15TH EUROPEAN FORUM ON URBAN FORESTRY CONFERENCE

Urban Forests – Ecosystem Services and Sustainable Maintenance

Leipzig, Germany, May 8 – 12, 2012




Welcome to the 15th annual conference of the European Forum on Urban Forestry (EFUF)

The City of Leipzig and Helmholtz-Centre for Environmental Research - UFZ are proud to be your host at the 15th EFUF in the City of Leipzig, Germany.

In Leipzig, the development of the city and the forest are closely interrelated, not least because one of the largest floodplain forests areas of Central Europe is in our urban territory. Indeed the urban floodplain forest is the backbone of the city's multifaceted green network that includes lots of parks, gardens & allotments and which contribute to the high quality of life in our city.

This green network is complemented by a system of rivers and water courses which cross the city and shape the cityscape. Awareness of our blue infrastructure is now emerging due to the the reconstruction and rehabilitation of canalized water courses, improvement of water quality and the river system. In recent years, it has developed into a significant attraction for Leipzig's citizen as well as for tourism businesses in the region.

The city administration is aware of the importance of its green and blue infrastructure for the city's economic development. They are looking at new ways forward and are developing pilot projects supported by Federal funding delivered in cooperation with local stakeholders, local enterprises and the various science and research institutes.

In Leipzig we also know that in future, in particular under the conditions of climate change, that it is crucial to protect and further develop our green infrastructure. The question is however, how can we improve our activities to maintain the important ecosystem services provide by the cities green and blue infrastructure? This we would like to discuss with you during the next days.

We are delighted to welcome you to our city with its diverse urban landscape. Please have productive working days, but also make new friends and business contacts and most of all have an enjoyable stay.

City of Leipzig

HELMHOLTZ CENTRE FOR ENVIRONMENTAL RESEARCH – UFZ

Content

General Information

Registration desk

The registration desk at the Foyer of the Leipziger KUBUS conference centre will be open on Tuesday from 18:00 - 20:00h and from 08:00h - 14:00h on Thursday and Friday as well as on Wednesday at the Foyer in front of the Sitzungssaal of the New City Hall. Each participant receives a conference bag and the name badge which needs to be worn during the entiry conference. The service at the registration desk provides you with the latest news of the conference programme and supports with useful information during your stay.

Lunches & Coffee Breaks

Coffee & Tea breaks are included (served at the Foyer) as well as the lunch.

Local Traffic and LVB-Ticket

The name badge is valid as LVB-Ticket for public transports. The LVB-Ticket is valid during the entire conference (8 -12 May) and allows unlimited trips in Zone 110 (City of Leipzig). Furthermore it includes one journey from and to the airport Halle/Leipzig (Zone 162 + 163). Please keep the name badge always with you, because several conferences transfers will be done via public transport.

Please proceed to the registration desk, if you need further information on local traffic.

Internet & Wireless LAN

At the Leipziger KUBUS you will have access to the intenet either on the working station provided at the Foyer next to the terrace or via WLan with the following SSID:

Name of net: KUBUS
Password: EFUF2012EFUF2012

Conference Venues

Wednesday, 9 May 2012

New City Hall Leipzig, Sitzungssaal | Martin-Luther-Ring 4-6, 04109 Leipzig.

Thursday-Friday, 10-11 May 2012

Leipziger KUBUS Conference Centre | Permoserstr. 15, 04318 Leipzig

Please visit: *www.leipziger-kubus.de* Phone: +49 (0)341 235 2264

Building 1.0
Management and Administration
Public Relations
Library
Dept. Applied Landscapes Ecology
Dept. Groundwater Remediation
Dept. Isotope Hydrology
Dept. Ecological Modelling
Dept. Economics
Dept. Conservation Biology
Dept. Urban Ecology, Environmental Planning and Transport
Dept. Urban and Environmental Sociology
Dept. Environmental and Planning Law

Building 2.0
Canteen

Building 4.0
Dept. Analytical Chemistry

Building 4.1
Dept. Environmental Microbiology

Building 5.0
Dept. Bioremediation
Dept. Environmental Microbiology
Dept. Environmental Technology
Centre for Environmental Biotechnology

Building 6.0
Dept. System Ecotoxicology
Dept. Human Exposure Research and Epidemiology
Dept. Cell Toxicology
Dept. Environmental Immunology

Building 6.1
Central computer centre
UFZ - Apartments

Building 7.0
Construction Section

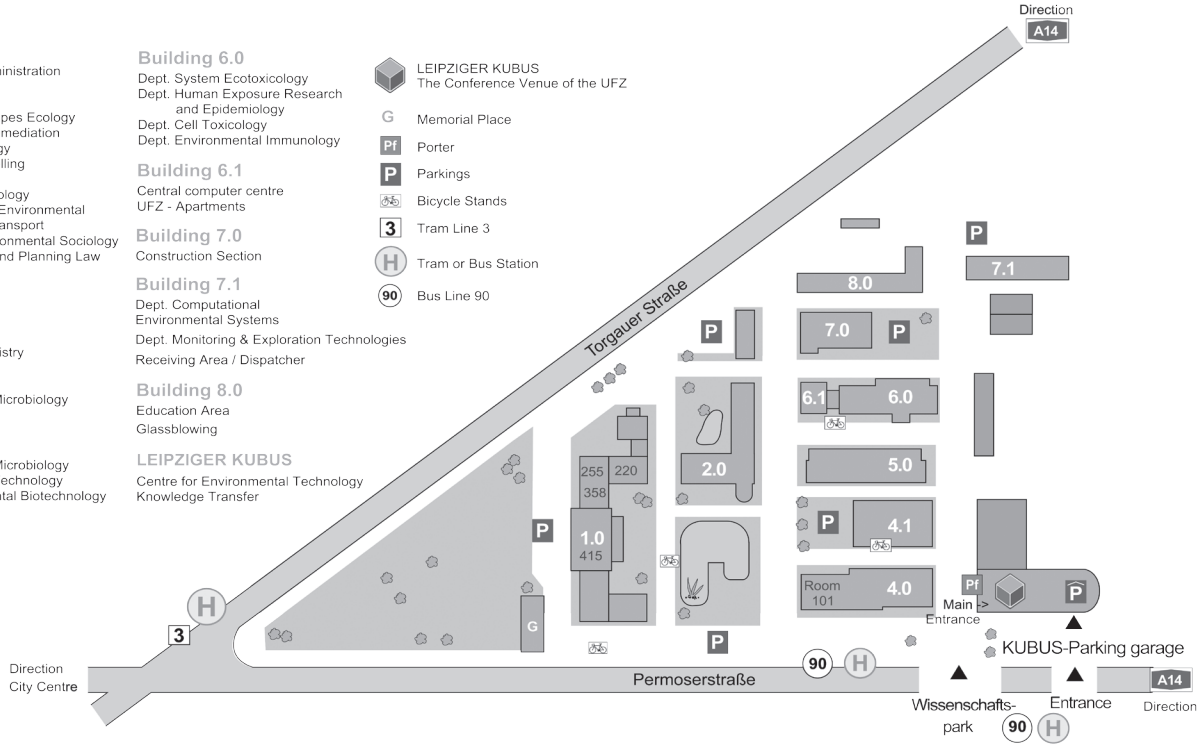
Building 7.1
Dept. Computational Environmental Systems
Dept. Monitoring & Exploration Technologies
Receiving Area / Dispatcher

Building 8.0
Education Area
Glassblowing

LEIPZIGER KUBUS
Centre for Environmental Technology
Knowledge Transfer

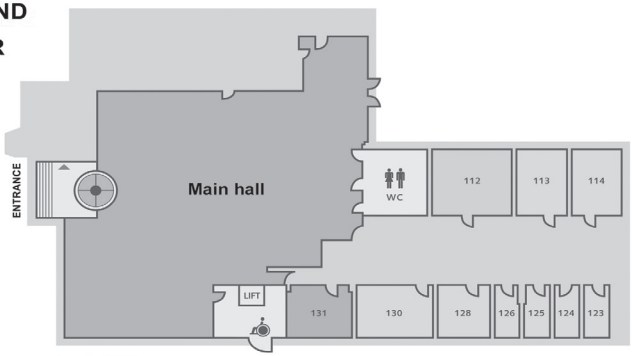
LEIPZIGER KUBUS
The Conference Venue of the UFZ

G Memorial Place
Pf Porter
P Parkings
Bicycle Stands
3 Tram Line 3
H Tram or Bus Station
90 Bus Line 90



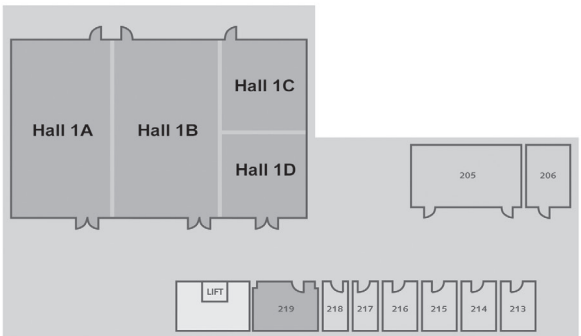
General Information

GROUND FLOOR



112 – 128 Various Offices
130 F&U confirm
131 Conference Office

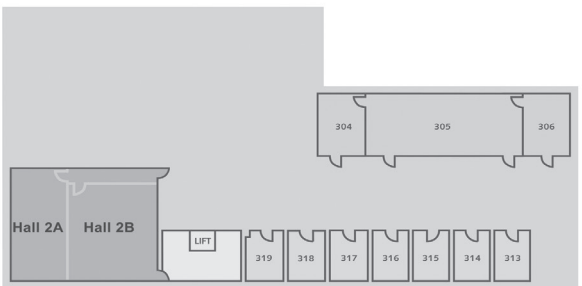
FIRST FLOOR



Hall 1 A/B/C/D
205 PC Pool
206 Laboratory

213 – 218 Various Offices
219 Press Room

SECOND FLOOR



Hall 2 A/B
304 – 306 Laboratories
313 – 319 Various Offices

General Information

Social Programme

Tuesday 8 May, 7 p.m.

Welcome reception at the Leipziger KUBUS

Address: Permoserstr. 15, 04318 Leipzig

Wednesday 9 May, 8 p.m.

Dinner at the Ratskeller

Address: Lotterstraße 1, 04109 Leipzig (next door to the Leipzig town hall)

Thursday 10 May, 8 p.m.

Dinner at Schlobachshof

Address: Lützschenaer Str. 200, 04178 Leipzig (a shuttle bus will be provided from the field exercise location "Alte Wache" in the area "Burgaue" and back to the city centre)

Friday 11 May, 8 p.m.

Dinner at the Kiwara Lodge of the Leipzig Zoo

Address: Zoo Leipzig GmbH, Pfaffendorfer Str. 29, 04105 Leipzig

Directions from the UFZ (KUBUS) to the Zoo (15min. by tram):

Please take tram no. 3 or 13 (direction Knautkleeberg) to tram stop Goerdelerring (1st stop after Main station). Take a minute walk along Pfaffendorfer Strasse or take tram 12 (direction Gohlis Nord) to tram stop Zoo (2nd stop). The zoo entrance is on the left hand side.

There will be a joint walk to the Kiwara Lodge through the zoo, meeting at 7.45 pm at the entrance. If you arrive later, the zoo will be open for you till 8 pm, after 8 pm the zoo will be closed!

Conference Programme

Tuesday 8 May: Registration and welcome reception
Location: Leipziger KUBUS

18:00 – 20:00 Registration
19:00 – 21:00 Welcome reception (light buffet and drinks)

Wednesday 9 May: Conference Day 1
Location: City Hall Leipzig, Sitzungssaal

08:00 – 09:40 Registration and welcome coffee / tea

09:40 – 10:00 Welcome address

Chair: Torsten Wilke

Heiko Rosenthal; Vice Mayor and Deputy Mayor for Environment, Public Order and Sports of the City of Leipzig
Klaus Henle; UFZ, Head of the Department Conservation Biology
Cecil C. Konijnendijk; Coordinator of the European Forum on Urban Forestry

10:00 – 10:45 Keynote I "Urban Forests and Ecosystem Services"
Ecosystem Services of Urban Nature

Beate Jessel; President of the German Federal Agency for Nature Conservation (BfN), Germany

Plenary Session Ia "Urban Forests and Ecosystem Services"

Chair: Renate Späth

10:45 – 12:15 The Economics of Ecosystems and Biodiversity in Germany – The Natural Capital or TEEB Germany
Bernd Hansjürgens; UFZ, Head of the Deptartment Economy, Germany

The TEEB-approach in urban forests of North Rhine-Westphalia – Findings from a feasibility study
Christoph Aicher, Uta Berghöfer; UFZ, Germany

Benefits of urban parks – systematic review of evidence
Cecil C. Konijnendijk; Swedish University of Agricultural Sciences, Alnarp, Sweden, Danish Centre for Forest, Landscape and Planning, University of Copenhagen
Matilda Annerstedt; Department of Work Science, Business Economics, and Environmental Psychology
Sreetheran Maruthaveeran; Danish Centre for Forest, Landscape and Planning, University of Copenhagen; Forest Research Institute Malaysia
Anders Busse Nielsen; Swedish University of Agricultural Sciences, Alnarp, Sweden

Planning for new green infrastructure to support ecosystem services and well-being in urban regions
Raffaele Lafortezza; Dipartimento di Scienze Agro-Ambientali e Territoriali, Università degli Studi di Bari "A.Moro"
Clive Davies (presenter); Department of Architecture, Planning & Landscape, Claremont Tower, Newcastle University, UK
Giovanni Sanesi; Dipartimento di Scienze Agro-Ambientali e Territoriali, Università degli Studi di Bari "A.Moro"
Cecil C. Konijnendijk; Danish Centre for Forest, Landscape and Planning, Faculty of Life Sciences, University of Copenhagen, Denmark

12:15 – 13:15 **Lunch**

Plenary Session Ib "Sustainable Maintenance – The Leipzig Case"

Chair: Alice Kube

13:15 – 14:00 Leipzig's green and blue infrastructure: Tasks and challenges for quality of urban living
Inge Kunath; Head of the Dept. Urban Green and Water Courses of the City of Leipzig, Germany

Urban Forests as an Innovative Open Space Strategy for Shrinking Cities
Regina Dietrich; City of Leipzig, Dept. Urban Planning
Dieter Rink, Thomas Arndt; UFZ, Department of Urban and Environmental Sociology, Germany

14:00 – 19:00 **Boat trip and excursion in two groups**

20:00 – 23:00 **Welcome dinner: Ratskeller der Stadt Leipzig**

Thursday 10 May: Conference Day 2
Location: Leiziger KUBUS

Keynote II "Urban Forests and Sustainable Maintenance"

Chair: Hans Kasperidus

09:00 – 09:30 The City Forests of Leipzig and their Management
Andreas Sickert, Head of the Forest Department of the City of Leipzig, Germany

Plenary Session IIa "Urban Forests and Ecosystem Services"

09:30 – 10:30 The Value of Being Selective
Sarah Low; USA

Open Space Technology and the collaborative rehabilitation of derelict land to enhance the ecosystem services potential of peri-urban forests and waterways
Fabio Salbitano; DEISTAF, University of Firenze, Italy
Marialuisa Cipriani, Elena Farne, Claudia Morri; Intercity Lab, Italy

The case study of an urban forest carbon credit trading patent: creation, regulation and trade catalyst
Gerrit Hennie Stoffberg, M.W. van Rooyen; Unisa and University of Pretoria, South Africa.

