

Urban biodiversity and green infrastructure
Brussels 2.10. 2012

SPATIAL PLANNING MEASURES FOR GREEN INFRASTRUCTURE PROTECTION AND DEVELOPMENT



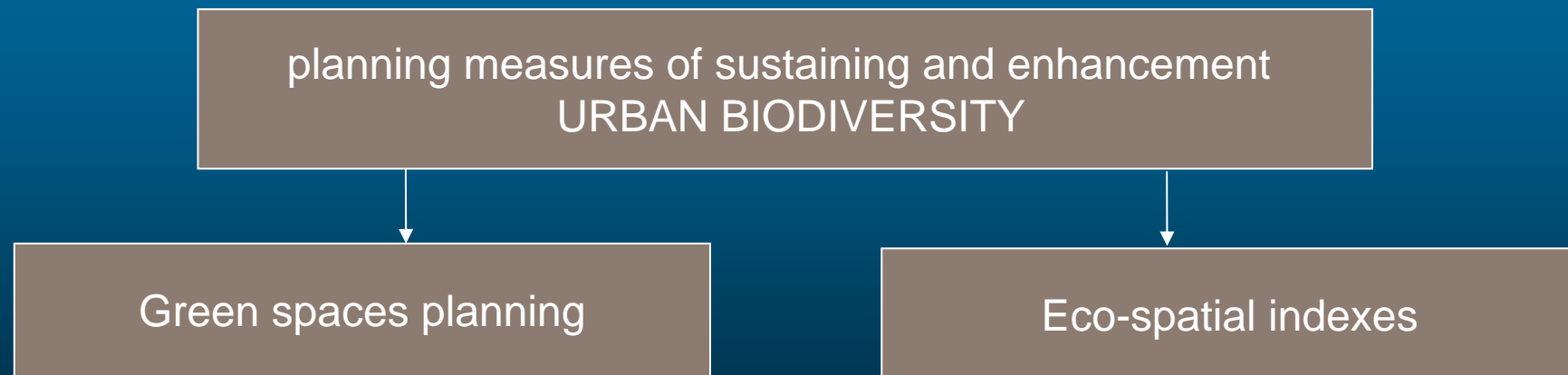
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STRUCTURE OF PRESENTATION

- **OUR APPROACH**
- **RESEARCH PROJECTS:**
 - **Ratio of Biologically Vital Areas**
 - **Urban Natural System**
 - **Green infrastructure potential**
 - **Green Belt**
- **FINAL REMARKS**

OUR APPROACH

- URBAN BIODIVERSITY depends on the quantity, quality and pattern of urban green open spaces
- URBAN BIODIVERSITY protection and enhancement strongly depends on development policy
- URBAN BIODIVERSITY must be considered on three main levels of city planning: regional, municipal and site



RATIO



GENERAL CHARACTERISTICS OF THE PROJECT

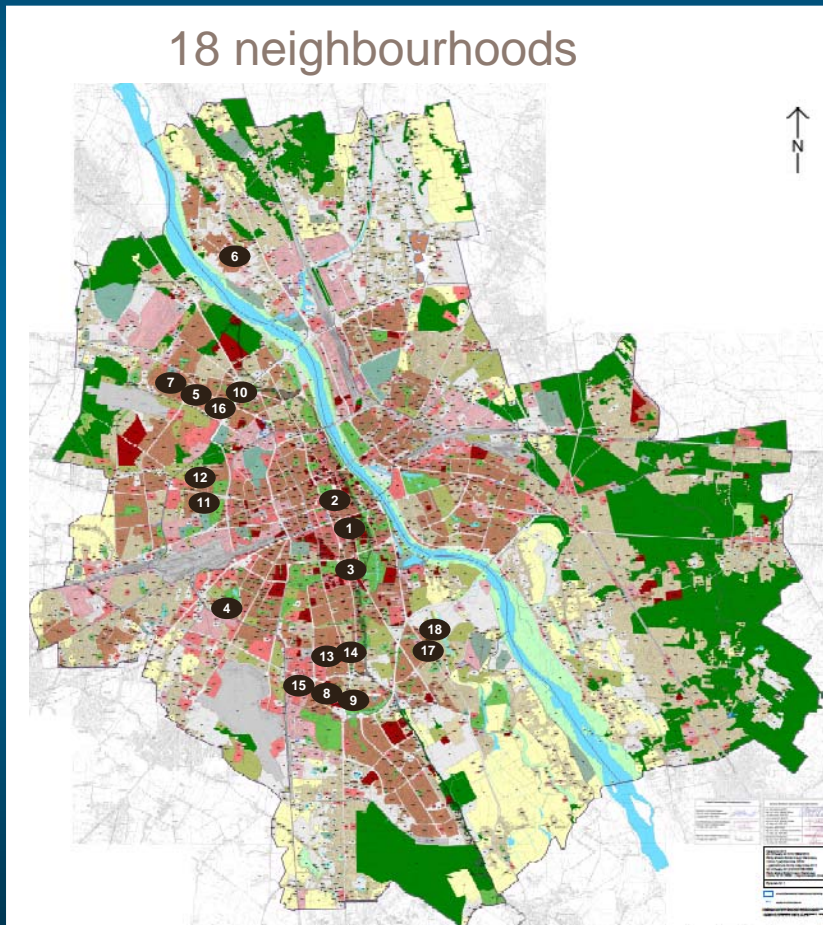
- Research grant no N527066933 financed by: Ministry of Science and Higher Education (2007 - 2010)

