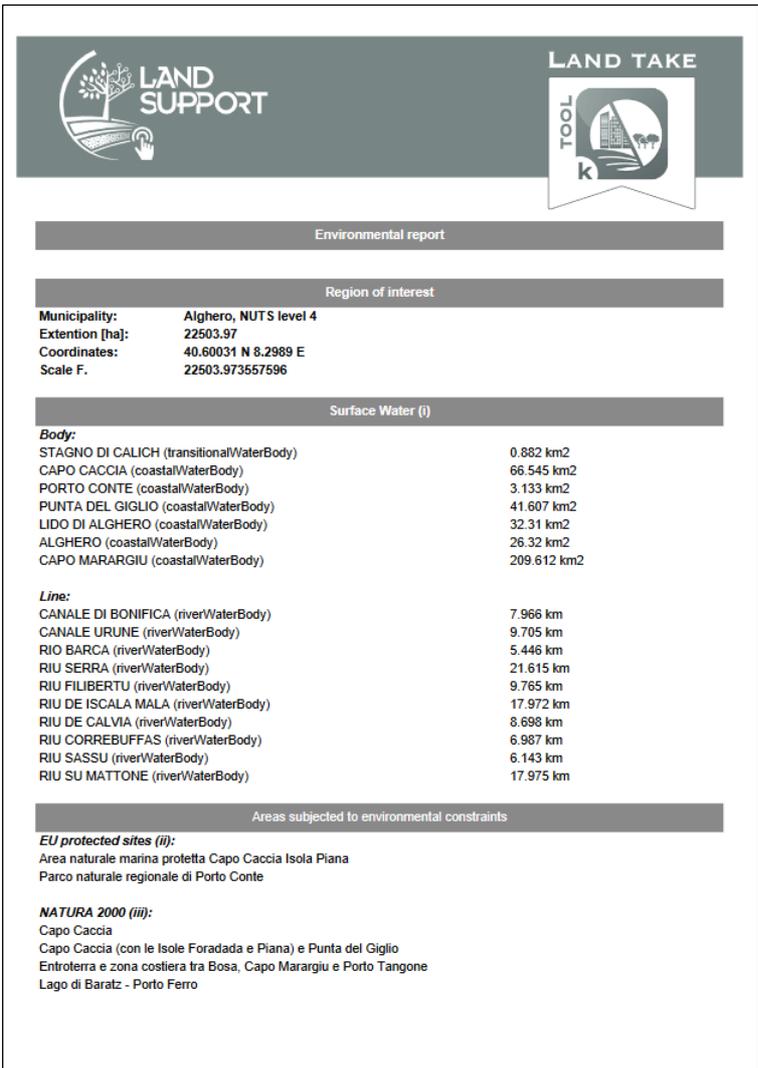


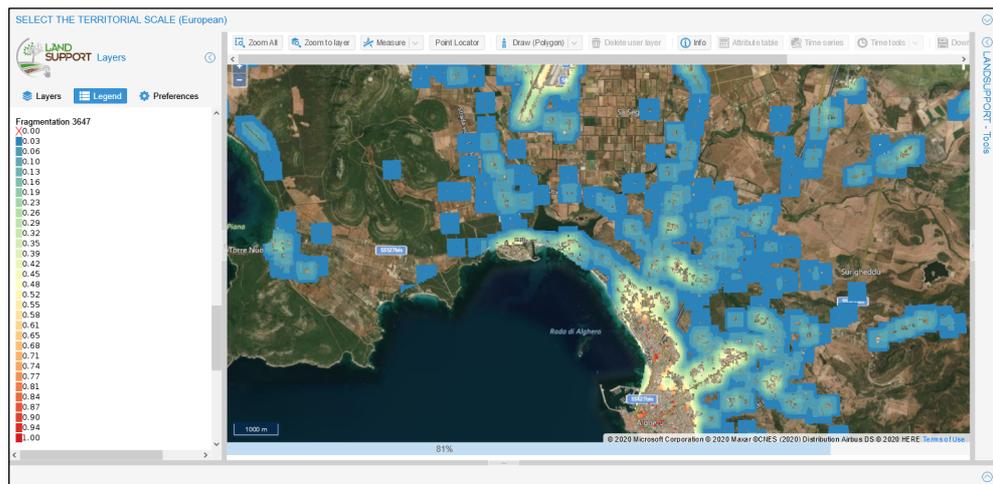
Land Take

Case of use N.1: description of the environment

Case 1																																							
User	Professional or public authorities employee responsible for the environmental assessment of a plan or project																																						
Background	<p>Environmental assessment of plans and programmes is now an essential part of town and country planning. The evaluation is often entrusted to external professionals or offices belonging to the body itself.</p> <p>For example, the evaluation of a municipal urban plan consists of several phases, which can be summarized in: description of the environment, monitoring.</p> <p>The LANDSUPPORT platform may provide data and information to the professional or technical person in charge of the environmental assessment at each of the stages listed.</p>																																						
User's goals	To collect information on the state of the environment																																						
Tool/tools	Environmental report Fragmentation																																						
Procedure	See technical sheet at www.																																						
Example of outputs	<p>Environmental report and fragmentation map</p>  <p>The screenshot displays the following information:</p> <ul style="list-style-type: none"> Environmental report Region of interest <ul style="list-style-type: none"> Municipality: Alghero, NUTS level 4 Extention [ha]: 22503.97 Coordinates: 40.60031 N 8.2989 E Scale F.: 22503.973557596 Surface Water (i) <table border="1"> <thead> <tr> <th>Body:</th> <th>Area (km²)</th> </tr> </thead> <tbody> <tr><td>STAGNO DI CALICH (transitionalWaterBody)</td><td>0.882</td></tr> <tr><td>CAPO CACCIA (coastalWaterBody)</td><td>66.545</td></tr> <tr><td>PORTO CONTE (coastalWaterBody)</td><td>3.133</td></tr> <tr><td>PUNTA DEL GIGLIO (coastalWaterBody)</td><td>41.607</td></tr> <tr><td>LIDO DI ALGHERO (coastalWaterBody)</td><td>32.31</td></tr> <tr><td>ALGHERO (coastalWaterBody)</td><td>26.32</td></tr> <tr><td>CAPO MARARGIU (coastalWaterBody)</td><td>209.612</td></tr> </tbody> </table> Line: <table border="1"> <thead> <tr> <th>Line:</th> <th>Length (km)</th> </tr> </thead> <tbody> <tr><td>CANALE DI BONIFICA (riverWaterBody)</td><td>7.966</td></tr> <tr><td>CANALE URUNE (riverWaterBody)</td><td>9.705</td></tr> <tr><td>RIO BARCA (riverWaterBody)</td><td>5.446</td></tr> <tr><td>RIU SERRA (riverWaterBody)</td><td>21.615</td></tr> <tr><td>RIU FILIBERTU (riverWaterBody)</td><td>9.765</td></tr> <tr><td>RIU DE ISCALA MALA (riverWaterBody)</td><td>17.972</td></tr> <tr><td>RIU DE CALVIA (riverWaterBody)</td><td>8.698</td></tr> <tr><td>RIU CORREBUFFAS (riverWaterBody)</td><td>6.987</td></tr> <tr><td>RIU SASSU (riverWaterBody)</td><td>6.143</td></tr> <tr><td>RIU SU MATTONE (riverWaterBody)</td><td>17.975</td></tr> </tbody> </table> Areas subjected to environmental