10:30 - 11:00 **Break**

Parallel Sessions II

Session A: Urban Forest Management in Urban Regions

Chair: Mathias Scholz

11:00 - 12:30 Urban forest management in Helsinki meets the challenges of climate change, biodiversity and municipal politics
Tiina Saukkonen; Public Works Department, Finland

Progressing Green Infrastructure in The Leeds City Region – The Nine Lakes Forest Park Project
Alan Simson; Leeds Metropolitan University; UK

Urban Forests: Are they really so different? The comparative analysis of urban forests' potentials of six largest cities in Slovenia
Robert Hostnik; Slovenia Forest Service, Slovenia

Adolescents' preferred river landscapes for recreation depending on human impact and river dynamic
Arne Arnberger, Renate Eder; University of Natural Resources and Life Sciences Vienna, Austria

Session B: Strategies and Management of Urban Green

Chair: Clive Davies

Population health as an ecosystem service within the concept of urban forestry
Matilda Annerstedt; Institution of Work Science, Business Economics, and Environmental Psychology, Sweden

Better Understanding the Performances of Urban Green Spaces European Research on Green Spaces - Goals and Results
Carlos Smaniotto Costa; DialogUrban - Network for Urban Research, Germany

Do Street Trees Tendencies Represent Trends in the Overall Urban Forest?
Charles A. Wade; C.S. Mott Community College, USA
J. James Kielbaso; Michigan State University, USA

Managing the Urban Forest
Kenton Rogers; University of Cumbria, UK

12:30 – 13:30 **Lunch**

Plenary Session IIb: "Urban Forests and River Restoration"
Chair: Carlos Smaniotto Costa

13:30 – 14:15 Introduction to the Project "Lebendige Luppe"
Project Team „Lebendige Luppe"

14:15 – 19:00 **Field exercise at "Alte Wache" in the area "Burgaue" (bus transfer)**

19:00 – 22:00 **Evaluation of exercise and Dinner: Schlobachshof (bus transfer)**

22:00 – 23:00 **Bus transfer from Schlobachshof to City Center and UFZ**

Friday 11 May: Conference Day 3
Location: Leipziger KUBUS

Keynote III "Grounding Urban Forests Ecosystem Services"
Chair: Cecil Konijnendijk

09:00 – 09:30 Green Technologies for the Development of Sustainable and Climate Resilient Cities
Marina Bergen Jensen; Professor at University of Copenhagen, Denmark

Plenary Session IIIa "Urban Green and Trees Management"

09:30 – 10:30 Another way? The park trust model in the UK
James McCulloch; Nene Park Trust, UK

The urban landscape below ground – can we grow trees „out of a box"?
Astrid Hamm; Consultant Urban Forestry, Arboriculture and Urban Greening 'Citybranchings', Germany

Urban forest on a rooftop: Exploring ecological and environmental functions
C.Y. Jim; University of Hong Kong, Hong Kong

10:30 - 11:00 **Break**

Parallel Sessions III

Session C: Urban Trees Management

Chair: Astrid Hamm

11:00 - 12:30 Enhancing the capacity of trees to withstand stressful conditions: the effects of nursery pre-conditioning
Alessio Fini; University of Florence, Italy
Piero Frangi, G. Amoroso, Riccardo Piatti, Marco Faoro; Mirt – Fondazione Minoprio, Italy
Cecilia Brunetti, Martina Di Ferdinando; University of Florence, Italy
Massimiliano Tattini; Istituto di Protezione delle Piante, Italy
Francesco Ferrini; University of Florence, Italy

Vegetation accumulates particulate matter and metals in urban areas.
Arne Sæbø, H.M. Hanslin; Bioforsk, Norway
H. Gawronska, S. Gawronski; SGGW, Poland

Management of Maksimir Urban Forest: Tree Risk Assessment Survey
Vinko Paulić, Milan Oršanić, Damir Drvodelić, Mario Šango; University of Zagreb, Croatia

Advancing urban forest management: Site-specific growth curves for young urban trees
Max Piana, Blake Troxel, Mark Ashton, Colleen Murphy-Dunning; Yale School of Forestry & Environmental Studies and Hixon Center for Urban Ecology, USA

Session D: Management and Reestablishment of Urban Forests

Chair: Dieter Rink

The Challenge of Urban Renewal within a Mature Inner City Forest - Creating a demonstration housing renewal project in central London
Chris Baines; Chris Baines Associates Ltd, UK

Brownfield Regeneration to Greenspace: Opportunities for Social and Environmental Gain
Gail Atkinson, Kieron Doick, Kate Burningham, Chris France; Centre for Forestry and Climate Change and University of Surrey, UK

Restoration of a Damaged Urban Forest Park: The Case of Point Pleasant Park, Halifax, Canada
Peter Duinker; Dalhousie University, Canada

Liverpool City Region Green Infrastructure Framework
Clare Olver, Paul Nolan (presenter); The Mersey Forest, UK

Session E: Urban Forest Structure & Biodiversity

Chair: Robert Hostnik

LIFE+ project EMoNFUr - Establishing a monitoring network to assess lowland forest and urban plantation in Lombardy and urban forest in Slovenia
Andrej Verlič, Enrico Calvo, Roberto Carovigno, Riccardo Gini, Benedetto Selleri, Primož Simončič, Giovanni Sanesi; Slovenia and Italy

Ecological effects of fire on biodiversity in periurban forests: a case study in Southern Italy
Mario Elia, Raffaele Lafortezza, Giuseppe Colangelo (presenter), Eustachio Tarasco, Giovanni Sanesi; DISAAT and Università degli Studi di Bari "A.Moro", Italy

Towards a large scale network of Urban Forests for ecosystem services in the heart of Mediterranean basin: the new strategy of the project "Urban Parks" in Sardinia, Italy
Marcello Airi, Antonio Casula; Regional Agency the Forests Sardinia, Italy
Fabio Salbitano; DEISTAF, Italy

Effects of urbanization on the structure of plant communities in the urban forests of İstanbul
Serhun Sağlam, Raffaele Lafortezza; Istanbul University, Turkey and University of Bari, Italy

12:30 – 13:30 **Lunch**

Parallel Sessions IIIb
Session E: Urban Forestry Strategies and Public Involvement

Chair: Alan Simson

13:30 – 14:15 The Mersey Forest - 20 years of progress and a look to the future
Paul Nolan; The Mersey Forest, UK

Youth recreation participation in Oregon, USA: A comparison of urban and non-urban perceptions
Robert Burns, West Virginia University, USA

Session F: Urban Forestry and Governance

Chair: Marina Bergen Jensen

Municipal woodland in Denmark: resource, governance and management
Anders Busse Nielsen, Cecil C. Konijnendijk, Björn Wiström, Rasmus Bartholdy Jensen; Swedish University of Agricultural Sciences, Sweden; University of Copenhagen and Herning Municipality, Denmark

Incorporating sustainable development and governance to the management and planning of urban green areas
Ramiro Flores-Xolocotzi, Noé Santacruz García (presenter); Noé Santacruz Garcia; El Colegio de Tlaxcala; México

Session G: Open Space for Miscellaneous Meetings
Plenary Session IIIb: EFUF 2012 and beyond

Chair: Cecil Konijnendijk

14:15 – 15:00 Award of Young Urban Forester of the Year 2012
Cecil Konijnendijk

EFUF 2013 – Milan, Italy

EFUF 2014 – Lausanne, Switzerland

EFUF 2012 Closing address - *Clive Davies*

15:00 – 18:00 **Field trips in 4 Tours (max. 20 participants per tour)**

Tour 1: The "Green Promenadenring" - Germany's oldest inner-city landscape park

Tour 2: The "Green Arc" of Paunsdorf – a city urban nature safari

Tour 3: New urban forests: "Stadtgärtnereiholz" - model area for an action research project

Tour 4: Green places for remembrance: Leipzig's South Cemetery & Etzoldsch's Sand Pit

20:00 – 23:00 **Dinner at KIWARA-Lodge of the Zoo Leipzig**

Saturday 12 May: Excursion to Leipziger Neuseenland

09:00 – 17:30 Start and End at Leipziger KUBUS (detailed programme see chapter field trips)

- Sustainable Forestry Concept in The Gambia
  Hatab Camara, Ebrima AK Sanneh (PCED; The Gambia)
- Distribution of Armillaria species along a purple beech (Fagus sylvatica L. atropunicea) tree line as an aid to management decision
  Bruno Campanella (Lab. for Environmental Toxicology, Belgium), Sophie Schmitz (Life Sciences Dept., Belgium), Valérie Decoux (Ministry of the Brussels-Capital Region, Belgium)
- Allelopathic Effect of Ailanthus altissima on seedling growth of Fraxinus chinensis and Robinia pseudocacia
  Bing Cao, Lihua Song, Quanxiong Jiang (Ningxia University, China)
- Incorporating Climate Change into Urban Tree-Species Selection: The Case of Halifax, Canada
  Peter Duinker, Maliheh Rostami (Dalhousie University, Canada)
- Aggressive Urban Tree Planting for Carbon Sequestration: The Case of Burnside Industrial Park
  Peter Duinker, Alison Walsh (Dalhousie University, Canada)
- Aesthetic Value of the Young Forest
  Marina Golivets (National Academy of Sciences of Ukraine)
- Combining basic research, modeling and GIS techniques to maximize pollution mitigation by urban trees
  Arianna Morani (IBAF, Italy), David Nowak (USDA Forest Service, USA), Fabio Recanatesi Università degli Studi della Tuscia, Italy), Carlo Calfapietra (IBAF, Italy)
- Trend of Urban Development and its Impact on Urban Forestry (Case study: Rasht city, Iran)
  Farid Kazem Nezhad, Maryam Kasalinia Moghadam, Farshad Yazdyan (Islamic Azad Univ., Iran)
- MEDways: State of the art and a new networking strategy for Mediterranean Urban and Periurban Forests
  Fabio *Salbitano (Univ. of Firenze, Italy), G. Sanesi (Univ. of Bari, Italy), C. Basnou (UAB Creaf, Spain), P. Carinanos Gonzales (Univ. de Granada, Spain), J. Choumert (Univ. of Clermont Ferrand, France), K. Gazoulit (Haut Commissariat aux Eaux et Forêts et à la Lutte contre la Désertification, Morocco), S. Krajter (Univ. of Zagreb, Croatia), D. Pearlmutter (Ben-Gurion Univ. of the Negev, Israel), S. Sağlam (Univ. of Istanbul, Turkey), M. Sanchez (Public Univ. of Navarra, Spain), M. Santos-Reis (Univ. of Lisboa, Portugal), K. Tzoulas (Manchester Metropolitan Univ., UK), A. Verlic (Slovenian Forestry Institute, Slovenia)*
- Satellite Monitoring of Vegetation Cover of Lal Bagh Botanical Gardein, India
  Malini A Shetty, Somashekar R.K (Bangalore University, India)
- Ljubljana's urban forest management for safe and quality recreational experience
  Andrej Verlič, Nataša Đurić, Milan Kobal, Lena Marion (Slovenian Forestry Institute), Krištof Oštir (Slovenian Academy of the Sciences and Arts), Primož Simončič (Slovenian Forestry Institute), Janez Pirnat (Biotechnical faculty UL, Slovenia)
- Urban Forests and the Needs of Visitors: Case Study of the Park-Forest Košutnjak
  Andrijana Vukadinović (Technical School „Drvo art", Serbia), Ivana Gudurić, Tomićević Jelena (Univ. of Belgrade, Serbia)

Ecosystem services of urban nature

Quelle: Bundesamt für Naturschutz

Beate Jessel

President of the German Federal Agency for Nature Conservation (BfN), Konstantinstrasse 110 , 53179 Bonn, e-mail: pbox-bfn@bfn.de

Since 2010, half of the global population lives in urban areas and the urban population will continue to increase. In Germany, even three quarters of the population live in cities and agglomerations and around 30 % in cities with more than 100.000 inhabitants. Cities and towns thus not only represent the political majority – it is where the people are – but they are the places were for many people the first or only experiences with nature take place. So the appearance of the urban environment is very important for society's relationship to and perception of nature. If not for other reasons strategies of nature conservation must not stop at city boundaries but should include them.

Urban nature provides important ecosystem services which gain importance against the background of current challenges such as climate change and demographic change.

