Sherbinin, A., Srebotnjak, T. y Mara, V. 2008. 2008 Environmental Performance Index. New Haven: Yale Center for Environmental Law and Policy. • Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	The scale of measurement of 100 has been inverted to avoid null values in the data normalisation process and so that its result can be added to the environmental sustainability index.

EN19: PER CAPITA WATER CONSUMPTION (WC)	
Definition	Daily water consumption per inhabitant
Sustainable Development Goal	6-UN-Goal4, 11-OECD, 2.2.3-EU-SDS, EC, OE5-EMDS, SSDS, 20104-20105-SIAS_CYL, 28-FMP-CLM, 10-EPI, WAT18-EEA, MMA, MAGRAMA
Calculation formula	$WC = \left[\frac{\left(\frac{wcon * 243}{pop2005} \right) + \left(\frac{scon * 122}{spop2005} \right)}{365} \right] * 1000$ <i>wcon = winter consumption in m3</i> <i>pop2005 = total population according to Census for 2005</i> <i>scon = summer consumption, in m3</i> <i>spop2005 = seasonal population according to the SLIF for 2005</i>
Measurement unit	Litres person ⁻¹ day ⁻¹
Information sources	Survey on Local Infrastructure and Facilities (SLIF), Ministry of Finance, 2005 https://ssweb.seap.minhap.es/descargas-eiel/index.php Census for 2005
Desirable trend	Reduction
Type of indicator	Pressure
Dimension	Environmental
Category	Water
References	• CIHEAM-PLAN BLEU-MARM, 2009, TerraMED: Nuevas perspectivas para el Desarrollo Rural en el Mediterráneo, Madrid, CIHEAM-Plan Bleu-MARM, 420pp. • EEA, 2020. European Environment Agency indicators. http://www.eea.europa.eu/data-and-maps/indicators/#c0=10&b_start=0 • European Communities, 2000. Towards a local sustainability profile: European common indicators, Office for Official Publications of the European Communities: Luxembourg, 2000. https://op.europa.eu/es/publication-detail/-/publication/33eba485-e1e3-4748-9358-0d66ef86bcc3/language-en/format-PDFA1B • EUROSTAT, 2016. EU Sustainable Development Strategy (Indicators). Progress towards the EU SDS objectives and targets is evaluated using a set of about 130 sustainable development indicators (EU SDI set), http://ec.europa.eu/eurostat/web/sdi/ • Esty, D.C., Levy, M.A., Kim, C.H., de Sherbinin, A., Srebotnjak, T. y Mara, V. 2008. 2008 Environmental Performance Index. New Haven: Yale Center for Environmental Law and Policy. • FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla-La Mancha, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf • JUNTA DE CASTILLA Y LEÓN, 2015. Sistema de indicadores ambientales y de sostenibilidad de Castilla y León, 2015, http://www.medioambiente.jcyl.es/web/jcyl/MedioAmbiente/es/Plantilla100/1218521587650/_/_/ • Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 • MINISTERIO DE MEDIO AMBIENTE, 1996, Indicadores ambientales. Una propuesta para España, Madrid, Ministerio de Medio Ambiente, 146pp.

	• OECD 2001, Environmental Indicators 2001: Towards Sustainable Development, http://www.oecd.org/site/worldforum/33703867.pdf • Science for Environment Policy, 2018. Indicators for sustainable cities. In-depth Report 12. European Commission DG Environment-Science Communication Unit, UWE, https://ec.europa.eu/environment/integration/research/newsalert/pdf/indicators_for_sustainable_cities_IR12_en.pdf • Spanish Ministry for Ecological Transition 2019. Environmental Profile of Spain 2018. Indicator-based Report. https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/publicaciones/pae2018en_tcm30-504011.pdf • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	FMP-CLM, 2009 proposes a simple formula for calculation: (annual volume of water consumed, in litres/census population)/365. However, this procedure does not take into account the fact that the real population in some municipalities is greater at weekends and in the summer. For a more accurate calculation, we propose consideration of the official population in winter and the seasonal population in summer. The summer consumption period covers June, July, August and September (122 days). The rest of the year is estimated as winter consumption (243 days). The target reference amount considered is 130 litres/person/day.

EN20: URBAN SOLID WASTE GENERATION (USW)	
Definition	Daily production of urban solid waste per inhabitant
Sustainable Development Goal	12-UN-Goal5, 7-OECD, 2.2.4-EU-SDS, EC, SSDS, 16-EESUL, 70101-SIAS_CYL, 37-FMP-CLM, WAS1-EEA, 5.7-OSE, MMA, MITECO
Calculation formula	$USW = \frac{\left(\frac{Ac_{usw}}{pop2005} \right)}{365} * 1000$ <i>Ac_usw = annual collection of urban solid waste, in tonnes</i> <i>pop2005 = total population according to the Census for 2005</i>
Measurement unit	kg person ⁻¹ day ⁻¹
Information sources	Survey on Local Infrastructure and Facilities (SLIF), Ministry of Finance, 2005 https://ssweb.seap.minhap.es/descargas-eiel/index.php Census for 2005
Desirable trend	Reduction
Type of indicator	Pressure
Dimension	Environmental
Category	Waste
References	• CIHEAM-PLAN BLEU-MARM, 2009, TerraMED: Nuevas perspectivas para el Desarrollo Rural en el Mediterráneo, Madrid, CIHEAM-Plan Bleu-MARM, 420pp. • EEA, 2020. European Environment Agency indicators. http://www.eea.europa.eu/data-and-maps/indicators/#c0=10&b_start=0 • European Communities, 2000. Towards a local sustainability profile: European common indicators, Office for Official Publications of the European Communities: Luxembourg, 2000. https://op.europa.eu/es/publication-detail/-/publication/33eba485-e1e3-4748-9358-0d66ef86bcc3/language-en/format-PDFA1B • EUROSTAT, 2016. EU Sustainable Development Strategy (Indicators). Progress towards the EU SDS objectives and targets is evaluated using a set of about 130 sustainable development indicators (EU SDI set), http://ec.europa.eu/eurostat/web/sdi/ • Esty, D.C., Levy, M.A., Kim, C.H., de Sherbinin, A., Srebotnjak, T. y Mara, V. 2008. 2008 Environmental Performance Index. New Haven: Yale Center for Environmental Law and Policy. • FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla-La Mancha, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf • JUNTA DE CASTILLA Y LEÓN, 2015. Sistema de indicadores ambientales y de sostenibilidad de Castilla y León, 2015, http://www.medioambiente.jcyl.es/web/jcyl/MedioAmbiente/es/Plantilla100/1218521587650/_/_/ • MAGRAMA-MINISTERIO DE FOMENTO, 2011, Estrategia española de sostenibilidad urbana y local (EESUL), http://www.fomento.gob.es/NR/rdonlyres/1668CD1E-0B11-4C9E-84E2-E664DD3464C1/111503/EESULWEB2011.pdf • Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 • MINISTERIO DE MEDIO AMBIENTE, 1996, Indicadores ambientales. Una propuesta para España, Madrid, Ministerio de Medio Ambiente, 146pp.

	• OECD 2001, Environmental Indicators 2001: Towards Sustainable Development, http://www.oecd.org/site/worldforum/33703867.pdf • OSE, 2012, Indicadores de sostenibilidad de los municipios españoles y portugueses • Science for Environment Policy, 2018. Indicators for sustainable cities. In-depth Report 12. European Commission DG Environment-Science Communication Unit, UWE, https://ec.europa.eu/environment/integration/research/newsalert/pdf/indicators_for_sustainable_cities_IR12_en.pdf • Spanish Ministry for Ecological Transition 2007. SSDS, Spanish Sustainable Development Strategy. https://www.miteco.gob.es/es/ministerio/planes-estrategias/estrategia-espanola-desarrollo-sostenible/09047122800cfd5b_tcm30-88639.pdf • Spanish Ministry for Ecological Transition 2019. Environmental Profile of Spain 2018. Indicator-based Report. https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/publicaciones/pae2018en_tcm30-504011.pdf • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	According to data for 2004 (Ministry of the Environment), each inhabitant in Spain generated an average of 1.4 kg person⁻¹ day⁻¹ of USW. The trend was rising. In 2000, the average was 1.2 kg person⁻¹ day⁻¹. In 2007, according to EUROSTAT data, the European average was about 1.43 kg person⁻¹ day⁻¹

