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Böden für die regionale Eigenversorgung

Regional Benefits of Sustainable Land Use

Project-Reports:

- Urban SMS newsletter no. 7
- SONDAR INFORMATION N° 1
Soil Strategy Network in the Danube Region

This goal could have been considered too ambitious, but some help in achieving it came from another major change in the land management policies in Milan in these years: after years of discussion and research, in spring 2010 Milan changed its main planning tool (the former General Masterplan) eliminating the zoning system and shifting to a Land Governance Plan where land uses have to be negotiated between developers, municipal officers and technicians on the basis of services available or needed in the surrounding of the land parcel under discussion. In this new system every land parcel is assigned a building volume of $0,5\text{m}^3/\text{m}^2$ that is exchangeable with a stock market-like mechanism. The Municipality can ask a developer to shift its building rights from one parcel to another, from a zone to another (in case to a parcel owned by the Municipality itself) in order to densify the city where services (such as roads, schools, etc) are sufficient and to open spaces where it is already too crowded.

In this way an Urban-SMS tool able to identify the best location for a new area with high ecological quality can effectively support day-by-day work of municipal technicians dealing with decisions described above. The same happens with agricultural leftover in densely built areas: the SMS tools can better tell even non-specialists where soils should be preserved (and connected through re-shaping of the urban fabric) or can be lost in change of some adequate compensation in the surroundings.

The first set of tools planned in the Urban Soil Management Suite – developed both as a simplified electronic spreadsheet and as a more complex client-server Web-GIS application – comprehended mainly soil quality tools able to describe intensive properties for the considered parcel. These tools cannot describe whether a good or bad soil could be connected to an adjacent one or could be reached and used by citizens. For this reason the Municipality of Milan asked for the development of two additional tools, i.e. a so called Connectivity tool (CNT) and a Proximity/Accessibility tool (PROX) and diverted part of funds from other activities to that objective; these two additional tools are anyway available to each project partner interested in their application to its own case.

Aim of the Connectivity tool is the identification of parcels suitable to connect existing ecosystems (or, in a plainer way, open and unsealed spots) while the Proximity tool assesses the increased benefit of citizens in one area descending from the recovery of an area with good ecosystem quality in the surroundings. Another use of the Connectivity tool is driving urban transformation influencing trades of building rights in order to create - through years – green corridors and areas following the design indicated by municipal technicians through a densify-rarefy mechanism.

Beyond the application of described tools and planning/EIA/SEA methodologies developed by the Urban-SMS Consortium there are still some delicate aspects, specific of the Milan case study, that need more attention and

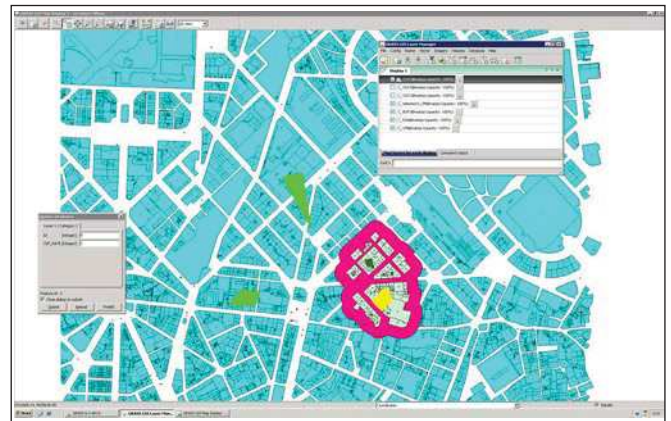


Fig. 2: Demo version of PROX tool.

for sure will be in the focus of local administrators in the years leading to the International Exhibition EXPO 2015, to be held precisely on the area chosen as pilot in the Urban-SMS project itself: Italian and Lombardy legislation up to now have defined requirements and recovery methods for polluted soil with a post-industrial approach: mainly physico-chemical properties are considered and assessed as means on 1 to several (up to 20-25) metres deep layers. No specific assessment methodology or requirement is established for soil of ecosystem interest, i.e. the first centimetres. Moreover in Risk Assessments for contaminated sites only direct contact, ingestion, inhalation of vapours or leakage to groundwater are considered, not evaluating the role of vegetation both on the natural environment and on human health, typically through consumption of agricultural products. In fact the application of URBAN SMS in Milan – through the newly acquired awareness of soil properties and the possibilities offered by project's tools and methodologies – suggests that management of soils within land planning processes should involve in this direction.



Fig. 3: Part of the Milan staff; from left to right: Andrea Zelioli, Fabio Villa and Marco Parolin.

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Analysis of Milan soils

To apply on Milan the Urban-SMSuite (Web-GIS tools for natural soil preservation in Land Planning procedures) the local staff decided to lead an ad hoc soil sampling campaign in selected areas: a major chance was offered by the ongoing environmental survey on the area designated for EXPO 2015, other areas were selected within a new public housing scheme in the semi-peripheral city belt.