Due to demographic change the inventory of derelict land has risen steadily in many German cities for the last two decades. On the one hand, these areas often have unfavourable effects on the urban landscape; on the other hand, they have the potential to support certain ecosystem services. The afforestation of urban forests on derelict land introduces a new type of urban green. The testing and development project on urban forests on derelict land in the city of Leipzig, funded by the Federal Agency for Nature Conservation, shall explore new and innovative approaches for establishing such urban forests and evaluate them from an ecologic, economic and aesthetic perspective.

The respective efforts in Germany are framed by the National Strategy on Biological Diversity, adopted by the Federal Government in 2007. The strategy includes inter alia a vision for urban landscapes which is underpinned by verifiable targets and measures. To support its implementation the new federal funding programme on biological diversity was launched in 2011. An Alliance of Municipalities for Biodiversity was founded in February 2012. So far 64 municipalities have joined the Alliance. Obviously, any success in the state and development of urban biodiversity can only be achieved in dialogue with all stakeholders.

Beate Jessel is President of the Federal Agency for Nature Conservation (BfN) since 2 November 2007. Before, she was Professor of Strategy and Management in Landscape Development (Allianz Foundation Professorship) at the Technische Universität München and appointed Professor of Landscape Planning at the University of Potsdam (Institute of Geoecology). A full version of her CV is available at http://www.bfn.de/0102_p+M52087573ab0.html

The City Forests of Leipzig and their management

Andreas Sickert

Head of the Forest Department of the City of Leipzig, Germany

The city of Leipzig is the owner of about 2.000 ha forest areas and is one of the largest non-state owners in Saxony. The main portion of Leipzig's city forest is located near densely populated areas. The main parts belong to the flood-plain forest ecosystem of the so called "Leipziger Auwald". In total some 40 tree species can be found in the forest.

Leipzig's flood plain forest has been greatly changed throughout history, influenced by mans economic activity. This has led to it becoming an ecosystem with a huge range of biodiversity, high economical potential and is of great value for recreation.

The overarching objective for its management is to maximise multiple benefits covering ecology, economy and recreation.

However the floodplain forest has an unbalanced age structure and in the absence of sufficient management is becoming a "maple-forest" with over 86% of natural regeneration being Maple. Sadly the ecological important oak is disappearing. Hence the main task for city forest management activities is to maintain a mixed forest ecosystem that is ecologically valuable.

The practical approach to forest management is the application of a special form of the 'high forest system' in order to protect and to develop a tree species composition and a crop structure aiming at the sustainable preservation of canopy hardwood species diversity.

For semi–light demanding tree species, especially for common oak, the group selection method of cutting is applied to create small clear cuts for regeneration. However cutting trees in our densely populated area causes conflicts and trouble.

Public relations are important for the management of the city forest and communications is very important for achieving this. Today, there is good cooperation between the authorities for nature protection and local NGO's. This is good and constructive.

Andreas Sickert is forest engineer and is head of the forest department of the City of Leipzig since 1991. His department is responsible for the management of the urban forests owned by the city of Leipzig. Management follows the rules of FSC and PEFC and is honored with national awards for environmental sound forestry. He cooperates closely with national and international scientific institutes as well as with local authorities for nature protection and NGO's.

Urban Forests and Ecosystem Services
Green Technologies for the Development of Sustainable and Climate Resilient Cities

Marina Bergen Jensen

Professor at the Danish Centre for Forest, Landscape and Planning, University of Copenhagen, Rolighedsvej 23, DK-1958 Frederiksberg C

To what extent can we put green before grey in the transition of cities towards greater climate resilience and sustainability? The final destination for this transition is unknown; we can only work for the right direction, which at present seems to include the following elements linked to ecosystem services:

- Implementation of a strong green infrastructure
- Closing of the urban freshwater cycle
- Development of a green economy

None of these are yet well defined, but all hold promise of significant contributions. A well designed green infrastructure can alleviate the effects of extreme rain and urban heat island, and counteract loss of biodiversity. By linking stormwater, greywater and other types of wastewater to the water supply system the ecological footprint of the city on distant aquifers can be reduced, as can the sensitivity of the city towards drought. Finally, the use of such green technologies may create green jobs that replace fossil energy based solutions, and further the technologies may be refined into methods and products that can be exported and thus allow for 'Green Growth'.

According to their climate change adaptation plan, which was adopted 2011, The City of Copenhagen, Denmark, prioritizes the use of the green infrastructure for providing the extra drainage capacity needed and to cool the city during heat spells. Major technical challenges include how to implement a strong backbone of green overflow routes and flood resistant areas in the existing cities; how to ensure adequate water storages for evapotranspiration, and how to avoid contaminating surface and groundwater when infiltrating contaminated stormwater runoff from roads. A fourth major challenge is related to the Copenhagen soil conditions with low water infiltration capacity. At the same time the City of Copenhagen pushes the ambitions further by including biodiversity, mobility and health issues, as well as green growth spin off, in their green transition plans. Enhanced biodiversity and landscape based stormwater management are in many ways complementary; this also goes for the use of plants for cooling the city and closing of the urban water cycle.

Marina Bergen Jensen is a professor in design and construction of urban landscapes adapted to climate change. She holds a ph.d. in Soil Science, and is the inventor of the patented Dual Porosity Filtration technology, developed for treatment of stormwater runoff from roads. She is co-responsible for two national research projects dealing with urban water (www.vandibyer.dk, www.byerivandbalance.dk), teaching the master level course 'Urban Ecosystems – structures, functions and design', and the supervisor for currently six ph.d. students.

Abstracts of Oral Presentations

The TEEB-approach in urban forests of North Rhine-Westphalia – Findings from a feasibility study

Christoph Aicher, Uta Berghöfer

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North Rhine-Westphalia is the most densely populated state in Germany. The state is home to urban agglomerations where approximately 10 million people live in the vicinity of only 80.000 ha of forests. The pressure on these urban forests and the demand for their ecosystem services are high. It is essential for municipal forest authorities to go beyond core forest management objectives: Instead of focussing on timber production and common conservation practices, it is necessary to adapt management and its objectives in line with the multiple benefits and ecosystem services (ESS) these forests provide for the urban population. The ESS satisfy needs and expectations of a variety of urban stakeholders. This includes aspects such as space for leisure, habitat conservation, provision of sufficient water with good quality, climate regulation etc. Neglect of aligning forest management to these needs and benefits will not solve existing conflicts and will not lower the pressure on urban forests as well as on their services. So far, indicators are missing which help to value the management performance in terms of both social and ecological criteria. Appropriate indicators (1) represent the ESS of urban forests, (2) make the contribution of the forest management visible and accountable and (3) serve as a basis for communication with stakeholders, the general public and local policy makers.

According to the UNEP driven report on TEEB for Local and Regional Policy Makers, the TEEB Stepwise Approach facilitates a needs-oriented process which takes ecosystem services into consideration in local and regional decision making (2010, www.teebweb.org).

The UFZ has conducted a feasibility study with the aim to apply the TEEB Stepwise Approach in cooperation with major stakeholders and local and regional decision makers. The objective is to develop with the participation of major stakeholders a manual for the systematic survey and valuation of ecosystem services provided by urban forests. Results of the study are expected to be of relevance to for other urban environments as well.

Christoph Aicher is senior scientist at the Department Environmental Politics at the Helmholtz Centre for Environmental Research – UFZ. He obtained a Ph.D. in Forestry and a M.A. in Political Science. He is part of the TEEB (The Economics of Ecosystems and Biodiversity) research group at the UFZ and engaged in a project on urban forest governance in North-Rhine-Westphalia. His research focus is on environmental policy issues, especially, international forest policy.

Towards a large scale network of Urban Forests for ecosystem services in the heart of Mediterranean basin: the new strategy of the project "Urban Parks" in Sardinia, Italy

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Sardinia is one of the less urbanized areas in Italy. It is the second island of the Mediterranean Sea as size (24.000 km^2) but the population density is rather low (70 inh. x km^{-2}). Nevertheless, in the last two decades, even in an island well known for the wilderness of the landscape and for the very strong rural and pastoral character of the greater part of the land, the styles of life changed, and urban issues came to the top of the Policy Agenda. The concept of Urban Forest is rather new in the context of the island: planning, design, and management aspects of urban open spaces are very linked to the term Urban Park. The largest urban area, the metropolitan area of Cagliari (almost 500.000 residents i.e. 30% of the whole Sardinian population), has 12 urban parks but only 100 ha are available for social activities. In order to provide expertise and technical assistance to the urban municipalities of Sardinia, in 2011 the Regional Agency for the Forests launched the project "Urban Parks". The objective of the project is to constitute a network of Municipalities to promote the perspective management of the existing Urban Parks and to define the guidelines for a high performing social inclusive design and management. The first step of the project consisted in the commitment phase and the Municipalities were asked to sign an agreement to the further programme of shared knowledge and technical and institutional capacity building. During the ongoing second phase, the Municipalities can candidate a Urban Park every year (2011 campaign is finished) and a maximum of 12 urban parks per year can be selected and be part of the Regional Network of Urban Parks. The criteria to cope are i. the size of the park, ii. the number of trees, iii. the length of cycle paths and the number of areas for recreation, health and sport activities; iv. the number of social events held in the park; v. the number of projects of Urban Forestry carried on by the proposing Municipality; vi. the accessibility to the park and the interconnection with the most densely urbanized area; vii. the presence of cultural and natural areas heritage of high value; viii. the proximity and connection with other parks. The first response to the project is very promising and more than 60 municipalities expressed the will to participate and signed the agreement. The evaluation of the ongoing selection will be provided via qualitative and quantitative methods to determine the performance of the given criteria. The participatory phase on capacity building is getting a high feedback in term of shared knowledge and improvement in the management quality of the urban forests.

Abstracts of Oral Presentations

Population health as an ecosystem service within the concept of urban forestry

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Nature's potentially positive effect on wellbeing may serve as an important resource for population health. In an increasingly urbanized society this resource will to a relatively high extent be provided by urban forestry, and other urban green areas. Based on theories mainly derived from environmental psychology the association between nature and health has been explored in varied scientific studies the last century. This has rendered a substantial amount of empirical evidence for different beneficial effects of natural environments and urban greenery on health.

The aim of this presentation is to give a summary of the results and conclusions drawn from a thesis published last December at the Swedish University of Agricultural Sciences. The results' implications for practitioners and for the concept of ecosystem services will be discussed.

In the thesis the state of the art for nature as intervention was explored by a systematic review designed in accordance with the Cochrane principles. Different landscape types' effect on stress and mental health were studied by one cross-sectional survey study and one longitudinal epidemiological study. Finally physiological stress recovery reactions by a standardized nature setting were examined in an experimental randomized between-group study in a virtual reality laboratory.

The different methodological aspects contributed to a broad entrance to the subject. In combination with the broad subject as such this spawned reflections upon the scientific approach and encouraged transdisciplinary working manners, something that contributed for example to collaborations with the urban forestry sector, as well as agencies for environmental protection and sustainability.

A very simplified conclusion of the thesis would be that a small evidence base of the efficiency of nature assisted therapy is in line with the findings of certain nature qualities as resources for recovery from stress and reducing the risk for mental health problems, and that this may partly be mediated by an active relaxation mechanism within the parasympathetic nerve system. Altogether the work gave examples of the necessity of collaboration between the green and the white sector in order to maintain healthy living in healthy nature.

The findings may have implications for the contemporary disease scenario and the expected rise in non-communicable diseases and mental disorders. Policies and actions for public health should consider populations' living environments and promote access to nature. By enrolling population health in the concept of ecosystem services pertinent collaborations may develop, something that would contribute to both sustainable health and sustainable urban greenery.

Abstracts of Oral Presentations

Adolescents' preferred river landscapes for recreation depending on human impact and river dynamic

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Urban alluvial forests provide many cultural ecosystem services such as recreation, educational and aesthetic values, social relations, and sense of place for all age groups. So far, few studies have addressed adolescents' preferences for river landscapes as places for recreation depending on the degree of river dynamics. This study that was financed by the Austrian Sparkling Science Programme explored adolescents' preferences for river landscapes with varying degrees of human impact and flood intensity influences. In 2010, a visual discrete choice experiment asked pupils of Austrian urban and rural schools (N = 281) about social, managerial and physical river setting characteristics typically for the Danube Floodplains in Vienna and Lower Austria. The river landscapes depicted highly dynamic, natural river settings that are regularly flooded and settings with a low water flow dynamic. Human impact was displayed by different trail conditions with varying visitor numbers, technical and recreational infrastructures, and trail surfaces. The 128 digitally calibrated river landscape scenarios, organized in 32 choice sets, integrated simultaneously six attributes in each scenario. Each adolescent was shown four choice sets and he or she had to choose which river landscape scenario of the four is perceived as best for recreation and which least. Latent-class choice modelling was applied to account for the possible heterogeneity of the adolescents' choices. Results indicated that river landscapes with high water dynamic were perceived as best for recreation, while rather dry alluvial river sites were less preferred. Litter-free trails with few people and natural shorelines were preferred. Latent-class modelling identified two segments among the pupils. One segment preferred river settings with high water dynamic and low human impact, while the other one expressed higher preferences for settings with more human impact and low water dynamic. Past experience with rivers, motives for river recreation and attitudes towards rivers differed between the segments. Consequently, river preferences are not homogenous and many pupils dislike highly dynamic river landscapes. This finding may have implications for the acceptance of the revitalization of ecosystem services and management of urban waterways.

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Brownfield Regeneration to Greenspace: Opportunities for Social and Environmental Gain

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Brownfield and derelict land regeneration is an important government objective across Europe and North America. Since the post-industrial period, regeneration to greenspace in particular, has been used to help reverse social and environmental decline. Today there is an awareness of the benefits of creating greenspace evident in literature and case study examples. Typical environmental benefits include air quality improvement, increased flood retention capacity, temperature regulation and habitat for wildlife. Social benefits include building communities, encouraging local engagement and providing space for natural play and recreation through green infrastructure provision.