EN21: PRODUCTION OF LIVESTOCK WASTE (LW)	
Definition	Daily production of livestock waste per livestock unit
Sustainable Development Goal	12-UN-Goal5, 31-OECD, 39-FMP-CLM
Calculation formula	$LW = \frac{\left(\frac{LW}{LU}\right)}{365} * 1000$ <i>LW = production of livestock waste, in tonnes</i> <i>LU = total livestock units, according to the Agricultural Census for 2009</i>
Measurement unit	kg UG ⁻¹ day ⁻¹
Information sources	Agricultural Census for 2009, National Statistical Institute https://www.ine.es/dyngs/INEbase/en/operacion.htm?c=Estadistica_C&cid=1254736176851&menu=resultados&secc=1254736194950&idp=1254735727106
Desirable trend	Reduction
Type of indicator	Pressure
Dimension	Environmental
Category	Waste
References	- Diputación de Valladolid 2004, Diagnóstico del agua y los residuos agropecuarios en 42 municipios de la provincia de Valladolid. http://www.diputaciondevalladolid.es/extras/ex_not_portada/notas_prensa/20041215043%29%20Residuos.pdf - FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla-La Mancha, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf - Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 - OECD 2001, Environmental Indicators 2001: Towards Sustainable Development, http://www.oecd.org/site/worldforum/33703867.pdf - UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	We used a reference from the Valladolid Provincial Council that estimated total livestock waste production in the province in a 2004 pilot study in 42 municipalities by type of livestock. In it, total production is related to the livestock units of each type of livestock, and average production of livestock waste is calculated for each livestock unit for each type of livestock. Average production was estimated at 19.95 Tm UG ⁻¹ year ⁻¹ of bovine manure, 23.56 Tm UG ⁻¹ year ⁻¹ of sheep manure, 325.56 Tm UG ⁻¹ year ⁻¹ of pig manure and 2.34 Tm UG ⁻¹ year ⁻¹ of poultry manure.

EN22: SELECTIVE URBAN WASTE COLLECTION (UWs)	
Definition	Proportion of solid urban waste collected selectively
Sustainable Development Goal	12-UN-Goal5, 8-OECD, 2.2.4-EU-SDS, SSDS, 17-EESUL, 11.4-EOTA, 70101-SIAS_CYL, 9.8-FMP-CLM, 5.8-OSE, MMA, MITECO
Calculation formula	$UWs = \frac{UWs \times 100}{TotUW}$ <i>UWs = urban waste collected selectively, in tonnes</i> <i>TotUW = total solid urban waste collected, in tonnes</i>
Measurement unit	%
Information sources	Survey on Local Infrastructure and Facilities (SLIF), Ministry of Finance, 2005 https://ssweb.seap.minhap.es/descargas-eiel/index.php
Desirable trend	Increase
Type of indicator	Response
Dimension	Environmental
Category	Waste
References	• EUROSTAT, 2016. EU Sustainable Development Strategy (Indicators). Progress towards the EU SDS objectives and targets is evaluated using a set of about 130 sustainable development indicators (EU SDI set), http://ec.europa.eu/eurostat/web/sdi/ • FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla-La Mancha, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf • Gobierno de Aragón, 2014, Estrategia de Ordenación Territorial de Aragón, Modelo Territorial, Tomo II: Indicadores, http://www.aragon.es/estaticos/GobiernoAragon/Departamentos/PoliticaTerritorialInterior/Areas/01_Ordenacion_territorio/EOTA/EOTA_Aprobados_Definitivos/05%20EOTA_Indicadores_AD_BOA.pdf • JUNTA DE CASTILLA Y LEÓN, 2015. Sistema de indicadores ambientales y de sostenibilidad de Castilla y León, 2015, http://www.medioambiente.jcyl.es/web/jcyl/MedioAmbiente/es/Plantilla100/1218521587650/_/_/ • MAGRAMA-MINISTERIO DE FOMENTO, 2011, Estrategia española de sostenibilidad urbana y local (EESUL), http://www.fomento.gob.es/NR/rdonlyres/1668CD1E-0B11-4C9E-84E2-E664DD3464C1/111503/EESULWEB2011.pdf • Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 • MINISTERIO DE MEDIO AMBIENTE, 1996, Indicadores ambientales. Una propuesta para España, Madrid, Ministerio de Medio Ambiente, 146pp. • OECD 2001, Environmental Indicators 2001: Towards Sustainable Development, http://www.oecd.org/site/worldforum/33703867.pdf • OSE, 2012, Indicadores de sostenibilidad de los municipios españoles y portugueses • Science for Environment Policy, 2018. Indicators for sustainable cities. In-depth Report 12. European Commission DG Environment-Science Communication Unit, UWE, https://ec.europa.eu/environment/integration/research/newsalert/pdf/indicators_for_sustainable_cities_IR12_en.pdf

	- Spanish Ministry for Ecological Transition 2007. SSDS, Spanish Sustainable Development Strategy. https://www.miteco.gob.es/es/ministerio/planes-estrategias/estrategia-espanola-desarrollo-sostenible/09047122800cfd5b_tcm30-88639.pdf - Spanish Ministry for Ecological Transition 2019. Environmental Profile of Spain 2018. Indicator-based Report. https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/publicaciones/pae2018en_tcm30-504011.pdf - UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	By way of reference, the CatMed platform establishes that 50% of selectively collected urban waste is the desirable rate for Mediterranean cities participating in its sustainability initiative.

EN23: SOIL EROSION (SERO)	
Definition	Proportion of high erosion levels
Sustainable Development Goal	15-UN, OE2-EMDS, 11.3-EOTA, T15-UNEP-CBD, CGL29-S3-EEA, MMA, MITECO
Calculation formula	We calculate the percentage of municipal land that has high, very high or extremely high erosion levels ($> 50 \text{ t. ha}^{-1} \cdot \text{year}^{-1}$) in proportion to total municipal area. $SERO = 100 - \left[\frac{HELA > \frac{50t}{ha}}{munA} \times 100 \right]$ <i>HELA = high, very high and extremely high erosion levels area</i> <i>munA = municipal area, in hectares</i> <i>t/ha/yr = Tons / hectares / year</i>
Measurement unit	%. The index ranges between 100 (best value) and 0 (worst value). The measurement scale of 100 is inverted to avoid null values in the data normalisation process and so that the result can be added to the environmental sustainability index.
Information sources	Maps of states of erosion https://www.miteco.gob.es/es/biodiversidad/servicios/banco-datos-naturaleza/informacion-disponible/mapas_estados_erosivos.aspx
Desirable trend	Reduction. In terms of the index value, it would be desirable to increase the value.
Type of indicator	Pressure
Dimension	Environmental
Category	Global Change
	• CIHEAM-PLAN BLEU-MARM, 2009, TerraMED: Nuevas perspectivas para el Desarrollo Rural en el Mediterráneo, Madrid, CIHEAM-Plan Bleu-MARM, 420pp. • EEA, 2016. European Environment Agency indicators. http://www.eea.europa.eu/data-and-maps/indicators/#c0=10&b_start=0 • Gobierno de Aragón, 2014, Estrategia de Ordenación Territorial de Aragón, Modelo Territorial, Tomo II: Indicadores, http://www.aragon.es/estaticos/GobiernoAragon/Departamentos/PoliticaTerritorialInterior/Areas/01_Ordenacion_territorio/EOTA/EOTA_Aprobados_Definitivos/05%20EOTA_Indicadores_AD_BOA.pdf • MAGRAMA, 2014, Perfil Ambiental de España 2013. Informe basado en indicadores. http://www.magrama.gob.es/es/calidad-y-evaluacion-ambiental/publicaciones/perfil_ambiental_2013.aspx • Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 • Martínez-Vega, J., Samir, M., Echavarría, P. 2016. Assessing forest sustainability: Evidence from Spanish provinces. Geoforum 70:1-10. • MINISTERIO DE MEDIO AMBIENTE, 1996, Indicadores ambientales. Una propuesta para España, Madrid, Ministerio de Medio Ambiente, 146pp.