In July 2010 topsoil samples were collected in Via Rizzoli (assigned to a new housing compound), while other analysis were performed in parallel on the same and on other points in deeper layers (1 to 3 meters). In September 2010 27 topsoil samples were then collected on the EXPO area. Also in this case, in the same points and plus others a parallel environmental campaign was performed on deeper samples. Two sets of soil samples were collected in all investigated points: the first was sent to a commercial laboratory specialized in soil contamination and land reclamation procedures for ordinary physico-chemical analysis (heavy metals, PCB, HC with C >12, <12, PAHs), while the second was taken by the University of Turin for determination of basic soil properties and agronomical characteristics.

Expo area	pH	Organic C	N	P Olsen	CaCO ₃	CEC	Gravel	Coarse sand	Fine sand	Coarse silt	Fine silt	Clay
N=27		%	%	mg kg ⁻¹	%	cmol/kg	g/kg	%	%	%	%	%
Mean	5.18	1.23	0.13	2.44	0.1	10.92	123	18	21	17	30	14
Median	5.03	1.32	0.13	2.17	0.0	11.18	125	16	22	17	29	14
Min	4.41	0.66	0.08	0.00	0.0	7.63	10	9	14	11	24	6
Max	7.53	1.58	0.17	8.03	2.0	13.71	254	30	29	23	39	20
Std. Dev.	0.70	0.23	0.02	1.94	0.4	1.90	63	6	3	3	4	3
Via Rizzoli	pH	Organic C	N	P Olsen	CaCO ₃	CEC	Gravel	Coarse sand	Fine sand	Coarse silt	Fine silt	Clay
N=4		%	%	mg kg ⁻¹	%	cmol/kg	g/kg	%	%	%	%	%
Mean	7.00	1.97	0.20	3.91	23.0	12.29	350	36	26	10	18	9
Median	7.35	2.47	0.18	4.34	6.0	11.31	312	35	26	10	18	9
Min	5.40	0.01	0.12	1.09	0.0	8.30	240	23	22	7	10	7
Max	7.90	2.92	0.32	5.86	80.0	18.24	535	53	31	14	25	13
Std. Dev.	1.13	1.34	0.09	2.02	38.1	4.60	129	14	4	3	6	3

Tab. 1: Statistics of soil data regarding two Milan case-studies: Expo area and Via Rizzoli, 2010/2011.

Soil contamination

Despite of the great variability in basic soil properties, topsoils of the area show some common trends in terms of soil contamination. Table 2 on the right shows the descriptive statistics of identified contaminants that were analyzed on the areas. Some of the samples at both sites showed relatively high values of inorganic contaminants (As, Hg, Pb and Zn) in green areas. While some of these could be related to the land use (e.g. As with agricultural practices on the Expo area) the others are typical pollutants from diffuse sources (heating plant, traffic etc.). The city can therefore be considered as a singular, large source of diffuse contamination, which causes enrichment of some typical contaminants on surface layers of its exposed soils. This is confirmed also by the results of samples taken from the whole first 1 meter thick layer (data not shown), where much lower values were observed, testifying their accumulation on the first centimetres of soils as a consequence of atmospheric deposition. ■

In total 31 samples were analyzed for pH, organic C content, total N, available P, carbonates content, Cation Exchange Capacity (CEC), exchangeable cations, gravel content and particle size distribution.

Soil characterization

The two study areas strongly differ in terms of general soil properties, as shown by the statistical summary of some of the data shown in Table 1. In fact, the Via Rizzoli site most likely reflect an anthropogenic influence, showing neutral pH, high carbonate and gravel content and a coarse texture. These are typical properties of urban soils, that often are mixed with anthropogenic materials such as bricks, demolition wastes and so on, which can bring about an increase in pH and carbonates content, an increase in coarser fractions, a high gravel content etc. This typical urban soils pattern is well represented by the comparison of data from via Rizzoli (an inner city green area with evidence of anthropogenic disturbance) with those from the Expo area (an outer city green area still used for agricultural practices). In this latter, in fact, soil does not appear to have been strongly modified in its composition by human activities. Soils of the expo area in fact present a more uniform texture, a lower gravel content, no carbonates and an acidic pH.

Expo area	As	Cd	Cr	Hg	Ni	Pb	Cu	Zn	PCB	PAH
Mean	11.0	0.2	58.2	0.3	29.3	65.5	22.2	73.0	0.001	0.004
Median	10.8	0.2	57.5	0.1	28.1	63.6	21.7	68.1	0.000	0.000
Std. Dev.	3.5	0.1	7.7	0.4	4.1	27.6	6.9	23.1	0.003	0.009
Via Rizzoli	As	Cd	Cr	Hg	Ni	Pb	Cu	Zn	PCB	PAHs
Mean	9.2	1.3	63.7	0.3	34.6	73.3	38.6	145.1	0.024	0.115
Median	8.1	0.9	58.3	0.3	35.4	76.6	40.5	135.5	0.024	0.115
Std. Dev.	2.9	1.3	18.0	0.3	7.6	54.8	20.7	100.4	0.034	0.163

Tab. 2: Statistics of contaminants (mg/kg) regarding two Milan case-studies: Expo area and Via Rizzoli, 2010/2011.