Regeneration project objectives are set to maximise benefits of green space creation using fit-for-purpose principles for any specific location. These objectives are critical to lever funding and political support required to pump-prime activity. However, during the planning phase, the opportunities to heighten benefits delivered through the process of regeneration can be overlooked. This research identified that there was a disconnect between practices required to meet the defined objectives for a specific site, and the land regeneration activity. This was often due to gaps in the project plans; missing tasks which are important to realise social and environmental improvement. Emphasis was often found to be on site delivery and project outcomes, with a benign assumption that benefits will naturally arise as a result of project completion. Although there are examples of practices to optimise benefits during regeneration, a lack of consistency indicated that there was scope for improvement.

A process model was developed in a bid to address this issue and support practitioners with formulating project delivery planning of regeneration projects. The model maps the social and environmental objectives for a site against specific and targeted project delivery stages. The model was tested and refined through collection of qualitative data generated through 12 semi-structured interviews with practitioners. Interviews were conducted with practitioners at regular intervals over the initial six month period of planning for three new urban greenspaces, on brownfield sites.

This paper presents a model of the whole project, which includes a list of practical considerations to deliver social and environmental benefits during regeneration. It is proposed that the model could improve the project delivery planning process to optimise social and environmental benefits delivered during and after regeneration. By doing so it could raise the overall quality of new greenspace and prove invaluable to practioners, landscape architects, operational staff, funders and policy makers.

Key words: social, environmental, remediation, reclamation, restoration, urban planning

The Challenge of Urban Renewal Within a Mature Inner City Forest

Creating a demonstration housing renewal project in central London

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The Heygate high-rise housing estate is a large development of several thousand homes in the central London neighbourhood known as the *Elephant and Castle*. It was built in the early 1970s, but rapidly developed a very negative social image and was occupied for little more than 30 years. The 20 storey apartment blocks have now been empty for several years and the estate's image has been further damaged through its use a film set for a great many gangster movies. It is now to be demolished and rebuilt. Over the past 40 years a mature urban tree canopy of more than 430 very large trees has grown to fill all the open space between the buildings. The great majority of the trees are London planes (*Platanus orientalis*), and the developers are determined to protect and retain as much of this mature forest as possible.

This presentation will outline the ways in which site planning, structural engineering, site management and construction are being organised to minimise root disturbance and secure the trees' long term survival and growth. The Heygate Estate is to be redeveloped over a 15 year period as a large scale demonstration of good practice in mature tree management. There is considerable enthusiasm for long term research and environmental monitoring, and already there is a strong network of academics and design professionals, working to shape the research and development programme.

The Heygate Estate is expected to become a significant demonstration of the creative link between urban forestry and inner city economic regeneration, and this presentation at EFUF will provide an opportunity for delegates to influence the content of the research and demonstration programme.

Chris Baines trained as a horticulturist and landscape architect. He is one of the UK's leading environmental communicators, and has been a champion of nature in the city for almost 40 years. He works as an independent adviser to the UK government and to a number of major companies in the construction, minerals, energy and water industries. Recent commissions have included green infrastructure advice for the government's proposed ecotowns, for the London 2012 Olympic Village, for the U N World Heritage city of Bath, for a major development of 11,000 new homes beside the River Thames, and for the demolition and redevelopment of a 1970s high-rise housing scheme in central London.

Chris is very active in the UK not-for-profit sector and has been a National Vice President of the Royal Society of Wildlife Trusts for almost 25 years. He works from home in inner-city Wolverhampton and has travelled widely to visit urban regeneration programmes and to contribute to conferences in China and South Korea, New Zealand, North America and much of Europe.

Abstracts of Oral Presentations

Youth recreation participation in Oregon, USA: A comparison of urban and non-urban perceptions

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This research study was designed to explore the opinions and thoughts directly from youth of various age groups who lived in rural and urban areas in the state of Oregon, USA. Activities, time, constraints and benefits experienced in the outdoors were the major focus of this exploration. A series of nine focus group meetings occurred in three separate locations in Oregon. Four focus groups took place in the city of Portland, Oregon and five took place in rural and suburban settings (one in Prineville and four in Bend). Ages of the youth ranged between 7-18 years old and grouped ages of 7-9, 9-11, 11-13, 13-16, and 16-18 were the divisions for the meetings. Racial/ethnic backgrounds of the youth included Caucasian, African American, Hispanic, and Asian-American. The majority of youth interviewed in the rural settings were Caucasian and the majority of youth interviewed in the urban areas were African-American and Hispanic. The average focus group size was eight participants and the meetings lasted between 30—90 minutes. The transcribed interviews from each focus group were analyzed through categorization analysis. Using this technique, the three researchers searched for categories and sub-categories within the text which were then developed into major themes representative of the data (Silverman, 2000). These themes are then linked with examples and quotes from the interviews. The five major themes constructed from the data are divided into the perceptions of youth who lived in rural settings versus youth who lived in urban settings and include:

1) preferred recreation activities

2) the benefits of recreation: why the youth like playing outdoors

3) constraints: what keeps you from playing outdoors more?

4) what happens when kids don't go outside?

5) how can we get more kids into the parks and outside?

The focus groups conducted within this study provide insight from one of the most powerful voices we should listen to when we are exploring youth and the outdoors. Conducting focus groups with the youth themselves is a mechanism to incorporate two of the 20 external developmental assets listed under the category of empowerment which is necessary in positive youth development: 1) Community Values Youth-young person perceives that adults in the community value youth and 2) Youth as Resources-youth are given useful roles in the community (Search Institute, 1997).

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Urban Forest as an Innovative Open Space Strategy for Shrinking Cities

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In the last few decades shrinkage has become the norm for a growing number of European cities and poses a central challenge for planning and politics. Shrinkage reveals itself in, amongst others, vacant flats, offices and commercial units, the dismantling of infrastructure and demolition of houses and, above all, also the related increase in urban brownfields. Since, especially in shrinking cities, the chance for re-use of brownfields is generally quite small, there is a need for open space planning here. In the last few years open space planning has made a number of suggestions about how the large number of urban brownfields can be dealt with. These range from simple greening measures or the creation of classical greenspaces and parks to new forms of interim use, controlled succession and urban forests. With respect to this the city of Leipzig, in cooperation with the Federal Agency for Nature Conservation, has started the pilot project "Urban Forest". As part of this project (funded until 2015) forests will probably be planted on three brownfields in the inner-city area. This aims to achieve several goals: the forests should contribute to an improvement in the urban climate and air quality, they should increase the value of neighbouring areas, and they should also create recreational possibilities as well as contribute to an increase in biodiversity. Furthermore a new open space category should be created in urban restructuring and in planning. Whether and how the urban forest achieves these goals is the subject of an inter-disciplinary accompanying research. The social-science part of this research deals with the perception of inner-city brownfields and the acceptance and possible forms of use of urban forest on these through differing social groups. In addition the perceived effects of the transition of brownfields into forests for the residential areas, with respect to the increase in attractiveness through the creation of new recreational areas, as well as through the improvement of the surroundings will be analysed. For this, a quantitative survey in the areas selected for the afforestation was carried out; the focal point here was the survey of households. As part of the investigation photo methods was used in all phases: for documentation of the changes of the urban areas and the urban landscape, household surveys themselves through the use of photo montage. Photo methods are very suitable for the visualisation of different forms of forest and growth stages in an urban context; in this case they show the innovative approach. In the presentation the results of the social-science research will be presented which deal with the aspects of perception, acceptance and use of urban forest.

Abstracts of Oral Presentations

Restoration of a Damaged Urban Forest Park: The Case of Point Pleasant Park, Halifax, Canada

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Point Pleasant Park is a 70-hectare urban forested landscape in the south end of the Halifax peninsula, Nova Scotia, Canada. The Park is heavily used by Haligonians mainly for walking, jogging and dog-walking. An ice storm and a beetle outbreak damaged significant portions of the ca. hundred thousand mature trees in the Park in the 1990s. In September 2003, Hurricane Juan blew down some three-quarters of the remaining trees. Following the cleanup, the Park re-opened to the public in June 2004. Park users expressed strong desires to get the forest back. An intensive planning process in subsequent years yielded the Park's first-ever comprehensive plan. Along with programs for shoreline stabilization, visitor management and protection of cultural heritage, a sustainable forest management (SFM) program was created. I present the principles used in forest restoration, as well as the values, objectives, indicators, targets and actions elaborated for the forest. Raising forest resilience in the face of a changing climate was an overriding theme in designing the SFM program for Point Pleasant Park. The comprehensive plan, finished in October 2008, won both local praise and a few national awards.

Ecological effects of fire on biodiversity in periurban forests: a case study in Southern Italy

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Forest fire is the most important natural threat to urban and periurban forest and wooded areas in Southern Europe. These areas are increasingly affected by wildfires with effects on species diversity. Among ecological communities, insects are important bioindicators of fire disturbance due to their sensitivity to environmental change and habitat requirements. In this study, we explored the relationship between insect abundance and distance from the ignition point of fires over a two-year period in an periurban oak-dominated forest located in Southern Italy. Specific objectives are two: (i) determine the spatial and temporal responses of insect abundance to fire;

(ii) explain the effects of forest fire on different taxa through a comparison between terrestrial Coleoptera and Lepidoptera. Using analysis of variance and developing a number of regression models we observed in terms of spatial variation, a significant difference between abundance of Coleoptera in burnt (0-300 m) and unburnt (300-600 m) locations with the highest level of abundance in the forest at the edge of the burnt area. For Lepidoptera, differences were not as significant. In terms of temporal variation, we observed significant differences between the abundance of Coleoptera in the two study years, both in burnt and unburnt locations, with the highest level of abundance in the second year after fire. For Lepidoptera the temporal differences were also significant. The two insect orders showed a contrasting pattern in terms of mean abundance values: the abundance of Coleoptera increased during the survey period, while the abundance of Lepidoptera decreased. Fire disturbance influences the short-term response of insect abundance with positive or negative effects depending on the ecological traits and habits of taxa. Understanding these effects is crucial in highly-modified ecosystems, such as the Mediterranean forests.

Key words: wildfires, insect biodiversity, wildland-urban interface, periurban forests

Enhancing the capacity of trees to withstand stressful conditions: the effects of nursery pre-conditioning

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Trees are exposed to a variety of stresses when planted in the urban environment. This often leads to poor health, short life span, higher maintenance requirements and high mortality of urban trees, when compared to the same species growing in the natural environment. Several management techniques (i.e. mulching, organic amendment, soil aeration) have been developed to ameliorate tree health after planting in the landscape, whereas nursery acclimation of urban trees has received, until recently, much less attention. During the nursery period it is possible to induce some morphological, anatomical, physiological and functional adaptations, which can increase plant ability to withstand transplanting, and which are positively correlated with survival, growth and carbon assimilation after planting in the landscape. Therefore, hardening and pre-conditioning in the nursery may result in quality nursery stock, better able to adapt to the adverse or sub-optimal condition which frequently occur in the urban

environment. In this paper, three "acclimation techniques" are discussed: 1) inoculation with specific mycorrhizal fungi; 2) deficit irrigation; 3) change in irradiance.

Mycorrhizae are often lacking in the urban environment, because urbanization causes a heavy disturbance which reduces or alters mycorrhizal populations and root colonization of shade tree species, but effective, native fungal inocula can be found associated to roots of very healthy mature trees. Fine roots were sampled from several healthy, mature trees of different species growing in Milan urban area and, for each tree species, best-performing fungi were isolated and multiplied to produce the specie-specific, native fungal inoculum. The inocula were, then, used to inoculate container-grown seedlings in the nursery. Two years after inoculation, seedlings were planted in a field near Milan, and the effect of inoculation on post-transplant growth and physiology were investigated.

Deficit irrigation has been proposed as a technique capable of inducing morphological (i.e. altered root to shoot ratio), physiological (i.e. efficient stomatal regulation, higher WUE) and biochemical (i.e. osmotic adjustment) adaptations in plants. Plants grown in the nursery with sub-optimal water availability may, therefore, better be able to tolerate stress after planting in the landscape. Seedlings of hedge maple, pedunculate oak and littleleaf linden were grown in either well watered conditions or mild water stress for 2 years. Morphological and physiological characteristics were assessed after the 2-years acclimation, and the effect of "deficit-irrigation" pre-conditioning on post transplant performances was evaluated.

Shading is commonly used in the nursery to reduce summer heat stress, to lower air temperature and light radiation, and to promote growth. However, shading can affect both leaf and plant morphology, and alter plant physiological and metabolic processes. For example, shade leaves tend to have larger area, lower leaf mass per area, lower capacity to adjust osmotically and to defend from ROS, which may result in lower stress tolerance after planting in the landscape. Contrary to this, acclimating plants to excess-light conditions in the nursery induced changes in the suite of morpho-anatomical, physiological and biochemical traits which resulted in a greater tolerance to the water stress which was successively imposed.

Alessio Fini is a Post-Doc at the Department of Horticulture of Florence University. Since 2005, he has been working on projects regarding sustainable cultivation techniques for nursery production and urban forestry. His PhD thesis is dealing with the mechanisms of drought tolerance of shade trees and the selection of drought tolerant species, with a particular regard to climate change. He is author of about 50 publications in international peer-reviewed journals and conference proceedings.

Incorporating sustainable development and governance to the management and planning of urban green areas.

Flores-Xolocotzi, Ramiro, Santacruz García, Noé (presenter)

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The theorist context related with green urban areas, has incorporated the sustainable development and the governance, this has resulted in the development of economic, environmental and social indicators which could be apply in management and planning of green areas. The implementation of these indicators requires the consideration of: 1) multidisciplinary conception of sustainable development; 2) Particularly ways of management and planning and 3) participation is important in management and planning, besides there are failures difficult to detect and fix. It is concluded that a good management and planning will depend on technical and administrative strengths of local governments in Latin America that could incorporated sustainable and governance criteria.