	NACIONES UNIDAS, 2015. Objetivos de Desarrollo Sostenible (ODS) y Metas (Mt) para 2015-2030. http://www.un.org/sustainabledevelopment/es/objetivos-de-desarrollo-sostenible/
Observations	In Spain, the National Soil Erosion Inventory is being drawn up to assess land loss in relation to erodable area (http://www.magrama.gob.es/es/biodiversidad/servicios/banco-datos-naturaleza/informacion-disponible/inventario_nacional_erosion.aspx), but information is missing for twelve provinces, affecting three National Parks. Once the inventory is complete, its methodology will be consistent and comparable on a national level and applicable to the whole network of National Parks. Data are given on municipal level. The calculation method would be: $ERO = \frac{Ll}{Se}$ <i>ERO = land loss in relation to erodable area</i> <i>Ll = land loss, in tonnes per year</i> <i>Se = erodable area, in hectares</i> Measurement unit = t ha⁻¹ year⁻¹

EN24: INDUSTRIAL PM10 PARTICULATE EMISSIONS	
Definition	The indicator expresses the sum of annual emissions of PM10 particulate into the atmosphere for each municipality by industries registered in the European Pollutant Release and Transfer Register E-PRTR.
Sustainable Development Goal	UN-12,UN-3,UN-15, EU SDS 5.2, 5.3, EC, MITECO
Calculation formula	$PM10 = \frac{TEv \text{ PM10 particles}}{Inhabitants} \times 1000$ <i>TEv = total annual emissions verified in the municipality, in kg.</i>
Measurement unit	Kg person ⁻¹
Information sources	PRTR-España: http://www.prtr-es.es/ PRTR-España is the State Register of Emissions and Pollutant Sources. It covers emissions into the atmosphere, water and land of pollutants and gives data on waste transfers from the main industries and other sources both specific and general, in accordance with legal provisions on international (Kiev Protocol and Aarhus Convention), European (E-PRTR Regulation) and national levels (Royal Decree 508/2007 and subsequent amendments).
Desirable trend	Reduction
Type of indicator	Pressure
Dimension	Environmental
Category	Emissions
References	- Esty, Daniel C., M.A. Levy, C.H. Kim, A. de Sherbinin, T. Srebotnjak, and V. Mara. 2008. 2008 Environmental Performance Index. New Haven: Yale Center for Environmental Law and Policy. - Fernández-Latorre, F.M. Indicadores de sostenibilidad y medio ambiente. Métodos y escalas. Consejería de Medio Ambiente. http://www.juntadeandalucia.es/medioambiente/site/portalweb/menuitem.7e1cf46ddf59bb227a9ebe205510e1ca/?vgnextoid=957528c276cbf010VgnVCM1000000624e50aRCRD&vgnextchannel=4836a7aaaf4f4310VgnVCM2000000624e50aRCRD - PRé Consultants, Radboud University Nijmegen, Leiden University, RIVM, 2014. http://www.lcia-recipe.net/ - Science for Environment Policy, 2018. Indicators for sustainable cities. In-depth Report 12. European Commission DG Environment-Science Communication Unit, UWE, https://ec.europa.eu/environment/integration/research/newsalert/pdf/indicators_for_sustainable_cities_IR12_en.pdf - UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	Emissions with effects for human health. Can be expressed in relative terms (per inhabitant) and absolute terms. There is a time series (2014-2010-2007), allowing for trends to be estimated.

EN25: ACIDIFICATION BY INDUSTRIAL EMISSIONS													
Definition	The indicator expresses the sum of annual emissions of acidifying substances into the atmosphere of each municipality by industries registered in the European Pollutant Release and Transfer Register E-PRTR.												
Sustainable Development Goal	UN-12, UN-3, UN-15, OECD 5, EC, EPI, CSI 040, MITECO												
Calculation formula	$SO_2 \text{ equivalents} = \frac{AEv \text{ } SO_2 \text{ equivalents}}{\text{inhabitants}}$ <i>Total annual emissions verified in the municipality, in kg in the year under study, aggregated by characterisation factors, in kg of SO₂ equivalents.</i> $AEv \text{ } SO_2 \text{ equivalents} = \frac{\sum_{j=1}^k \text{Mass of substance}_j \times \text{Characterisation factor of substance}_j}{\text{no. of inhabitants in the municipality}}$ <table border="1"> <thead> <tr> <th>Substance j</th><th>Characterisation factor (kg eq. SO₂)</th></tr> </thead> <tbody> <tr> <td>NO_x</td><td>0.56</td></tr> <tr> <td>NH₃</td><td>2.45</td></tr> <tr> <td>SO_x</td><td>1</td></tr> <tr> <td>NO₂</td><td>0.56</td></tr> <tr> <td>SO₂</td><td>1</td></tr> </tbody> </table> <i>AEv = total annual emissions verified in year under study, in kg</i>	Substance j	Characterisation factor (kg eq. SO ₂)	NO _x	0.56	NH ₃	2.45	SO _x	1	NO ₂	0.56	SO ₂	1
Substance j	Characterisation factor (kg eq. SO ₂)												
NO _x	0.56												
NH ₃	2.45												
SO _x	1												
NO ₂	0.56												
SO ₂	1												
Measurement unit	Kg person ⁻¹												
Information sources	PRTR Spain. http://www.prtr-es.es/												
Desirable trend	Reduction												
Type of indicator	Pressure												
Dimension	Environmental												
Category	Emissions												
References	- EEA, 2020. European Environment Agency indicators http://www.eea.europa.eu/data-and-maps/indicators/#c0=10&b_start=0 - Esty, Daniel C., M.A. Levy, C.H. Kim, A. de Sherbinin, T. Srebotnjak, and V. Mara. 2008. 2008 Environmental Performance Index. New Haven: Yale Center for Environmental Law and Policy. - EUROSTAT, 2016. EU Sustainable Development Strategy (Indicators). Progress towards the EU SDS objectives and targets is evaluated using a set of about 130 sustainable development indicators (EU SDI set), http://ec.europa.eu/eurostat/web/sdi/ - Fernández-Latorre, F.M. Indicadores de sostenibilidad y medio ambiente. Métodos y escalas. Consejería de Medio Ambiente. http://www.juntadeandalucia.es/medioambiente/site/porta/web/menuitem.7e1cf46ddf												

	59bb227a9ebe205510e1ca/?vgnextoid=957528c276cbf010VgnVCM1000000624e50aRCRD&vgnextchannel=4836a7aaaf4f4310VgnVCM2000000624e50aRCRD • OECD 2001, Environmental Indicators 2001: Towards Sustainable Development, http://www.oecd.org/site/worldforum/33703867.pdf • PRé Consultants, Radboud University Nijmegen, Leiden University, RIVM, 2014. http://www.lcia-recipe.net/ • Science for Environment Policy, 2018. Indicators for sustainable cities. In-depth Report 12. European Commission DG Environment-Science Communication Unit, UWE, https://ec.europa.eu/environment/integration/research/newsalert/pdf/indicators_for_sustainable_cities_IR12_en.pdf • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	Can be expressed in relative terms (per inhabitant) and absolute terms. There is a time series (2014-2010-2007), allowing for trends to be estimated. This information could be crossed with forest defoliation.

EN26: EUTROPHICATION BY INDUSTRIAL EFFLUENTS

Definition	This indicator expresses the sum of industrial effluents that can cause eutrophication in municipalities from industries registered in the European Pollutant Release and Transfer Register E-PRTR, measured in phosphor equivalents (P eq.).										
Sustainable Development Goal	UN-12, UN-3, UN-15, OECD 5, EC, EPI, CSI 040, MITECO.										
Calculation formula	$P\ eq = \frac{AEv\ P\ equivalent}{Inhabitants}$ <i>Total verified annual emissions in the municipality, in kg, in the year under study, aggregated by characterisation factors, in kg of P equivalents.</i> $AEv\ P\ equivalent = \frac{\sum_{j=1}^k \text{Mass of substance}_j \times \text{Characterisation factor substance}_j}{n^{\circ} \text{ inhabitants in municipality}}$ <table border="1"> <thead> <tr> <th>Substance j</th><th>Characterisation factor (kg P eq.)</th></tr> </thead> <tbody> <tr> <td>Phosphoric acid</td><td>0.32</td></tr> <tr> <td>P Pentoxide</td><td>0.44</td></tr> <tr> <td>P total</td><td>1</td></tr> <tr> <td>Phosphate</td><td>0.33</td></tr> </tbody> </table> <i>AEv = Total verified annual emissions in the year under study, in kg</i>	Substance j	Characterisation factor (kg P eq.)	Phosphoric acid	0.32	P Pentoxide	0.44	P total	1	Phosphate	0.33
Substance j	Characterisation factor (kg P eq.)										
Phosphoric acid	0.32										
P Pentoxide	0.44										
P total	1										
Phosphate	0.33										
Measurement unit	Kg person ⁻¹										
Information sources	PRTR España. http://www.prtr-es.es/										
Desirable trend	Reduction										
Type of indicator	Pressure										
Dimension	Environmental										
Category	Emissions										
References	- EEA, 2020. European Environment Agency indicators http://www.eea.europa.eu/data-and-maps/indicators/#c0=10&b_start=0 - Esty, Daniel C., M.A. Levy, C.H. Kim, A. de Sherbinin, T. Srebotnjak, and V. Mara. 2008. 2008 Environmental Performance Index. New Haven: Yale Center for Environmental Law and Policy. - EUROSTAT, 2016. EU Sustainable Development Strategy (Indicators). Progress towards the EU SDS objectives and targets is evaluated using a set of about 130 sustainable development indicators (EU SDI set), http://ec.europa.eu/eurostat/web/sdi/ - Fernández-Latorre, F.M. Indicadores de sostenibilidad y medio ambiente. Métodos y escalas. Consejería de Medio Ambiente. http://www.juntadeandalucia.es/medioambiente/site/porta/web/menuitem.7e1cf46ddf59bb227a9ebe205510e1ca/?vgnnextoid=957528c276cbf010VgnVCM1000000624e50aRCRD&vgnnextchannel=4836a7aaaf4f4310VgnVCM2000000624e50aRCRD										