constraints <ul style="list-style-type: none"> EU protected sites (ii): <ul style="list-style-type: none"> Area naturale marina protetta Capo Caccia Isola Piana Parco naturale regionale di Porto Conte NATURA 2000 (iii): <ul style="list-style-type: none"> Capo Caccia Capo Caccia (con le Isole Foradada e Piana) e Punta del Giglio Entroterra e zona costiera tra Bosa, Capo Marargiu e Porto Tangone Lago di Baratz - Porto Ferro 	Body:	Area (km ²)	STAGNO DI CALICH (transitionalWaterBody)	0.882	CAPO CACCIA (coastalWaterBody)	66.545	PORTO CONTE (coastalWaterBody)	3.133	PUNTA DEL GIGLIO (coastalWaterBody)	41.607	LIDO DI ALGHERO (coastalWaterBody)	32.31	ALGHERO (coastalWaterBody)	26.32	CAPO MARARGIU (coastalWaterBody)	209.612	Line:	Length (km)	CANALE DI BONIFICA (riverWaterBody)	7.966	CANALE URUNE (riverWaterBody)	9.705	RIO BARCA (riverWaterBody)	5.446	RIU SERRA (riverWaterBody)	21.615	RIU FILIBERTU (riverWaterBody)	9.765	RIU DE ISCALA MALA (riverWaterBody)	17.972	RIU DE CALVIA (riverWaterBody)	8.698	RIU CORREBUFFAS (riverWaterBody)	6.987	RIU SASSU (riverWaterBody)	6.143	RIU SU MATTONE (riverWaterBody)	17.975
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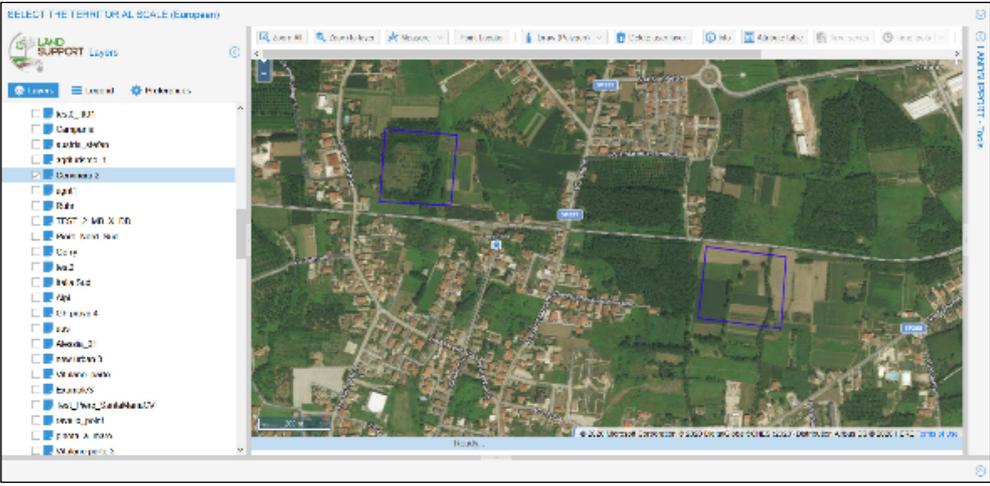
Population data (iv)	
<i>Historical Population data:</i>	
Year 1961	26289
Year 1971	31687
Year 1981	36115
Year 1991	38792
Year 2001	38451
Year 2011	40464
<i>Current Population data:</i>	
Year 2015	44082
Year 2016	44019
Year 2017	44019
Year 2018	43979

