URBAN SMS Soil Management Strategy

Stakeholder network for impact assessment of soil protection scenarios

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STAKEHOLDER NETWORK FOR IMPACT ASSESSMENT OF SOIL PROTECTION SCENARIOS

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PP6 – City of Celje
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The Content:

1. INTRODUCTION

Nowadays there is a common agreement that development of urban areas and whole landscapes must be sustainable. Sustainability must be based on site adapted land use considering best examples of environmental protection and spatial planning concepts. The standards of sustainable land development must include (a) long-term conservation of biotic, abiotic and cultural resources, (b) economic welfare of land users, (c) social perspectives for the population, (d) technical and cultural infrastructure (Helming and Wiggering, 2003). The concept of land multifunctionality has been raised which refers to a list of environmental, social and economic land functions.

The European Commission developed the impact assessment guidelines to be used for assessment of potential effects of policies or development strategies within three dimensions: environmental, social and economic (EC, 2005).

It is obvious that land use changes related to urbanization process may disturb the balance between environment quality or environmental functions of land and socio-economic development. Soil plays a particular role in supporting the environmental stability based on its retention, buffering or provision of biodiversity potential. Soil quality is also important to food safety and broadly understood population health. According to European Commission, sealing is one of main threats to soil quality as identified in the framework of Strategy for Soil Protection (COM231, 2006). Thus, protection of soil resources is needed in order to balance impacts of urbanization.

There are different approaches for impact assessment of spatial development or soil protection policies. Analytical approaches involving spatial information systems, as presented in Deliverables 6.1.2 and 6.2.1, provide ex-post or ex-ante assessments of urbanization effects on soil resources. Another approach involves participation of local stakeholders and, thus, might be called ‘participatory impact assessment’. Major part of this approach is collecting opinions of stakeholders on possible urbanization consequences. The advantage of this method is that it involves individuals familiar with local circumstances and needs, and allows to collect data also on social and economic issues - which data is usually scarce and not present in spatial format.

2. OBJECTIVES

The objectives of the action were:

- Establish a network stakeholders representing pilot city areas
- Raise awareness on role of soil in urban development and need for soil protection through meetings with stakeholders
- Gather opinions of stakeholders on key sustainability issues in cities of Central Europe and potential impacts of soil protection scenarios in a semi-quantitative form

The stakeholders were asked to provide opinions within such areas as:
According to stakeholders, what are the key environmental, social and economic issues in cities? What will be the likely social, environmental and economic impacts of the various soil protection scenarios? What conditions would have to be fulfilled before the proposed protection scenario is sustainable? How do the social, economic, and environmental impacts relate to one another?

3. METHODOLOGY

3.1. Approach for stakeholder involvement

The applied approach was a modification of the novel methodology used in SENSOR project that was proposed by Morris et al. (2008). It is a participatory impact assessment method that involves work with group of stakeholders representative for the area of interest. The procedure involved series of workshops during which the detailed set of questions led the stakeholders through steps of impact assessment in order to gather their opinions in a quantitative form. Consistent methodology was applied to each pilot study area in order to explore locally defined sustainability issues, policy impacts and sustainability limits, all in a form enabling comparison between cities.
The series of six workshops was organized for the pilot cities:

- Celje (13.02.2009 in Ljubljana)
- Vienna (20.05.2009)
- Milan (12.11.2009)
- Prague (20.11.2009)
- Wroclaw (4.12.2009)
- Bratislava (19.02.2010).

It was assumed that potential participants of the stakeholder network would represent the following groups:

• individuals (e.g., long-term local residents)

• political authorities prescribed by national laws (e.g., elected representatives at village or district levels)

• local governance structures (administration)

• agencies with legal jurisdiction over the relevant natural resources (e.g., a state park agency, environmental protection)

• local governmental services (e.g., education, health, forestry and agriculture extension)

• relevant non-governmental organizations (e.g., dedicated to environment or development) at local or regional level

• planners

• developers

• universities and research organizations

• government authorities at district and regional level.

3.2. Protocol for stakeholder workshops

The structure of the stakeholder workshop consisted of several steps:

1) introduction to the stakeholder participatory research methodology

2) short introduction to soil functions in urban ecosystem (social, economic, environmental)

3) discussion and assessment of the importance of soil functions by participants

4) short introduction to indicators describing the soil functions

5) discussion regarding soil protection scenarios for the city and assessment how these scenarios would affect soil functions (trough evaluation of changes in the selected indicators)

6) discussion and assessment of sustainability limits for soil functions reflecting participants views on that to what degree it is acceptable (or not acceptable) that certain soil functions are lost during urbanization process.

Assessment of the importance of soil functions

The assessed soil functions are grouped into 3 sustainability pillars: social, economic and environmental – each pillar is represented by 3 functions (Table 1).

Group of social functions was represented by cultural, recreation and health functions. Cultural function of soil can be understood e.g. as resource of archeological information useful for capturing natural and human history of the site. Recreation function refers to soil ability to provide sites of natural character for spending leisure time. This is an important aspect of mental condition of the human population. Health function of soil has a direct link to

soil quality – soil contamination with inorganic (e.g. cadmium or lead) or organic contaminants (e.g. Polycyclic Aromatic Hydrocarbons) may affect human health through number of pathways such as food contamination, soil inhalation, direst ingestion of soil dust or secondary ground, surface or drinking water contamination.

In traditional agricultural understanding soil function is considered as production of food and feed. This serves as one of economic functions. The two other are related to role of soil as a ground for industrial or residential construction and transport infrastructure.

Nowadays increasing attention is given to environmental functions of soils. In our analysis they were represented by habitat (biodiversity), buffering and retention functions. Habitat function is related to the role of soil in functioning of non-agricultural ecosystems and ensuring biodiversity of landscape. Buffering function of soil controls migration of contaminants in the environment. Sorption of organic contaminants or metals in soil protects against the contaminants transfer to biotic and abiotic components of ecosystem. Retention function is responsible for holding water in a soil profile and limiting risk of flood after heavy or long-lasting rains. Movement of contaminants and nutrients in profile of soil with high water holding capacity is slower since such soil reaches the full saturation much later.

Table 1. List of functions included in the impact assessment

Sustainability pillar	***Soil/Land Function***
Social – 1	Cultural heritage
Social – 2	Recreation
Social – 3	Health
Economic - 1	Land based production (agricultural)
Economic - 2	Transport infrastructure
Economic - 3	Housing and workplace provision
Environmental - 1	Biodiversity
Environmental - 2	Retention
Environmental - 3	Buffering and filtering

The functions were ranked by the participants in scale from 9 to 1 with the assumption that each score may appear only once. Score 9 meant the most important soil function for the local conditions.