	• OECD 2001, Environmental Indicators 2001: Towards Sustainable Development, http://www.oecd.org/site/worldforum/33703867.pdf • PRé Consultants, Radboud University Nijmegen, Leiden University, RIVM, 2014. http://www.lcia-recipe.net/ • Science for Environment Policy, 2018. Indicators for sustainable cities. In-depth Report 12. European Commission DG Environment-Science Communication Unit, UWE, https://ec.europa.eu/environment/integration/research/newsalert/pdf/indicators_for_sustainable_cities_IR12_en.pdf • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	Can be expressed in relative terms (per inhabitant) and in absolute terms. There is a time series (2014-2010-2007), so trends can be calculated.

EC01: ATMOSPHERIC CARBON FIXATION SERVICES (ACFS)	
Definition	Atmospheric carbon fixation services
Sustainable Development Goal	15-UN-Goal4, OE2-EMDS, T14-CBD, MITECO
Calculation formula	To estimate the atmospheric carbon fixation services provided by trees, scrub, agricultural land and peat bogs, the avoided cost method is used. This considers the costs that would have to be covered if the environment stopped providing these services. This carbon capture lowers atmospheric levels of greenhouse gases, avoiding to some extent the need to resort to markets to buy emission rights. In agricultural ecosystems, the method only takes into account the carbon fixed by permanent crops (olives), crop mosaics where there are spaces of natural and semi-natural vegetation and agroforestry systems. Herbaceous crops and pasture lands are not taken into account. In permanent crops, the carbon gains and loss method is used, for which the biomass rate of olive orchards is estimated, considering renovations and replanting of rootstocks. In all cases, the biomass rate of each plant cover is estimated, with its gains and losses resulting from annual cutting, uprooting and renovation (in the case of olives). This is transformed into its equivalent in weight of carbon and carbon dioxide and the current unit value of tonne of CO₂ is applied. Finally, we add the values, weighted by size if incomplete, of all the VANE 100*100m cells included in each municipality. The total value (in €) is divided by the municipal area (in km²).
Measurement unit	€ km ⁻²
Information sources	VANE Project (Valuation of Natural Assets in Spain) https://www.miteco.gob.es/es/biodiversidad/temas/conservacion-de-la-biodiversidad/valoracion-y-aspectos-economicos-de-la-biodiversidad/cb_vae_valoracion_activos_naturales.aspx
Desirable trend	Increase
Type of indicator	State
Dimension	Economic
Category	Land uses
References	• CIHEAM-PLAN BLEU-MARM, 2009, TerraMED: Nuevas perspectivas para el Desarrollo Rural en el Mediterráneo, Madrid, CIHEAM-Plan Bleu-MARM, 420pp. • Cruickshank, M.M., Tomlinson, R.W. y Trew, S. 2000. Application of CORINE land-cover mapping to estimate carbon stored in the vegetation of Ireland, Journal of Environmental Management (2000) 58, 269–287 • Esteban, F. 2010, Valoración de los activos naturales de España. Ambianta 91: 76-92. https://www.mapa.gob.es/ministerio/pags/biblioteca/revistas/pdf_AM/Ambianta_2010_91_76_92.pdf • FOREST EUROPE-UNECE-FAO, 2011. State of Europe's Forests 2011. Status and Trends in Sustainable Forest Management in Europe, http://www.foresteurope.org/documentos/State_of_Europes_Forests_2011_Report_Reviewed_November_2011.pdf

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- OSE, 2011. Biodiversidad en España. Base de la sostenibilidad ante el cambio global, Madrid, OSE, 490pp.
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- UNEP-CBD, 2010, Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting X/2. The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets, <https://www.cbd.int/doc/decisions/cop-10/cop-10-dec-02-en.doc>
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- WORLD BANK, 2007, State and Trends of the Carbon Market 2007, Washington, D.C.

Observations

In view of the probable underestimation of C fixation using VANE, other alternative methods calculate it as proposed, on the one hand, by Román et al. 2013 and, on the other, by Cruickshank et al. 2000, Molin 2010 and Martínez-Vega et al. 2016.

According to Román et al. 2013, most of the value of environmental services is related to the volume of CO₂ that land uses can capture. To estimate it, a coefficient for carbon density (t ha⁻¹) is assigned to each of the categories in CORINE-Land Cover level 3 (Cruickshank et al., 2000; Molin, 2010; OSE, 2011, and our amendment, Martínez-Vega et al., 2016) and multiplied by the area occupied by each class in each municipality studied. The summation of all the classes present is multiplied by the average price per tonne of CO₂ in the year of evaluation (World Bank, 2007).

$$ACFS = \frac{\left[\sum_{j=1}^k nh_{j,i} cd_j \right] * Pc_{20xx}}{munA}$$

k = number of categories of land uses
nh_{j,i} is the number of hectares of category *j* in municipality *i*
cd_j is the coefficient for carbon density in land use category *j*
Pc_{20xx} is the average price per tonne of carbon, in euros,
in 20xx (year of evaluation)
munA = municipal area, in hectares

EC02: VALUE OF PRODUCTIVE SERVICES PROVIDED BY LIVESTOCK (PSL)	
Definition	Value of productive services provided by livestock
Sustainable Development Goal	15-UN-Mt4, OE2-EMDS, T14-CBD
Calculation formula	The basic source of information for estimating the value of grassland are the agistment fees from which the corresponding functions for the transfer of value to the territory as a whole are calculated. Pasture patches are selected from CORINE Land Cover, excluding any located inside National Parks where there are restrictions on such land use. It is also necessary to know the canopy cover fractions of trees and scrub. Finally, we add the values, weighted by size if incomplete, of all the VANE 100*100 cells included in each municipality. The total value (in €) is divided by the municipal area (in km²).
Measurement unit	€ km ⁻²
Information sources	VANE Project, Valuation of Natural Assets in Spain https://www.miteco.gob.es/es/biodiversidad/temas/conservacion-de-la-biodiversidad/valoracion-y-aspectos-economicos-de-la-biodiversidad/cb_vae_valoracion_activos_naturales.aspx
Desirable trend	Increase
Type of indicator	State
Dimension	Economic
Category	Livestock
References	• CIHEAM-PLAN BLEU-MARM, 2009, TerraMED: Nuevas perspectivas para el Desarrollo Rural en el Mediterráneo, Madrid, CIHEAM-Plan Bleu-MARM, 420pp. • Esteban, F. 2010, Valoración de los activos naturales de España. Ambia 91: 76-92. https://www.mapa.gob.es/ministerio/pags/biblioteca/revistas/pdf_AM/Ambia_2010_91_76_92.pdf • FOREST EUROPE-UNECE-FAO, 2011. State of Europe's Forests 2011. Status and Trends in Sustainable Forest Management in Europe, http://www.foresteurope.org/documentos/State_of_Europes_Forests_2011_Report_Review_November_2011.pdf • Förster, J., Barkmann, J., Fricke, R., Hotes, S. et al. 2015. Assessing ecosystem services for informing land-use decisions: a problem-oriented approach. Ecology and Society 20 (3):31, http://www.ecologyandsociety.org/vol20/iss3/art31/ • Martínez-Vega, J., Samir, M., Echavarría, P. 2016. Assessing forest sustainability: Evidence from Spanish provinces. Geoforum 70:1-10. • Molina, J.R., Rodríguez y Silva, F. y Herrera, M.A. 2016. Integrating economic landscape valuation into Mediterranean territorial planning. Environmental Science & Policy 56:120-128. • Ojea, E., Ruiz-Benito, P., Markandya, A., Zavala, M.A., 2012. Wood provisioning in Mediterranean forests: A bottom-up spatial valuation approach. Forest Policy and Economics 20, 78-88. • Román, M.V., Azqueta, D., Rodrigues, M., 2013. Methodological approach to assess the socio-economic vulnerability to wildfires in Spain. Forest Ecology and Management 294, 158-165. • UNEP-CBD, 2010, Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting X/2. The Strategic Plan for Biodiversity

	2011-2020 and the Aichi Biodiversity Targets, https://www.cbd.int/doc/decisions/cop-10/cop-10-dec-02-en.doc • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	An alternative source is the FIREGLOBE project (Román et al. 2013) which uses a km² grid cell as the unit of analysis. To calculate PSL at municipal level, we add the value of all the cells forming part of the municipality, weighted by their proportion within it. The drawback of this source is that there is no information on the Balearic and Canary islands so it cannot be applied to 4 National Parks.

