Norway grants

The National Centre for Research and Development

Potential of CLMS products for monitoring green urban areas in city of Łódź

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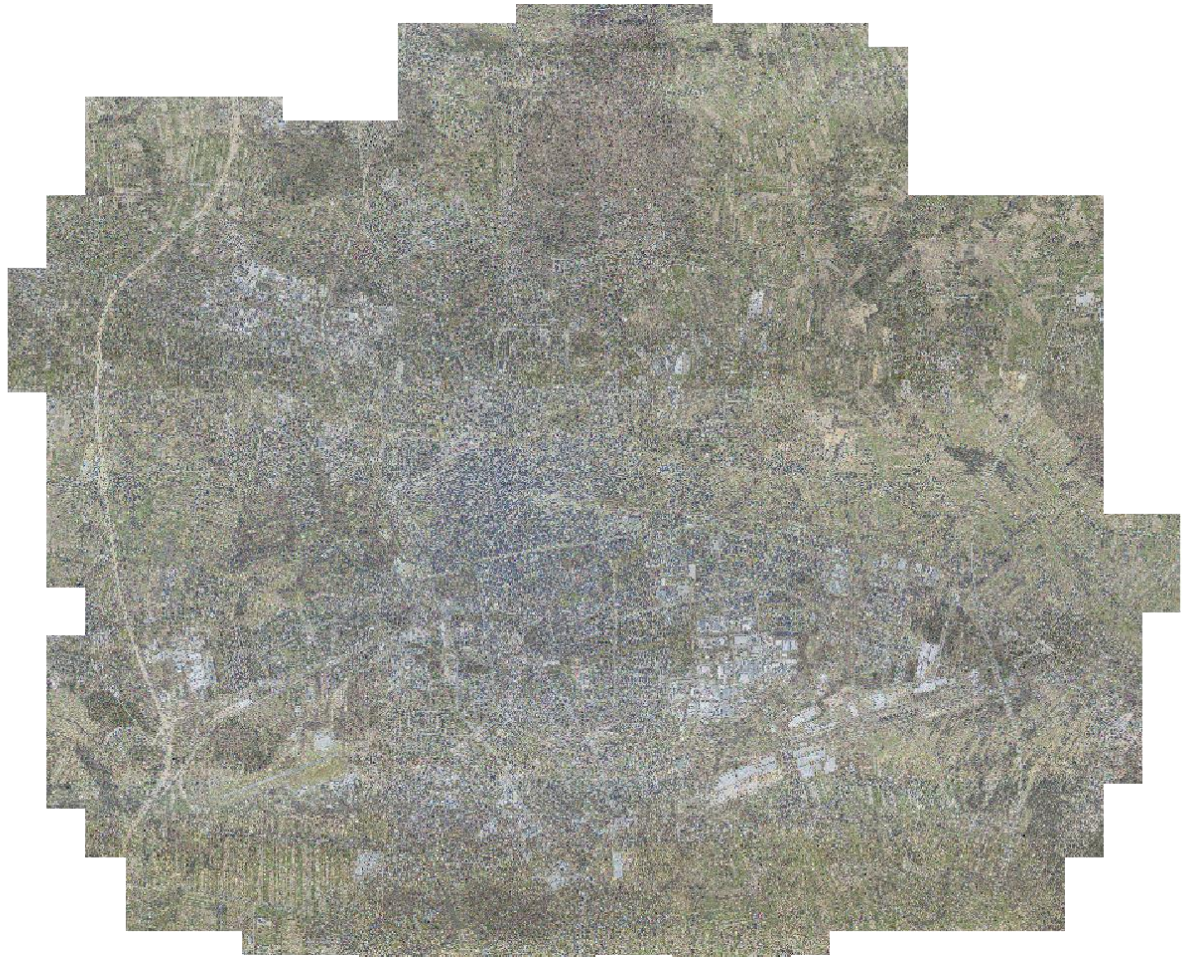
EVERSIS

InCoNaDa aim and objectives

Aim: to improve the user uptake of Land Cover / Land Use (LCLU) information derived from the integration of Copernicus Land Monitoring Service (CLMS) and national databases.

Objective: to examine the usefulness of CLMS for urban and spatial planning



https://www.mapa.lodz.pl/index.php?strona=prof

Literature review on previous research and application of CLMS in spatial planning

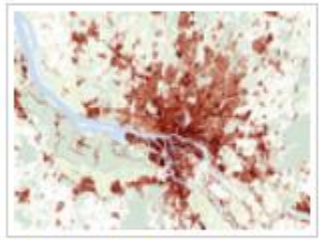
CLMS product	Application	Detailed application; indicators	Reference
CORINE	**URBAN SPRAWL, LAND CONVERSION**	overgrowth of urbanization (OU) index; monitoring urbanization processes assess built-up area expansion	(Cieślak et al., 2020; Kovács et al., 2019; Stoica et al., 2020)
	DEVELOPMENT OF AIR QUALITY MAPS	urban or street level air quality models	(Dabija et al., 2021)
	LAND USE	for monitoring of changes in settlement development and land use: The analyses made have revealed that the exhaustive examination of the processes of dispersion of built-up areas in Poland based on CORINE Land Cover 2018 data is **very difficult or even impossible**	(Śleszyński et al., 2020)
	DECISION MAKING FOR URBAN POLICY	a good tool for land management and decision making. European land monitoring spatially on the level of environmental analysis	(Voie, 2003) (Aune-Lundberg & Strand, 2021)
	URBAN GREEN SPACE	forest cover and vegetation abundance mapped ecosystem forest and other natural non-forest vegetation; natural landscape	(HJELLE et al., 2015) (Brown et al., 2016) (Engen et al., 2018) (Recio et al., 2018)
	WATER	Assessment of the hydrological model	(Schönfelder et al., 2017)
URBAN ATLAS	**URBAN GREEN SPACE MANAGEMENT**	assessing availability, **accessibility and usability of green area**s, share of different green ares Spatial distributions of population and of green areas classify the urban green land cover	(Annerstedt van den Bosch et al., 2016; Feltynowski et al., 2018; Kabisch et al., 2016; Badiu et al., 2016; Feltynowski & Kronenberg, 2020; Quatrini et al., 2019) Poelman, 2018 Halvorsen Thorén et al., 2010
	DECISION MAKING FOR URBAN POLICY	decision makers planning of sustainable development of the city and to enhance connectivity to reveal the potential effectiveness of planning in terms of **sustainable urban development**	(Ferrari et al., 2019; Domingo et al., 2021)
	URBAN SPRAWL TRACKING (URBAN GROWTH, LAND-USE EFFICIENCY ANALYSIS)	identyfication of prominent environmental issues	(Kovács et al., 2019)
	LAND-USE EFFICIENCY ANALYSIS	analyzing the **spatial distribution** of land-use efficiency using descriptive statistics	(Masini et al., 2019)
	MAP THE LOCAL CLIMATE ZONES		(Sigler et al., 2019)

biologically active surface ratio = soft landscaped area ratio – defined as area with surface arranged in a way which ensures natural plant vegetation and rainfall retention as well as 50% of terraces and flat roofs with such surface and other surfaces ensuring natural plant vegetation of the surface of at least 10m2 as well as surface water on this area

Regulation of the Minister of Infrastructure as of 12.04.2002
on technical conditions which buildings and their location should comply with (Dz.U.15.1422 as amended)

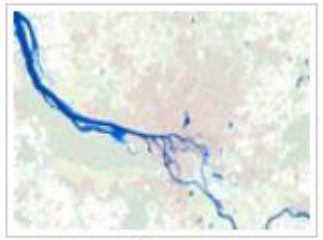
IMD – Imperviousness 2018

High Resolution Layers

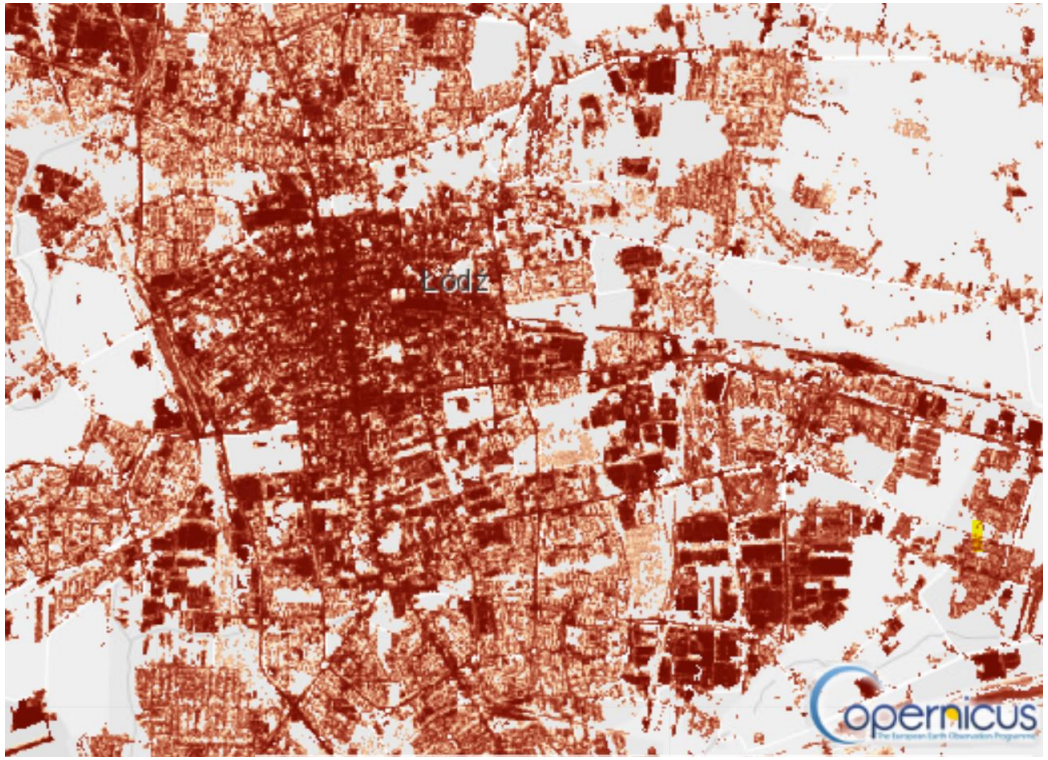

Imperviousness


Forests


Grassland


Water & Wetness


Small Woody Features



Imperviousness Density 2018

Available reference years:

2006, 2009, 2012, 2015, **2018,** 2021 (?)