Soil protection scenarios

Three scenarios representing different soil protection approaches were proposed to be assessed regarding their impacts in long-term perspective. They basically reflected the following criteria:

Scenario 1 (the baseline scenario)

It assumed that **nothing would change** in regulations concerning soil protection. Law and its efficiency remain at the present level, described by experts.

Scenario 2 (moderate protection)

City planners have to take into account the quality of soils and constructions can be placed on **low and medium quality** soils mainly; if more area for construction is needed on high quality soils but more open space needs to be planned in this zone

Scenario 3 (strong protection)

Construction is placed on **brownfields and low quality soils**; if more area is needed construction can be placed on medium or, exceptionally, high quality soils but more open space needs to be planned in these zones

In Vienna the scenarios were defined more specifically, however the meaning of the variants was similar to those assessed in other citis.

Impact assessment of soil protection scenarios

In the subsequent part of the meeting the potential impact of the scenarios on the soil functions was assessed through exemplary indicators (Table 2). It is often easier to rank the impact of a certain policy on an indicator that is more measurable and quantitative than the soil function.

Table 2. The list of indicators of soil functions within three sustainability pillars

Sustainability pillar	*Soil function*	*Indicator*
Social - 1	Cultural heritage	Number of archaeological sites discovered and protected
Social - 2	Recreation	Share of recreation sites
Social - 3	Health	Share of uncontaminated soils
Economic - 1	Land based production (agricultural)	Overall soil quality index
Economic - 2	Transport infrastructure	Time efficiency (ease) of travel
Economic - 3	Housing and workplace provision	Share of land available for construction
Environmental - 1	Biodiversity	Share of wooded land and green areas
Environmental - 2	Retention	Water holding capacity
Environmental - 3	Buffering and filtering	Soil ability to immobilize pollutants

The stakeholders were asked to answer the following questions:
Soc 1, Cultural heritage:
How will number of discovered and protected archeological sites change in scenario x?
Soc 2, Recreation:
How will share of recreation sites change in scenario x?
Soc 3, Health:
How will share of uncontaminated soils change in scenario x?
Eco 1, Land based production (agricultural):
How will overall soil quality index change in scenario x?
Eco 2, Transport infrastructure:
How will time efficiency (ease) of travel change in scenario x?
Eco 3, Housing and workplace provision:
How will share of land available for construction change in scenario x?
Env 1, Biodiversity:
How will share of wooded land & green areas change in scenario x?
Env 2, Retention:
How will water holding capacity change within city change in scenario x?
Env 3, Buffering and filtering:
How will soil ability to immobilize pollutants change in scenario x?

Each expert individually scored the potential impacts of a given policy scenario within the range: -3 to 3:

-3 – strongly negative impact
-2 – moderately negative impact
-1 – slightly negative impact
0 – no effect
1 – slightly positive impact
2 – moderately positive impact

3 – strongly positive impact

Sustainability limits

The last part of the meeting was aimed to discuss and set sustainability limits for each soil function in the context of the particular city. The experts were asked to consider what impact on a given function (expressed by the indicator) within urbanization process, within range –3 to 3, can be accepted.

4. RESULTS

4.1. Stakeholder network

Celje

Nina Masat, City of Celje
Peter Medved, City of Celje
Jure Radisek, geographer and postgraduate student of spatial planning
Blaz Repe, geographer of soil - Ljubljana Univerity
Franc Lenarčič, Ministry of Environment and Spatial Planning
Maja Zupan, geography and sociology, urban planner in LUZ d.o.o. (Ljubljana urban planning company)
Mery Loncar, urban planner in LUZ d.o.o.
Zala Strojin Bozic, City of Ljubljana, b.a. Geography (soil section in Environmental Department)
Izidor Jerala, landscape architect
Aljosa Jasim Tahir, geographer, environmental consultant in Chronos d.o.o. dealing with environmental analysis
Dr. Anka Lisec, "surveyor", "land management", Faculty of civil engineering, Department for spatial planning, University of Ljubljana

Vienna

Franz Dollinger, Land Offices of the regional government of Salzburg, Spatial Planning Department
Andreas Baumgarten, Austrian Agency for Health and Food Safety, Advisory Board for soil fertility and soil protection
Marion Jaros, Vienna Ombuds Office for Environmental Protection, Chemicals, genetic engineering and soil protection
Nora Mitterböck, Federal Ministry of Agriculture, Forestry, Environment and Water Management, Immission and Climate Protection Department
Erich Dallhammer, Austrian Institute for Regional Studies and Spatial Planning
Eckart Hermann, City of Vienna, Administration
Christian Steiner, Offices of the regional government of Lower Austria, Land Development Department
Andrea Spanischberger, Federal Ministry of Agriculture, Forestry, Environment and Water Management, Plant Production Department

Milan

24 stakeholders

Prague

Zuzana Sulcova, a designer of Land Fund system, employee of City Development Authority Prague
Jaroslava Janku, - soil scientist at Czech University of Life Science
Jan Nemecek – soil science expert
Karel Jacko, Ministry of Agriculture of the Czech Republic
Lenka Pavilkova - resident

Wroclaw

Ewa Markowicz-Judycka – planner, Regional Urban Office
Cezary Kabała – scientist, Wroclaw University of Environmental and Life Sciences
Rafał Odachowski – Dept. of Development and Architecture, City of Wroclaw
Magdalena Doniec - Dept. of Development and Architecture, City of Wroclaw
Beata Meinhardt – Regional Inspectorate of Environmental Protection, Wroclaw
Maciej Dębowski – soil science expert
Marta Zgolińska - Lower Silesia Region, Department of Geodesy
Stanisław Talerzowski – Lower Silesia Region, Department of Geodesy

Bratislava

Ondrej Ferenci – Magistrat hl. Mesta SR Bratislava
Martin Hozlar - Soil Science and Conservation Research Institute, Bratislava
Andrea Steruska – VUPOP Bratislava
Jozef Koren - Soil Science and Conservation Research Institute, Bratislava
Bohdan Jurani - PrifUK Katedra pedologie
Rozalia Szallayova – Ministerstvo podohospodarstva SR
Stanislav Tokos - Magistrat hl. Mesta SR Bratislava
Zoltan Bedrna – PrifUK Katedra pedologie

4.2. Importance of soil functions

The highest averaged values were given to two economic functions: 'Housing and workplace provision' and "Transport infrastructure' (Table 3). The stakeholders recognize the need for new housing and further development of industrial/commercial and transport infrastructure as basic condition for a city progress. This observation makes the activities aimed at raising awareness of soil role even more important. In 4 cities (Bratislava, Prague, Wroclaw and Vienna) 'Housing and workplace provision' function was set as the most important (ranking approx. 8). Lower scores were given to this function in Celje and Milan (Figure 1).