Key words: cities, urban parks, citizen participation, urban planning, urbanism

The urban landscape below ground – can we grow trees „out of a box"? Below-ground growing conditions and their significance for sustainable tree development

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The development of urban trees and plants in general does depend to a great extent upon below-ground growing conditions in the urban environment.

The composition and availability of growing media as well as adequate space for tree root development have been altered radically by human activities as a consequence of increasing urbanisation, plus rapid economic and technological development. These changes impose major negative impacts on tree growth in urban green space, and numerous research activities have investigated how to improve urban soil quality and below-ground conditions to create a sustainable growing environment.

In various countries, research has resulted in numerous techniques to improve 'below-ground' growing conditions of young, established, and older trees in degraded soil environments.

Many attempts have been made to define a "critical root zone" for tree planting in the

urban environment, and guidelines have been developed to determine a "minimum root zone" for urban trees, in order to integrate clear specifications for urban tree growth into the built in urban infrastructure guidelines.

Yet, no definite formula for a general minimum tree root zone, respectively a perfect urban soil can be established, due to varying requirements of tree species and local soil and environmental conditions below as well as above ground.

This presentation introduces some of the advances to improve below-ground growing conditions for urban trees, for example use of structural soils and pervious ground surfaces, as well as critical root zone calculations to define minimum tree root zone areas and their limitations.

Above all, proposals are discussed how tree owners and planners can improve conditions not only related to technical solutions, but considering important aspects of tree biology and its complex interaction with the urban environment, also considering numerous new challenges imposed by the effects of climate change. At last, the question is put forward whether town and open space planning have to look into new concepts for urban tree planting, such as planning more urban woodlands in designed areas, and – for example - vertical gardens where below and above space available for urban (street) trees is not sufficient to fulfil requirements for sustainable tree growth.

Key words: Sustainable urban tree development, below-ground conditions, growing media, degraded soil, tree root development, minimum tree root zone, urban infrastructure guidelines, new concepts

Astrid Hamm is a Consultant for Urban Forestry, Urban Greening and Arboriculture with 'Citybranchings', Fürth Germany. After her graduation as Bachelor of Science in Urban Horticulture at University of Technology Sydney, Australia in 1997. In 2006, she successfully completed an international Master programme in Urban Forestry & Urban Greening at SLU University in Sweden.

Natural Capital Germany – TEEB DE

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In 2011, the German Federal Ministry for Environment, Nature Conservation and Nuclear Safety decided on a national TEEB follow-up strategy that is based on the experience of the international TEEB-study. The national TEEB study "Natural Capital Germany" will be conducted starting in 2012, coordinated by the Helmholtz Centre for Environmental Research – UFZ and led by Bernd Hansjürgens.

Within the highly developed agricultural and forestry production systems in Germany,

the intensive use of provisioning services can erode its own ecological basis and affect the provision of cultural and regulating services provided by these ecosystems (e.g. loss of soil fertility, negative effects on recreation, ground-water protection, and surface-water quality). By contrast, biodiversity conservation measures and the sustainable use of ecosystem services often help to maintain or even improve a range of nature's services, thereby delivering effective and efficient solutions for some of the looming challenges to the prosperity of our societies (e.g. carbon sequestration and mitigation of CO2-emissions by peat land restoration, flood protection and water purification by natural flood plains). An economic assessment of ecosystem services and their monetary values can provide (economic) arguments for further efforts to the conservation and restoration of nature as well as help mainstreaming biodiversity and ecosystem services into other sectoral policies.

Inspired by the international TEEB study that was scientifically coordinated by UFZ, TEEB Germany is conducted in an open architecture. Between 2012 and 2015, a series of four reports will be compiled with contributions from science, policy, administration and business, following a broad "call for evidence" and national expert workshops. A main focus of the initiative is on communications and creating convincing messages to mainstream the idea of a responsible utilization of ecosystem services. The four "Natural Capital Germany – TEEB-DE" reports will focus on:

(1) Biodiversity and Climate

(2) Green infrastructure in rural areas

(3) Green infrastructure in urban areas

(4) Mainstreaming the economics of nature in Germany: instruments and policies (Synthesis)

We will present the objectives, approach, process, intended products and scientific challenges of the German TEEB study "National Capital Germany".

Urban Forests: Are they really so different?
The comparative analysis of urban forests' potentials of six largest cities in Slovenia

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The presentation deals with the different aspects of urban forests in Slovenia, one of the European countries with the highest share of forests and with one of the lowest levels of urbanization. Preliminary results of the recent comparative analysis of the urban forests of the six largest Slovenian cities: Ljubljana, Maribor, Celje, Kranj, Velenje and Novo mesto are presented. The condition of the urban forests of these cities was researched from the aspects of particular elements of biodiversity, ownership structure

and legal status. Besides, the analysis of the presence and meaning of forests in urban environment was carried out. The role of the urban forests in strategic documents is relatively well recognized although these are mostly discussed in the context of green areas or urban green systems. The research shows that the urban forest ecosystems are relatively well preserved and comparable to the forests on the local and regional level from the aspects of preserved natural tree composition, structure of development phases and biodiversity. As aspected the main difference is highlighted by the emphasized social functions and less expressed economic roles. The forest share of the urban areas is significantly lower than on the local and regional level. The area of forests per inhabitant is in the urban areas of the selected cities from 3 to 30 times lower than the Slovenian average. The ownership structure of the urban forests is unfavourable because of the predominance of fragmented private forests. In the last decade municipalities are beginning to recognize the meaning of urban forests. However, with few exceptions, they do not manage them with adjustments and they do not think long-term. Nevertheless, the urban forests still represent the least modified natural environment in the immediate vicinity of dwellings of the increasing number of inhabitants. They offer good opportunities and a channel for education and raising awareness of the public. In the future they have potential to be an important carrier of shaping the relationship to nature and nature values.

Urban forest on a rooftop: Exploring ecological and environmental functions

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Compact cities lack ground-level space for greening. Hong Kong as an ultra-compact city is gravely deficient in green spaces. The numerous flat and yet barren rooftops provide unexplored opportunities to introduce vegetation and accompanied nature into heavily built-up areas. Most recently installed green roofs are the extensive type with thin soil layer and simple herbaceous vegetation. An attempt was made to design a native woodland with complex biomass structure and diverse species composition for a new building in urban Hong Kong. The soil thickness, horizon disposition and composition and tree species diversity emulate the natural woodland ecosystem in the south China region. The rooftop tropical woodland was equipped with environmental sensors to evaluate thermal-energy benefits under humid-tropical conditions. Selected parameters were monitored continuously for 24 months: concrete roof slab internal temperature, soil temperature and moisture at different depths, air temperature and relative humidity at different heights, infrared surface temperature of soil and vegetation surfaces, solar radiation, wind speed and wind direction. The tree saplings were able to establish successfully and attract wildlife to the new urban forest which served as a habitat island and stepping stone. Even though the

soil was 100 cm thick, the solar heat penetration was largely confined to the top 10 cm. The thick soil mass offered an effective heat sink to dampen diurnal and seasonal temperature fluctuations. The availability of rain and irrigation water played a pivotal role in evapotranspirational cooling. Seasonal variations in temperature exerted notable control on transpiration and associated cooling effect. The woodland structure established its own microclimate under its canopy. Creating a woodland on a rooftop in a compact city has been found to be feasible and it could offer important ecological and environmental benefits. The key contributions include ushering nature into highly developed urban milieu, enhancing urban diversity and suppressing urban heat island effect and energy conservation. The findings could help to optimize future urban forest establishment on rooftops in Hong Kong and other tropical cities.

Keywords: rooftop urban forest, intensive green roof, ecological functions, urban biodiversity, energy conservation

C.Y. Jim, Chair Professor in Geography at the University of Hong Kong, focuses his research on the nature-in-city core theme, encompassing urban ecology, urban forestry, green roof, green wall, urban green spaces, urban soil science, and urban nature conservation. Adopting an interdisciplinary approach with an emphasis on compact and south cities, he works mainly in Hong Kong and other Chinese cities and covers both conceptual and applied studies.

Benefits of urban parks – systematic review of evidence

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Urban parks contribute to liveable and attractive urban areas by providing a wide range of ecosystem services, defined as the benefits people derive from ecosystems. However, decision-making requires reliable and quantifiable proof of these benefits, while the scientific evidence on park benefits seems to be of varying quality where different ecosystem services are concerned. Moreover, recent work has highlighted the rather limited attention given in the peer-reviewed literature to urban parks and the specific benefits associated with them, where for example urban woodland, urban trees and the overall green infrastructure have been covered more comprehensively.

Presented are the findings from a literature review of the benefits of urban parks carried

out for the International Federation of Parks and Recreation Administration (IFPRA). Benefits included related to recreation; tourism; human health & wellbeing; social cohesion and community; aesthetics; cultural-historical aspects; house prices and other economic impacts; biodiversity; and environmental services such as cooling and air pollution reduction. Rather than relying on a wide range of sources of varying quality, only peer-reviewed publications listed in Web of Science and Scopus were considered in a systematic review process. Studies were retrieved on basis of predefined inclusion criteria for transparency reasons. The methodological quality of studies and abstracted data were assessed according to a defined grading system. Studies' final inclusion was decided jointly by the authors. Moreover, the review only looked at publications from 2000 onwards to reflect the present state-of-knowledge. Primary search terms aimed to identify research specifically on urban parks, while secondary search terms addressed the various ecosystem services provided by parks.

Preliminary results from the review demonstrates that scientific evidence for many ecosystem services provided by urban parks remains weak, with a limited number of studies of high evidence grade. The contributions of urban parks to human health, for example, have only recently become the subject of more stringent scientific studies, and the evidence if prevailingly of low to moderate grade. An additional problem is that services like cultural and aesthetic are difficult to assess in more quantitative ways. However, for other services, such as enhancing biodiversity, house prices, and cooling, studies of higher evidence grade is available, demonstrating that parks make significant, largely positive contributions to more sustainable and liveable urban areas.

These results can be used to support evidence-based policies, planning and management, as well as to prioritise future research on the benefits of urban parks.

Keywords: ecosystem services; park benefits; peer-reviewed literature

Cecil Konijnendijk holds professorships in green space management at both the University of Copenhagen and the Swedish University of Agriculture Sciences, Alnarp. He has been involved in research, development and educational activities related to urban forestry and urban greening for close to 20 years. Main thematic focus has been on policies and governance, social and cultural values of green spaces, and communication and marketing issues. Cecil is editor-in-chief of the scientific journal Urban Forestry & Urban Greening and holds various positions in international organisatons, including as deputy coordinator of IUFRO's social science division.

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Planning for new green infrastructure to support ecosystem services and well-being in urban regions

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In the last decades we have seen an important shift in planning and development of landscapes and ecosystems in Europe. First of all, in line with international developments, the productivity of ecosystems has come in focus through the concept of ecosystem services. Second, grounded in e,g. landscape ecology, , nature conservation in Europe has changed from site protection - to the enhancement of linkages between ecosystems are stressed through the concept of ecological reserves towards the establishment of green infrastructure networks linked to wider urban, peri-urban, rural and environmental processes. Green infrastructure networks at different scales, and across urban, peri-urban and rural landscapes, both support ecological processes and contribute to human health and well-being, stressing the provision of additive ecosystem services through networking. Moreover, especially in an urban context, green infrastructure places green spaces are the same level as other essential urban infrastructure. This paper discusses the concept of ecosystem services and its increasing implementation in Europe. A new framework for the development, management, and analysis of green infrastructure networks is presented. Application of this framework at different spatial and temporal scales is illustrated through a series of case studies. Finally, directions are provided for future research, and for developing and delivering green infrastructure in the emerging context of ecosystem services and human well-being.

Key words: green infrastructure, ecosystem services, human well-being, landscape planning

The Value of Being Selective

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A critical component in watershed protection efforts is increasing forest cover. Reforestation, however, can be a challenging activity in disturbed areas such as floodplains in urban area due to the impact associated with invasive plants, human activities, and stormwater runoff. During this presentation, we will discuss ways that you can address invasive plant management and native planting to encourage long-term success. We will discuss the role of plant biology in invasive plant management and the benefit of carefully timing control efforts. We will also discuss how and when to plant on your site so that your trees and shrubs have the best chance for success. This presentation will include some case studies illustrating the value of using a selective approach. In addition, it will cover the role of plant biology in invasive plant management and describe how to choose an approach that makes sense for your site and your circumstances. The presentation will include good planting techniques and common mistakes. Lastly, this presentation will include strategies for incorporating volunteer and staff into reforestation projects. A successful reforestation project can have a tremendous impact on the reduction of stormwater, quality of wildlife habitat, and the health and well-being of the people living in the surrounding community, but success requires being deliberate, selective, and thoughtful in your approach.

Summary

This presentation will focus on ways to address reforestation in highly disturbed areas using a detail-oriented and selective approach to invasive plant management and to native planting to encourage long-term forest health. Case studies will be used to compare and contrast projects that illustrate varying levels of success. These case studies will also include strategies for incorporating volunteer and staff into reforestation projects.

Keywords: Planting and restoring forest in urban areas, floodplain restoration, invasive plant management, native plants, watershed management

Sarah Low, founder of Strategic Nature, LLC, specializes in strategic planning around urban and community forestry, and ecological restoration. She focuses on bridging the gap between policy, planning, and science, specifically as it relates to the interaction of people and nature. She holds a Bachelor of Science in Fish and Wildlife Conservation and a Master of Science in Watershed Science and Management from the University of Massachusetts Amherst. She has worked in ecological restoration and park management for over ten years and has worked for consulting companies, non-profit organizations, and government agencies.

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Another way? The park trust model in the UK

James McCulloch

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As parks departments continue to face major cuts to their budgets, interest is growing in other ways of providing these services. In particular, there is a focus on alternatives, such as the park trust model, that provide a long term and secure future outside of the unpredictable arena of Local Government political control, but retain a high degree of stakeholder involvement.