Pixel size:

10m & 100m (2018)

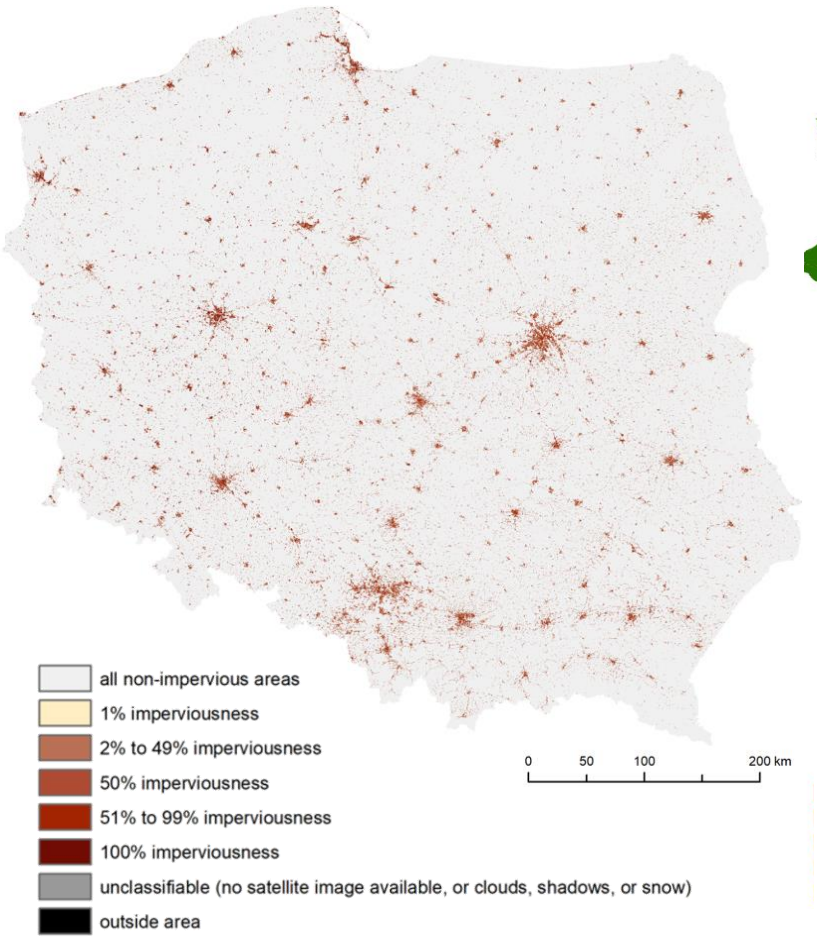
20m & 100m (2006,2009,2012,2015)

Projection

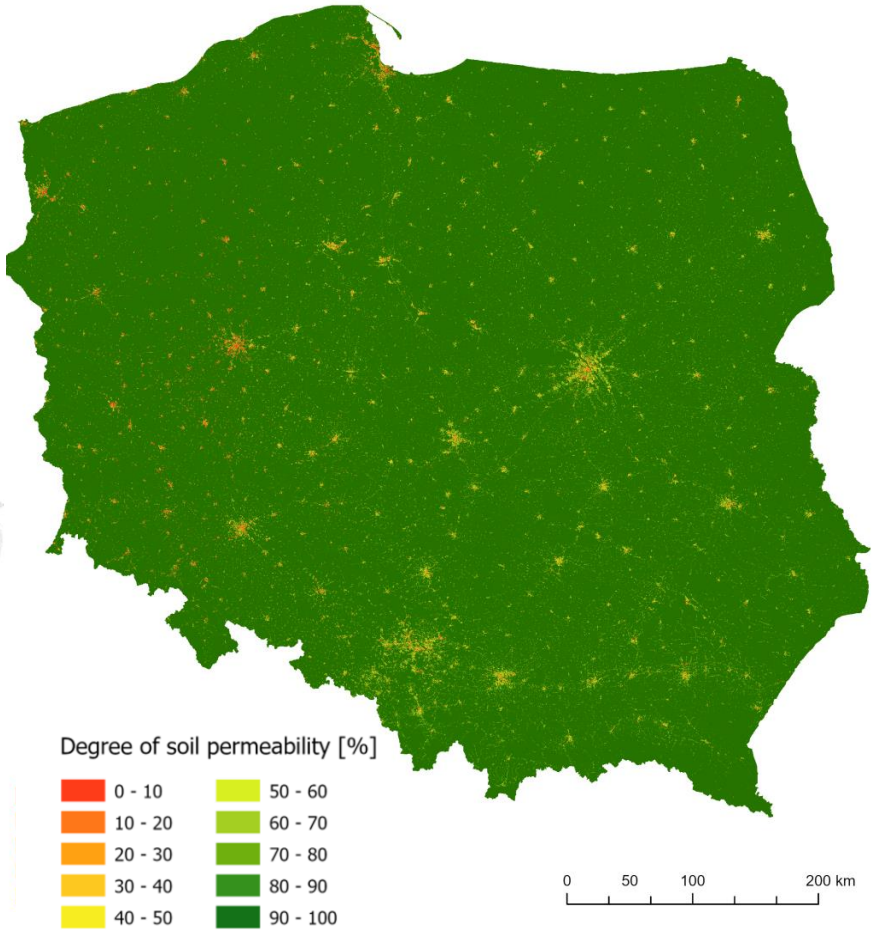
National projections and LAEA (for pan-European mosaics)

https://land.copernicus.eu/pan-european/high-resolution-layers/imperviousness

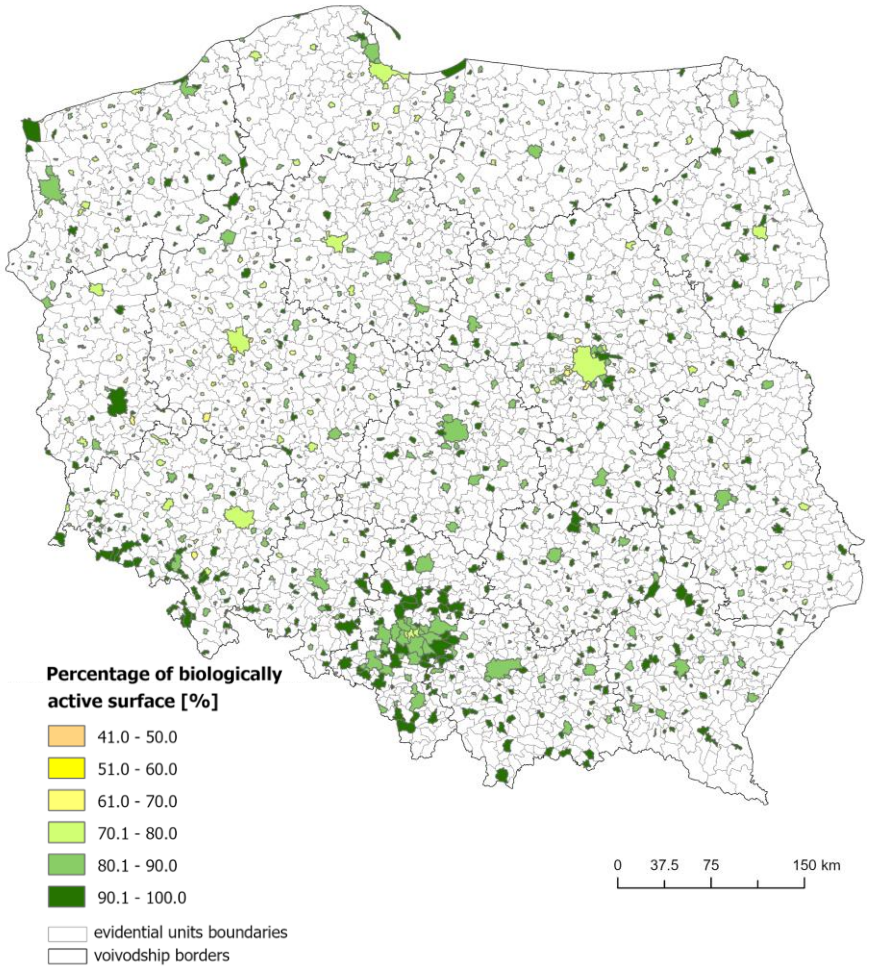
HRL-Imperviousness



HRL-Imperviousness 2018 data for Poland

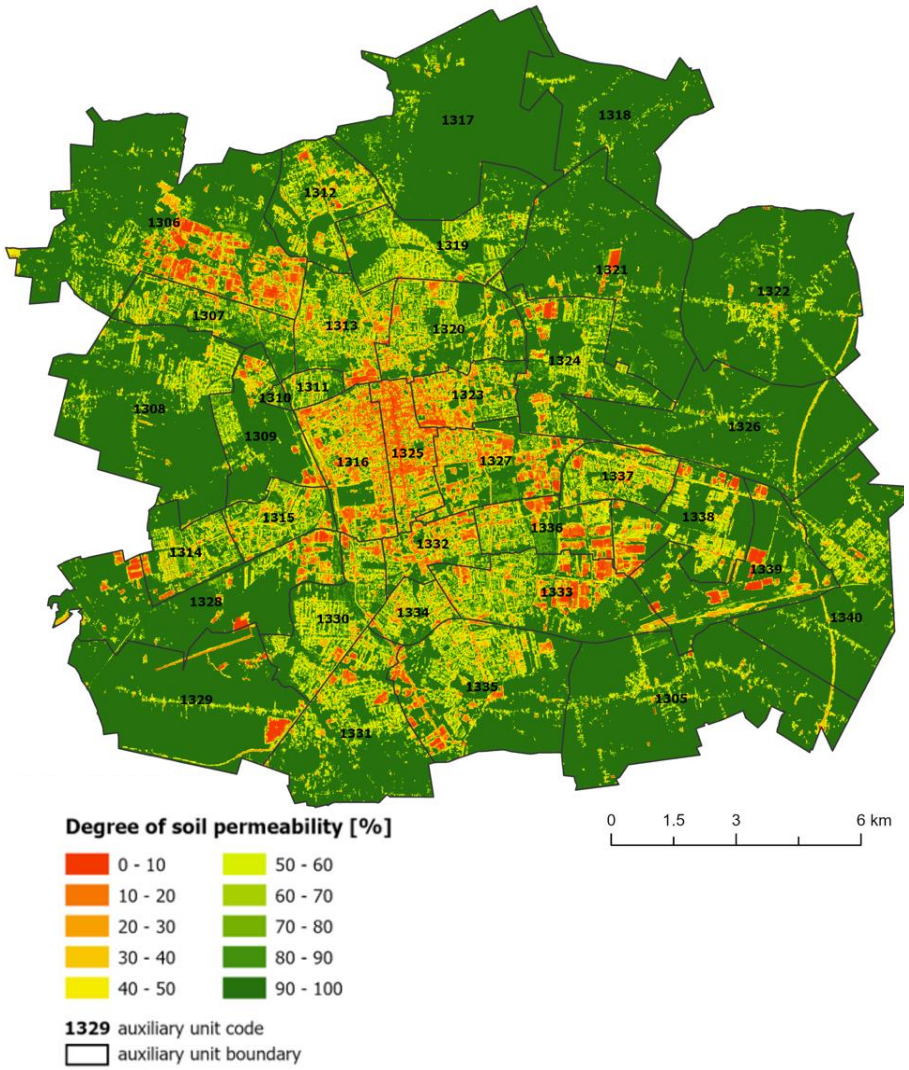


Reversed HRL-Imperviousness data for Poland

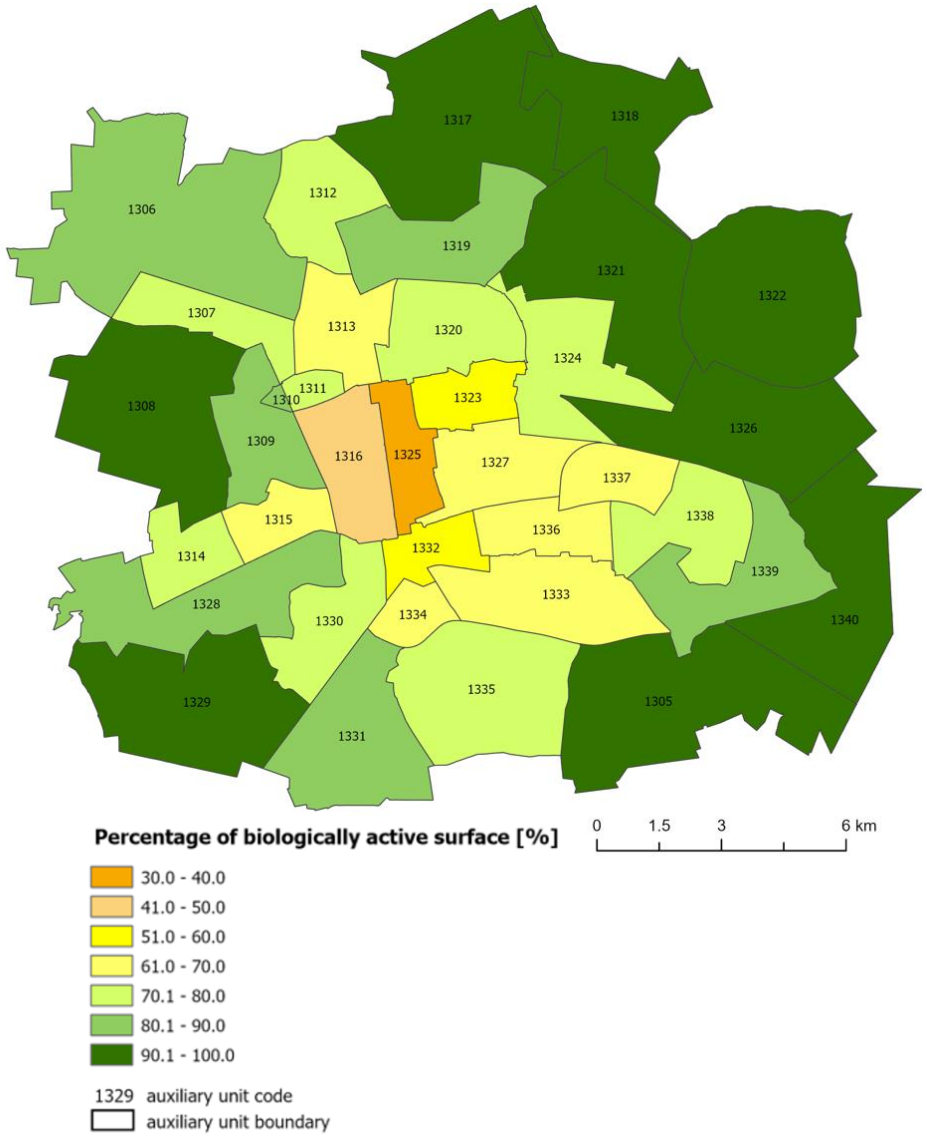


Percentage of biologically active surface in urban municipalities and cities in urban-rural municipalities