Similarly, high 'transport infrastructure' needs were expressed in Bratislava, Prague, Wroclaw and Vienna. Much lower ranking was credited to this function in Milan and Celje. It must be

noted that in Milan the ranking was performed in 3 separate groups representing different areas of expertise. Thus, the mean ranking values were calculated for this city by averaging means of these 3 groups. In all other cities the mean value is a mean of all individual scores since all stakeholders worked in one group.

The last economic function related to "Land based production' which is basically equal to agricultural production, had the lowest average ranking across cities among all soil functions (mean score 3.32). The highest ranking (5.5) was given to this function in Celje, relatively high score was recorded in Milan (4.5) whereas in Bratislava almost all stakeholders found this function as insignificant (mean score 1.4) (Figure 1).

Averaged ranking for all 3 environmental functions was at the level 4.46 – 4.96. This means that the stakeholders treated all these functions as equally important. They often informed that it was difficult to decide on the importance order of the environmental function since all were meaningful. However, the stakeholders admitted the high meaning of environmental functions in all cities, which is confirmed by low variability of scores (Table 3).

'Biodiversity' function received the mean scores between 2.6 (Prague) and 6.4 (Celje). This function had the highest variability among environmental functions.

The range of scores for 'Retention' function was much smaller: 4.0 (Prague) to 5.6 (Celje).

The cities covered by the analysis do not represent heavy smelting industry, however the stakeholders recognized the importance of 'Buffering/filtering' soil function that is responsible for inactivation of contaminants (average importance 4.46 with the range 3.4-5.6). The highest scores were given to this function in Celje and Bratislava: 5.6 and 5.3, respectively.

The social 'Health' function received the 3rd average ranking (5.61) among all the functions. They were the highest in Celje (7.1 – the most important function in this city) and in Prague (6.4) and in none of cities dropped below 4.4.

'Recreation' function received surprisingly high attention (4th average ranking) being especially important in case of Wroclaw (6.8) and Milan (6.3, but most important among all functions). The lowest average score was given to this function in Bratislava (3.6).

'Cultural heritage' function was in most cities set as less important (7th place in Bratislava and Wroclaw, 9th in Vienna and Celje) but it was ranked high in Prague and Milan (score 5.2 and 5.7; place 4 and 2, respectively).

Table 3. Ranking of soil functions across all cities

Function	min*	max	mean	SD
Cultural heritage	2.1	5.7	3.95	1.35
Recreation	3.6	6.8	5.23	1.12
Health	4.4	7.1	5.61	0.90
Land based production	2.1	5.5	3.32	1.38
Transport infrastructure	3.0	7.4	5.72	1.66
Housing and workplace provision	3.3	8.4	6.88	1.96
Biodiversity	2.6	6.4	4.81	1.29
Retention	4.0	5.6	4.96	0.58
Buffering and filtering	3.4	5.6	4.46	0.86

*Min, max, mean and standard deviation values calculated based on city means

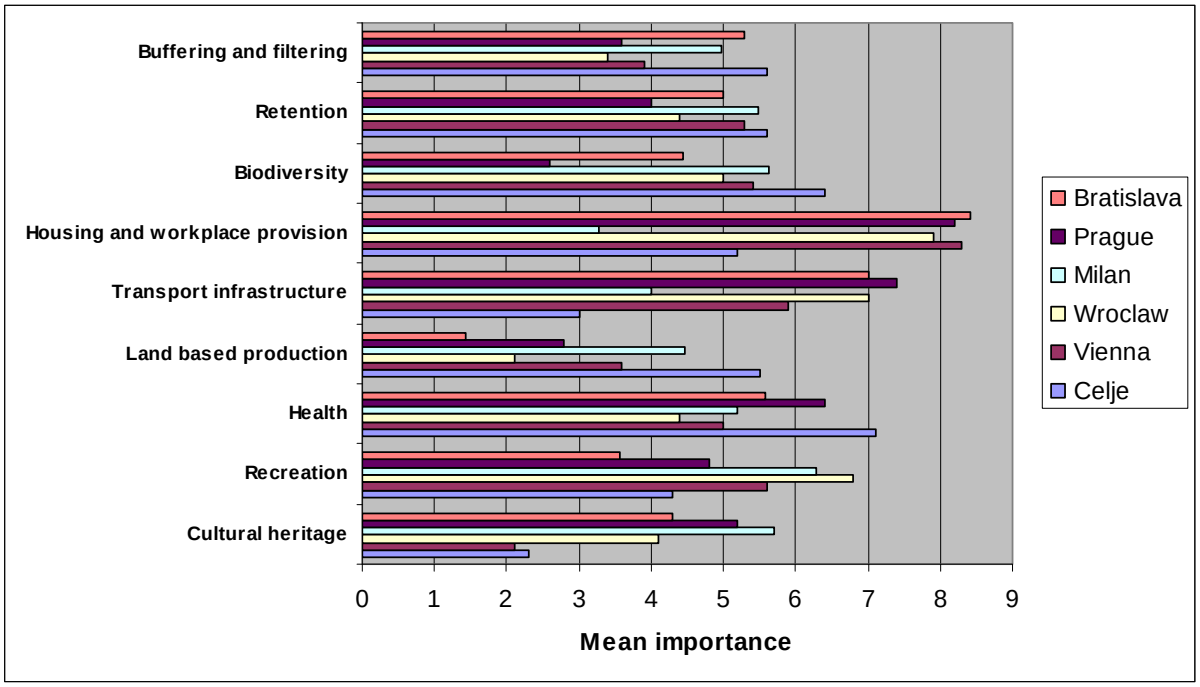

Figure 1. Ranking of soil function importance in cities based on stakeholder opinions

Taking all soil functions into account, the importance assessment seemed to be different in Celje and Milan than in other cities. The most significant difference between these 2 groups of cities was lower ranking of economic functions in Celje and Milan. The closest similarities were observed between Vienna and Wroclaw and between Bratislava and Prague (Figure 2).