Nene Park Trust is an independent self financing charitable trust that manages Nene Park, which stretches for 10km along the valley of the River Nene in City of Peterborough, 120km north of London. The Trust was established in 1988 with a 999 year lease on the Park and a charitable aim of 'improving the quality of life for Peterborough residents and visitors through providing quality and accessible open spaces'.

Nene Park Trust was the first park trust created in the UK, and was conceived from a strong desire to ensure that the park would be managed, on a long term basis, by a secure and financially stable organisation solely dedicated to this task.

Today, the Trust spends over £1.5m a year on managing and maintaining Nene Park. This is entirely self funded through rental income from commercial and park properties, concessions and investments, and is therefore at no cost to the taxpayer.

Over the past twenty years, a small number of other park trusts have formed in the UK, most notably at Milton Keynes, but this still remains a model that is yet to have wider adoption.

However, the last decade has seen a much wider understanding and appreciation of the importance of green space to health, the economy and communities. This has helped achieve a significant improvement in the condition and management of many green spaces. If this is to be sustained, more radical thinking will be required in terms of the financing and governance of green space to ensure their long term sustainability.

The park trust model has the potential to deliver this, and James McCulloch will provide an overview of park trusts in the UK, how to establish such a model, and will highlight the work taking part in Nene Park as an example of what can be achieved.
www.neneparktrust.org.uk

James McCulloch is Chief Executive of Nene Park Trust, an independent self financing Charitable Trust that manages over 1,750 acres of land to the west of Peterborough (UK), including a 500 acre country park. James is currently leading the Trust through a major modernisation and improvement programme through the delivery of 2020, an ambitious new strategic plan.

Prior to joining the Trust in 2008, James was for six years the Superintendent of Parks and Gardens for the City of London, where his responsibilities included management

of over 150 parks and gardens in London, as well as the City's floral decorations service for State Banquets. In 2006, James chaired the national Parks and Play Conference in London.

James has a wide variety of experience in the parks and landscape profession through a number of roles in the public, private and third sector over the past 15 years, and is a qualified landscape manager and horticulturalist. James has a passion for the outdoors and the important role that exciting and accessible landscapes have in improving quality of life.

James is a keen advocate of the trust model for parks management and has promoted its importance and benefits through national and international press articles. In 2010, James founded the UK Parks Trust Network and is currently working with the UK charity, GreenSpace, and other UK park trusts on a new national guidance publication for park trusts. In 2011, James spoke at the Parks Asia Pacific Congress in Australia on the trust model, and its implementation at Nene Park, and is scheduled to speak at national and international conferences on this subject in 2012.

Municipal woodland in Denmark: resource, governance and management

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Woodlands in and around towns provide a wide range of ecosystem services to urban societies. Compared to parks and other types of urban green space, woodlands tend to be more multi-purpose and able to absorb many uses, whilst also providing a wider range of ecosystems services, such as protection of drinking water resources and urban biodiversity. In recognition of this, national policies, have increasingly addressed urban woodlands as a critical part of strategies of sustainable urban development. A strategic overview of urban woodland resources is needed to transform the policies into governance, planning and management initiatives. However such information is very seldom available at the national level.

This paper presents a national study of municipal woodland in Denmark. Data were collected among all 98 Danish municipalities through a postal survey (with a response rate of 52%). On average, the responding municipalities owned 12.6 woodland units with an allocated area of 265 ha. As much as 83% of the woodland units were located within urban settlements or at their fringe, emphasising that municipalities are important urban woodland providers. Especially around Denmark's three larger urban agglomerations, Greater Copenhagen, Aarhus, and Odense, municipal woodland properties constitute major parts of the total woodland resource.

Municipal woodland resources were typically divided into many separate units of

varying size. A general lack of management plans, and a significant drop in recreational facilities provided with decreasing woodland size indicate that the recreational use potential of small woodland units was underestimated. Municipal woodland units frequently bordered other woodland or nature areas of different ownership. Thus even small municipal woodlands can play a key role in the development of multifunctional green infrastructures in the urban landscape. The development of urban woodland policies at municipal, regional and national level can play a key role in setting up such partnering. It was therefore worrying that only municipalities with larger woodland properties had issued a woodland policy and certified their woodland management. The study's findings thus indicate that (1) a definition of best policy and management practices has to consider the size variation and fragmented nature of municipal woodland resources, and (2) a need for development of governance and strategic management instruments attractive to municipalities with limited woodland property. Here important lessons can be learnt from those municipalities that have implemented a more strategic approach to urban woodland management and development.

Keywords: city forest; forest governance, forest recreation; municipality; recreational facilities; urban forestry; woodland ownership

The Mersey Forest - 20 years of progress and a look to the future

Paul Nolan

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The Mersey Forest is the largest of the 12 Community Forests set up in England in 1991. It is a wide ranging partnership established to: increase woodland cover; tackle the large areas of derelict land and contribute to initiatives to improve a wide range of socio-economic, environmental and health issues found in our post-industrial landscape. Forestry techniques, more traditionally employed in rural areas, combine with community engagement to achieve the overall vision of creating a well wooded landscape, cherished by those who live and work in the area. Large scale reclamation of derelict land followed on from an extensive programme of award winning research initiated by The Forest Partnership in conjunction with local universities looking at creating community woodlands on derelict land. Through targeted interventions the programme has now reduced the stock of derelict land considerably, with Forestry Commission as a key landowner. Vitally, the sites are no longer eyesores thus enhancing both communities and businesses alike. Together with woodland creation on other land types such as agricultural land, and smaller scale planting in urban areas; this means that woodland cover has increased by 75%, creating new habitats, a richer landscape, improved green infrastructure, jobs, new business and greater community engagement. The woodlands planted in the early years of The Mersey Forest are now being thinned, creating opportunities to link to new programmes around biomass and

woodfuel and linked access. The Mersey Forest supports local communities to manage these woodlands and to instigate new woodland projects with over 300 diverse events organised by community woodland "Friends" groups annually. The Partnership also works in the heart of our urban areas. Green Streets brings the urban forest to people's front door. We aim to produce a continuum, from the street trees to small urban woodlands, through to the urban fringe woodland, much of which is in greenbelt and larger in scale. Green Streets is critical to creating the green infrastructure for one of Europe's largest developments at Wirral Waters and for transforming North Liverpool and South Sefton over the next 10 years. Economic assessment of impact has shown that for every £1 invested in The Mersey Forest £2.63 of GVA and £10.20 of wider economic benefit are delivered. 92% of people surveyed in the area support the work of The Mersey Forest, 64% say that it has led to a positive change in their environment.

Paul Nolan has Degrees in Forestry and has worked with The Mersey Forest Team for over 17 years, 12 of which as Director. His role involves managing the multidisciplinary team delivering a 30 year Government approved Forest Plan.

Paul is a member of the Institute of Chartered Foresters, NW Regional Advisory Committee for Forestry Commission and Chair of the National Community Forest Partnership and several other regional initiatives.

Liverpool City Region Green Infrastructure Framework

Clare Olver

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The Liverpool City Region Green Infrastructure Framework sets out the role that green infrastructure could play in driving forward sustainable growth, regeneration and the protection and enhancement of natural environments in one of the most challenging post industrial landscapes in England. The framework builds on previous work developing green infrastructure as an ecosystems approach in North West England. It utilises mapping techniques developed by The Mersey Forest Team (now published by Ordnance Survey and the Royal Institute of Chartered Surveyors) and identifies three key purposes.

1. Produce the first ever comprehensive assessment of the City Region's green infrastructure resource. Going beyond a simple inventory, the framework identifies green infrastructure assets and "pinch points" that are inhibiting sustainable development.

2. Develop an agreed set of actions against a set of priorities to inform a programme of investment (such as community infrastructure levy). This is not theoretical; the

work builds on UK and international experience and makes particular use of contacts developed through EU Interreg programmes.

3. Advocate that green infrastructure is a critical infrastructure who's planning and management should be recognised in policy as a cost effective and efficient mechanism to tackle priority issues.

Stakeholders agreed 5 priorities;

1. Setting the Scene for Growth - where can green infrastructure support economic development by providing attractive settings, increasing environmental quality and attracting/retaining people in the City Region through excellent image and high quality of life.

2. Adapting to and mitigating climate change – where and how can green infrastructure help the City Region to prepare for projected climate change.

3. Providing access to high quality recreation – looking at strategic routes and the cumulative impacts of development, the contribution that recreation can make to the City Region's quality of life and local economy.

4. Safeguarding and enhancing the ecological framework of the City Region – how can green infrastructure planning help to increase the movement of wildlife between important biodiversity areas and ensure that City Region growth is underpinned by a healthy ecosystems.

5. Supporting the Rural Economy of the City Region – specifically looking at opportunities for rural diversification and local food production.

6. Improving health and well being - as part of an integrated programme of public health improvement.

The Framework is helping to shape local planning documents and the proposed Local Nature Partnership for the City Region, direct activity and investment and provide a common vision across multiple stakeholders.

Management of Maksimir Urban Forest: Tree Risk Assessment Survey

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Urban forests provide numerous benefits which are expressed through ecological and social functions of forests, the most important of which is the recreational function. In order to fulfil those functions it is necessary to have safe and stable forest stands.

Maksimir is the oldest and one of the largest urban forest in Zagreb with the total area of 139,5 ha. On its entire surface there are many tracks used for recreation (walking, walking with dogs, jogging, encounters with people etc.)

This work presents the management of Maksimir urban forest through the results of tree risk assessment along main walking tracks. The aim of tree risk assessment is to identify hazardous trees and to suggest arboricultural treatment in order to support healthy trees which will ensure sustainable management of forests.

Safety area was defined along walking tracks, and tree risk assessment was done for three main walking tracks, where every tree in the area was examined and only hazardous were registered. The results of tree risk assessment gave grounds for defining tree care measures.

The results of research revealed that the main reason for marking a tree as hazardous was a dead tree crown. Most of such trees were in the lower diameter classes, suppressed and overcome by neighbour dominant trees, and should be removed before they become a threat for visitors. Tree risk assessment also includes identification of growth defect symptoms and frequency of mechanical wounds. It was observed that most of the wounds and defects were on the butt end and stem of trees. Protection of those parts of trees is particularly important as most of the trees are in the age of physiological maturity and their site conditions have been altered, which limits them to further dieback. The prescribed tree care intervention for hazardous trees in almost half of the cases was felling, which was mainly associated with dead tree crowns, while a smaller number of trees had mechanical wounds that made them hazardous. Other assigned tree care interventions included pruning of the crown (mainly dead wood pruning overlooking tracks) and further monitoring (with additional inspection).

Tree risk assessment revealed the main reason for which trees were rated as hazardous and indicated the need to carry out regular tree care interventions.

Vinko Paulić is a forester with MSc. currently working as junior researcher in the Department of Ecology and Silviculture within the Faculty of Forestry, Zagreb University. He is also PhD student at Faculty of Forestry, Zagreb at course: Urban Forestry, Nature Protection, Forest Managment, and Protection of Forests. His professional and research interests include Arboriculture (Vitality and safety of urban trees, Management of old urban forests), Nursery production (Impact of seedling quality on growth of urban trees) and Forest establisment (Container production of forest seedlings). He is active member of Croatian Arboricultural Society (HUA).

Abstracts of Oral Presentations

Advancing urban forest management: Site-specific growth curves for young urban trees.

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Knowledge of urban tree growth, specifically allometric relationships, can enable professionals to manage urban forests for desired economic, social, and ecological benefits. However, the complex, dynamic, and heterogeneous character of the urban landscape variably influences the growth, and ultimately the mortality, of urban trees. Consequently, there is a need for greater understanding of urban tree growth that is not only region-specific, but that also considers site-specific conditions across the inter-urban gradient. The objectives of this study are threefold: (1) to address the limited understanding of the impacts and interactions of multiple biophysical factors on the growth of young urban trees; (2) to examine associations between dominant parameters of growth in order to formulate local allometric relationships and generate predictive growth equations; (3) to integrate biophysical conditions and allometric relations to generate condition- and species-specific predictive growth curves.

Conducted in New Haven, Connecticut, this study examines the 10 most common species from a census of 1474 young urban community trees planted across a range of inter-urban sites. Species-specific analysis of variance (ANOVA), multivariate analysis, and regression modeling identified significant interactions between multiple biophysical factors and measures of tree growth [growth rate index and crown volume (m3)]. Polynomial regressions established basic allometric relationships between tree age, bole size, total height, crown height, crown diameter, and crown volume. Across all species, the inclusion of biophysical factors improved the predictive strength of growth equations by an average of 11.6% (percent increase in R2: 2-30%). Foremost, these growth predictions will improve tree species selection and siting in New Haven and throughout the highly urbanized northeastern United States, thereby increasing associated benefits. Additionally, this study identifies select parameters for measurement and demonstrates efficient, affordable, and replicable methods that can be adapted globally. Furthermore, similar site-specific growth curves may inform innovative urban ecosystem service planning and policy.

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Managing the Urban Forest

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In 2005 the Millennium Ecosystem Assessment concluded that we systematically undervalue the ecosystem services that are provided by our natural assets and that as a result in the last 50 years we have degraded two thirds of these. The Economics of Ecosystems and Biodiversity study from the European Commission (TEEB D1) states "Natural capital -our ecosystems biodiversity and natural resources- underpins economies, societies and individual well being". It also calls for more in the way of measuring our natural assets, concluding that "Valuing ecosystem services makes economic sense".

Trees in the urban forest provide multiple ecosystem benefits, yet without measuring these ecosystem services no baseline can be established from which to monitor trends or identify where additional resources are required. If you can't measure your resource, then how can it be managed?