Investigation of biologically active Surface within the Lodz auxiliary units



Reversed HRL-Imperviousness data within the Lodz auxiliary units



Percentage of biologically active surface within the Lodz auxiliary units

Auxiliary unit	Auxiliary unit code	Percentage of biologically active area [%]
Łagiewniki	1317	98.3
Wzniesień Łódzkich	1318	98.0
Mileszki	1326	95.6
Dolina Łódki	1321	95.4
Wiskitno	1305	95.2
Nowosolna	1322	95.2
Nad Nerem	1329	93.6
Złotno	1308	92.4
Andrzejów	1340	92.1
Lublinek-Pienista	1328	86.4
Ruda	1331	84.4
Zdrowie-Mania	1309	84.1
ŁÓDŹ	-	**83.1**
nr 33	1339	82.9
im. Józefa Montwiła-Mireckiego	1310	82.4
Bałuty Zachodnie	1306	81.6
Julianów-Marysin-Rogi	1319	80.8
Stoki-Sikawa-Podgórze	1324	79.7
Chojny	1335	78.8
Teofilów Wielkopolska	1307	77.8
Radogoszcz	1312	77.5
Retkinia Zachód-Smulsko	1314	76.2
Bałuty Doły	1320	74.5
Olechów-Janów	1338	73.3
Koziny	1311	73.1
Rokicie	1330	72.2
Chojny Dąbrowa	1333	69.7
Karolew-Retkinia Wschód	1315	68.3
Widzew Wschód	1337	67.6
Piastów-Kurak	1334	66.0
Bałuty-Centrum	1313	64.3
Zarzew	1336	61.2
Stary Widzew	1327	61.1
Górniak	1332	56.3
Śródmieście Wschód	1323	56.0
Stare Polesie	1316	47.9
Katedralna	1325	34.2

Investigation of biologically active surface – national data [BDOT10k + OSM]

Classes selected from the BDOT10k database:

From buildings, structures and facilities:
- buildings (code: BUBD)
- high technical buildings (code: BUWT)
- technical tanks (code: BUZT)
- covered swimming pools, open and covered tennis courts (code: BUSP)
- other structures (code: BUIB)

From communication network:
- roadway (code: SKJZ)
- pedestrian and bicycle paths (code: SKRP)

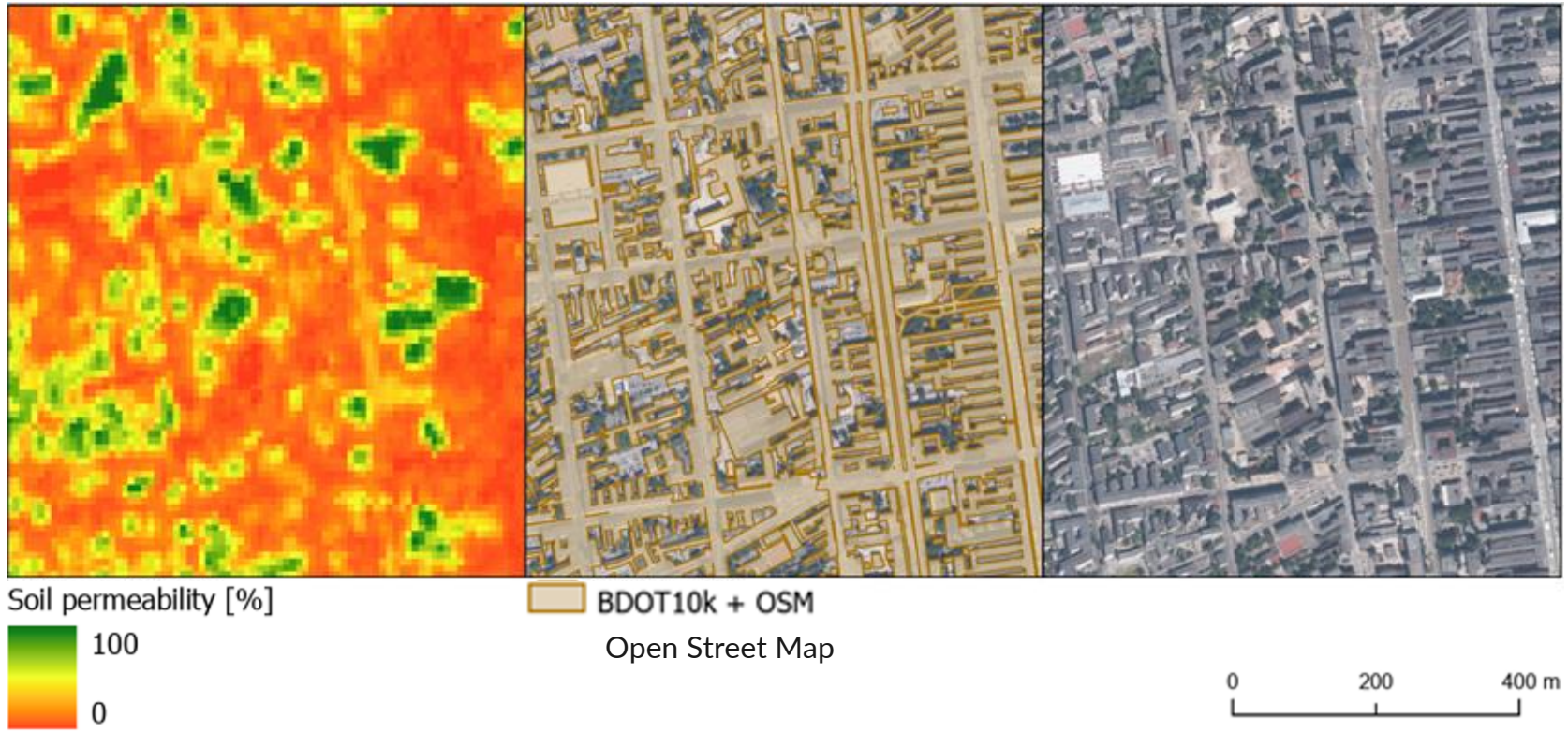
From other object:
- landmarks (code: OIOR)

From land use complexes:
- petrol stations and depots (code: KUKO)

From land cover:
- town squares (code: PTPL)
- area under the airport road (code: PTKM)
- dump sites (code: PTSO)
- other non-built-up areas (code: PTNZ)

Selected layers from the OSM database:

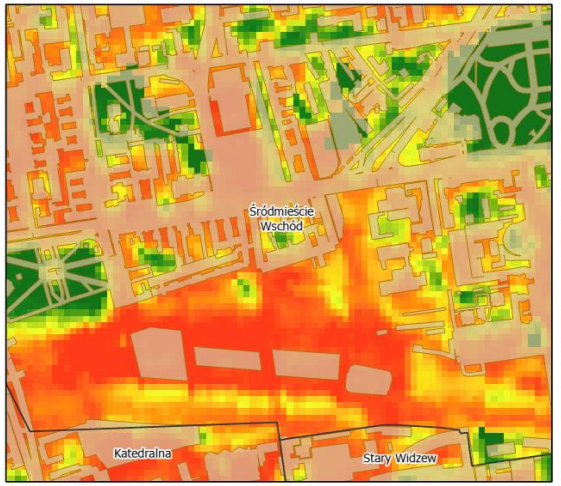
- town squares and parking



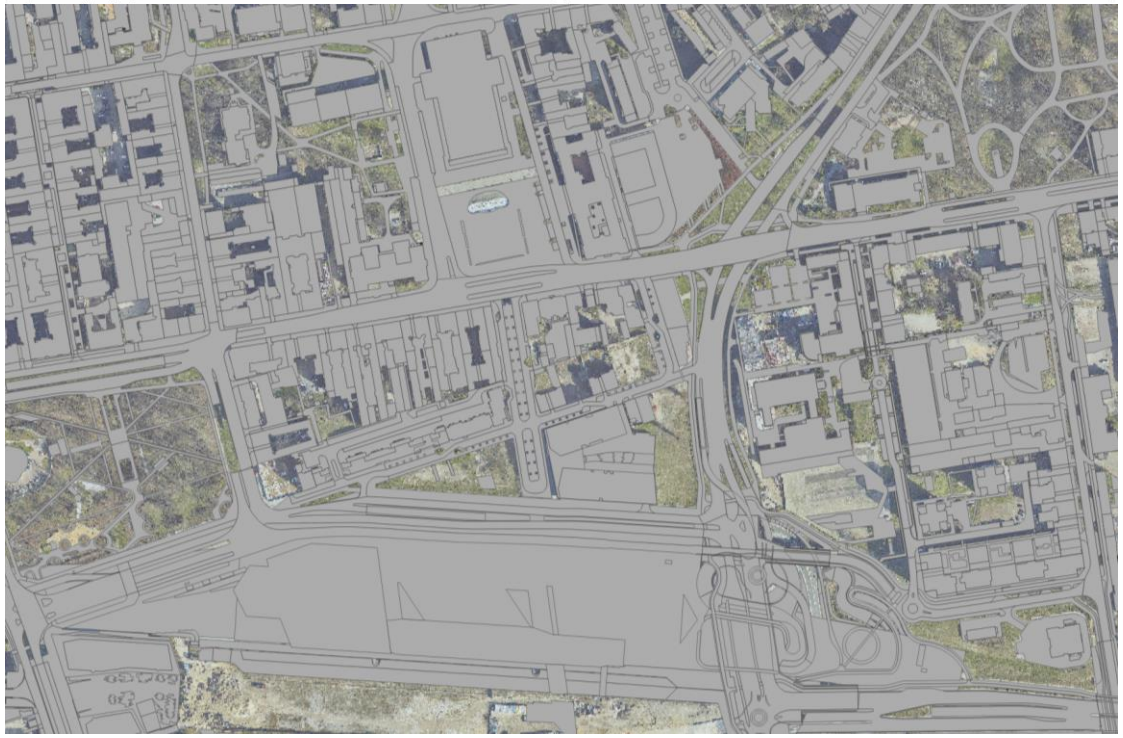
Investigation of biologically active surface – national data [base map]