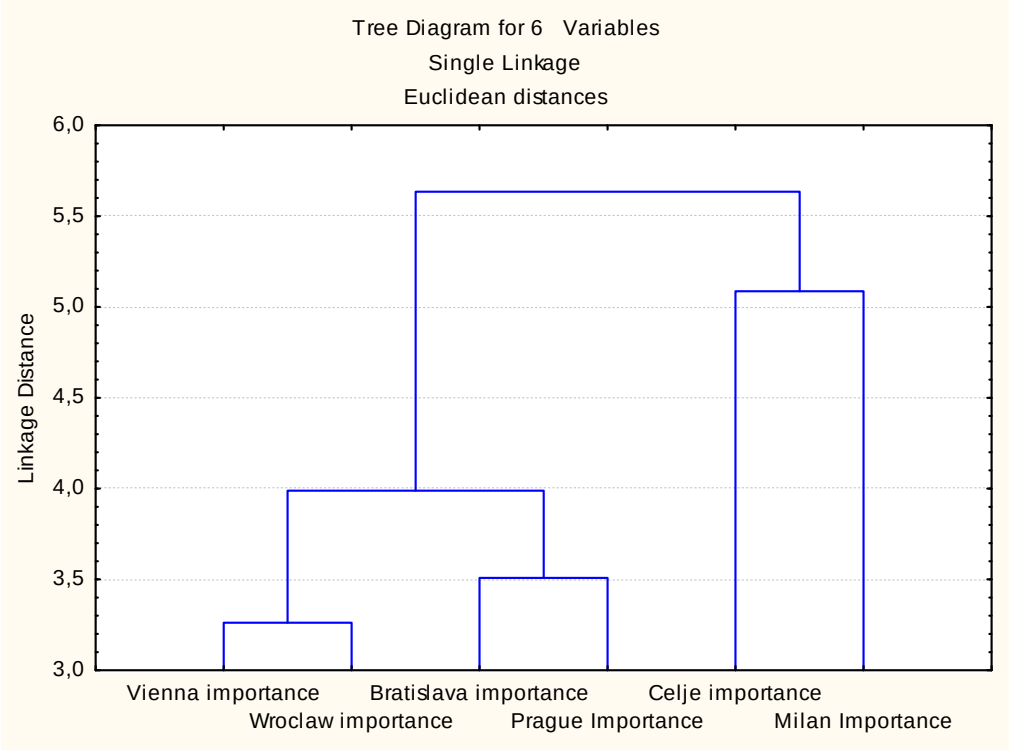

Figure 2. Hierarchical tree cluster analysis for importance of soil functions

4.3. Soil protection scenario impact assessment

4.3.1 Baseline scenario

Baseline scenario represents variant with no change in current regulations of soil protection. Impact of this scenario was assessed as generally favorable to the economic functions 'Housing and workplace provision' (ECO3) and 'Transport infrastructure' (ECO2) (Figure 3 and 4). Positive values are indicative of improvement of a given function. According to the local experts, 'Housing and workplace provision' would not be changed under baseline scenario in Milan, Prague and Bratislava whereas in other cities it would be strongly improved.

The baseline scenario would not improve 'Transport infrastructure' in Milan and Vienna, however the improvement is expected in other cities.

The production function (ECO1) is predicted to be significantly lost in baseline scenario, however this function was set as the least important (Figure 3). This loss was quantified from slight (impact -1 in Prague) to strong (impact -2.5 in Wroclaw).

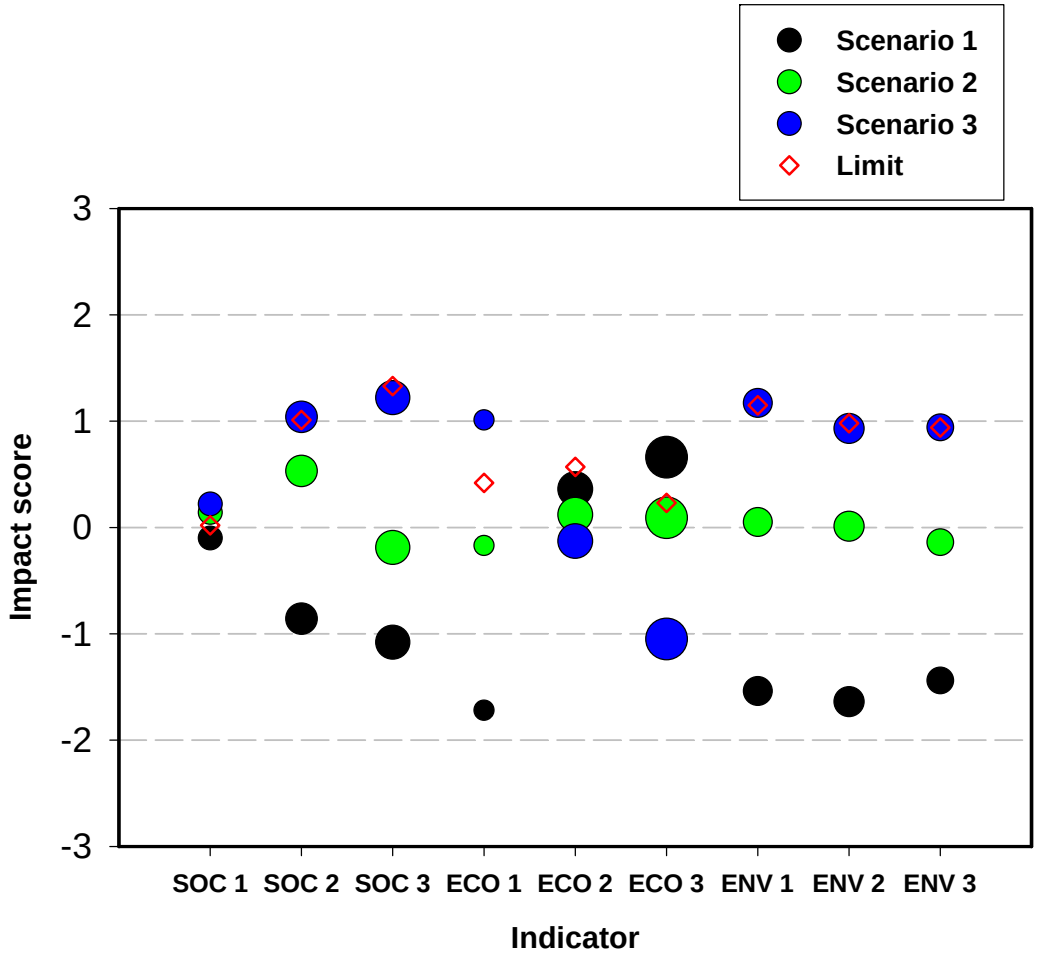

Figure 3. The average impact (across all cities) of soil protection scenarios on social, economic and environmental soil functions. Bubble size represents the average (across all cities) importance of the soil function.

'Cultural heritage' (SOC1) generally should not be affected under baseline scenario – average effect near 0 (Figure 3). However, in Milan the stakeholders were concerned about deterioration of this function (impact -1.7) (Figure 4).

The stakeholders deemed all environmental functions as threatened under "as is" scenario (Figure 3). In all cities these functions are expected to worsen if the current soil protection regulations are not changed (Figure 4). It would be a consequence of urbanization of high quality soils with high water holding and buffering capacities (e.g. clay or high organic matter soils). These functions were scored similarly in all cities, the range of scores was very narrow (Figure 4).

Similarly, fulfillment of functions 'Recreation' (SOC2) and 'Health' (SOC3), classified in the social group, was predicted to be restricted (average impact approx -1) (Figure 3 and 4).