- Goal:

to establish empirical support for **minimum biologically vital** areas in which neighbourhoods (multi-storey buildings) may function well  in terms of their environmental performance

STUDY AREA

18 neighbourhoods



SELECTION CRITERIA:

- varied ratio of biologically vital areas
- spatial connections to formal city's green areas or other open spaces
- total area 5 – 7 ha
- construction time (at least 10 years ago)



SCOPE OF THE SURVEY

- **Climate:** spatial differentiation of thermal, humidity and wind conditions within the neighbourhoods and between different types of land covers
- **Water conditions:** differentiation of hydrological processes intensity
- **Ecology:** biological diversity of green areas (plants + butterflies) and intensity of ecological processes (indirectly – Green Plot Ratio)
- **Sociology:** to what extent diversification of RBVA influences the perception of green spaces

RESULTS

Sort of a **'threshold'**:

- for human thermal conditions - RBVA values: 41.7% and 48.6%

- for hydrological processes stabilization - RBVA values: 44.5% - 48.00% (retention ponds construction)

-for biodiversity: **no 'threshold'**

increase of RBVA explains:

66% of total number of plant species increase

62% of percentage of native plants appearance

73% variability of butterflies

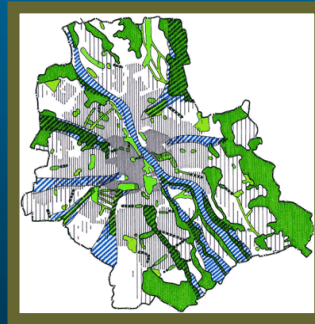
Social response: 40%, 50%, 60% were almost equally content

URBAN NATURAL SYSTEM



GENERAL CHARACTERISTICS OF THE PROJECT

- General concept **created** by the team from Institute of Physical Planning and Municipal Economy (published 1996); continued and **developed** in Department of Landscape Architecture WULS/ SGGW
- Goal:
to develop methodology enabling identification of city space elements (areas) important for nature to function



Finding a balance between **green city** and **compact city**

CONCEPT'S ASSUMPTIONS

Climatic function

- Air flow between urban – open areas
- Air regeneration

Hydrological function

- Water condition stabilisation

Biological function

- Biodiversity
- Biological processes

System identification

I step – inventory, landscape analysis, landscape structure indication

criteria:

Land cover diversity

Relief

Water conditions

result:

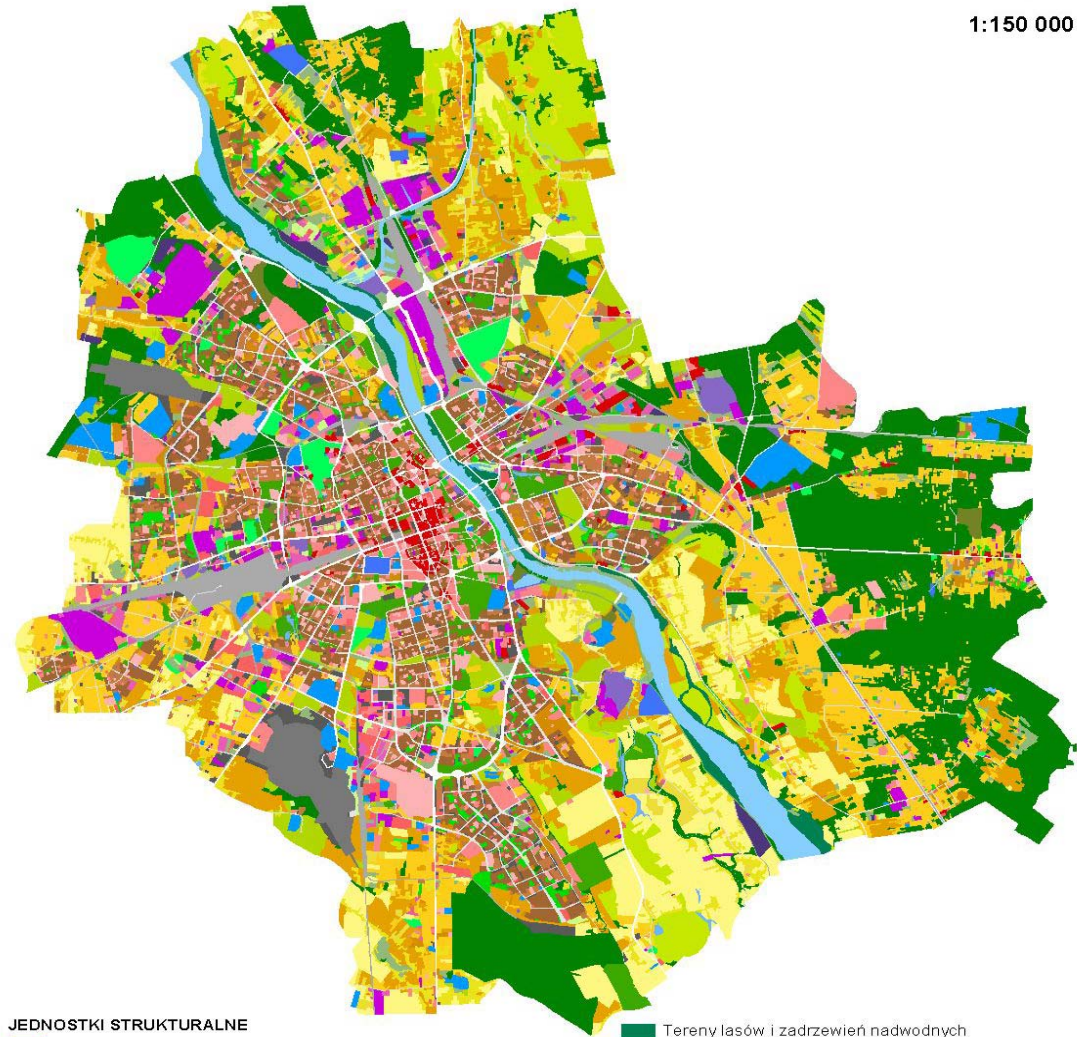
11 600 structural units

36 types of units

homogeneous units according to physiognomy

Mapa jednostek strukturalnych

1:150 000



JEDNOSTKI STRUKTURALNE

- | | |
|--|--|
| Tereny skoncentrowanych funkcji różnych z dominacją usług i administracji | Tereny lasów i zadrzewień nadwodnych |
| Tereny usług o wysokiej intensywności zabudowy | Pozostałe tereny lasów i zadrzewień |
| Tereny usług o średniej intensywności zabudowy | Tereny gruntów rolnych, warzywnictwa i ogrodnictwa |
| Tereny usług o niskiej intensywności zabudowy | Tereny łąk i pastwisk |
| Tereny mieszkalnictwa wielorodzinnego wysokiego (pow. 12m) | Tereny sadów |
| Tereny mieszkalnictwa wielorodzinnego niskiego (do 12m) | Tereny nieużytków rolnych |
| Tereny mieszkalnictwa jednorodzinnego - zabudowa bliźniacza i szeregowa | Tereny urządzeń energetycznych |
| Tereny mieszkalnictwa jednorodzinnego - zabudowa wolnostojąca i na działkach leśnych | Tereny składowisk i utylizacji odpadów |
| Tereny mieszkalnictwa jednorodzinnego - zabudowa zagrodowa | Tereny urządzeń kanalizacyjnych i hydrograficznych |
| Tereny produkcji | Inne tereny techniczne, inżynierskie i obronności |
| Tereny składów i magazynów | Drogi krajowe i wojewódzkie |
| Tereny parków | Pozostałe drogi, ulice i place |
| Tereny zieleńców, skwerów i ogrodów jordanowskich | Tereny linii kolejowych |
| Tereny cmentarzy | Tereny lotnisk |
| Tereny ogrodów działkowych | Tereny urządzeń transportu i komunikacji |
| Inne tereny zieleni | Wody powierzchniowe - zbiorniki wodne |
| | Wody powierzchniowe - cieki |
| | Tereny wałów ochronnych |
| | Tereny nieużytków i tereny rekultywowane |
| | Tereny zdegradowane i zainwestowane niefunkcjonujące |