Responsible for this issue: Emil Fulajtar, Reto D. Jenny, Marco Parolin, Mattia Biasoli, Fabio Villa, Andrea Zelioli; for the status of work packages: Sigbert Huber (**Soil management concept**), Borut Vrščaj (**Soil manager suite**), Grzegorz Siebielec (**Acceptance and awareness**).

Status of Work Packages

Soil management concept

The Draft Guide "Municipal soil manager", which was finalised in the last period provides a concept how urban soil management should be carried out in order to consider the soil functions as much as possible in spatial planning. The report describes the goals and strategies as well as needs for soil protection which should be followed and implemented by several tools. Legislative instruments, soil management and evaluation tools are described and guidance for application and monitoring of urban soil management are given. This guide shall help spatial planning authorities to conserve soils for providing natural functions relevant for the citizens in urban areas. During spring and summer 2011 the practical application of the guide was tested in several pilot areas according to local opportunities. First experiences show that the guide is helpful, but it should be more focused on practical implementation.

Soil manager suite

In the last months, the Soil manager suite software has been successfully installed at the project partner's institutions. In the first stage it was tested on a test datasets and later on, each partner also adopted their own datasets. This stage of testing proved to be most difficult for a majority of the partners. The manuals and guidance documents were that for improved and adjusted accordingly, to serve best the user's needs. The testing of software functionalities now continues. Partners will assess the software results and outputs based on their local expertise and experiences. In the mean time some minor changes are being made in order to smoothen the installation and dataset adaptation stages.

Local applications

The WP5 activities were concentrated on the progress in local applications of research results. All participants were supplied with four templates, which were designed to unify reporting results gained at pilot areas and follow the outputs of the other partners. One of them was aimed on experiences with application of Soil Manager Suite software for evaluation of suitability of the land for its utilization as a building area. Nowadays the testing is realizing and the first results and outputs are arising. Other template was designed to extract the experiences with application SEA/EIA procedures. The third was designed to get the datasets, used for its application in above mentioned software. The last template is concerning compensation measures package during urbanization process. All the participants are preparing final form of the experience report; which will serve as a material for preparation of the final materials of WP5 – Case study book and Experience book.

Acceptance and awareness

The report on assessing impact of uncontrolled urbanization on local climate was prepared. Furthermore it was analyzed how density of sealed areas in large cities may affect occurrence of temperature extremes. The analysis revealed that average temperatures in sealed city centres might be up to 10 degrees higher in summer periods than in districts with significant share of green zones. The draft of the Awareness Raising Pack has been prepared: 1) general information on role of soils for urban environment and life quality (a leaflet explaining and illustrating value and role of soils for creating quality of life in urban areas and the awareness raising video); 2) information on limited efficiency and possible consequences of current soil management in urban zones (a leaflet on current trends in soil management and its possible consequences based on spatial analysis and participatory impact assessment); 3) information on available measures and techniques to improve soil management and soil functions.

About the URBAN SMS newsletter

This is the 7th issue of the Urban SMS newsletter which is published regularly in the Local land & soil news. The newsletter keeps the readers informed about the progress and the results of the international Central European project "URBAN SMS" aimed on management of soils in urban environment. Each issue presents a case study from one project partner city. This issue presents the information about case study in Milano, Italy.

URBAN SMS calendar

The next URBAN SMS event will be on 19–21st October 2011 in Milano, Italy. The meeting organizer will be Municipality of Milano. At this meeting there will be a training session on use of URBAN SMS tools developed as the major output of URBAN SMS Project. The URBAN SMS final conference will take place on 8–9 February 2012 in the City Hall of the City of Stuttgart, Germany. It will be having an interactive conference with plenary as well as workgroup sessions and the possibility to take part in an excursion on the second day. As a premiere the URBAN SMS awareness raising video: "Soil at Risk" will be presented.

URBAN SMS website – updates

Project website is on www.urban-sms.eu. It provides basic information on the project, the publications produced in the frame of the project and information on case studies. The information is regularly updated.

Last but not least ...

The URBAN SMS project entered to final stage of its life time. The results of project will be summarized in Final brochure. This brief document (about 24 pages) will provide overview of the project achievements. All particular detailed outputs will be uploaded on project web site, which will remain accessible also after the end of the project. Final brochure will provide links to each particular output document available at website.

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