This paper explores the urban forest assessment undertaken by Torbay in 2010, where for the first time, the entire urban forest was considered (trees on both public and private property) in the context of the benefits it provides to society. It will look at the results of the study, how they compare to urban areas in other countries and will demonstrate how the results have been used to inform decision making and policy, for example:

1. Provide a specific UK benchmark allowing the system to be applied elsewhere.

2. To determine magnitude and distribution of Torbay's urban forest resources.

3. To gain knowledge of total carbon storage and pollution filtration by urban trees.

4. Improve planning and management of the Urban Forest through strategic management.

5. To demonstrate the benefits of the urban forest to communities and businesses thereby promoting an ecosystem services approach.

Urban forests have a vital role to play in making our towns and cities liveable places (filtering pollutants and reducing the urban heat island effect for example), yet very few have any idea of how the urban forest is composed or what condition it is in. This information is crucial if we want our urban forests to continue delivering benefits to our future cities making them places in which communities and businesses can continue to thrive.

Keywords: Urban Forest Ecosystem Services

Vegetation accumulates particulate matter and metals in urban areas

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Air pollution may decrease the life expectancy of residents in polluted areas by over one year (WHO, 2010) and the harmful particulate matter (PM) of air pollution is mainly of anthropogenic origin (Bosko et al., 2005; Suzuki, 2006). The particles comprise a mixture of substances of organic and inorganic character suspended in the atmosphere. A challenge for the future is to explore how directed vegetation designs can be used to reduce the human exposure to pollutants. Thus, the mapping of plants' efficiency in capturing and immobilize pollutants is important.

Two trees, Tilia cordata and Acer platanoides, two shrubs, Taxus baccata and Sorbaria sorbifolia and the grasses Lolium perenne and Festuca rubra were established at the most trafficked cross roads of down town Stavanger city and at a rural and clean site in SW Norway. The aim was to compare plants' ability to accumulate particulate matter (PM) and metal pollution. After the growing season, PM was analyzed as coarse, fine and ultrafine particles in two fractions; on the leaf surface and in the leaf covering waxes, respectively. The leaves were analyzed for 60 metals, including heavy metals and novel elements, mainly of traffic origin. The largest particles made up the largest mass deposited and a substantial part of all fractions were found in the waxes. In general, the deposition was largest on grasses, less on shrubs and smallest on trees, when calculating per unit leaf area. However, per ground area, accumulation on the vegetation will also depend on leaf area index of the species used. The future use of vegetation should be directed to yield optimal conditions for the shielding of city dwellers against pollution. Till now trees have been emphasized as most important and shrubs are probably underestimated as a tool to decrease exposure of people to pollution. The best combination will be shrubs, small trees and large trees in an aim directed design. The carefully designed vegetation should be used to separate polluted areas from the vulnerable areas, like for example play grounds, schools and residential areas that are situated near streets and roads.

Arne Sæbø took his PhD within horticulture in 1992 and is at present research leader for the Urban Greening Section in Norwegian Institute for Agricultural and Environmental Research. His work has been on shelter belts, plants' responses to climate and CO2. The selection of plants for use in urban areas and lately the ecosystem services related to plant selection have been important working areas. The focus on deposition of pollutants on plants in urban situations was initiated through a bilateral cooperation with University of Life Sciences in Warsaw. The international engagement has been in COST actions (E 12 Urban forests and trees) and in Scandinavian networks on urban forestry and urban greening.

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Effects of urbanization on the stand structure of Istanbul urban forests

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Istanbul is the most urbanized city of Turkey with its population of 13 million people. Green areas in various sizes are spread in and around the city. These woody lands play very important roles on the social, cultural and spiritual human needs. This study describes the effects of urbanization on the stand structure of Istanbul urban forests. We analyzed forest structure along the edge-interior gradient in Istanbul urban forests fragment to determine whether there are significant edge-effects on stand structure (basal area, number of trees and volume) of this fragmented urban forests. Also we determined the number of species (exotic + indigenous) of each urban forest. We used inventory data from local management and silvicultural plans across six urban forest fragments near the Boshporus. The results show that the effect on forest structure and the number of exotic species is correlated with the size and location of urban forests. Additionally, location of the urban forests affected expectations of the society from the urban forests and the society had desire to manipulate the structure and location of urban forest located within the city through mainly municipality. The structural changes were made mostly for aesthetic purposes in the urban forests within the city whereas recreational purposes in peri-urban forests.

Keywords: Urbanization, urban forest, basal area, functions, Istanbul

Open Space Technology and the collaborative rehabilitation of derelict land to enhance the ecosystem services potential of periurban forests and waterways

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The conflicts among the conservation of biodiversity and nature and the need of space and forest for social activities and ecosystem services in the European periurban landscapes is intensifying. These conflicts can grow as very hot topics when it is required to make decisions on derelict land in urban contexts. Current legislation, a lack of knowledge on the recreation–biodiversity relationship, and the diverging point of view of stakeholders make it difficult to find consensual solutions. Exhausted river

quarries constitute very often an unexpected resource inside or at the door step of urban areas. This is the case of In. Cal System along the river Marecchia, close to the city of Rimini, the core area of one of the main linear metropolitan systems in Italy with more than 60 km of continuous settlements on the Adriatic waterfront. In this context the opportunities to have forest and green spaces to experience nature and biodiversity are very few. In parallel, the conflicts for the land and the pressures acted by stakeholders carrying specific social or economic interest are strong. The Municipality of Rimini initiated a process of rehabilitation of the former quarry In. Cal System asking to apply a collaborative design of the area. The given constraint was the designation of the area as Site of Community importance of the European Network Natura 2000. In fact, after the abandonment, two lakes formed in the place of the quarry, the land was recolonized by willows and poplars, and trees of a number species were planted. It was decided to test the methodological procedure Open Space Technology (OST). The process of participatory design was developed through six OST meetings, from October 2010 to April 2011. The core group of Actors consisted of thirty people, private citizens or members of associations. The majority of the participants, highly motivated, was directly or indirectly involved in associations promoting nature and landscape conservation. A lower number of people was more interested in the archeological aspects. A smaller group was defending the potential character of the place for recreation and nature tourism, related also to the existing nature trail along the river. The OST helped to solve the greater part of the conflicts and to create innovative actions. The actors highlighted the key role of the designed area in connecting the city with the rural part of the valley and proposed strategic actions to value the river and the valley. At the end of the OST process they were extremely confident in criticizing and selecting the physical elements of the design, i.e. all the structures/infrastructures required for a better accessibility, the protection of biodiversity and nature, the environmental education activities, the security of people. Finally, the group defined clearly the document for the perspective management of the area.

Fabio Salbitano is professor at the University of Florence and currently teaching Urban Forestry, Landscape Ecology and Advances in Silviculture. The research related to urban forestry concerns: ecological history in urban landscapes; social involvement in planning, design and management; urban strategic planning; health/green infrastructure relationships. He is part of FAO urban forestry programs and coordinating WG7 (UPF) of FAO-SILVA MEDITERRANEA committee.

Abstracts of Oral Presentations

Urban forest management in Helsinki meets the challenges of climate change, biodiversity and municipal politics

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The City of Helsinki got The Nature Management Policy on 18.10.2011. It guides the design, construction and maintenance of the natural green areas for which the Public Works Department is responsible. The policy affects forests, meadows, bedrock outcroppings, shores, marshes, small waterways, bogs, other natural features, natural conservation areas and fields. The policy outlines nature management objectives as well as the actions required for their attainment. It is formulated interactively by an extensive group consisting of the city's other administrative agencies, residents' associations and important stakeholder groups.

One of the most important objectives of nature management is to develop and maintain a pleasant, sustainable, functional, safe and healthy residential and recreational environment for all the areas' users. This is achieved by safeguarding the vitality and durability of natural green areas.

The city environment's forests and other natural areas suffer from the environmental stresses generated by high-density urban fabric and intensive recreational use. To maintain their recreational value, remain safe and project a landscape image suiting the built urban environment, green areas require regular care.

The new challenge to urban forest management in Helsinki is the climate change. Summers have become warmer and drier than before. Winters are more stormy and rainy. Because of these changes the old Norway spruce stands have difficulties to survive. There are a lot of other signs of changes too, which forces the experts to find new solutions.

Natural biodiversity is taken into account in the city forests of Helsinki. Areas important from the natural conservation standpoint are left outside the scope of management activities or they are maintained to retain their natural values. Also the methods of management techniques are developed to be more nature-like.

Green values and nature conservation thinking has become more and more popular in the municipal politics. This all has its effect to urban forest management tasks. It requires more openness and interactions in all planning and management of urban forests.

Abstracts of Oral Presentations

Progressing Green Infrastructure in the Leeds City Region – The Nine Lakes Forest Park Project

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The numerous benefits that accrue from the concepts of green infrastructure [GI], ecosystem services and urban forestry vary from region to region and city to city. A common theme however is that, ideally, the concepts require a broad spectrum of regional or sub-regional application in order to function efficiently and deliver the benefits that are increasingly being understood, quantified and appreciated, particularly at the policy making and political level.

The Leeds City Region [LCR] is the largest city in the North of England, covering an area of more than 5000 km^2, with a population of 3.5 million and encompassing 10 local authority areas. The LCR commissioned a Green Infrastructure Strategy in 2010, which recommended a number of significant projects across the City Region, including a project known as 'Fresh Aire'. The concept for this project is unashamedly based on the Emscher Park in Germany, and envisages for the whole length of the Rivers Aire and Calder a flagship project for environmentally conscious development and regeneration, acting as a demonstrator for high standards of design, construction and environmental management, as well as an engine for local environmental research and innovation. This also includes significant amounts of new riparian and other urban woodland.

However, it has not been easy to secure political traction for this project. Even in the boom times, it sometimes proved difficult to justify and deliver green infrastructure and significant areas of urban forestry. In an era of funding cuts, GI is all too often being seen as 'nice to have', and is notorious for being the first item on the value engineering chopping block, with limited budgets being directed elsewhere.

This illustrated presentation will chart the progress being made with part of the Fresh Aire Project called the Nine Lakes Forest Park. A partnership between Leeds Metropolitan University, with their 'research into action' approach, a local community trust, the City Region, the local authority and the private sector has championed an approach that has promoted investment in GI as a regenerative catalyst, rather than as a by-product or outcome of regeneration, and political traction has been achieved as a result.

The scale of ambition is considerable. The Nine Lakes Forest Park proposal is for a large, high quality and regionally significant leisure, sports and tourism destination that builds upon the existing environmental, cultural and locational assets of the area, uniting the three historic estates of Chevet, Waterton and Nostell to create a single, public park that covers an area of approximately 32km^2. The Park links affluent, suburban residential areas with other more run-down, post-industrial settlements, includes areas of ancient woodland and proposes significant amounts of new urban woodland. Land acquisition is underway, bids have been made to regional development funds and the project goes 'live' in autumn 2012.

Alan Simson is a chartered landscape architect and urban forester. He has gained extensive professional experience in the UK New Towns, private practice and higher education. Currently, he is a Reader in Landscape Architecture + Urban Forestry at Leeds Metropolitan University, and Head of Research + Enterprise in the Leeds School of Art, Architecture + Design. He is involved in research, trans-disciplinary teaching and consultancy on adaptive / landscape urbanism, urban forestry and green infrastructure in the UK and Europe, and has published widely on these subjects.

Better Understanding the Performances of Urban Green Spaces European Research on Green Spaces - Goals and Results

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Green spaces - from small gardens to large urban forests - play a key role in improving the quality of urban life, not only because of their multiple ecological and environmental functions but also of their relevance for public health, societal wellbeing, and the economic benefits they can provide. Green spaces play also an important role for cities' ability to adapt to climate change. Despite to these benefits green space development often remains on the periphery of public policy priorities and is therefore unable to attract more resources.

This paper presents and discusses the approaches and outcomes of the projects URGE (Urban Green and Environment) and GreenKeys (Green Spaces as a Key for Sustainable Cities) in light of the current endeavours of valuating ecosystem services of urban green. Both projects tackled the understanding of green space from different but complementary aspects; and developed methodologies to support city councils in their efforts towards more sustainable development.

URGE-Project's major objective was to increase the knowledge of the complex interactions between nature, economy and social systems in urban environments, considering this as a premise to the development of modern strategies for the design and management of urban landscapes. A set of criteria for evaluating the performance, benefits and functions of green structures and sites were questioned and amalgamated into an Interdisciplinary Catalogue of Criteria (ICC). Convinced that only a comprehensive and long-term Green Space Strategy can be a guarantee to a more sustainable environment and an incentive to acquiring active partnerships with local organisations GreenKeys-Project, in turn, proposes a general conceptual framework for formulating, adopting and implementing a strategy devoted to green spaces development. This framework, with supportive tools and reflecting different political and legal situations, acts also as a 'Tool for Talking' - as a channel to advance and strengthen relationship between the councils and the citizens/stakeholders via guiding and prompting encourage the start of the (re)thinking and learning about the

complex interactions between the needs of citizens, environmental requirements and the supply of green spaces.

Considering that green spaces are the most obvious component of natural capital, with essential provision of ecosystem services and biodiversity, both projects bought up tools to address a better recognising and demonstrating their values, both at the conceptual level and also at the applied level.

In the discussion the projects' results, the developed tools and their applicability will be presented and illustrated with lessons learned on how quantifying the environmental benefits can lead to better urban environment, urban design and social inclusion.