The tool Environmental report (k2) collects information on environmental components and demographic evolution, and returns them in the form of a PDF report.



The tool Fragmentation (k3) yields maps describing rural landscape fragmentation, with catchment radius between 1 and 1500 metres.

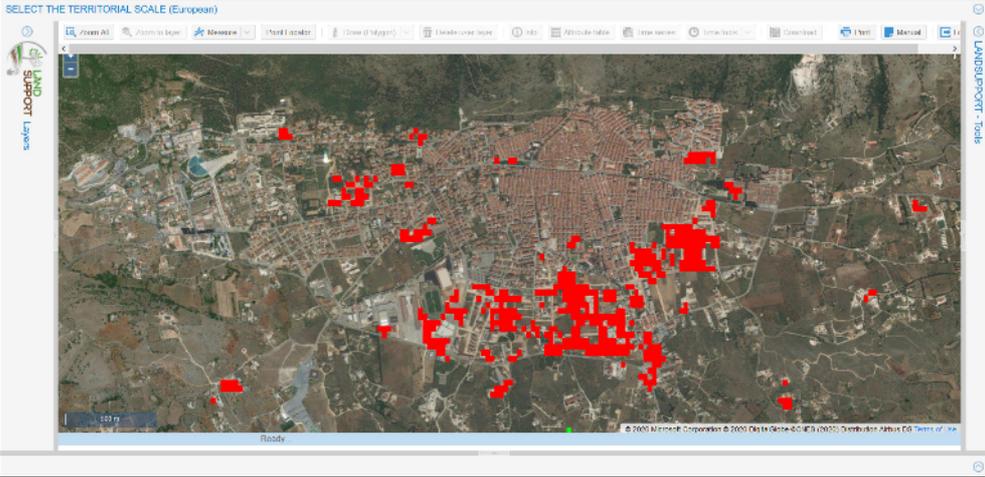
Case of use N. 2: localisation of new urban development