System identification

II step – data base of urban environment for each structural unit (GIS)

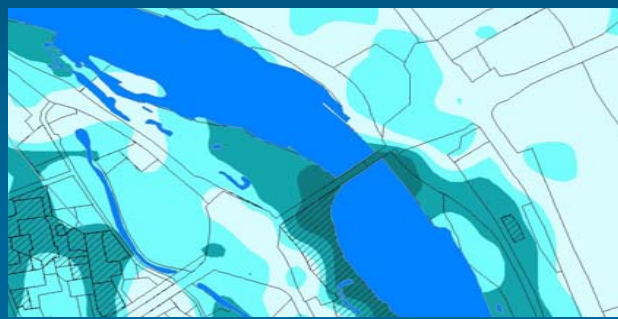
Soil and bedrock permeability

range from permeable to impermeable soil and bedrock



Ground water level

range: 0-1; 1-2, 2-5; > 5 m u.g.l.



Degree of real vegetation transformation



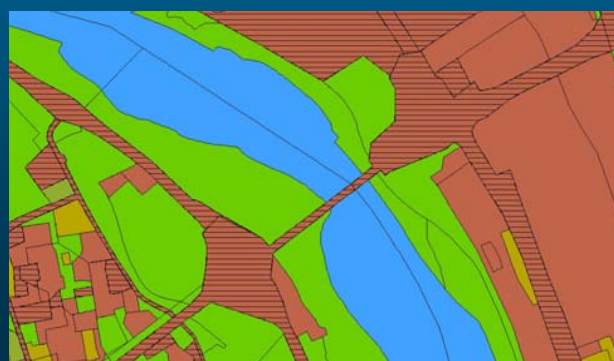
Vertical vegetation structure

Three ranges: low, mixed, height



Degree of vegetation cover

Four ranges: 0-25%; 25-50%; 50-75%; 75-100%



Height of vertical elements

Ranges: 0-1; 1-4, 4-8; 8-12; more than 12 m



System Przyrodniczy Miasta generalizacja

1:150 000



Warsaw's Natural System

Scenario minimum

Out of system

Scenario optimum

Supporting areas

GREEN INFRASTRUCTURE POTENTIAL



GENERAL CHARACTERISTICS OF THE PROJECT

- PhD thesis - to be completed by the end of 2013
- Goal:
to estimate and compare the potential for the **green infrastructure** development in the 17 biggest European Union cities (in quantitative and qualitative terms)

METHODS

Quantitative analysis:

- The total share of BVA in the city limits (statistics, supervised classification and Urban Atlas)
- The share of BVA particular classes (green infrastructure elements) in the city limits (statistics, supervised classification and Urban Atlas)
- The share of BVA particular classes in larger urban zones (Urban Atlas)