Geoinfo codes	Description of the object code - Classes selected from the Lodz base map
GESBZO	Building
GESBLO	Storeys above ground (building blocks)
GESBLI	Another block
GESBPD	Underground storeys
GESBNZ	Connector
GESBRP	Building related ramp
GESBTO	Terrace or porch
GESBWG	Veranda or porch
GESBWT	A shed or an open terrace on supports
GESIIB	another object related to the building
GESIWP	Entrance to the underground
GESSCH	Stairs, overhead cranes, ramps for the disabled
GSSDSO	Retaining wall
GSSIIN	Dam
GSSISM	Dumpster
GSSKAL	Avenue (including: concrete, pavement, stone cubes, prefabricated cubes, bituminous mass, concrete slabs)
GSSKOA	Roadway
GSSKOD	Pavement
GSSKPL	Square or roundabout (including: concrete, pavement, clinker, stone cubes, prefabricated cubes, bituminous mass, concrete slabs)
GSSKSC	Lane
GSSSCH	Stairs
GSSSKT	Tennis Court
GSSSPS	Sports square
GSSUIN	Another engineering structure
GSSZES	Wharf
GSSZIN	Another earth structure
GSSZKL	Footbridge
GSSZSU	(strengthened) escarpment (indluding: Concrete cladding, other)

HRL + BDOT + OSM



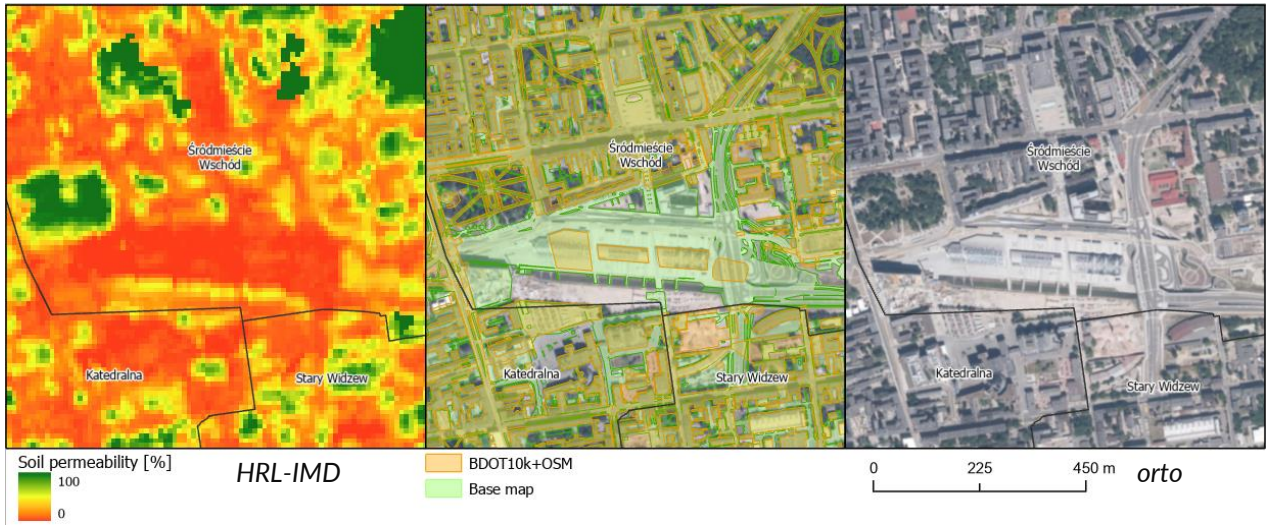
Ortophoto

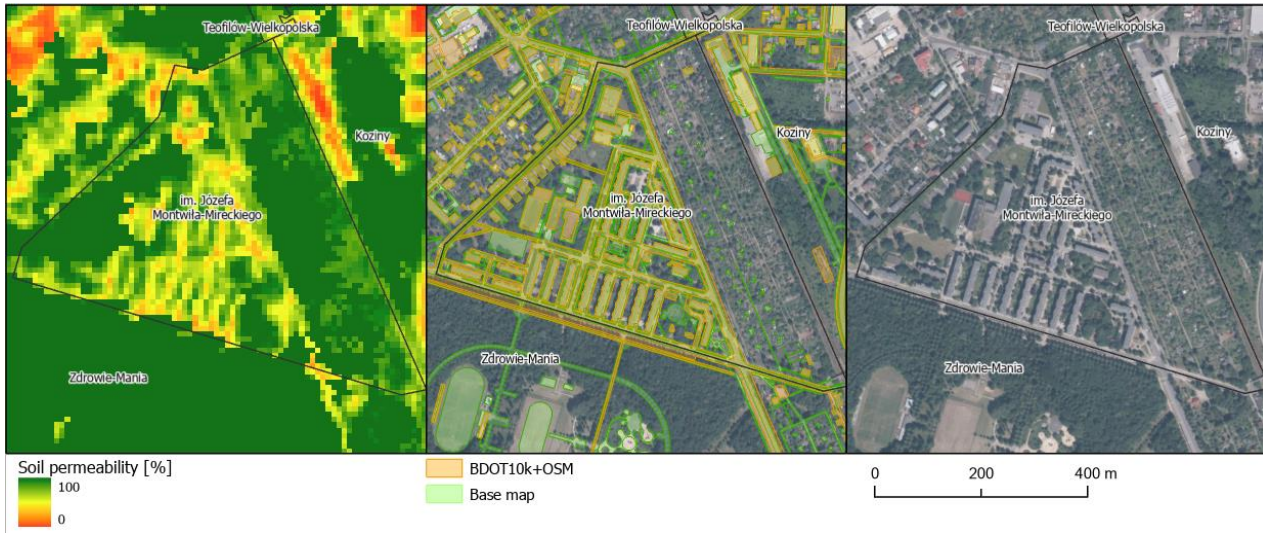


Impermeable surfaces derived from base-map

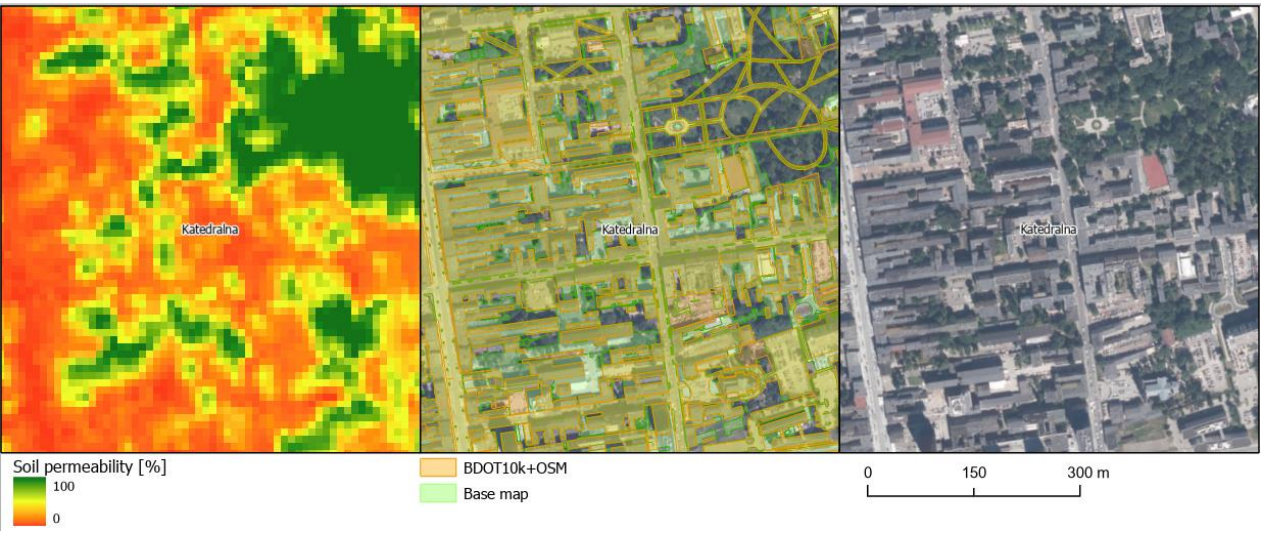
Samples from different auxiliary units (housing estates)

This slide shows presents selected samples from different databases showing discrepancies in mapping land use and land cover.
Both, HRL-IMD, BDOT10k+OSM and base map are not perfect data; each contains some errors, deficiencies and discrepancies.

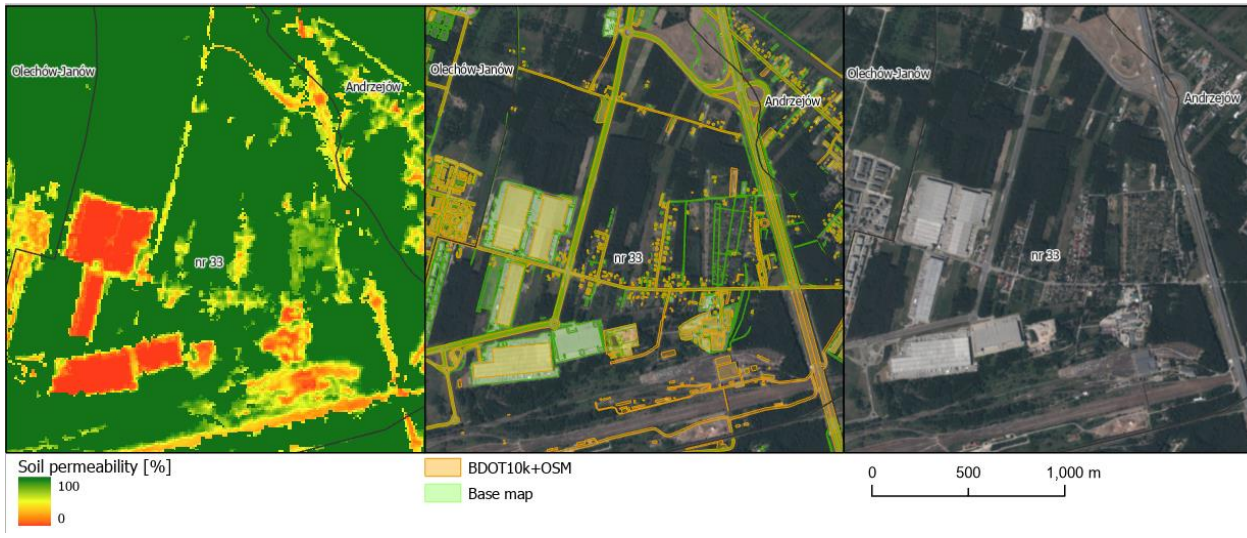




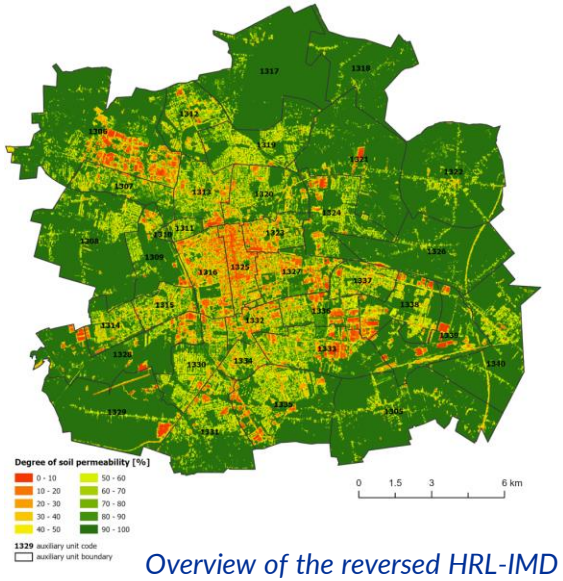
BDOT does not include the actual sealed surface of the train station in New Centre of Lodz. In the orthophoto raster layer we can see more paved areas mainly due to the lack of timeliness of the BDOT10k database.