Case 2																																																																									
User	Town planner and/or public authority																																																																								
Background	<p>In the choice of location of new settlements and infrastructure or in the revision of existing town planning instruments, many factors must be considered, among which is certainly the impact on soil and on the possible loss of agricultural productivity and ecosystem services.</p> <p>The new urban development tool allows to estimate the loss of ecosystem services as a result of the urbanization of one or more user-defined areas. Thus the tool may enable to compare alternative options of new settlement also highlighting the choice at least impact.</p>																																																																								
User's goals	Comparison of two or more urban development options																																																																								
Tool/tools	New urban development																																																																								
Procedure	...See technical sheet at www.																																																																								
Output	 <div style="display: flex; justify-content: space-around;"> <div data-bbox="523 1263 906 1794"> <p>LAND TAKE</p> <p>Scenario for impact of new urban development (1)</p> <p>Region of interest</p> <p>Name: User RCR, Cerveno Extension (ha): 426 Centroid location: 48.0334 N 14.6094 E</p> <p>Percentage of planned soil sealing [%] Soil: 0 Scale-factor: 90 / 100 * 4024.268994242 / 10000 for 0.00031144012545</p> <p>Potential loss in ecosystem services (MUS approach)</p> <table border="1"> <tr><td>Food crops</td><td>10.00</td><td>ton/year</td></tr> <tr><td>Fodder crops</td><td>63.20</td><td>ton/year</td></tr> <tr><td>Energy crops</td><td>3.20</td><td>ton/year</td></tr> <tr><td>Turf peat</td><td>0</td><td>ton/year</td></tr> <tr><td>Organic crop area</td><td>0.576</td><td>ha</td></tr> <tr><td>Grassland</td><td>7</td><td>ha</td></tr> <tr><td>Timber removal</td><td>1.502</td><td>m³/year</td></tr> <tr><td>Wood volume</td><td>214.282</td><td>m³</td></tr> <tr><td>Water abstraction for industrial use</td><td>0</td><td>m³</td></tr> <tr><td>Water abstraction for agricultural use</td><td>0</td><td>m³</td></tr> <tr><td>Water abstraction for public use</td><td>1083.240</td><td>m³</td></tr> <tr><td>Forest with protective functions area</td><td>1.536</td><td>ha</td></tr> </table> <p>Potential loss in soil organic carbon (tonC)</p> <p>Loss of organic carbon: 0.020 ton</p> <p>Model description</p> <p>This model aims to simulate some aspects of the environmental impact of a non urban development. The model takes into account the difference of state of each pixel between two scenarios: current against the simulated land take.</p> <p>Notes</p> <p>* The model must be considered only as a semi-quantitative tool. It does not consider climate, hydrology, soil, or other factors that may affect the results. Potential ecosystem services (timber, etc.) are calculated based on the input data. The model does not consider the impact of the urban development on the surrounding areas. For a proper interpretation of these data please check the corresponding methodology. Soil organic carbon value (tonC/ha): The Global Soil Organic Carbon Atlas v1.0</p> </div> <div data-bbox="911 1263 1289 1794"> <p>LAND TAKE</p> <p>Scenario for impact of new urban development (1)</p> <p>Region of interest</p> <p>Name: User RCR, Cerveno Extension (ha): 426 Centroid location: 48.0334 N 14.6094 E</p> <p>Percentage of planned soil sealing [%] Soil: 0 Scale-factor: 90 / 100 * 4024.268994242 / 10000 for 0.00031144012545</p> <p>Potential loss in ecosystem services (MUS approach)</p> <table border="1"> <tr><td>Food crops</td><td>0.77</td><td>ton/year</td></tr> <tr><td>Fodder crops</td><td>11.27</td><td>ton/year</td></tr> <tr><td>Energy crops</td><td>2.00</td><td>ton/year</td></tr> <tr><td>Turf peat</td><td>0</td><td>ton/year</td></tr> <tr><td>Organic crop area</td><td>0.556</td><td>ha</td></tr> <tr><td>Grassland</td><td>0</td><td>ha</td></tr> <tr><td>Timber removal</td><td>1.316</td><td>m³/year</td></tr> <tr><td>Wood volume</td><td>102.581</td><td>m³</td></tr> <tr><td>Water abstraction for industrial use</td><td>0</td><td>m³</td></tr> <tr><td>Water abstraction for agricultural use</td><td>0</td><td>m³</td></tr> <tr><td>Water abstraction for public use</td><td>1073.490</td><td>m³</td></tr> <tr><td>Forest with protective functions area</td><td>1.536</td><td>ha</td></tr> </table> <p>Potential loss in soil organic carbon (tonC)</p> <p>Loss of organic carbon: 0.021 ton</p> <p>Model description</p> <p>This model aims to simulate some aspects of the environmental impact of a non urban development. The model takes into account the difference of state of each pixel between two scenarios: current against the simulated land take.</p> <p>Notes</p> <p>* The model must be considered only as a semi-quantitative tool. It does not consider climate, hydrology, soil, or other factors that may affect the results. Potential ecosystem services (timber, etc.) are calculated based on the input data. The model does not consider the impact of the urban development on the surrounding areas. For a proper interpretation of these data please check the corresponding methodology. Soil organic carbon value (tonC/ha): The Global Soil Organic Carbon Atlas v1.0</p> </div> </div> <p>The new urban development tool, through PDF reports, allows to estimate the loss of ecosystem services as a result of the urbanization of one or more user-defined areas, comparing different options and highlighting the choice having the least impact. In this case the two options concern the urbanization of one of the two areas highlighted in the map.</p>	Food crops	10.00	ton/year	Fodder crops	63.20	ton/year	Energy crops	3.20	ton/year	Turf peat	0	ton/year	Organic crop area	0.576	ha	Grassland	7	ha	Timber removal	1.502	m ³ /year	Wood volume	214.282	m ³	Water abstraction for industrial use	0	m ³	Water abstraction for agricultural use	0	m ³	Water abstraction for public use	1083.240	m ³	Forest with protective functions area	1.536	ha	Food crops	0.77	ton/year	Fodder crops	11.27	ton/year	Energy crops	2.00	ton/year	Turf peat	0	ton/year	Organic crop area	0.556	ha	Grassland	0	ha	Timber removal	1.316	m ³ /year	Wood volume	102.581	m ³	Water abstraction for industrial use	0	m ³	Water abstraction for agricultural use	0	m ³	Water abstraction for public use	1073.490	m ³	Forest with protective functions area	1.536	ha
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Case of use N. 3: description of urban structure