EC03: VALUE OF PRODUCTIVE SERVICES PROVIDED BY FORESTS (PSF)	
Definition	Value of productive services provided by forests
Sustainable Development Goal	15-UN-Goal4, OE2-EMDS, T14-CBD
Calculation formula	We consider the value obtained from timber, firewood and pine nuts. On the one hand, we take into account the prices of timber, firewood and pine nuts and, on the other, the volume of the timber and firewood used and the annual increase in volumes including bark. We also take into account pine nut production. Finally, we add the values, weighted by size if incomplete, of all the VANE 100*100m cells included in each municipality. The total value (in €) is divided by the municipal area (in km ²).
Measurement unit	€ km ⁻²
Information sources	VANE Project, Valuation of National Assets in Spain https://www.miteco.gob.es/es/biodiversidad/temas/conservacion-de-la-biodiversidad/valoracion-y-aspectos-economicos-de-la-biodiversidad/cb_vae_valoracion_activos_naturales.aspx
Desirable trend	Increase
Type of indicator	State
Dimension	Economic
Category	Forestry
References	• CIHEAM-PLAN BLEU-MARM, 2009, TerraMED: Nuevas perspectivas para el Desarrollo Rural en el Mediterráneo, Madrid, CIHEAM-Plan Bleu-MARM, 420pp. • FOREST EUROPE-UNECE-FAO, 2011. State of Europe's Forests 2011. Status and Trends in Sustainable Forest Management in Europe, http://www.foresteurope.org/documentos/State_of_Europes_Forests_2011_Report_Revisted_November_2011.pdf • Esteban, F. 2010, Valoración de los activos naturales de España. Ambianta 91: 76-92. https://www.mapa.gob.es/ministerio/pags/biblioteca/revistas/pdf_AM/Ambianta_2010_91_76_92.pdf • Förster, J., Barkmann, J., Fricke, R., Hotes, S. et al. 2015. Assessing ecosystem services for informing land-use decisions: a problem-oriented approach. Ecology and Society 20 (3):31, http://www.ecologyandsociety.org/vol20/iss3/art31/ • Martínez-Vega, J., Samir, M., Echavarría, P. 2016. Assessing forest sustainability: Evidence from Spanish provinces. Geoforum 70:1-10. • Molina, J.R., Rodríguez y Silva, F. y Herrera, M.A. 2016. Integrating economic landscape valuation into Mediterranean territorial planning. Environmental Science & Policy 56:120-128. • Ojea, E., Ruiz-Benito, P., Markandya, A., Zavala, M.A., 2012. Wood provisioning in Mediterranean forests: A bottom-up spatial valuation approach. Forest Policy and Economics 20, 78-88. • Román, M.V., Azqueta, D., Rodrigues, M., 2013. Methodological approach to assess the socio-economic vulnerability to wildfires in Spain. Forest Ecology and Management 294, 158-165. • UNEP-CBD, 2010, Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting X/2. The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets, https://www.cbd.int/doc/decisions/cop-10/cop-10-dec-02-en.doc • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/

Observations	An alternative source is the FIREGLOBE project (Román et al. 2013) which uses a km ² grid cell as the unit of analysis. To calculate PSF at municipal level, the value of all the cells forming part of the municipality is added, weighted by their proportion within it. The drawback of this source is that there is no information on the Balearic and Canary island, so it cannot be applied to 4 National Parks.
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EC04: VALUE OF RECREATIONAL SERVICES (VRS)	
Definition	Value of recreational services
Sustainable Development Goal	15-UN-Goal4, OE2-EMDS, T14-CBD
Calculation formula	The VANE data referring to recreational services are differentiated as follows: 1. In the interior areas of the peninsula, the contingent valuation method (CVM) without a market price is used. Willingness-to-pay (WTP) is calculated using two models: the first is for Protected Natural Areas, and the second for unprotected forest areas. Then we add the values, weighted by size if incomplete, of all the grid VANE 100*100m cells included in each municipality. The total value (in €) is divided by the municipal area (in km²). 2. In coastal areas, there are two user profiles: 2.1 Residents: The recreational service provided by coasts to residents in coastal areas is evaluated using the travel cost method. For territorial allocation, we assign the value resulting from the natural – not artificial – area within the municipality. It is considered that all land uses – not only beaches – provide a holistic view of the system, assuming that visitors do not value beaches in isolation but as part of a system. 2.2 Non-residents: Similarly, we calculate the recreational value offered by coasts to non-resident visitors in coastal municipalities.
Measurement unit	€ km ⁻²
Information sources	VANE Project, Valuation of Natural Assets in Spain https://www.miteco.gob.es/es/biodiversidad/temas/conservacion-de-la-biodiversidad/valoracion-y-aspectos-economicos-de-la-biodiversidad/cb_vae_valoracion_activos_naturales.aspx
Desirable trend	Increase
Type of indicator	State
Dimension	Economic
Category	Recreational use
References	• CIHEAM-PLAN BLEU-MARM, 2009, TerraMED: Nuevas perspectivas para el Desarrollo Rural en el Mediterráneo, Madrid, CIHEAM-Plan Bleu-MARM, 420pp. • FOREST EUROPE-UNECE-FAO, 2011. State of Europe's Forests 2011. Status and Trends in Sustainable Forest Management in Europe, http://www.foresteurope.org/documentos/State_of_Europes_Forests_2011_Report_Reviewed_November_2011.pdf • Esteban, F. 2010, Valoración de los activos naturales de España. Ambianta 91: 76-92. https://www.mapa.gob.es/ministerio/pags/biblioteca/revistas/pdf_AM/Ambianta_2010_91_76_92.pdf • Förster, J., Barkmann, J., Fricke, R., Hotes, S. et al. 2015. Assessing ecosystem services for informing land-use decisions: a problem-oriented approach. Ecology and Society 20 (3):31, http://www.ecologyandsociety.org/vol20/iss3/art31/ • Martínez-Vega, J., Samir, M., Echavarría, P. 2016. Assessing forest sustainability: Evidence from Spanish provinces. Geoforum 70:1-10. • Molina, J.R., Rodríguez y Silva, F. y Herrera, M.A. 2016. Integrating economic landscape valuation into Mediterranean territorial planning. Environmental Science & Policy 56:120-128.

	• Román, M.V., Azqueta, D., Rodrigues, M., 2013. Methodological approach to assess the socio-economic vulnerability to wildfires in Spain. Forest Ecology and Management 294, 158-165. • UNEP-CBD, 2010, Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting X/2. The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets, https://www.cbd.int/doc/decisions/cop-10/cop-10-dec-02-en.doc • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	An alternative source is the FIREGLOBE project (Román et al. 2013) which uses a km² grid cell as the unit of analysis. To calculate VRS at municipal level, the value of all the cells forming part of the municipality is added, weighted by their proportion within it. The drawback of this source is that there is no information on the Balearic and Canary islands, so it cannot be applied to 4 National Parks.