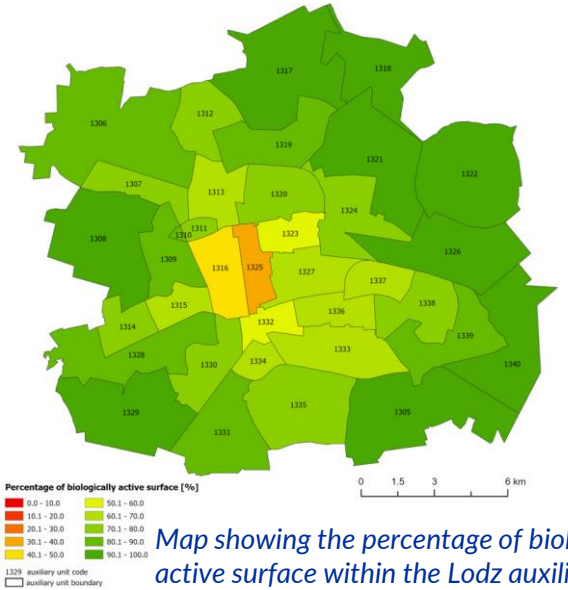
Too narrow roads were not identified on the HRL.



Investigation of biologically active surface ally active surface



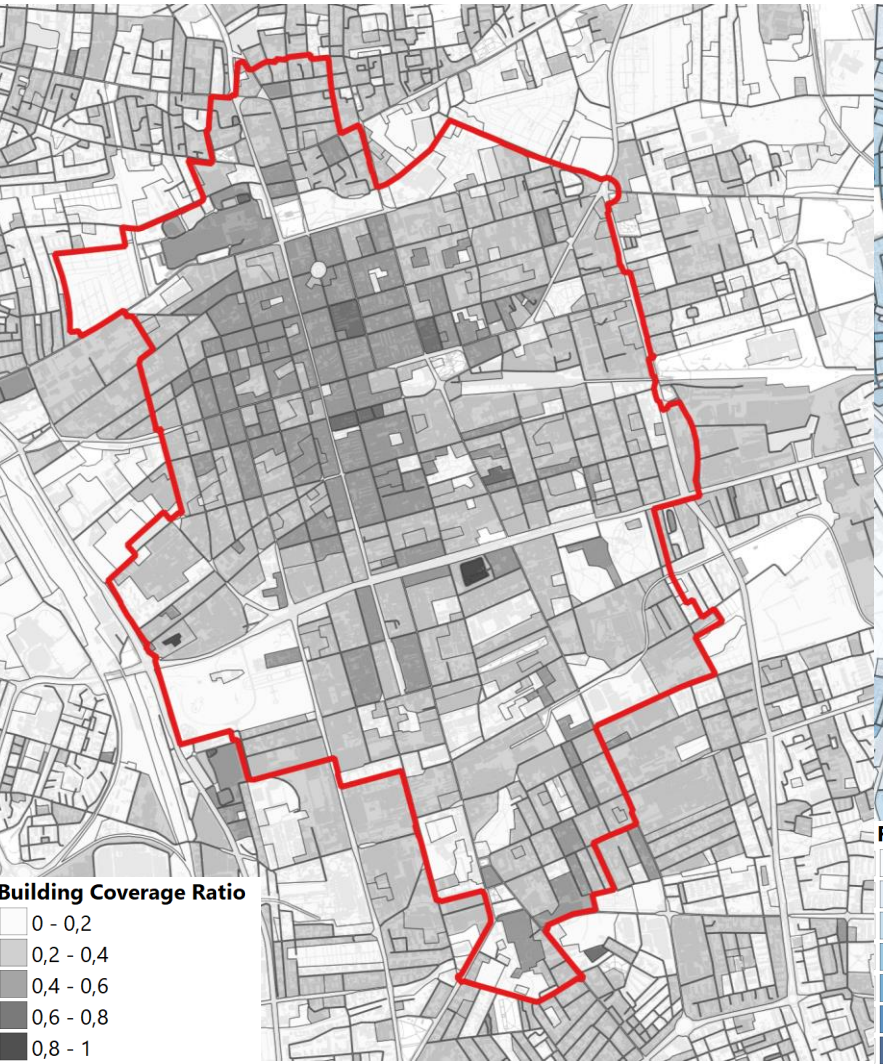
Overview of the reversed HRL-IMD data within the Lodz auxiliary units.

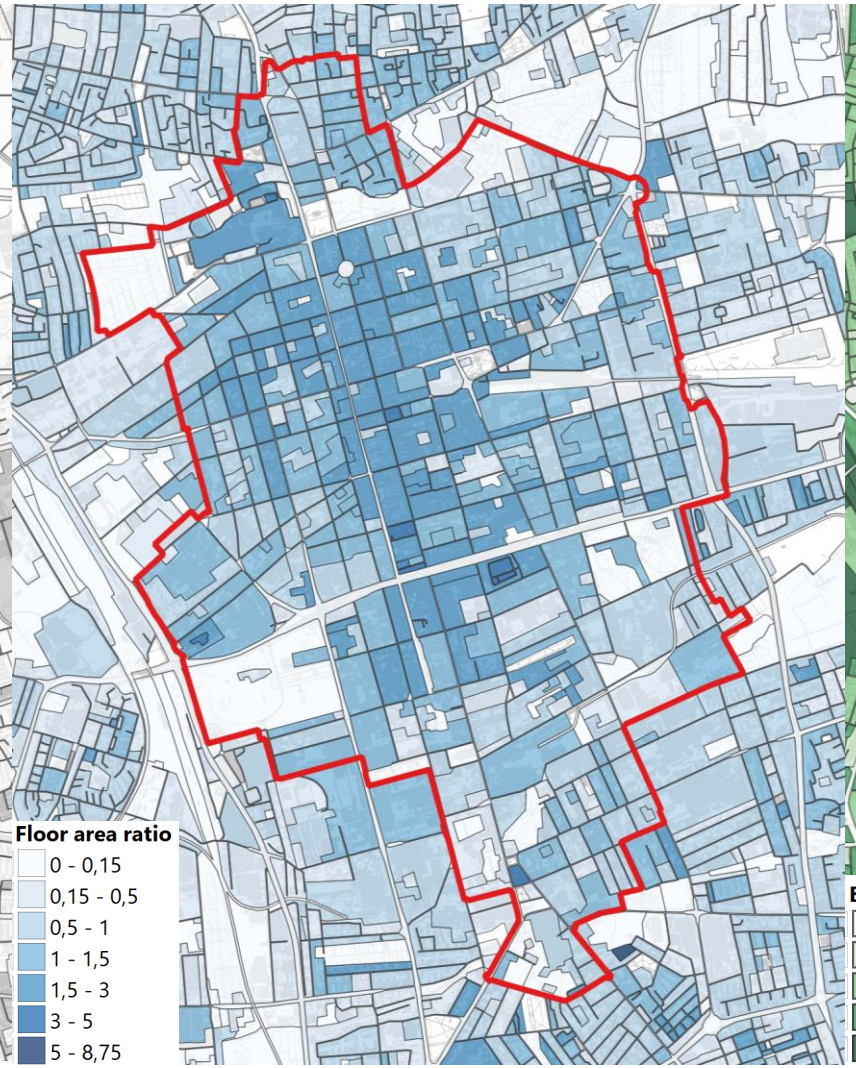


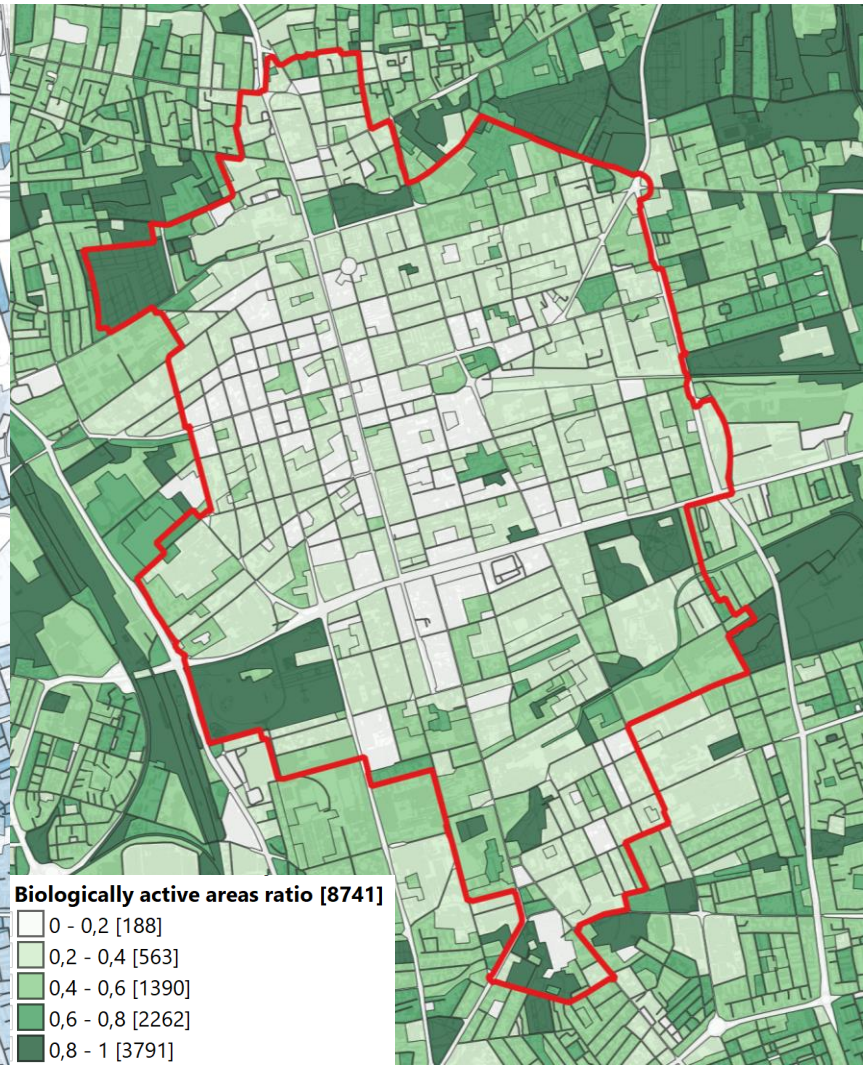
Map showing the percentage of biologically active surface within the Lodz auxiliary units.