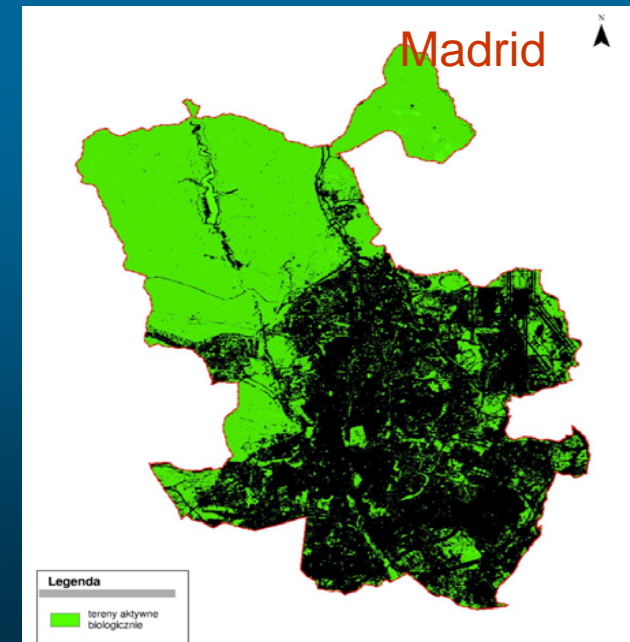
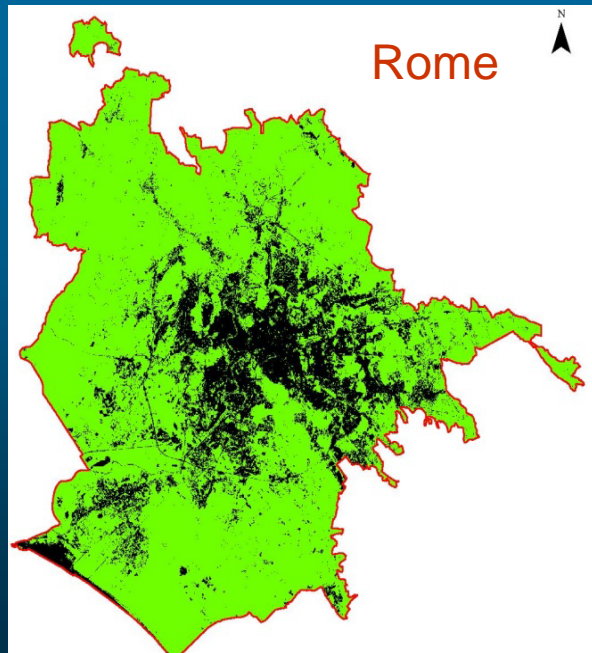
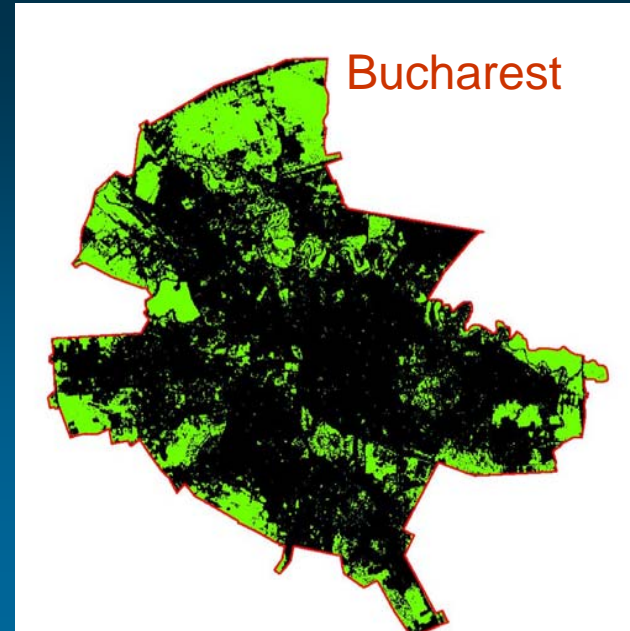
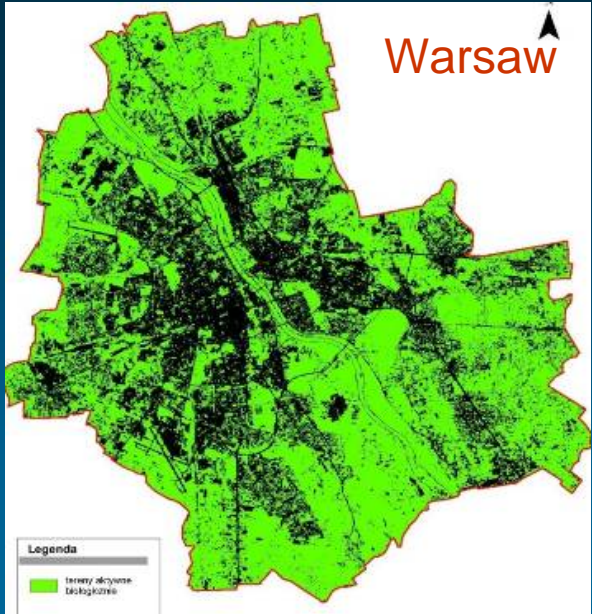
Qualitative analysis:

- Main GI elements
- Other important GI elements
- Green Infrastructure patterns in built-up areas
- Connectivity of the GI elements
- Accessibility to the GI
- Relations between natural conditions and Green Infrastructure pattern
- MODELS (?)