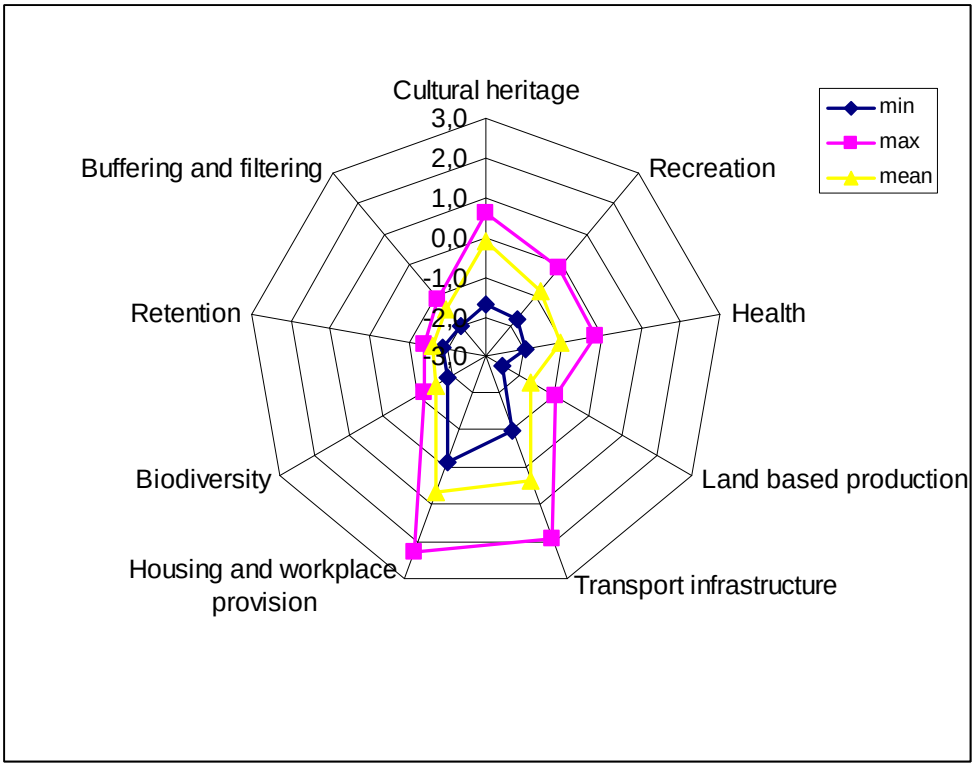

Figure 4. Range and mean impact of baseline scenario on soil functions (across all cities)

Cluster analysis revealed somewhat different impact assessment results in Wroclaw than in other cities. The stakeholders in this city gave the most extreme assessments, both regarding loss of environmental functions and improvement of "Housing and workplace provision' (ECO3) and "Transport infrastructure' (ECO2). Similarities were observed between Prague, Bratislava and, in a lesser extent, Vienna (Figure 5).

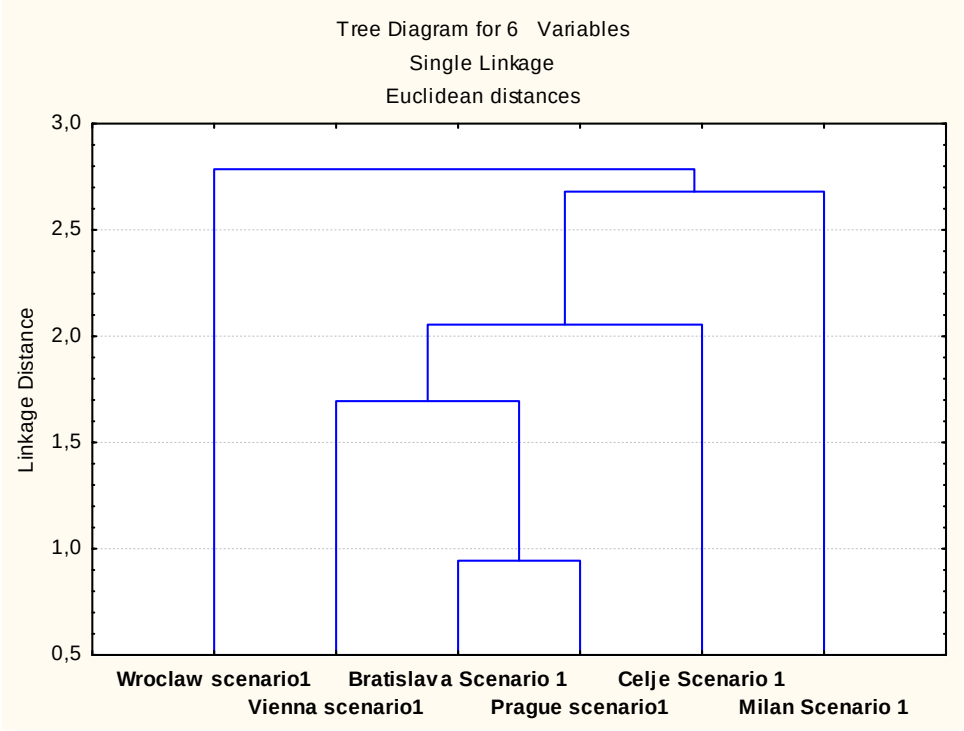

Figure 5. Hierarchical tree cluster analysis for impacts of baseline scenario on soil functions

4.3.2. Alternative scenarios - medium and strong protection scenarios

Medium protection scenario (assuming protection of high quality soils) seemed to be most balanced. Average impact was set near 0 (no impact) whereas in particular cities it generally ranged from slight decrease to slight improvement (-1 to 1) (Figure 3 and 6). It is worth to note that only in Prague medium protection would hamper the "Housing and workplace provision' (ECO3) and 'Transport infrastructure' (ECO2) – functions important for economic development. In other cities these functions would not be reduced. Thus, Prague assessment appeared different from other cities. However, results collected in Milan were the most different (Figure 7), mostly due to still negative results for environmental functions. 'Health' (SOC3) and 'Recreation' (SOC2). In other cities stakeholders generally did not expect adverse impact on these functions.

Across all soil functions, the most similar results were gathered for Vienna and Wroclaw (Figure 7).