Auxiliary unit code	Auxiliary unit	area [m2]	Percentage of biologically active surface HRL-IMD[%]	Percentage of biologically active surface BDOT10k [%]	Percentage of biologically active surface BDOT10k + OSM [%]	Percentage of biologically active surface Base Map [%]			difference BDOT+OSM - HRL	difference BASE MAP - HRL	difference BDOT+OSM- BASE MAP
Katedralna	1325	3633625,64	34,2	43,6	38,3	26,4			4	8	12
Stare Polesie	1316	5856396,53	47,9	50,1	47,0	42,9			1	5	4
Górniak	1332	2952661,01	56,3	52,9	51,1	43,7			5	13	7
Śródmieście-Wschód	1323	3487801,25	56,0	55,0	52,1	47,4			4	9	5
Stary Widzew	1327	5901920,51	61,1	59,0	57,0	52,4			4	9	5
Bałuty Centrum	1313	5225670,20	64,3	56,1	54,2	53,3			10	11	1
Piastów-Kurak	1334	2179882,81	66,0	60,6	59,1	55,0			7	11	4
Karolew-Retkinia Wschód	1315	3217304,76	68,3	60,2	58,3	58,0			10	10	0
Zarzew	1336	4111283,16	61,2	60,9	59,4	59,5			2	2	0
Koziny	1311	1071469,06	73,0	67,8	67,0	63,3			6	10	4
Chojny-Dąbrowa	1333	8488666,92	69,7	67,5	66,5	63,9			3	6	3
Bałuty Doły	1320	6716376,55	74,4	64,9	63,8	64,6			11	10	1
Widzew Wschód	1337	3595976,86	67,6	58,5	57,3	65,1			10	3	8
Teofilów Wielkopolska	1307	4577614,62	77,8	68,9	66,9	65,6			11	12	1
im. Józefa Montwiła-Mireckiego	1310	256624,38	82,4	70,1	69,7	66,4			13	16	3
Rokicie	1330	5963931,13	72,3	72,1	71,6	67,6			1	5	4
Olechów-Janów	1338	6642083,34	73,3	69,6	68,5	70,5			5	3	2
Retkinia Zachód-Smulsko	1314	3775014,16	76,2	72,6	70,8	71,0			5	5	0
Chojny	1335	12020615,19	78,8	77,5	76,8	72,8			2	6	4
Radogoszcz	1312	5860225,66	77,5	72,0	71,0	72,8			6	5	2
Stoki-Sikawa-Podgórze	1324	8012139,71	79,7	78,5	78,2	76,4			2	3	2
Julianów-Marysin-Rogi	1319	8257451,22	80,7	80,5	80,4	77,4			0	3	3
Zdrowie-Mania	1309	5670685,50	84,1	81,5	80,8	79,8			3	4	1
Bałuty Zachodnie	1306	21513630,62	81,6	83,7	83,5	79,9			2	2	4
Ruda	1331	10060639,40	84,4	82,4	82,2	80,3			2	4	2
nr 33	1339	7977506,52	82,9	84,4	84,2	83,8			1	1	0
Lublinek-Pienista	1328	10797949,14	86,4	84,8	84,5	84,0			2	2	0
Złotno	1308	14664584,89	92,4	92,6	92,4	89,7			0	3	3
Wiskitno	1305	16682518,72	95,2	95,0	94,9	90,3			0	5	5
Nad Nerem	1329	13343008,55	93,6	89,6	89,5	92,7			4	1	3
Nowosolna	1322	15552144,13	95,2	94,5	94,4	92,9			1	2	1
Andrzejów	1340	11952023,02	92,1	93,1	93,1	93,1			1	1	0
Dolina Łódki	1321	14069553,64	95,4	95,5	95,5	93,5			0	2	2
Łagiewniki	1317	16817421,96	98,3	96,9	96,8	94,4			2	4	2
Mileszki	1326	12499886,77	95,6	95,3	95,3	96,6			0	1	1
Wzniesień Łódzkich	1318	9443847,43	98,0	96,4	96,4	96,7			2	1	0

URBAN INDICATORS – APPLICATION INPUT







WP3 Milestone 2: Public access to green urban areas - quantitative research methods

INDICATORS

1. Share of green urban areas and forests in total land area, by auxiliary unit

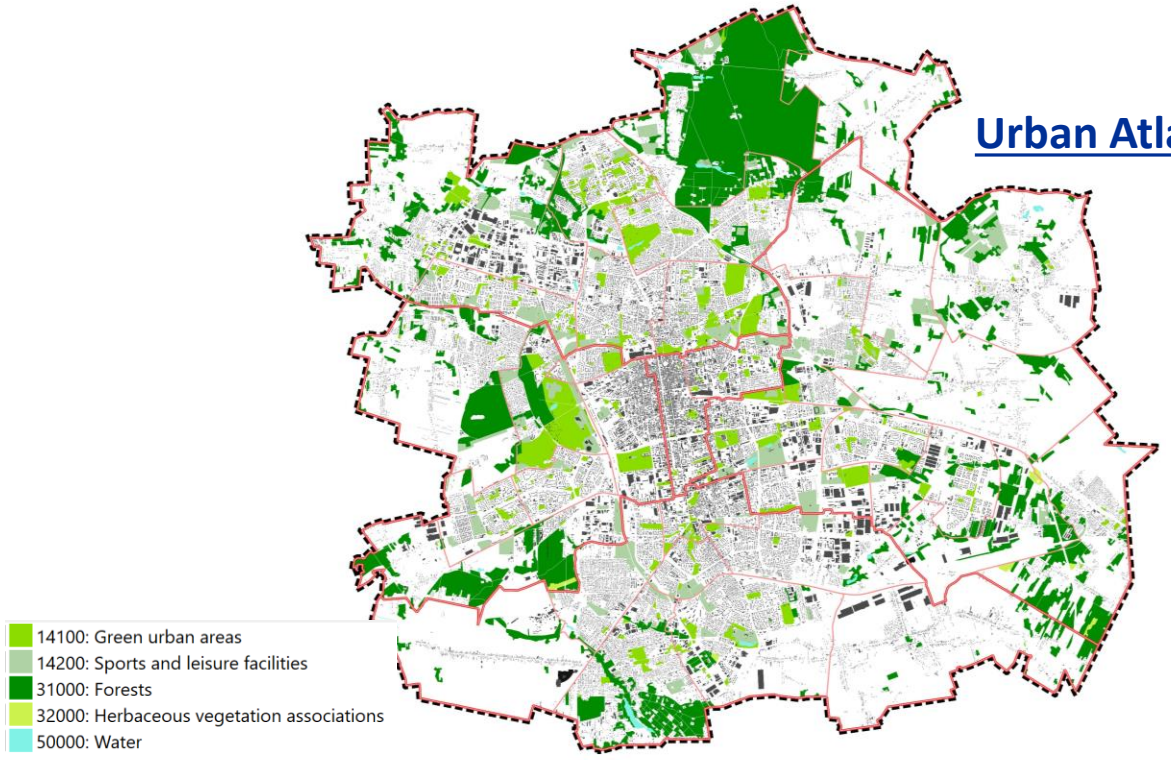
2. Green urban areas (m^2) per capita (city/district/housing estate inhabitant)

3. Number of inhabitants per ha of green urban areas

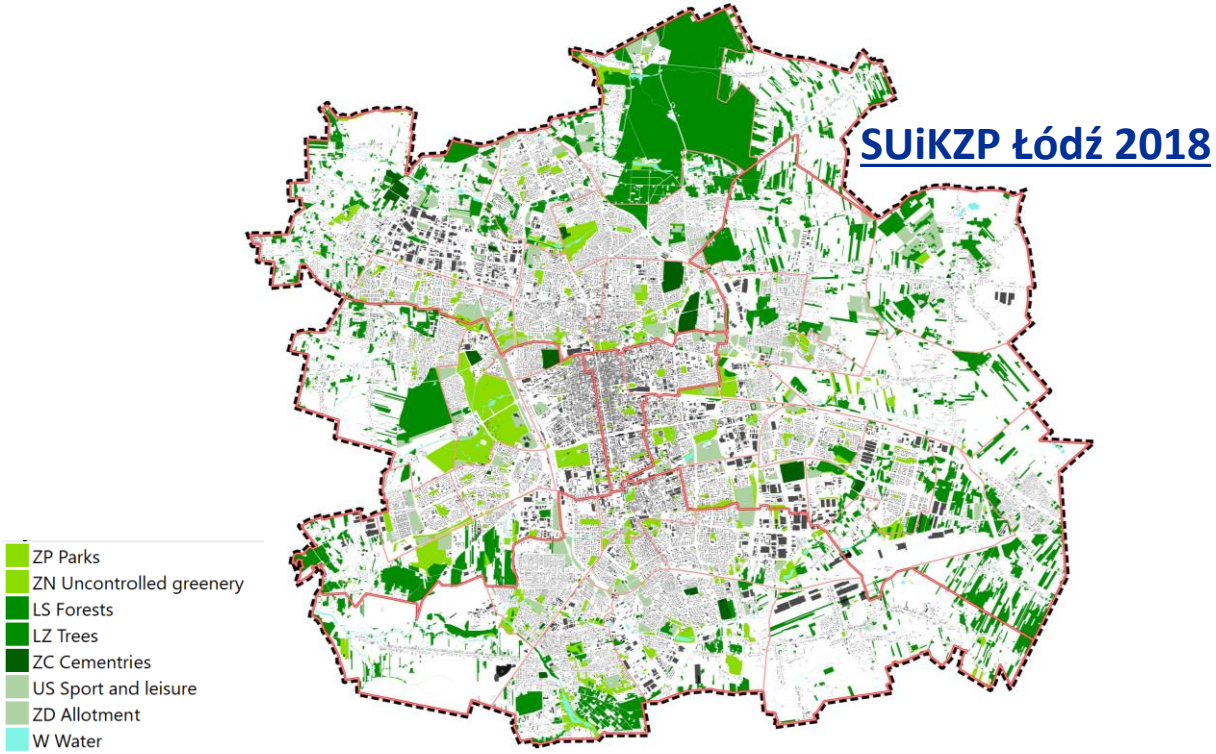
4. Share of housing estate area within 300 metres linear distance to urban green areas (percentage)

Urban Atlas LCLU 2018	SUIKZP/MPZP
14100: Green urban areas	ZP – Greenery areas, parks ZC – Cementries
14200: Sports and leisure facilities	ZD – Allotment gardens ~~US – Sport and recreation services~~
31000: Forests	ZL – Forests LZ- Trees

Urban Atlas 2018



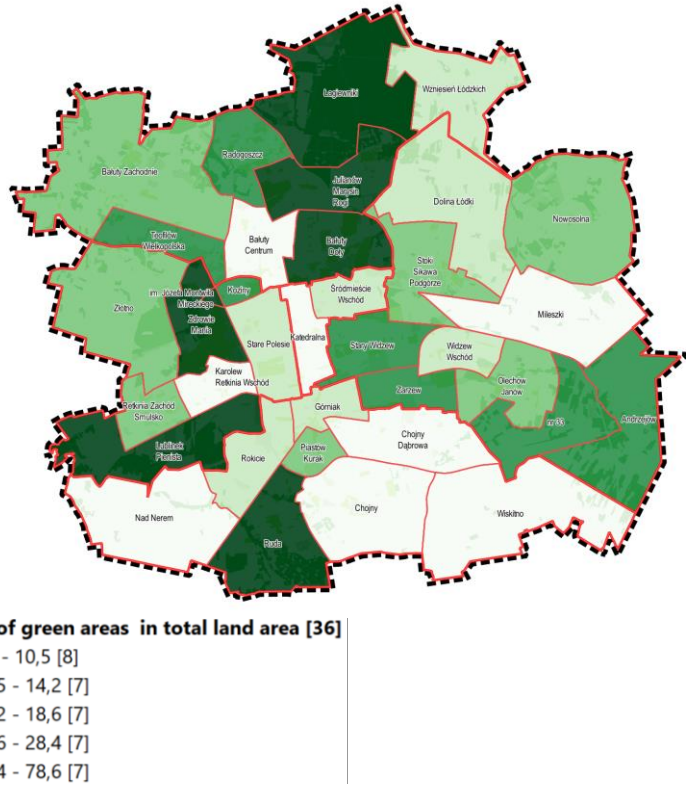
SUiKZP Łódź 2018



WP3 Milestone 2: Public access to green urban areas - quantitative research methods