Case 3																																																																	
User	Researcher																																																																
Background	<p>The morphology of urban settlements has different environmental impacts: from land consumption to landscape fragmentation, to energy consumption, accessibility, etc.</p> <p>The study of morphology, through indicators used in scientific literature (edge density, LCPI, RMPS) allows to describe briefly the structure of the settlements. The LANDSUPPORT platform allows you to quickly calculate these indicators for one or more administrative units and compare results, providing data for more in-depth research.</p>																																																																
User's goals	To analyse urban centres' structure (compact, sprawling, etc.)																																																																
Tool/tools	Model of urban development																																																																
Procedure	...See technical sheet at www.																																																																
Output	<p>The tool model of urban development can support the researcher in describing urban morphology. The results can be displayed in tabular and bar chart form.</p> <p>Table</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Edge density</th> <th>LCPI</th> <th>RMPS</th> </tr> </thead> <tbody> <tr> <td>Administrative Limit - Lazio</td> <td>17.82</td> <td>0.98</td> <td>2.58</td> </tr> <tr> <td>Administrative Limit - Lombardia...</td> <td>21.37</td> <td>0.97</td> <td>1.54</td> </tr> <tr> <td>Administrative Limit - Emilia-...</td> <td>12.81</td> <td>0.98</td> <td>2.73</td> </tr> <tr> <td>Administrative Limit - Campa...</td> <td>22.46</td> <td>0.97</td> <td>2.48</td> </tr> <tr> <td>Administrative Limit - Molise</td> <td>7.33</td> <td>0.98</td> <td>11.08</td> </tr> <tr> <td>Administrative Limit - Puglia</td> <td>12.14</td> <td>0.98</td> <td>3.00</td> </tr> <tr> <td>Administrative Limit - Corse</td> <td>5.42</td> <td>0.98</td> <td>16.02</td> </tr> </tbody> </table> <p>Bar chart</p> <table border="1"> <thead> <tr> <th>Administrative Limit</th> <th>Edge density</th> <th>LCPI</th> <th>RMPS</th> </tr> </thead> <tbody> <tr> <td>Lazio</td> <td>17.82</td> <td>0.98</td> <td>2.58</td> </tr> <tr> <td>Lombardia</td> <td>21.37</td> <td>0.97</td> <td>1.54</td> </tr> <tr> <td>Emilia-Romagna</td> <td>12.81</td> <td>0.98</td> <td>2.73</td> </tr> <tr> <td>Campania</td> <td>22.46</td> <td>0.97</td> <td>2.48</td> </tr> <tr> <td>Molise</td> <td>7.33</td> <td>0.98</td> <td>11.08</td> </tr> <tr> <td>Puglia</td> <td>12.14</td> <td>0.98</td> <td>3.00</td> </tr> <tr> <td>Corse</td> <td>5.42</td> <td>0.98</td> <td>16.02</td> </tr> </tbody> </table>	Name	Edge density	LCPI	RMPS	Administrative Limit - Lazio	17.82	0.98	2.58	Administrative Limit - Lombardia...	21.37	0.97	1.54	Administrative Limit - Emilia-...	12.81	0.98	2.73	Administrative Limit - Campa...	22.46	0.97	2.48	Administrative Limit - Molise	7.33	0.98	11.08	Administrative Limit - Puglia	12.14	0.98	3.00	Administrative Limit - Corse	5.42	0.98	16.02	Administrative Limit	Edge density	LCPI	RMPS	Lazio	17.82	0.98	2.58	Lombardia	21.37	0.97	1.54	Emilia-Romagna	12.81	0.98	2.73	Campania	22.46	0.97	2.48	Molise	7.33	0.98	11.08	Puglia	12.14	0.98	3.00	Corse	5.42	0.98	16.02
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Case of use N. 4: evolution of urbanisation