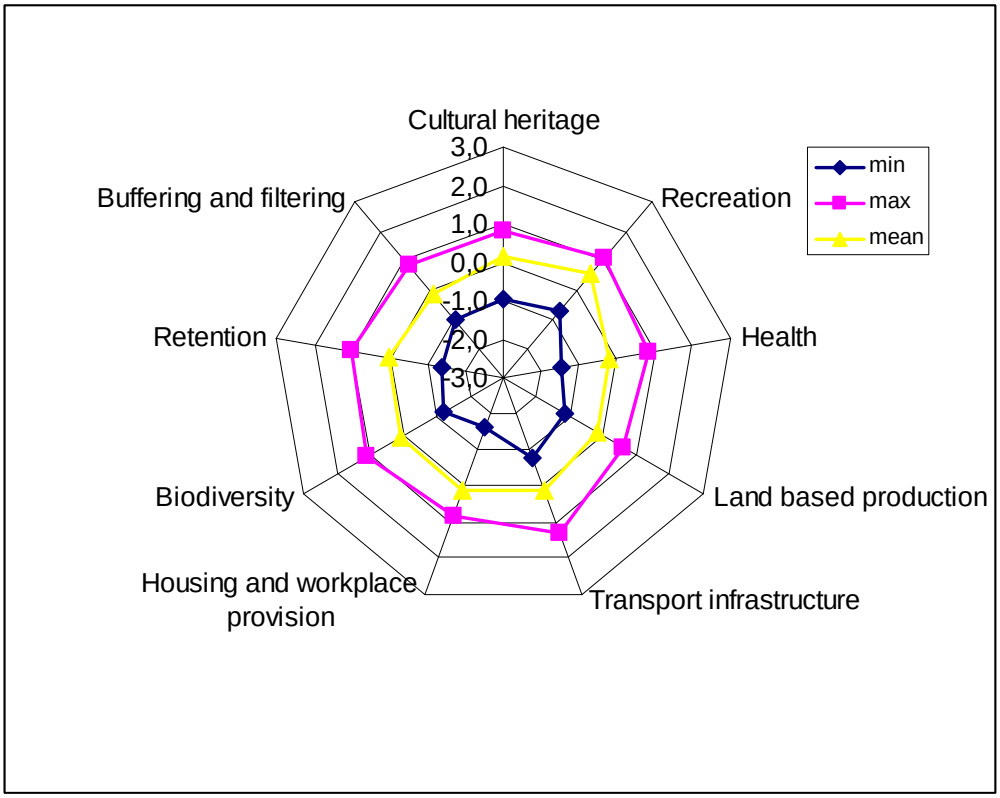

Figure 6. Range and mean impact of medium protection scenario on soil functions (across all cities)

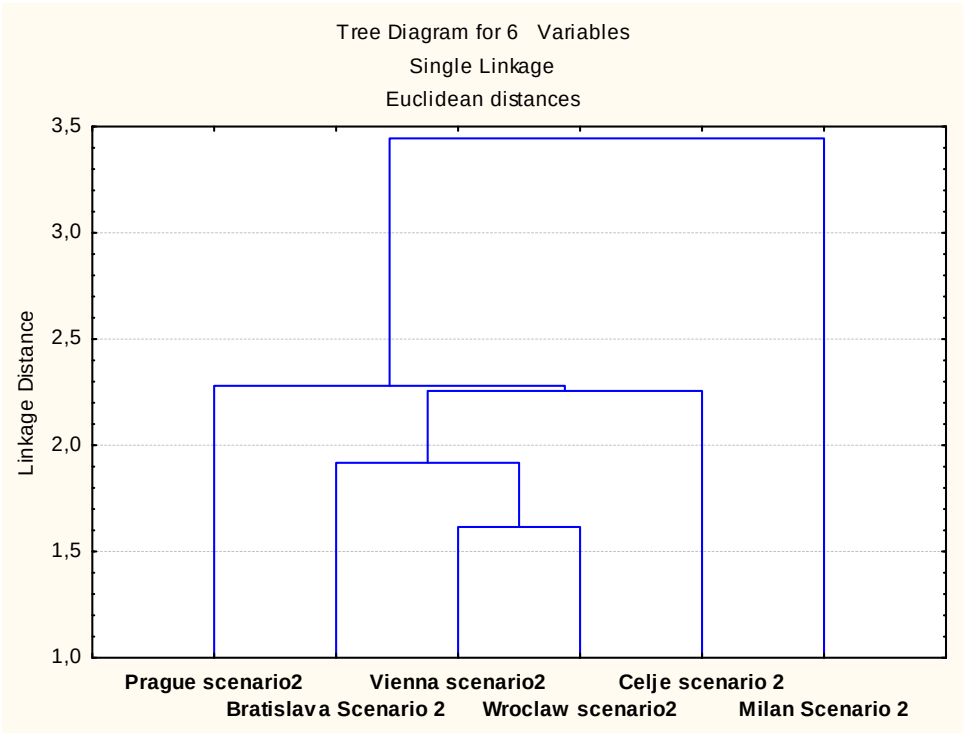

Figure 7. Hierarchical tree cluster analysis for impacts of medium protection scenario on soil functions

Strong soil protection scenario would locate new constructions mostly on brownfields and low quality soils. The scenario would generally improve all environmental functions (average impact +1) and such social functions as "Recreation' (SOC2) and 'Health' (SOC3) that are definitely linked to the environment (Figure 3). The improvement of these functions is expected in all cities (impact above 0). Only in Milan the stakeholder group did not expect enhancement of environmental functions (Figure 8).

It is also expected that 'Land based production' (ECO1) potential would be in general improved since most productive soils would be protected.

According to the stakeholders protection of medium and high quality soils would not dramatically worsen the 'Transport infrastructure' (ECO2) (Figure 8). It is likely related to the fact that nearly sufficient transport network exists in most cities. Only in Prague and Wroclaw slight reduction of transport infrastructure opportunities is expected.

Cultural heritage (SOC1) would not be impacted by the strong soil protection – in general no significant difference between all scenarios is predicted for that soil function (Figure 3).

Scenario 3 will result in decrease in 'Housing and workplace provision' function (ECO3) (on average -1). This loss was assessed as especially strong in Prague, Bratislava and Wroclaw, whereas in Vienna and Milan no loss was expected.

Comparing all cities based on all soil functions, predictions for Milan were the most different from other cities, whereas the assessment for Celje, Wroclaw, Vienna and Bratislava produced relatively similar results (Figure 9).