EC05: GROSS DOMESTIC PRODUCT PER CAPITA (GDC)	
Definition	Gross domestic product per capita
Sustainable Development Goal	8-UN-Goal1, 19-OECD, 1.1-EU-SDS, EC, 50101-SIAS_CYL, 4-FMP-CLM, SCE2-EEA, 1.1-OSE.
Calculation formula	$GDC = \frac{GDP}{pop2005}$ <i>GDP = Gross Domestic Product for 2005, in €</i> <i>pop2005 = total population according to 2005 Census</i>
Measurement unit	€ person ⁻¹
Information sources	FEDEA, Distribution of median and average income per inhabitant in Spanish municipalities: estimation based on micro-data on personal income tax (IRPF), http://renta.fedea.net/renta.html In 2015, the National Statistical Institute presented the result of the European “Urban Audit” project http://www.ine.es/prensa/np920.pdf which analysed 109 municipalities in Spain to find the net average income per household and the unemployment rate, among others. Other regional statistics institutes in Spain provide data on GDP or per capita income. ✓ Instituto Aragonés de Estadística https://www.aragon.es/-/estadistica-local ✓ IESTADIS (Community of Madrid) http://www.madrid.org/iestadis/fijas/otros/estructu_cre.htm
Desirable trend	Increase
Type of indicator	State
Dimension	Economic
Category	Population
References	• EEA, 2020. European Environment Agency indicators. http://www.eea.europa.eu/data-and-maps/indicators/#c0=10&b_start=0 • EUROSTAT, 2016. EU Sustainable Development Strategy (Indicators). Progress towards the EU SDS objectives and targets is evaluated using a set of about 130 sustainable development indicators (EU SDI set), http://ec.europa.eu/eurostat/web/sdi/ • FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla-La Mancha, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf • JUNTA DE CASTILLA Y LEÓN, 2015. Sistema de indicadores ambientales y de sostenibilidad de Castilla y León, 2015, http://www.medioambiente.jcyl.es/web/jcyl/MedioAmbiente/es/Plantilla100/1218521587650/_/_/ • Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 • OECD 2001, Environmental Indicators 2001: Towards Sustainable Development, http://www.oecd.org/site/worldforum/33703867.pdf • OSE, 2012, Indicadores de sostenibilidad de los municipios españoles y portugueses

	- Spanish Ministry for Ecological Transition 2019. Environmental Profile of Spain 2018. Indicator-based Report. https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/publicaciones/pae2018en_tcm30-504011.pdf - UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	In some cases, data are only available for municipalities with >1,000 inhabitants

EC06: UNEMPLOYMENT RATE (UR)	
Definition	Proportion of unemployed persons to potential working population
Sustainable Development Goal	8-UN-Goal5, 1.4.4-EU-SDS, EC, 24.1-EESUL, 8.3-EOTA, 50105-SIAS_CYL, 11.3-FMP-CLM, AEVAL, 3.1-OSE
Calculation formula	$UR = 100 - \left[\frac{Upop}{Wpop} \right] \times 100$ <i>Upop</i> = unemployed population <i>Wpop</i> = total working population
Measurement unit	%. The index varies between 100 (best value) and 0 (worst). The measurement scale of 100 is inverted to avoid null values in the data normalisation process and so that the result can be added to the economic sustainability index.
Information sources	NSI, Territorial Statistics. https://www.ine.es/FichasWeb/RegMunicipios.do
Desirable trend	Reduction. In terms of the index, it would be desirable to increase its value.
Type of indicator	State
Dimension	Economic
Category	Population
References	• AEVAL 2009. Agencia Estatal de Evaluación de las Políticas Públicas y la Calidad de los Servicios, Indicadores de Sostenibilidad. • EUROSTAT, 2016. EU Sustainable Development Strategy (Indicators). Progress towards the EU SDS objectives and targets is evaluated using a set of about 130 sustainable development indicators (EU SDI set), http://ec.europa.eu/eurostat/web/sdi/ • FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla-La Mancha, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf • Gobierno de Aragón, 2014, Estrategia de Ordenación Territorial de Aragón, Modelo Territorial, Tomo II: Indicadores, http://www.aragon.es/estaticos/GobiernoAragon/Departamentos/PoliticaTerritorialInterior/Areas/01_Ordenacion_territorio/EOTA/EOTA_Aprobados_Definitivos/05%20EOTA_Indicadores_AD_BOA.pdf • JUNTA DE CASTILLA Y LEÓN, 2015. Sistema de indicadores ambientales y de sostenibilidad de Castilla y León, 2015, http://www.medioambiente.jcyl.es/web/jcyl/MedioAmbiente/es/Plantilla100/1218521587650/_/_/ • MAGRAMA-MINISTERIO DE FOMENTO, 2011, Estrategia española de sostenibilidad urbana y local (EESUL), http://www.magrama.gob.es/es/calidad-y-evaluacion-ambiental/temas/medio-ambiente-urbano/EESUL-290311-web_tcm7-177531.pdf • Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 • OSE, 2012, Indicadores de sostenibilidad de los municipios españoles y portugueses • Science for Environment Policy, 2018. Indicators for sustainable cities. In-depth Report 12. European Commission DG Environment-Science Communication Unit, UWE, https://ec.europa.eu/environment/integration/research/newsalert/pdf/indicators_for_sustainable_cities_IR12_en.pdf

	UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	Other alternative sources are: Expansión 2020, https://datosmacro.expansion.com/paro/espana/municipios La Caixa, 2009, Anuario económico de España 2009, http://femp.femp.es/files/566-93-archivo/anuario%20economico%20de%20espa%C3%B1a%20la%20caixa.pdf However, there are different criteria for calculating this indicator. The National Statistical Institute considers the potential working population (aged 20-59) while, for example, the Federation of Municipalities and Provinces for Castile La Mancha (FMP-CLM) considers the 16-64 age group to be the potential working population. Other sources consider the total population.

EC07: PUBLIC MUNICIPAL DEBT (PMD)	
Definition	Municipal debt per capita
Sustainable Development Goal	8-UN-Goal1, 19-OECD, 1.1-EU-SDS, EC, 50101-SIAS_CYL, 4-FMP-CLM, SCE2-EEA, 1.1-OSE.
Calculation formula	$PMD = 100 - \left[\frac{PMD_{2016}}{pop_{2017}} \right] \times 100$ <i>PMD₂₀₁₆ = public municipal debt for 2016, in thousands of €</i> <i>pop₂₀₁₇ = total population according to the 2017 Census</i>
Measurement unit	The index varies between 100 (best value) and -302.95 (worst value). The measurement scale of 100 is inverted to avoid null values in the data normalisation process and so that the result can be added to the economic sustainability index.
Information sources	Spanish Ministry of Finance and Public Function, 2016. Outstanding municipal debt. https://www.hacienda.gob.es/es-ES/CDI/Paginas/SistemasFinanciacionDeuda/InformacionEELs/DeudaViva.aspx
Desirable trend	Decrease. In terms of the index, it would be desirable to increase its value.
Type of indicator	State
Dimension	Economic
Category	Population
References	• EEA, 2020. European Environment Agency indicators. http://www.eea.europa.eu/data-and-maps/indicators/#c0=10&b_start=0 • EUROSTAT, 2016. EU Sustainable Development Strategy (Indicators). Progress towards the EU SDS objectives and targets is evaluated using a set of about 130 sustainable development indicators (EU SDI set), http://ec.europa.eu/eurostat/web/sdi/ • FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla-La Mancha, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf • JUNTA DE CASTILLA Y LEÓN, 2015. Sistema de indicadores ambientales y de sostenibilidad de Castilla y León, 2015, http://www.medioambiente.jcyl.es/web/jcyl/MedioAmbiente/es/Plantilla100/1218521587650/_/_/ • Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 • OECD 2001, Environmental Indicators 2001: Towards Sustainable Development, http://www.oecd.org/site/worldforum/33703867.pdf • OSE, 2012, Indicadores de sostenibilidad de los municipios españoles y portugueses • Spanish Ministry for Ecological Transition 2019. Environmental Profile of Spain 2018. Indicator-based Report. https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/publicaciones/pae2018en_tcm30-504011.pdf • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	

EC08: EMPLOYMENT RATE IN THE PRIMARY SECTOR (ER1)	
Definition	Working population employed in the primary sector
Sustainable Development Goal	8-UN-Goal5, 50104-SIAS_CYL, 11.1-FMP-CLM, AEVAL, 3.2-OSE
Calculation formula	$ER1 = \frac{Wpop1}{Wpop} * 100$ <i>Wpop1 = working population in the primary sector</i> <i>Tpop = total working population</i>
Measurement unit	%
Information sources	Population Census for 2011 https://www.ine.es/censos2011/tablas/Inicio.do?L=1
Desirable trend	Maintain current status
Type of indicator	State
Dimension	Economic
Category	Population
References	• AEVAL 2009. Agencia Estatal de Evaluación de las Políticas Públicas y la Calidad de los Servicios, Indicadores de Sostenibilidad. • FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla-La Mancha, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf • JUNTA DE CASTILLA Y LEÓN, 2015. Sistema de indicadores ambientales y de sostenibilidad de Castilla y León, 2015, http://www.medioambiente.jcyl.es/web/jcyl/MedioAmbiente/es/Plantilla100/1218521587650/_/_/ • Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 • OSE, 2012, Indicadores de sostenibilidad de los municipios españoles y portugueses • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	