SOME RESULTS

Miasto	Powierzchnia i udział procentowy poszczególnych kategorii pokrycia terenu												
	Powierzchnia całkowita	Wody powierzchniowe		Tereny rolne i porolne*		Tereny zadrzewione*				Zabudowa i nawierzchnie		PBC	
						liściaste		iglaste					
						[km2]	%	[km2]	%				
Barcelona	100,10	0,14	0,14	20,02	20,00	0,03	0,03	8,83	8,82	71,08	71,01	29,02	28,99
Paryż	105,75	1,56	1,48	25,74	24,34	2,03	1,92	2,04	1,93	74,38	70,33	31,37	29,67
Bruksela	161,38	0,11	0,07	35,33	21,89	22,99	14,24	2,05	1,27	100,90	62,52	60,48	37,48
Mediolan	182,07	0,58	0,32	84,04	46,16	0,02	0,01	0,00	0,00	97,42	53,51	84,65	46,49
Bukareszt	238,00	6,32	2,65	50,85	21,37	5,22	2,19	0,00	0,00	175,61	73,79	62,39	26,21
Marsylia	240,72	3,28	1,36	107,56	44,68	0,53	0,22	24,23	10,07	105,12	43,67	135,60	56,33
Monachium	310,00	0,84	0,27	134,23	43,30	14,33	4,62	4,26	1,37	156,34	50,43	153,66	49,57
Wiedeń	414,66	8,44	2,03	239,69	57,80	21,88	5,28	0,30	0,07	144,35	34,81	270,31	65,19
Lyon	490,77	10,90	2,22	223,91	45,62	30,07	6,13	0,01	0,00	225,88	46,03	264,89	53,97
Praga	496,00	2,80	0,56	264,52	53,33	29,43	5,93	9,62	1,94	189,63	38,23	306,37	61,77
Warszawa	516,90	7,80	1,51	259,75	50,25	38,98	7,54	36,45	7,05	173,92	33,65	342,98	66,35
Budapeszt	525,10	13,14	2,50	264,22	50,32	9,33	1,78	30,33	5,78	208,08	39,63	317,02	60,37
Madryt	604,57	2,83	0,47	79,19	13,10	1,04	0,17	298,06	49,30	223,45	36,96	381,12	63,04
Hamburg	755,00	81,87	10,84	362,98	48,08	35,69	4,73	28,41	3,76	246,05	32,59	508,95	67,41
Berlin	892,00	36,71	4,12	377,78	42,35	64,73	7,26	120,78	13,54	292,00	32,74	600,00	67,26
Rzym	1285,30	3,87	0,30	964,53	75,04	17,62	1,37	36,77	2,86	262,52	20,42	1022,78	79,58
Londyn	1571	21,76	1,38	243,02	15,47	147,90	9,41	425,68	27,10	732,65	46,64	838,35	53,36
Średnia			2,01		42,07		4,55		8,43		49,18		57,07

The share of biologically active area according to particular classes and total (supervised classification)



GREEN BELT

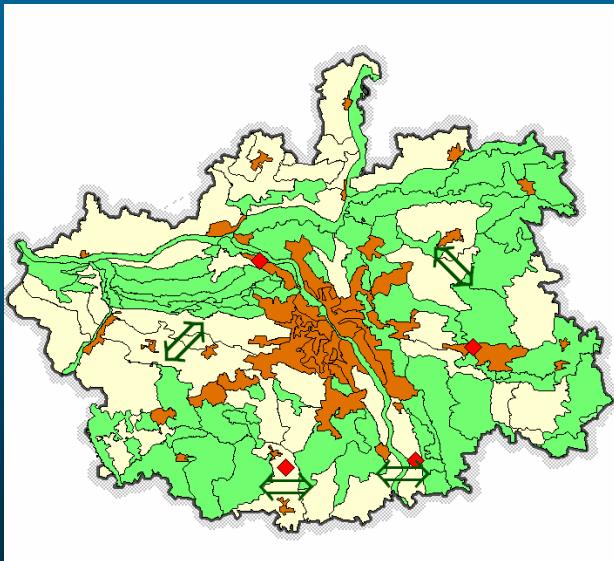


GENERAL CHARACTERISTICS OF THE PROJECT

Research grant financed by National Science Centre in Poland (NCN) 2011 - 2014

Goal:

to evaluate the efficiency of green belt concept in modern regional planning of metropolitan areas