Case 4																																																																											
User	Journalist/policy makers/ environmental protectionist																																																																										
Background	Awareness of environmental damage can be based on data collected using scientific methods. LANDSUPPORT can help policy makers, active citizen journalists to understand how urbanization had proceeded in their area of interest. This will highlight factors of environmental degradation, in particular as regards the consumption of permeable soil and the fragmentation of the natural landscape. Ease of communication can help to instil awareness in the citizen regarding environmental issues.																																																																										
User's goals	To highlight soil consumption, loss of ecosystem services and environmental degradation																																																																										
Tool/tools	Land take monitoring																																																																										
Procedure	...See technical sheet at www.																																																																										
Output	<p>Tool land take monitoring produces maps where the area occupied by urban expansion is clearly visible (in this case in the period 2006-2015). These maps can communicate effectively, even to an inexperienced audience, the size of the problem.</p>  <p>In addition, the tool estimates the change in soil consumption (loss and increase of natural soils) and the impact on soil productivity.</p> <div data-bbox="477 1476 1307 2004" style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;">Parameters</p> <p>Start date : 2006/01/01 End date : 2015/01/01</p> <p style="text-align: center;">Results</p> <p style="text-align: center;">CHANGE IN LAND TAKE (between the above two dates) (ii):</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Area</th> <th>UoM</th> </tr> </thead> <tbody> <tr> <td>Loss of rural area (*)</td> <td>1928.18</td> <td>hectares</td> </tr> <tr> <td>Gain of rural area (*)</td> <td>303.75</td> <td>hectares</td> </tr> </tbody> </table> <p style="text-align: center;">LOSS IN SOIL PRODUCTIVITY (hectares) (iii)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2"></th> <th colspan="10">Classes</th> </tr> <tr> <th colspan="10">increasing soil productivity from 1 to 10</th> </tr> <tr> <th></th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> <th>10</th> </tr> </thead> <tbody> <tr> <td>Crop</td> <td>0.3</td> <td>0</td> <td>0</td> <td>449.25</td> <td>151.95</td> <td>267.3</td> <td>2.63</td> <td>1.35</td> <td>0</td> <td>0</td> </tr> <tr> <td>Forest</td> <td>0</td> <td>0</td> <td>0</td> <td>0.53</td> <td>6.3</td> <td>3.08</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Grass</td> <td>0</td> <td>0</td> <td>0</td> <td>322.73</td> <td>75.68</td> <td>20.85</td> <td>6.3</td> <td>1.35</td> <td>0</td> <td>0</td> </tr> </tbody> </table> <p>NOTE: the area in hectares is based on a cell of 0.0003 x 0.0003 degree</p> <p style="text-align: center;">Model description</p> <p>Land take model takes into account the difference of state of each pixel between two times as recorded by the Copernicus Imperviousness grids.</p> </div>		Area	UoM	Loss of rural area (*)	1928.18	hectares	Gain of rural area (*)	303.75	hectares		Classes										increasing soil productivity from 1 to 10											1	2	3	4	5	6	7	8	9	10	Crop	0.3	0	0	449.25	151.95	267.3	2.63	1.35	0	0	Forest	0	0	0	0.53	6.3	3.08	0	0	0	0	Grass	0	0	0	322.73	75.68	20.85	6.3	1.35	0	0
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Case of use N. 5: monitoring of land use plan **YET TO BE DONE**

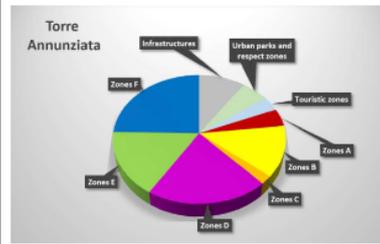
Case 5	
User	Town planner/professional/citizen/entrepreneur
Storyline	Urban plans are public documents and they should be easily accessible and understandable by a wide range of people. In this case, we imagine a request made by a citizen, a professional, an entrepreneur or a town planner who wants to access to a municipal plan and know more about its implementation state.
User's goals	To know the state of urban planning
Tool/tools	Check the state of urban planning (k12)
Procedure	...
Output	<p>The tool Check the state of urban planning (k12) allows to visualise the Municipal Land Use Plan, and to check the environmental state of the areas classified by the plan as “urban” or “rural”, by means of tables, maps and charts.</p> <div data-bbox="512 741 1273 1800" style="border: 1px solid black; padding: 10px;"> <p>The screenshot displays the 'LAND TAKE' tool interface. At the top, there are logos for 'LAND SUPPORT' and 'LAND TAKE TOOL k12'. Below the logos, a header reads 'Check the state of urban planning (i)'. Underneath, a section titled 'Administrative limits' provides the following data:</p> <ul style="list-style-type: none"> Name : Torre Annunziata, NUTS 4 Extention [ha] : 754 Centroid location : 40.36833 N 3.62552 W <p>Below this, a section titled 'Visualisation (ii)' shows a map of Torre Annunziata. The map is color-coded according to various land use zones. A legend on the right side of the map lists the following categories:</p> <ul style="list-style-type: none"> Administrative limits MOSGRO_NA_000_ENG Zones A - Historic centres Zones B - Residential Zones C - Planned residential areas Zones D - Industrial areas Zones E - Agricultural and natural lands Zones F - Inter-municipal public services Urban parks and respect zones Touristic zones Military zones Archaeological zones Infrastructures Cemeteries Other (inks) </div>