SO01: POPULATION DENSITY (PD)	
Definition	Population density
Sustainable Development Goal	3-UN, 20-OECD, 4.2.4-EU-SDS, 2.2-EESUL, 18.3-EOTA, 50102-SIAS_CYL, 1-FMP-CLM, AEVAL, SC1-EEA, MMA
Calculation formula	$PD = \frac{\frac{pop2011}{munA} + \frac{pop2011}{Aib}}{2}$ <i>pop2011 = total population according to the 2011 population survey</i> <i>munA = municipal area, in km2</i> <i>Aib = area of inhabited and built cells, in km2, GEOSTAT 2015</i> First, we considered standard population density based on the number of inhabitants according to the census and the total geographical area of each municipality. We then considered the GEOSTAT source which links population only to km² cells that are built and that actually house population. This is a more accurate way of considering the geographical distribution of the population because it considers inhabitation. If inhabitation is concentrated, there is greater environmental pressure on certain very specific points whereas, if it is dispersed, providing municipal services requires greater efforts and more infrastructure. The indicator is the average of both densities. We also took into account a dynamic target value (TV), considering that population density is not linearly related to sustainability. We therefore adjusted this indicator to a Weibull distribution, and then normalised all the figures according to the minimum and maximum values of distributions.
Measurement unit	inhabitant km ⁻²
Information sources	Population census for 2011, GEOSTAT 2015 & GIS
Desirable trend	Maintain a range of intermediate values, avoiding extreme values as far as possible.
Type of indicator	Pressure/State
Dimension	Social
Category	Population
References	• AEVAL 2009. Agencia Estatal de Evaluación de las Políticas Públicas y la Calidad de los Servicios, Indicadores de Sostenibilidad. • EEA, 2020. European Environment Agency indicators. http://www.eea.europa.eu/data-and-maps/indicators/#c0=10&b_start=0 • EUROSTAT, 2016. EU Sustainable Development Strategy (Indicators). Progress towards the EU SDS objectives and targets is evaluated using a set of about 130 sustainable development indicators (EU SDI set), http://ec.europa.eu/eurostat/web/sdi/ • FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla-La Mancha, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf • GEOSTAT, 2015. GEOSTAT grid POP 1K 2011 V2.0. https://ec.europa.eu/eurostat/cache/GISCO/geodatafiles/GEOSTAT-grid-POP-1K-2011-V2-0-1.zip • Gobierno de Aragón, 2014, Estrategia de Ordenación Territorial de Aragón, Modelo Territorial, Tomo II: Indicadores,

	http://www.aragon.es/estaticos/GobiernoAragon/Departamentos/PoliticaTerritorialInterior/Areas/01_Ordenacion_territorio/EOTA/EOTA_Aprobados_Definitivos/05%20EOTA_Indicadores_AD_BOA.pdf • Gómez, Carlos M. 2000. Población, Medio Ambiente y Crecimiento Económico: ¿Tres Piezas Incompatibles del Desarrollo Sostenible? <i>Ekonomi Gerizan</i> 7: 242-260. • JUNTA DE CASTILLA Y LEÓN, 2015. Sistema de indicadores ambientales y de sostenibilidad de Castilla y León, 2015, http://www.medioambiente.jcyl.es/web/jcyl/MedioAmbiente/es/Plantilla100/1218521587650/_/_/ • MAGRAMA-MINISTERIO DE FOMENTO, 2011, Estrategia española de sostenibilidad urbana y local (EESUL), http://www.magrama.gob.es/es/calidad-y-evaluacion-ambiental/temas/medio-ambiente-urbano/EESUL-290311-web_tcm7-177531.pdf • Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. <i>Boletín de la Asociación de Geógrafos Españoles</i>, 49:281-308 • Martínez-Vega, J., Samir, M., Echavarría, P. 2016. Assessing forest sustainability: Evidence from Spanish provinces. <i>Geoforum</i> 70:1-10. • MINISTERIO DE MEDIO AMBIENTE, 1996, Indicadores ambientales. Una propuesta para España, Madrid, Ministerio de Medio Ambiente, 146pp. • OECD 2001, Environmental Indicators 2001: Towards Sustainable Development, http://www.oecd.org/site/worldforum/33703867.pdf • OSE, 2012, Indicadores de sostenibilidad de los municipios españoles y portugueses • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/ • Weibull, W. 1951. A statistical distribution function of wide applicability, <i>J. Appl. Mech.-Trans. ASME</i> 18(3): 293-297. • Willy, D.K., Muyanga, M., Jayne, T. 2019. Can economic and environmental benefits associated with agricultural intensification be sustained at high population densities? A farm level empirical analysis. <i>Land Use Policy</i> 81: 100–110.
Observations	Various authors consider that population density does not follow a linear relation to sustainability. For example, Gómez-Gómez (2000) considers that population density follows a Kuznets environmental curve. Also, Willy et al. (2019) maintain that, as from 600 inhabitants/km², damage to arable land is observed.

SO02: SEASONAL POPULATION DENSITY (SPD)	
Definition	Demographic density taking seasonal population into account
Sustainable Development Goal	3-UN, 2.2-EESUL
Calculation formula	$SPD = \frac{\left[\frac{(pop2005 * 243) + (spop2005 * 122)}{365} \right]}{munA}$ <i>pop2005 = total population according to the 2005 Census</i> <i>spop2005 = seasonal population according to the EIEL for 2005</i> <i>munA = municipal area, in km²</i>
Measurement unit	inhabitants km ⁻²
Information sources	Census for 2005 (NSI), EIEL, 2005 & GIS.
Desirable trend	Contain/Maintain current status
Type of indicator	Pressure/State
Dimension	Social
Category	Population
References	- MAGRAMA-MINISTERIO DE FOMENTO, 2011, Estrategia española de sostenibilidad urbana y local (EESUL), http://www.fomento.gob.es/NR/rdonlyres/1668CD1E-0B11-4C9E-84E2-E664DD3464C1/111503/EESULWEB2011.pdf - Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 - UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	Here we calculate a weighted average, taking into account the increase in population during a minimum period of 122 days (4 summer months). In peri-urban National Parks (Sierra de Guadarrama, Sierra Nevada and Doñana), this alternative indicator could be relevant because it expresses the seasonal pressure that these protected areas are under.

SO03: SECOND HOMES (SH)	
Definition	Proportion of second homes
Sustainable Development Goal	3-UN, 2.2-EESUL
Calculation formula	$SH = \frac{secH}{totH} \times 100$ <i>secH = second homes in each municipality</i> <i>totH = total homes in each municipality</i>
Measurement unit	%
Information sources	NSI, 2017 Municipal Indicators https://www.ine.es/FichasWeb/RegMunicipios.do?L=1
Desirable trend	Containment/slight increase Consideration of second homes is controversial. Such homes, which are often dispersed around the territory or grouped in developments in forest areas, give rise to extensive strips known as Wildland Urban Interface (WUI) which are often the source of large forest fires. But from the point of view of social sustainability, the presence of second homes in rural or intermediate municipalities generates wealth and an attractive social fabric.
Type of indicator	Pressure/State
Dimension	Social
Category	Population
References	- MAGRAMA-MINISTERIO DE FOMENTO, 2011, Estrategia española de sostenibilidad urbana y local (EESUL), http://www.magrama.gob.es/es/calidad-y-evaluacion-ambiental/temas/medio-ambiente-urbano/EESUL-290311-web_tcm7-177531.pdf - Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 - UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	This is an indicator that indirectly measures the pressure exerted by the floating population that lives in the municipality at weekends and over holiday periods. This situation generates imbalance because the services offered by municipalities only consider the officially registered population.