Share of green urban areas and forests in total land area

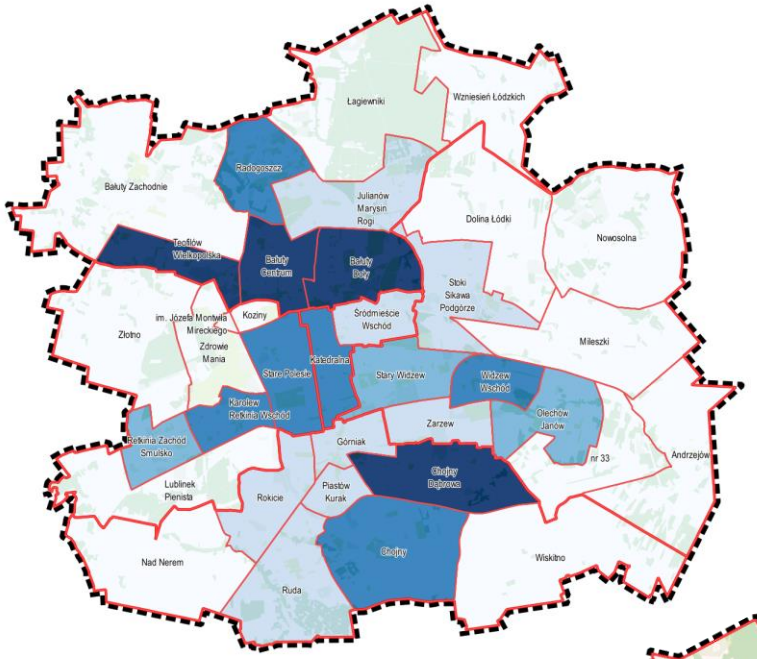
Auxiliary unit	Auxiliary unit code	Auxiliary unit area [ha]	Green urban areas	Sports and leisure facilities	Forests	Share of green areas in total land area [UA]	ZP+ZC (green urban areas)	ZD (sports and leisure facilities)	LS + LZ (Forests)	Share of green areas in total land area [MPU]		difference - share of green areas in total land area
Katedralna	1325	364	3,59%	0,09%	0,00%	3,68%	4,19%	0,37%	0,00%	5%		0,88%
Wiskitno	1305	1671	0,02%	0,00%	4,01%	4,03%	0,08%	0,00%	8,25%	8%		4,31%
Nad Nerem	1329	1336	0,00%	0,01%	4,80%	4,81%	0,72%	0,00%	7,92%	9%		3,83%
Mileszki	1326	1252	0,11%	0,07%	6,40%	6,58%	0,12%	0,00%	10,22%	10%		3,77%
Karolew-Retkinia Wschód	1315	322	4,62%	3,00%	0,00%	7,62%	5,40%	2,11%	0,03%	8%		0,07%
Chojny-Dąbrowa	1333	850	1,57%	3,73%	2,47%	7,77%	3,12%	2,72%	3,80%	10%		1,86%
Bałuty-Centrum	1313	523	4,99%	5,03%	0,00%	10,02%	4,26%	2,63%	0,52%	10%		-0,25%
Chojny	1335	1204	4,30%	3,17%	3,06%	10,53%	2,98%	1,36%	6,81%	12%		1,03%
Rokicie	1330	597	2,13%	7,43%	1,24%	10,79%	2,29%	5,61%	1,30%	9%		-1,38%
Stare Polesie	1316	586	8,98%	1,87%	0,00%	10,85%	7,94%	0,00%	0,01%	10%		-0,79%
Górniak	1332	296	8,27%	3,75%	0,00%	12,02%	5,75%	2,48%	0,00%	9%		-3,29%
Śródmieście-Wschód	1323	349	4,76%	6,60%	0,68%	12,04%	2,37%	3,35%	0,52%	8%		-3,99%
Wzniesień Łódzkich	1318	946	0,00%	0,46%	11,76%	12,22%	0,00%	0,25%	19,77%	20%		8,19%
Widzew-Wschód	1337	360	6,14%	2,47%	5,01%	13,62%	3,25%	1,70%	5,17%	12%		-1,79%
Dolina Łódki	1321	1409	0,04%	3,90%	10,20%	14,15%	0,00%	3,45%	20,40%	24%		9,85%
Nowosolna	1322	1557	0,31%	4,43%	12,36%	17,10%	0,07%	4,24%	13,69%	18%		1,03%
Retkinia Zachód-Smulsko	1314	378	4,51%	9,33%	3,64%	17,48%	6,89%	8,08%	2,49%	17%		-0,02%
Olechów-Janów	1338	665	2,49%	1,54%	13,52%	17,55%	3,96%	1,23%	14,40%	20%		2,32%
Piastów-Kurak	1334	218	5,13%	12,50%	0,00%	17,63%	4,91%	8,94%	0,18%	15%		-2,47%
Stoki-Sikawa-Podgórze	1324	802	4,83%	8,28%	5,01%	18,13%	5,75%	6,17%	8,35%	21%		2,79%
Bałuty Zachodnie	1306	2154	2,52%	2,88%	13,04%	18,44%	1,84%	2,53%	12,50%	17%		-1,45%
Złotno	1308	1468	0,27%	1,00%	17,38%	18,65%	2,73%	0,94%	18,98%	23%		4,05%
Andrzejów	1340	1197	0,77%	0,20%	18,71%	19,68%	0,07%	0,09%	21,78%	22%		2,37%
Zarzew	1336	412	11,71%	9,08%	0,00%	20,78%	10,73%	8,19%	0,00%	19%		-1,71%
nr 33	1339	799	0,00%	1,26%	21,31%	22,57%	0,80%	0,99%	19,04%	21%		-1,74%
Stary Widzew	1327	591	12,96%	11,45%	0,00%	24,41%	10,20%	5,45%	0,33%	20%		-4,28%
Teofilów-Wielkopolska	1307	458	7,46%	15,40%	1,58%	24,44%	5,03%	11,36%	1,12%	19%		-5,56%
Koziny	1311	107	22,99%	4,66%	0,00%	27,65%	20,04%	2,84%	0,00%	23%		-4,77%
Radogoszcz	1312	587	12,52%	4,72%	11,21%	28,44%	4,38%	3,56%	8,55%	17%		-11,86%
Julianów-Marysin-Rogi	1319	827	12,61%	2,23%	14,93%	29,77%	7,08%	1,59%	13,79%	23%		-7,21%
Ruda	1331	1007	3,26%	2,41%	25,58%	31,25%	3,59%	1,58%	19,06%	25%		-6,73%
Bałuty-Doły	1320	673	22,39%	8,41%	2,11%	32,91%	19,27%	5,48%	1,51%	27%		-5,53%
Lublinek-Pienista	1328	1081	0,12%	3,14%	29,94%	33,20%	4,38%	2,51%	27,74%	35%		1,59%
im, Józefa Montwiła-Mireckiego	1310	26	2,76%	39,67%	0,00%	42,43%	0,00%	33,05%	0,00%	33%		-9,38%
Zdrowie-Mania	1309	568	36,67%	15,12%	15,71%	67,50%	45,71%	6,29%	1,47%	59%		-8,45%
Łagiewniki	1317	1684	0,21%	3,54%	74,87%	78,62%	0,44%	2,93%	72,19%	76%		-2,88%



WP3 Milestone 2: Public access to green urban areas - quantitative research methods

Green urban areas (m2) per capita and Number of inhabitants per ha of green urban areas

District	Auxiliary unit	Auxiliary unit area [ha]	number of inhabitants (2018)	Green areas (m2) per capita	Number of inhabitants per ha of green urban areas (ua)
GÓRNA	Wiskitno	1671	3445	195,31	51
BAŁUTY	Bałuty Zachodnie	2154	7002	567,35	18
BAŁUTY	Teofilów-Wielkopolska	458	42946	26,08	383
POLESIE	Złotno	1468	8431	324,90	31
POLESIE	Zdrowie-Mania	568	3011	1273,04	8
POLESIE	im, Józefa Montwiła-Mireckiego	26	1618	67,39	148
POLESIE	Koziny	107	9930	29,88	335
BAŁUTY	Radogoszcz	587	30790	54,21	184
BAŁUTY	Bałuty-Centrum	523	44680	11,74	852
POLESIE	Retkinia Zachód-Smulsko	378	25980	25,44	393
POLESIE	Karolew-Retkinia Wschód	322	35891	6,84	1463
POLESIE	Stare Polesie	586	32734	19,44	514
BAŁUTY	Łagiewniki	1684	1669	7933,27	1
BAŁUTY	Wzniesień Łódzkich	946	1314	879,22	11
BAŁUTY	Julianów-Marysin-Rogi	827	11462	214,76	47
BAŁUTY	Bałuty-Doły	673	40349	54,86	182
WIDZEW	Dolina Łódki	1409	2302	865,80	12
WIDZEW	Nowosolna	1557	4147	642,06	16
ŚRÓDMIEŚCIE	Śródmieście-Wschód	349	17451	24,10	415
WIDZEW	Stoki-Sikawa-Podgórze	802	10590	137,32	73
ŚRÓDMIEŚCIE	Katedralna	364	35699	3,75	2664
WIDZEW	Mileszki	1252	1961	419,79	24
WIDZEW	Stary Widzew	591	21095	68,39	146
POLESIE	Lublinek-Pienista	1081	5537	648,33	15
GÓRNA	Nad Nerem	1336	1069	601,63	17
GÓRNA	Rokicie	597	16647	38,72	258
GÓRNA	Ruda	1007	11325	278,01	36
GÓRNA	Górniak	296	17622	20,17	496
GÓRNA	Chojny-Dąbrowa	850	46761	14,13	708
GÓRNA	Piastów-Kurak	218	19307	19,93	502
GÓRNA	Chojny	1204	32059	39,53	253
WIDZEW	Zarzew	412	19811	43,19	232
WIDZEW	Widzew-Wschód	360	37254	13,16	760
WIDZEW	Olechów-Janów	665	21043	55,47	180
WIDZEW	nr 33	799	1079	1670,79	6
WIDZEW	Andrzejów	1197	5673	415,18	24
			629684	491,76	318

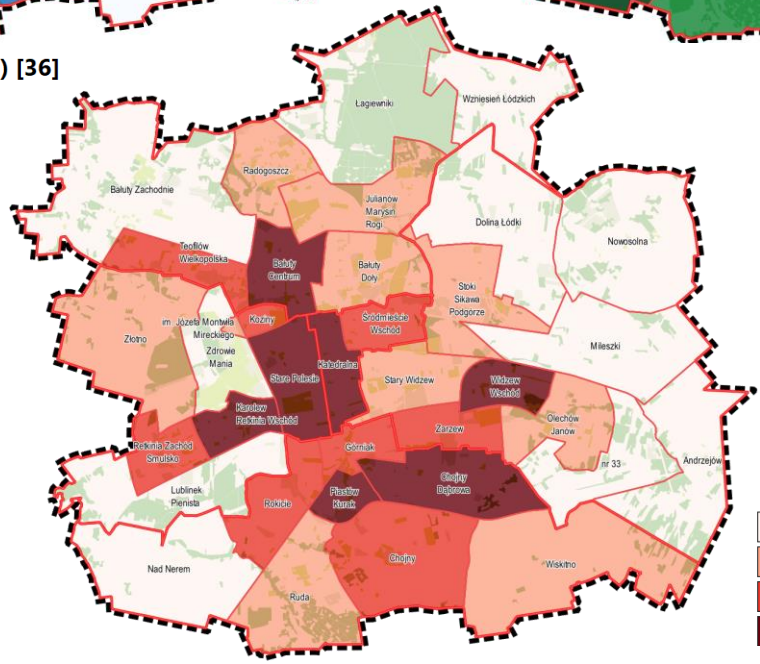


number of inhabitants (2018) [36]

- 1069 - 10000 [15]
- 10000 - 20000 [8]
- 20000 - 30000 [3]
- 30000 - 40000 [6]
- 40000 - 46761 [4]

Green areas (m2) per capita [36]