Main concerns:

- Shape (concept): belts, wedges, others
- Area designated as GB
- Functions: agriculture, recreation, ecology, development
- Implementation

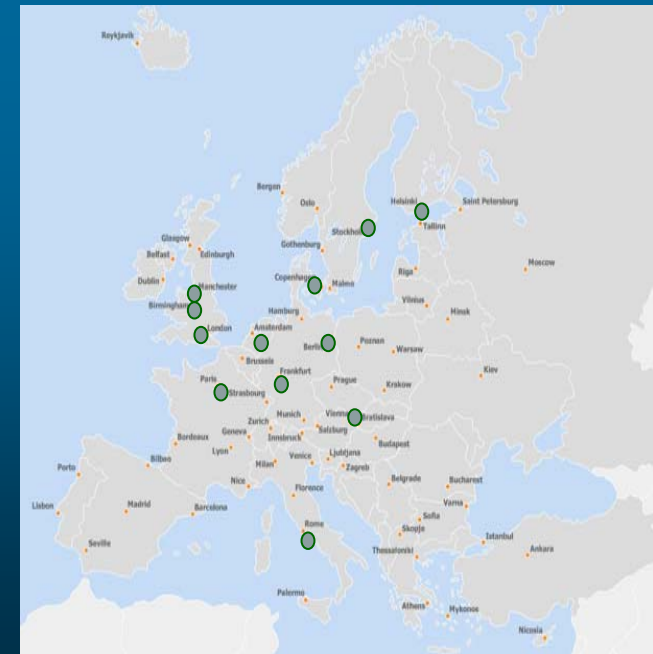
SCOPE OF THE SURVEY

Structure, function and management of green belts

42 metropolitan areas (all over the world)

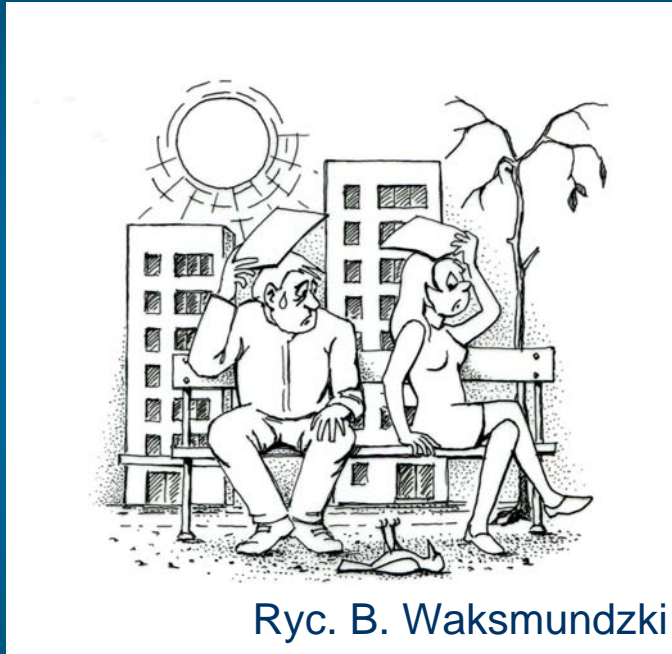
Data collection have covered:

- structure (population, size, type and size of open spaces, share of protected areas),
- function (declared main functions of existing greenbelts: structural, feeding, environmental, ecological, recreational, other)
- management (way of establishment, principles of open space protection, tools of open space protection, the role of public participation, type of



FINAL REMARKS

- Presented research concerns different measures implemented to support spatial planning efficiency
- It supports indirectly enhancing urban biodiversity (by making place)
- It directly relates to green infrastructure development



Ryc. B. Waksmundzki

THANK YOU