SO04: SENILE DEPENDENCY INDEX (SDI)	
Definition	Proportion of the population aged over 64 to the working population
Sustainable Development Goal	3-UN, 20-OECD, 4.5.1-EU-SDS, 21-EESUL, 2-FMP-CLM, AEVAL, 3.5-OSE
Calculation formula	$SDI = 100 - \left[\frac{pop > 64}{pop16 - 64} \times 100 \right]$ <i>pop > 64 = population aged over 64</i> <i>pop16 – 64 = potential working population</i>
Measurement unit	Index: ranges between 100 (best value) and 0 (worst value). The measurement scale of 100 is inverted to avoid null values in the data normalisation process and so that the result can be added to the economic sustainability index.
Information sources	NSI, 2017 Municipal Indicators https://www.ine.es/FichasWeb/RegMunicipios.do?L=1
Desirable trend	Maintain or reduce. In terms of the index, it would be desirable to increase its value.
Type of indicator	State
Dimension	Social
Category	Population
References	• AEVAL 2009. Agencia Estatal de Evaluación de las Políticas Públicas y la Calidad de los Servicios, Indicadores de Sostenibilidad. • EUROSTAT, 2016. EU Sustainable Development Strategy (Indicators). Progress towards the EU SDS objectives and targets is evaluated using a set of about 130 sustainable development indicators (EU SDI set), http://ec.europa.eu/eurostat/web/sdi/ • FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf • MAGRAMA-MINISTERIO DE FOMENTO, 2011, Estrategia española de sostenibilidad urbana y local (EESUL), http://www.fomento.gob.es/NR/rdonlyres/1668CD1E-0B11-4C9E-84E2-E664DD3464C1/111503/EESULWEB2011.pdf • Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 • OECD 2001, Environmental Indicators 2001: Towards Sustainable Development, http://www.oecd.org/site/worldforum/33703867.pdf • OSE, 2012, Indicadores de sostenibilidad de los municipios españoles y portugueses • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	This indicator could also be considered an indirect indicator of pressure on the natural environment. The consequences of aging and of low population density are clear in National Parks and other protected areas (land abandonment, encroachment of pastures by scrub, etc.) and are a matter of concern for the authorities.

SO05: MEDICAL FACILITIES INDEX (MFI)	
Definition	Provision of medical facilities
Sustainable Development Goal	3-11-UN, A4-CE, EC, 26-EESUL, 3.2-EOTA, 9.3-FMP-CLM, AEVAL
Calculation formula	$MFI = \frac{LHE \times 0.1 + HC \times 2 + Hos \times 10}{pop2017} \times 1000$ <i>LHE = no. of local health establishments</i> <i>HC = no. of Health Centers</i> <i>Hos = no. of Hospitals</i> <i>pop2017 = total population according to the 2017 Census</i>
Measurement unit	‰
Information sources	Spanish Ministry of Health, 2019. General Registry of health centers, services, and establishments (REGCESS) https://www.mscbs.gob.es/ciudadanos/prestaciones/regCess/home.htm
Desirable trend	Increase
Type of indicator	State
Dimension	Social
Category	Facilities
References	- AEVAL 2009. Agencia Estatal de Evaluación de las Políticas Públicas y la Calidad de los Servicios, Indicadores de Sostenibilidad. - European Communities, 2000. Towards a local sustainability profile: European common indicators, Office for Official Publications of the European Communities: Luxembourg, 2000. https://op.europa.eu/es/publication-detail/-/publication/33eba485-e1e3-4748-9358-0d66ef86bcc3/language-en/format-PDFA1B - FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla-La Mancha, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf - Gobierno de Aragón, 2014, Estrategia de Ordenación Territorial de Aragón, Modelo Territorial, Tomo II: Indicadores, http://www.aragon.es/estaticos/GobiernoAragon/Departamentos/PoliticaTerritorialInterior/Areas/01_Ordenacion_territorio/EOTA/EOTA_Aprobados_Definitivos/05%20EOTA_Indicadores_AD_BOA.pdf - MAGRAMA-MINISTERIO DE FOMENTO, 2011, Estrategia española de sostenibilidad urbana y local (EESUL), http://www.fomento.gob.es/NR/rdonlyres/1668CD1E-0B11-4C9E-84E2-E664DD3464C1/111503/EESULWEB2011.pdf - Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 - Science for Environment Policy, 2018. Indicators for sustainable cities. In-depth Report 12. European Commission DG Environment-Science Communication Unit, UWE, https://ec.europa.eu/environment/integration/research/newsalert/pdf/indicators_for_sustainable_cities_IR12_en.pdf - UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	Compulsory European indicator

SO06: INDEX OF EDUCATIONAL FACILITIES (IEF)	
Definition	Provision of educational facilities
Sustainable Development Goal	3-11-UN, A4-CE, EC, 26-EESUL, 3.3-EOTA, 9.4-FMP-CLM, AEVAL
Calculation formula	$IEF = \frac{EE}{pop2017} \times 1000$ <i>EE = no. of non – university educational establishments. Includes nursery, primary and secondary schools and other educational centers pop2017 = total population according to the 2017 Census</i>
Measurement unit	‰
Information sources	Spanish Ministry of Education, Culture and Sport, 2019 State Registry of Non-University Teaching Centers (RCD) https://www.educacion.gob.es/centros/buscar.do
Desirable trend	Increase
Type of indicator	State
Dimension	Social
Category	Facilities
References	• AEVAL 2009. Agencia Estatal de Evaluación de las Políticas Públicas y la Calidad de los Servicios, Indicadores de Sostenibilidad. • European Communities, 2000. Towards a local sustainability profile: European common indicators, Office for Official Publications of the European Communities: Luxembourg, 2000. https://op.europa.eu/es/publication-detail/-/publication/33eba485-e1e3-4748-9358-0d66ef86bcc3/language-en/format-PDFA1B • FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla-La Mancha, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf • Gobierno de Aragón, 2014, Estrategia de Ordenación Territorial de Aragón, Modelo Territorial, Tomo II: Indicadores, http://www.aragon.es/estaticos/GobiernoAragon/Departamentos/PoliticaTerritorialInterior/Areas/01_Ordenacion_territorio/EOTA/EOTA_Aprobados_Definitivos/05%20EOTA_Indicadores_AD_BOA.pdf • MAGRAMA-MINISTERIO DE FOMENTO, 2011, Estrategia española de sostenibilidad urbana y local (EESUL), http://www.fomento.gob.es/NR/rdonlyres/1668CD1E-0B11-4C9E-84E2-E664DD3464C1/111503/EESULWEB2011.pdf • Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 • Science for Environment Policy, 2018. Indicators for sustainable cities. In-depth Report 12. European Commission DG Environment-Science Communication Unit, UWE, https://ec.europa.eu/environment/integration/research/newsalert/pdf/indicators_for_sustainable_cities_IR12_en.pdf • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	Compulsory European indicator

SO07: SERVICE QUALITY (SQ)	
Definition	This indicator expresses: • The general degree of satisfaction among the population regarding their residence in the municipality • Satisfaction with the quality of some local public services: waste collection, drinking water supply, waste water disposal, power supply, interurban and urban public transport (only for large municipalities), health and education services, and others. • Satisfaction with other aspects of social cohesion: access to housing, citizen engagement. • Satisfaction with other environmental aspects: air quality, water quality, noise levels, smells, state of conservation of the natural environment (forests, rivers, etc.)
Sustainable Development Goal	3-UN, A1-CE, 27-EESUL, 10-FMP-CLM, AEVAL
Calculation formula	The quality of each of these services could be calculated independently or all together in a single indicator taking into account the average for all services. $SQ = Average_{i=1}^n \left[\frac{Resp_svs}{Tot_resp} * 100 \right]$ <i>Resp_svs = no. of satisfied and very satisfied respondents</i> <i>Tot_resp = total no. of respondents</i>
Measurement unit	%
Information sources	Survey among the general public (first question), and among users of the services mentioned (remaining questions)
Desirable trend	Increase
Type of indicator	State
Dimension	Social
Category	Services
References	• AEVAL 2009. Agencia Estatal de Evaluación de las Políticas Públicas y la Calidad de los Servicios, Indicadores de Sostenibilidad. • European Communities, 2000. Towards a local sustainability profile: European common indicators, Office for Official Publications of the European Communities: Luxembourg, 2000. https://op.europa.eu/es/publication-detail/-/publication/33eba485-e1e3-4748-9358-0d66ef86bcc3/language-en/format-PDFA1B • FMP-CLM, 2009, Panel de indicadores de Sostenibilidad Local, Federación de Municipios y Provincias de Castilla-La Mancha, http://www.absostenible.es/fileadmin/agenda21/documentos/observatorio/Panel_indicadores_2009.pdf • MAGRAMA-MINISTERIO DE FOMENTO, 2011, Estrategia española de sostenibilidad urbana y local (EESUL), http://www.fomento.gob.es/NR/rdonlyres/1668CD1E-0B11-4C9E-84E2-E664DD3464C1/111503/EESULWEB2011.pdf • Martínez-Vega, J., Echavarría, P., González Cascón, V. y Martínez Cruz, N. 2009. Propuesta metodológica para el análisis de la sostenibilidad en la provincia de Cuenca. Boletín de la Asociación de Geógrafos Españoles, 49:281-308 • UNITED NATIONS, 2015. Sustainable Development Goals 2015-2030. https://www.un.org/sustainabledevelopment/sustainable-development-goals/
Observations	Compulsory European indicator

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