- 4 - 20 [8]
- 20 - 50 [7]
- 50 - 200 [7]
- 200 - 600 [6]
- 600 - 7933 [8]



inhabitants per ha of green urban areas

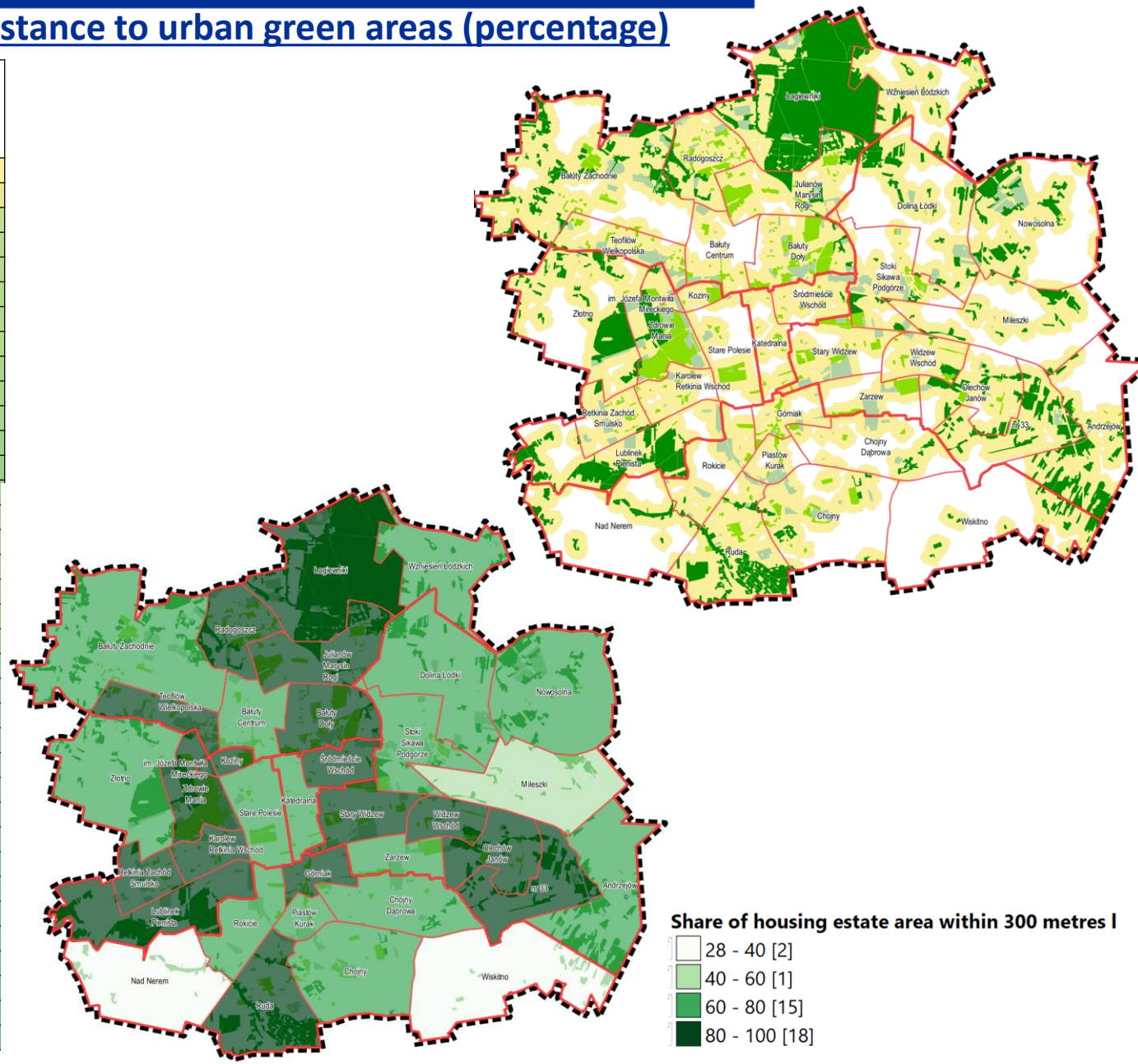
- 1 - 25 [11]
- 25 - 200 [10]
- 200 - 500 [8]
- 500 - 2664 [7]

WP3 Milestone 2: Public access to green urban areas - quantitative research methods

Green areas (of at least 0,25 ha) within 300 metres linear distance (around 5 minutes' walk)

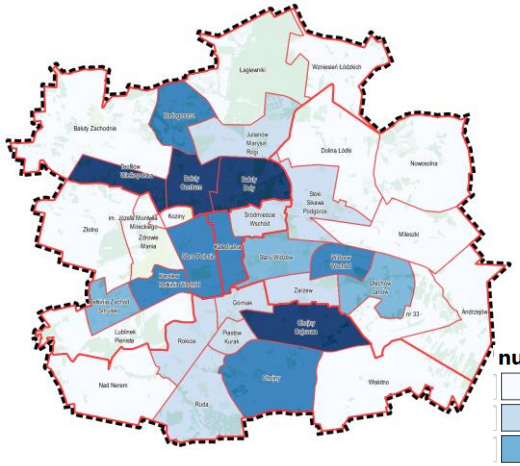
Share of housing estate area within 300 metres linear distance to urban green areas (percentage)

District	Auxiliary unit	Auxiliary unit code	Auxiliary unit area [ha]	Share within 300 metres linear distance to urban green areas
GÓRNA	Wiskitno	1305	1671	28%
GÓRNA	Nad Nerem	1329	1336	40%
WIDZEW	Mileszki	1326	1252	55%
GÓRNA	Chojny	1335	1204	61%
BAŁUTY	Bałuty-Centrum	1313	523	61%
POLESIE	Stare Polesie	1316	586	62%
GÓRNA	Chojny-Dąbrowa	1333	850	62%
WIDZEW	Nowosolna	1322	1557	64%
WIDZEW	Dolina Łódki	1321	1409	67%
WIDZEW	Zarzew	1336	412	68%
WIDZEW	Andrzejów	1340	1197	68%
BAŁUTY	Wzniesień Łódzkich	1318	946	72%
WIDZEW	Stoki-Sikawa-Podgórze	1324	802	74%
GÓRNA	Rokicie	1330	597	75%
POLESIE	Złotno	1308	1468	75%
ŚRÓDMIEŚCIE	Katedralna	1325	364	75%
BAŁUTY	Bałuty Zachodnie	1306	2154	77%
GÓRNA	Piastów-Kurak	1334	218	79%
WIDZEW	Olechów-Janów	1338	665	81%
WIDZEW	Stary Widzew	1327	591	83%
GÓRNA	Górniak	1332	296	84%
POLESIE	Lublinek-Pienista	1328	1081	85%
WIDZEW	nr 33	1339	799	87%
POLESIE	Karolew-Retkinia Wschód	1315	322	87%
ŚRÓDMIEŚCIE	Śródmieście-Wschód	1323	349	91%
BAŁUTY	Julianów-Marysin-Rogi	1319	827	92%
WIDZEW	Widzew-Wschód	1337	360	92%
BAŁUTY	Teofilów-Wielkopolska	1307	458	92%
BAŁUTY	Bałuty-Doły	1320	673	94%
POLESIE	Retkinia Zachód-Smulsko	1314	378	95%
GÓRNA	Ruda	1331	1007	97%
POLESIE	Koziny	1311	107	97%
BAŁUTY	Łagiewniki	1317	1684	99%
BAŁUTY	Radogoszcz	1312	587	99%
POLESIE	Zdrowie-Mania	1309	568	100%
POLESIE	im, Józefa Montwiła-Mireckiego	1310	26	100%



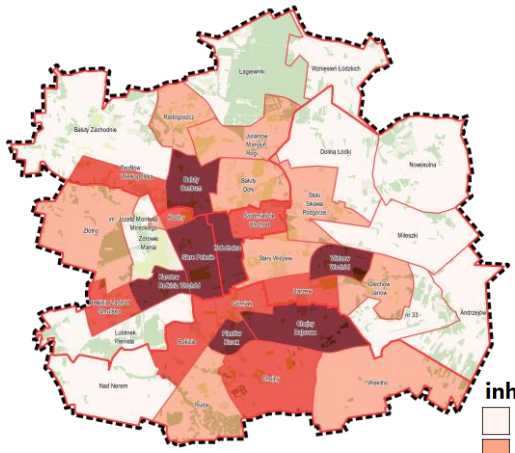
WP3 Milestone 2: Public access to green urban areas - quantitative research methods

Green urban areas (m2) per capita and Number of inhabitants per ha of green urban areas

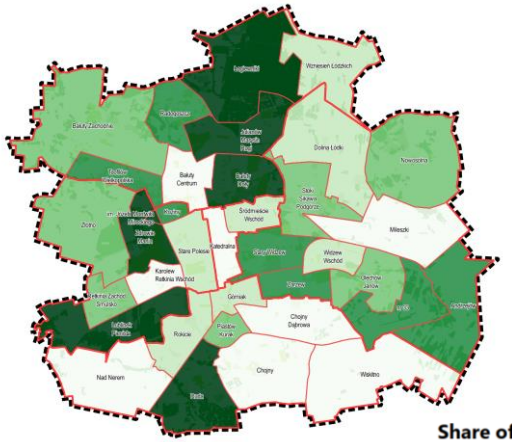


number of inhabitants
- 1069 - 10000 [15]
- 10000 - 20000 [8]
- 20000 - 30000 [3]
- 30000 - 40000 [6]
- 40000 - 46761 [4]

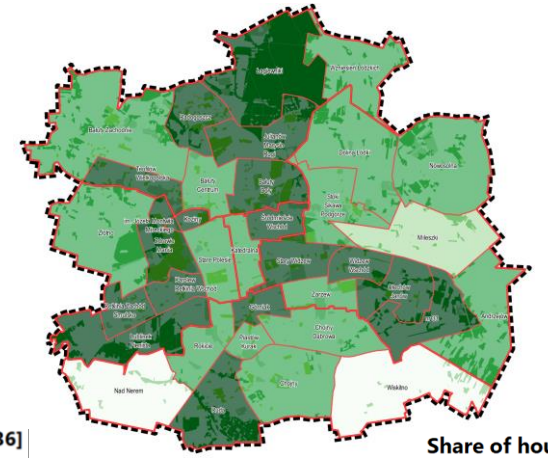
Green areas (m2) per capita
- 4 - 20 [8]
- 20 - 50 [7]
- 50 - 200 [7]
- 200 - 600 [6]
- 600 - 7933 [8]



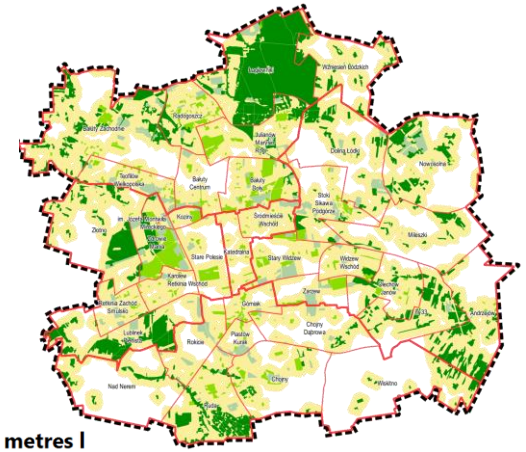
inhabitants per ha of green urban areas
- 1 - 25 [11]
- 25 - 200 [10]
- 200 - 500 [8]
- 500 - 2664 [7]



Share of green areas in total land area [36]
- 3,7 - 10,5 [8]
- 10,5 - 14,2 [7]
- 14,2 - 18,6 [7]
- 18,6 - 28,4 [7]
- 28,4 - 78,6 [7]



Share of housing estate area within 300 metres l
- 28 - 40 [2]
- 40 - 60 [1]
- 60 - 80 [15]
- 80 - 100 [18]



Share of green urban areas and forests in total land area

Share of housing estate area within 300 metres linear distance to urban green areas (percentage)

Public access to green urban areas – additional analyses

Analysis/testing the quality of new CLMS products and its possible use in spatial planning:

High Resolution Vegetation Phenology and Productivity Indices:

1. **Greenness, measured by Normalised Difference Vegetation Index (NDVI)** – from Copernicus
2. **Plant Phenology Index (PPI)** – from Copernicus
3. **Fraction of Absorbed Photosynthetically A (FAPAR)** – from Copernicus
4. **Leaf Area Index (LAI)** – from Copernicus

- CLMS products appear to urbanists as too detailed.
- They contain too comprehensive information for urban planners to be used for land-use zoning purposes.
- The products should be recommended to develop specialist ecophysiographic studies and environmental impact forecasts, including environmental impact forecasts for draft local spatial development plans.

Conclusions

HRL-IMD
BDOT10k+OSM
Base map
Urban atlas

Errors, deficiencies and discrepancies

Research on national and local scale (country, auxiliary units/districts, urban atlas units)

Open, user-friendly InCoNaDa's data platform

Thank you for your attention!

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