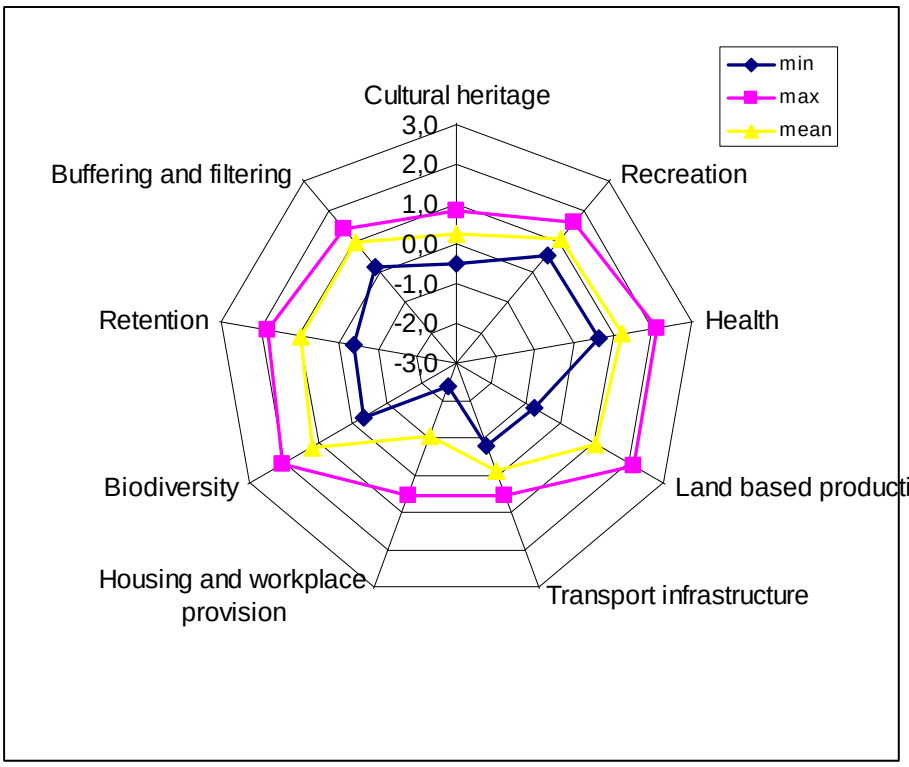

Figure 8. Range and mean impact of strong protection scenario on soil functions (across all cities)

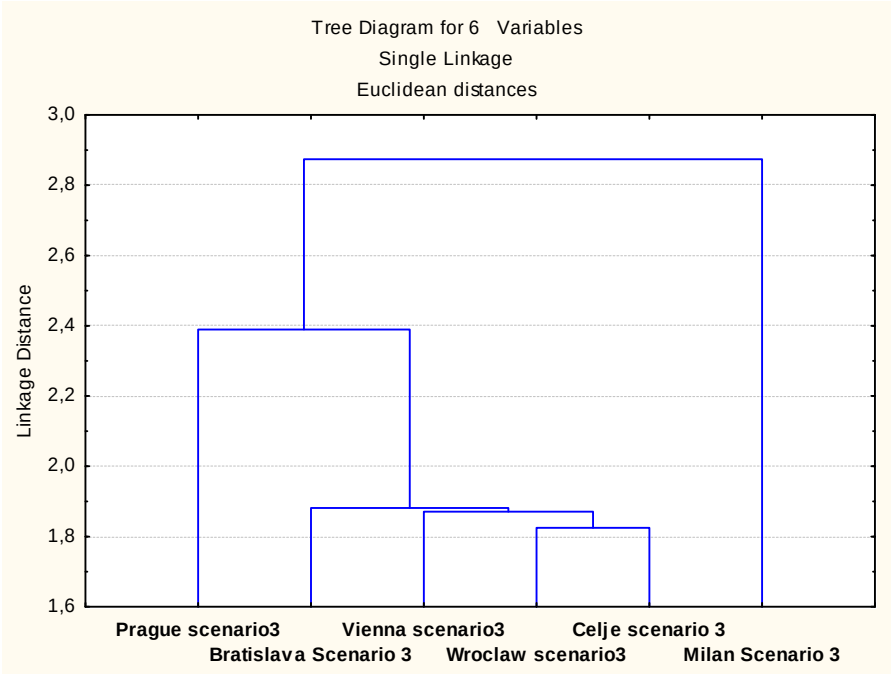

Figure 9. Hierarchical tree cluster analysis for impacts of strong protection scenario on soil functions

In order to assess combined effect of particular scenarios on all sustainability issues, so called Cumulative Scenario Effect Indicator (CSEI) was developed. It takes into account both importance of soil functions and scenario impacts on these functions and calculates one combined value for the given scenario based on all the functions. It enables to quantify the effect of scenarios considering what issues are most important for sustainable city development under the local circumstances known by the stakeholders.

It is calculated the following way:

CSEI = Function 1 importance ● Function 1 scenario impact + Function 2 importance ● Function 2 scenario impact + ……. + Function 9 importance ● Function 9 scenario impact

The CSEI indicator gave negative values for the baseline scenario in all cities (Table 4). However the effect was near 0 in Wroclaw – loss of environmental functions was compensated by improvement of housing and workplace provision and transport infrastructure that were defined as most important for the city. The most negative combined effect of Scenario 1 was recorded for Milan and Celje. In Milan only strong protection scenario gave positive combined effect.

In Celje and Prague the CSEI was only slightly negative under medium protection scenario, whereas in Wroclaw, Vienna and Bratislava the impact of scenario 2 was positive. Wroclaw and Bratislava are the cities in which medium soil protection would already give maximum benefits – the stronger protection would not provide an additional value (Table 4).

In other cities the strong protection scenario would be most beneficial when expressed as the cumulative impact on soil functions.

Taking all functions into account, the baseline scenario is strongly negative whereas medium protection is quite balanced – function losses are compensated by improvements of other functions (Table 4). However, the cities should be analyzed individually since different pattern was observed for the particular cities.

Table 4. Cumulative Scenario Effect indicators (CSEI) for the cities

City	Baseline scenario	Medium protection	Strong protection
Milan	-71.9	-43.4	2.0
Celje	-53.7	-3.1	41.4
Prague	-18.6	-3.5	9.8
Wroclaw	-0.3	14.0	9.0
Vienna	-24.2	11.6	29.4
Bratislava	-22.4	28.6	30.9
All cities	-32.2	2.6	23.1

4.4. Sustainability limits

Sustainability limits provide information on what losses of certain functions can be accepted during urbanization process (when the limit is set as negative value) or what are stakeholders expectations regarding the functions that currently are not at satisfactory level (when the limit is set as positive value).

Regarding 'Cultural heritage' the stakeholders do not expect significant improvement, in some cities the slight loss is accepted if other functions would be improved (Figure 10). In all cities there is a demand for improvement of all functions within environmental pillar as well as 'Recreation' and 'Health' functions.

Sustainability limits for all economic functions were diverse. Certain loss of agricultural production potential ('Land based production' function) was accepted in Wroclaw whereas most of other cities would expect even small improvement of this function.

Wroclaw stakeholders expressed a need for strong improvement of transport infrastructure and housing/workplace function. Prague was the only city that would accept certain 'Transport infrastructure' loss whereas Vienna stakeholders would devote 'Housing and workplace provision' function in certain extent if the environmental functions are improved.

Similarities regarding sustainability limits were observed between Vienna, Milan and Prague, whereas Celje and Wroclaw were the most distinct from other cities (Figure 11).