Current land use planning (iii)

The following table represents the percentage of land use according to in-force municipal plan.

Municipality	Torre Annunziata		
Land use plan typology	PRG		
Approval year	Before 1995		
Land use zones (1)	Hs	%	
Existing residential settlements	Zones A – Historic centres	33,6	4,5%
	Zones B – Residential	96,3	12,8%
Planned residential settlements	Zones C – Planned residential areas	15,7	2,1%
	Zones D – Industrial areas	158,1	21,0%
Other urban functions (existing and planned)	Zones F – Inter-municipal public services	186,0	24,7%
	Touristic zones	26,5	3,5%
	Infrastructures	71,6	9,5%
Rural areas and parks (existing and planned)	Zones E – Agricultural and natural lands	123,4	16,4%
	Urban parks and respect zones	42,7	5,7%
Other zones (existing and planned)	Military zones	-	-
	Archaeological zones	-	-
	Cemeteries	-	-
	Other	-	-

Pie Chart



Notes

(a) The Italian law regarding urban planning (in particular the Ministerial Decree n. 1444 of 1968) establishes "homogeneous zones" to be defined by municipal land use plans, marked with letters from A to F. Not all zones can be found in each municipal plan; moreover, municipal plans are allowed to introduce "special" zones (Touristic, urban parks, etc.) based on local features.

Environmental quality per land use zones (iv)

The following table represents the environmental state of soils per each land use zone.

Land use zones	Environmental state of soil sealing and vegetation						Indicators		
	Sealed soils (*)		Unsealed soils		Vegetated land (*)		Ratio unsealed/sealed areas	Difference unsealed-sealed (ha)	Indicator of green quality %
	ha	%	ha	%	ha	%			
Existing residential settlements	Zones A – Historic centres	23,5	70	10,1	30	5,04	15		
Planned residential settlements	Zones B – Residential								
	Zones C – Planned residential areas								
Other urban functions (existing and planned)	Zones D – Industrial areas								
	Zones F – Intermunicipal public services								
	Touristic zones								
Rural areas and parks (existing and planned)	Infrastructures								
	Zones E – Agricultural and natural lands								
Other zones (existing and planned)	Urban parks and respect zones								
	Military zones								
	Archaeological zones								
	Cemeteries								
	Other								

Notes
 (*) Source: High resolution layer Imperiousness
 (*) Source: High resolution layer (forests, grasslands, small woody features)

Environmental state of "Rural area and parks" (vi)

The following map represents soil sealing within land use zones classified as "Rural area and parks" (see notes).



Municipality	Planned unsealed soil (Ha)	Actual sealed soil (*)
Torre Annunziata	166 Ha	83 Ha (50%)

(*) Source: High resolution layer Imperiousness
 Note: high values could indicate urban sprawl in rural and natural areas

Loss in ecosystem services (MAES approach):

Sealed soil (t/ha)		83 Ha
Food crops	---	ton/year
Fodder crops	---	ton/year
Etc.	---	---