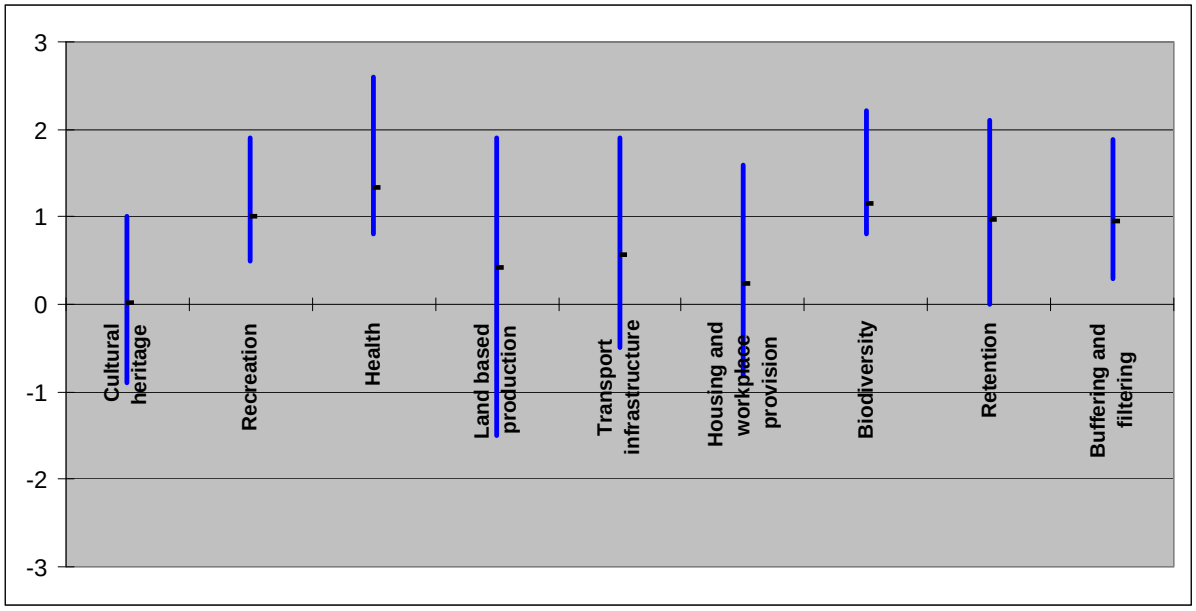

Figure 10. Range of sustainability limits defined for soil functions in 6 cities. Short dash represents mean value across all cities

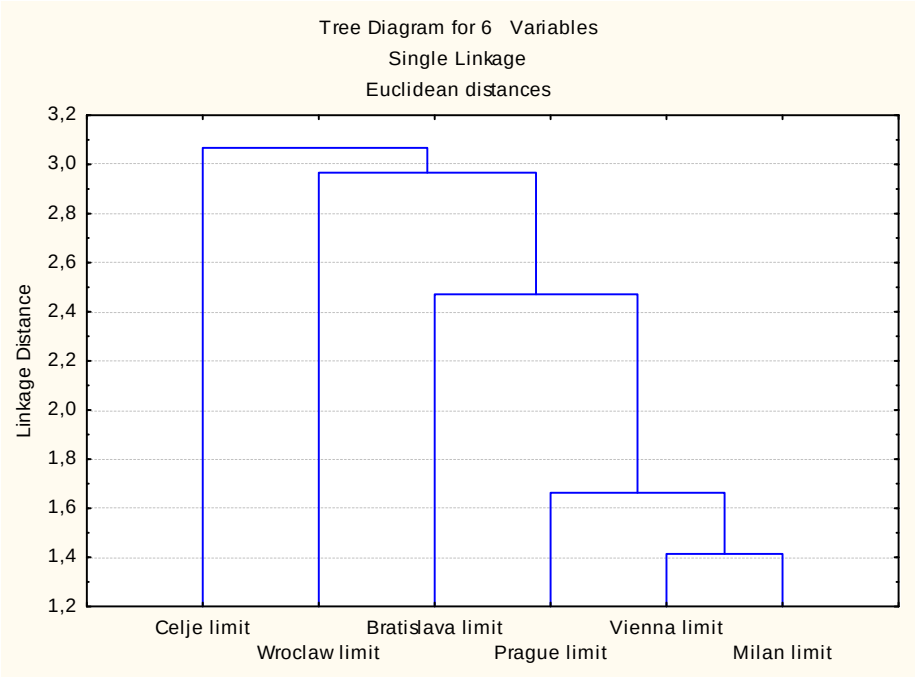

Figure 11. Hierarchical tree cluster analysis for sustainability limits for soil functions

Taking average values into consideration, only the strong protection scenario is expected to enable reaching the sustainability limits for environmental functions and partly related 'Health' (SOC3) and 'Recreation' (SOC2) functions (Figure 3). However, this extreme

protection scenario would lower the transport (ECO2) and housing/workplace (ECO3) functions far below the accepted limit. These most important economic functions would not be reduced (comparing to the current status) by the medium protection scenario – this scenario would enable reaching the expected limit for ECO3 and only slightly drop below stakeholders expectations for ECO2. However, we must remember that the relationships between scenarios and sustainability limits are different in particular cities.

5. SUMMARY

The approach of the impact assessment presented here involves participation of local stakeholders and is based on collecting their opinions on possible urbanization consequences. The objectives of the Deliverable 6.3.1 were to establish a network of stakeholders representing project pilot cities, raise the awareness on soil role in urban areas and gather their opinions on key sustainability issues in the cities and potential impacts of various soil protection scenarios. Stakeholder meetings were organized in Celje, Vienna, Milan, Prague, Wroclaw and Bratislava.

In general two economic soil functions 'Housing and workplace provision' and 'Transport infrastructure' were set as most important by the stakeholders. These circumstances make soil protection activities even more important. All environmental soil functions were classified as important to protect in all cities.

Potential impact of baseline (no change in regulations) and two alternative scenarios (medium and strong soil protection) was analyzed. The baseline scenario was assessed as favorable to economic functions 'Housing and workplace provision' and 'Transport infrastructure' whereas all environmental functions were deemed as threatened. Medium soil protection (no sealing on high quality soils) would basically sustain the soil environmental functions at the current level.

The very important observation is that certain strengthening of soil protection (medium soil protection) would not restrict infrastructure and housing/industry construction below the limit acceptable by the local stakeholders (Figure 3). Exclusion of both medium and high quality soils from sealing (strong protection scenario) would be, according to the stakeholders, unacceptable obstacle for development of housing and workplace sector. However, this extreme scenario would highly improve the environmental soil functions. There is a general demand for improvement of soil environmental functions, such as retention, biodiversity and buffering, in the pilot cities.

6. KEY MESSAGES

- **In all cities continuation of current soil protection regulations would lead to loss of all environmental soil functions**
- **Economic functions were set as key issues for city development which makes the soil protection more challenging task and the awareness of soil role even more important**
- **Better protection of soils is required to sustain or improve the quality of life in the cities**
- **There is a demand for improvement of environment status in the pilot cities**
- **According to stakeholders – strengthening of soil protection (medium protection scenario) would not limit the economic development**

7. REFERENCES

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URBAN SMS Soil Management Strategy

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