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The case study of an urban forest carbon credit trading patent: creation, regulation and trade catalyst

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A South African urban forest carbon sequestration patent was awarded in 2004. The quest was to profit from voluntary carbon markets within new urban tree planting programmes. The patent filed secured the constants of calculated allometric equations, which were determined during an urban street tree research project. The methods used to determine the constants were similar to those for other urban forests, including North America and Europe. However, the patent was based on a method for calculating the carbon sequestration rates. These were the only equations that could predict the carbon sequestration rates in relation to tree growth, available for urban and indigenous savannah trees. In order to benefit from the intellectual property (IP), a commercialisation strategy was required. Quintessential was politically contentious tree planting and urban greening in shanty towns and low cost housing. The support from a local municipality was ever increasing due to cuts and reductions in parks and recreation budgets. The patent could possibly have provided some assistance. Yet, the commercial patent pursuit did not reach success. Upon reflection it appears that the

academic non-disclosure, legal complexities and the patent's restraints on trade could have reduced industry advancements. Furthermore, it is evident that the legal nature of patents inevitably gives rise to policing of infringements. Perhaps, the anticipation of payment of "royalties" and legal action seemingly created tension and alienation of the industry. In parallel, Corporate Social Investment (CSI) programs funded urban forestry developments. Job creation, planting of trees in shanty towns and carbon credits offsets were dividends. After publication of the research findings that are embedded in the patent, some catalytic and synergistic projects appeared. A new way forward is suggested.

Hennie (G.H.) Stoffberg holds a PhD Botany (UP) in Urban Forestry, MPhil Environmental Sciences (UCT) and BL Landscape Architecture (UP). His research focus is the discourse in carbon management and climate change. He co-authored the book: Climate Change: A Guide for Corporates (2009), he is the co-editor of two books: South African Landscape Architecture: A Compendium & A Reader (2012).

LIFE+ project EMoNFUr - Establishing a monitoring network to assess lowland forest and urban plantation in Lombardy and urban forest in Slovenia

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One of the main goals of the EU's environmental policy is the protection of forests and biodiversity. Therefore knowing the condition and understanding the evolution of natural forests, usually present in the countryside, and also those forests located inside and outside urban areas (i.e., urban and peri-urban forests), is essential. It is important to consider the role urban and peri-urban forests could have in mitigating climate change effects. On the other hand we should understand the processes climate change could have on those forests causing their degradation or even disappearance. Long-term forest monitoring is therefore needed to enhance knowledge and understanding of urban forest ecosystems.

In the last thirty years, a considerable amount of afforestation projects have been

implemented in Lombardy region and other European countries. Newly created woodlands have a great importance for they have been usually planted on agricultural lands, on former industrial or degraded areas. Those forests near urban and peri-urban areas play an important role in environmental and social services terms. For this reason, a strategic decision to establish a system for monitoring the status of those forests was made. This would allow their long-term and sustainable management.

Following the European policy and governance framework EMoNFUr project will create the premise for a European monitoring network of urban and peri-urban forests. Moreover, EMoNFUr project will promote the effectiveness of forest monitoring activities. This includes measures for harmonisation and the use of synergies between different monitoring schemes at the national, regional and European level. Project consortium will produce Minimum Requirements for monitoring urban and peri-urban forests, followed by a set of optional parameters. Along with the obligatory parameters each member of UPF monitoring network will be able to choose a set of optional ones according to their circumstances.

Apart from the monitoring proposal, one of the goals of the project is also to prepare guidelines on urban and peri-urban forest management and give suggestions for the future projects on the topic of urban and peri-urban forest monitoring.

A project consortium of Italian and Slovenian partners will work closely together with Scientific Board composed of international scientists and researchers who will actively and continuously supervise completion of the main project goals. A User Committee will be constituted to ensure effective communication, involvement and participation in the preparatory and implementation project actions.

Do Street Trees Tendencies Represent Trends in the Overall Urban Forest?

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Many street tree surveys are used to describe entire urban forests. Our research, in select, USA, cities, reveals that street trees represent as little as ten percent of the total urban forest. With this, is it appropriate to make decisions about the entire urban forest, while only ten percent of the urban forest is known? Our study shows that many of the overall trends in urban forest structure; diversity, density, species composition, species richness, and succession, are not represented in the street trees. One problem with the urban forest is the overplanting of certain species. In fact, there are a total of eight species of trees that are considered to be overplanted and these eight tree species account for nearly 75% of all public trees. The genus Acer accounts for nearly 40% of

all the public trees. Species wise; ash (Fraxinus sp.), Norway maple (Acer plataniodes), sugar maple (Acer saccharum), silver maple (Acer saccharinum), pin oak (Quercus palustris), Linden (Tilia sp.) Pear (Pyrus sp.), and red maple (Acer rubrum) are public trees that are considered overplanted. Of these eight species, silver maple and Norway maple are also considered overplanted private trees. Our research shows that, if we rely on the surveys of public street trees, we are missing the big picture of the urban forest as a whole. So, sampling the public and private trees of randomly chosen city blocks, can give a more complete picture of the trends of the urban forest.

Sustainable Forestry Concept in The Gambia

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The community forestry in The Gambia is to transfer ownership rights back to the villagers to stimulate an attitudinal change towards forest protection and to encourage the sustainable utilization of resources through the creation of benefits for the communities.

The involvement of the population in the management of the forest is achieved through a three - stage process leading to the full ownership rights of the forestland by the communities (=CFMA, Com-munity Forestry Management Agreement).

Obtaining with the third step full ownership enables communities to benefit from the forest products utilised in a sustainable way. The ownership transfer from governmental owned forestland to com-munities has its legal background in The Gambian Forest Act 1998, while the Gambian Forest Management Concept (GFMC), revised in 2001, is providing guidelines to achieve governmental objective to bring forestland under sustainable management, with the participation of the rural population.

The Market Analysis and Development (MA&D) Approach [1]:

The MA&D approach has been developed specifically to assist people in achieving a sustainable livelihood system in which their household and community economic assets are increased and a local forest management is improved. The main strength of the MA&D process is the high degree of community involvement in the planning and design of the enterprise and finally the business plan. Its focus is on building the capacity of local people to become entrepreneurs. By taking into consideration the environmental, social, technological and commercial aspects, MA&D assists communities in directly linking forest management and conservation activities to income generating opportunities.

Four important aspects of sustainability:

- **Resource sustainability:** The process provides safeguards for developing markets and products that do not lead to resource overexploitation.
- **Market sustainability:** Changes in the market environment will be assessed and products adapted in order to remain competitive and attractive to targeted customers.
- **Social / institutional sustainability:** The focus on capacity building and strengthening institutions at the local level supports the development and success of small enterprises.
- **Technical sustainability:** Community members will be trained to utilise, maintain equipment and gain understanding of production, manufacturing and marketing processes.

Abstracts of Poster Presentations

Distribution of *Armillaria* species along a purple beech (*Fagus sylvatica* L. *atropunicea*) tree line as an aid to management decision

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This research is focused on the decline of 730 *Fagus sylvatica* L. '*Atropunicea*' (purple beech) constituting a 2.5 km tree line in the peri-urban Soignes forest (Lorraine drive, Brussels, Belgium). Since their planting in 1886, trees have coped with important changes in their environment, namely road enlargement and increased occurrence of dry summers, which are not favorable for beeches. In 2006, a particularly important fruiting of *Armillaria* led us to study the influence of this pathogen on the tree line management. Samples were collected at the foot of each tree (1m from collar) and pulled to obtain a composite sample representing 6 trees. Two kinds of sub-samples (soil and roots) were analyzed in order to evaluate the invasive pressure of the fungi against tree roots. Presence of *Armillaria* only in soil samples could indicate a saprophytic behavior while detection in roots would establish a pathogenic character which could lead to root rot. DNA extraction followed by PCR-RFLP (Lochman *et al*., 2004) was carried out on soil and root samples from 137 tree groups and results provided a distribution map of *Armillaria* along the tree line. Among all the samples, 56.2 % were infected by *Armillaria* and three species were detected (*Armillaria mellea*, *A. gallica* and *A. cepistipes*). Soil samples were mainly infected by the weaken parasite *A. gallica* (65.7%) while the primary parasite *A. mellea* was detected in 50.4% of the cases. The species *A. cepistipes* was found in solely one soil sample. Concerning root samples, infection percentages of 17.5% and 14.6% were encountered for *A. gallica* and *A. mellea* respectively. Both species had a uniform distribution along the tree line except for zones where root extraction was performed after felling. In these zones, reduced presence of *A. mellea* enhances the positive effect of this recommendation. Presence of the species *A. gallica* in root samples suggest that the tree line decline might have been favored by a previous weakening. Relatively low percentages of root infections by *Armillaria* raise expectations of a slow evolution of the sanitary status of the tree line although presence of *A. mellea* in soil constitutes a major threat for weakened trees health. The entire tree line will be renewed within 10 years through 6 phases depending on the sanitary status of trees and their possible evolution. In this context, the study completes Visual Tree Assessment (VTA) diagnosis and is an aid to management decision by helping to determine the order of priority in tree replacement.

Abstracts of Poster Presentations

Allelopathic Effect of Ailanthus altissima on seedling growth of Fraxinus chinensis and Robinia pseudocacia*

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The allelopathy is a kind of common chemical eco-defense mechanism in plants, which is that plant releases the chemicals to growing environment to affect itself and other plants. So to study the plant chemical eco-defense mechanism is benefit for the human to set up man-made vegetation and artificial forests. Ailanthus altissima is a wide spread tree species in northern China, its root, bark, and leaves content special active chemicals that show great insecticidal actions, but their allelopathic effects is still unknown. This paper studied the effects of summer-wood-branches (young shoots) and leaves of Ailanthus altissima on the seedling growth of Fraxinus chinensis and Robinia pseudocacia in small plastic-house micro-environment. The result showed that the shoots and leaves had an intensive inhibiting effect to the seedling growth of Robinia pseudocacia, and the inhibiting effect was increased with the increasing of the weight of shoots and leaves used in the plastic-house. The inhibiting rates of the treatment of 500g shoots and leaves on seedling height, leaf numbers and roof-collar growth were 26%,16% and 14% respectively. But there was not significant inhibiting effect on the seedling growth of Fraxinus chinensis. All these indicated that the young shoots and leaves of had the allelopathic effects to the plants grown with them, moreover, the effects also vary depending on species.

Key words: Ailanthus altissima, Fraxinus chinensis, Robinia pseudocacia, Seedling growth, Allelopathic effect

*This study is supported by National Natural Science foundation of China (No.30460110).

Aggressive Urban Tree Planting for Carbon Sequestration: The Case of Burnside Industrial Park

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Burnside Industrial Park is the largest agglomeration of commercial and light-industrial firms in Eastern Canada, covering some 1270 ha. The landscape before development was totally forested.

As the Park expanded over the past half century, trees were of low importance, and the built-up landscape supports a paltry population of street and yard trees. Our study sought first to determine the abundance of potential tree-planting spots where little

to no land restoration would be needed to grow a tree. We determined that the area available for immediate planting, from a biophysical point of view, is about 87 ha. We believe that Burnside business owners, as well as the Halifax Regional Municipality, which owns the street-side planting spots, might only be enticed to put trees in all the plantable spots if a financial incentive were to materialize. One such incentive might be carbon offsets, whereby organizations and individuals offer money for tree-planting programs as a mitigative measure associated with their fossil-fuel-derived carbon emissions. This made it necessary to estimate the carbon sequestration and storage potential of a new Burnside urban forest based on planting trees on some proportion of the plantable spots. We did this, and estimated that the Burnside forest, by 2050, could store approximately 25856.6 t C at an annual sequestration rate of 621.9 t C/year if all plantable spots were planted by 2020. The paper explains the entire analytical process of estimating the number of plantable spots and the carbon-sequestration and storage potential. The next step in the research is to discover whether any Burnside businesses would be interested in participating in a carbon-offset program where trees are planted close to their businesses rather than far away, potentially in other countries.

Incorporating Climate Change into Urban Tree-Species Selection: The Case of Halifax, Canada

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Tree-species selection is critical to ensuring that urban forests are diverse, healthy, and well-adapted to the urban environment. Climate is one of the main controllers of plant distribution around the world, so tree species are expected to redistribute as a result of climate change. This research aimed to identify which eastern North American tree species should be most suited for planting in urban areas in Halifax given impending climate change. A database was developed for 57 tree species and 95 tree characteristics to enable analysis of tree species native to eastern North America. Applying results of previous climate envelope research, the database was used to identify the tree species most suitable for planting in Halifax. Of the 57 tree species examined, 17were identified as most suited for the Halifax urban forest of the 21st century.

Keywords: adaptation; climate change; tree species; planting

Abstracts of Poster Presentations

Aesthetic Value of the Young Forest

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The need of integrating aesthetic aspects into forest management has been stressed both in research and in practice. Management of forests for the recreational purpose is mainly associated with maintenance of their attractiveness early after establishment. The particular research interest is associated with aesthetic quality of young forests, which have been traditionally treated as unattractive for the general public. The aim of the study was to find out about the influence of physical attributes of the young forest stands on their aesthetic quality, and to suggest possible ways for improving visual appearance of the young forest at the stand level. Two different methods of surveying public preferences were used in the study. The psychological method was used while surveying people in the field, and the psychophysical method – for the indoor survey using photographs. Three groups of respondents with different background in forestry and ecology were involved in the photo assessment of the young forest interiors according to their aesthetic and ecological values. The statistical treatment of the data was based on correlation analysis, and to some extent on principal component analysis. The study resulted in a set of findings, and most of them are reliable at the chosen level of significance (p=0,05). Some of the findings are applicable to the forest landscape in general, while others are restricted solely to the young forest. The results showed that the public's image of recreational forest differed to a great extent from the image of forest in general. The most important characteristics of the 'recreational forest' were its attractiveness and passability, while diversity and naturalness referred to the 'forest'. Attractiveness of the young forest, i.e. perceived aesthetic beauty, was mostly correlated with sense of easy access and safety. Thus, presence of deadwood, understory and high stand density were the most important factors towards negative attitude about the forest. Single tree characteristics (height, diameter) showed a small but significant positive correlation with aesthetic quality, which contradicts with previous studies, where those variables were the main predictors of the forest scenic beauty. This suggests for the gradual change of the determinative factors of the forest's aesthetic quality along its life span. Standing and total volumes had a very small negative relationship with scenic beauty. The results also indicated a correlation between aesthetic and ecological values within the group of respondents, who were not educated in forest ecology. This finding suggests about the influence of good-looking appearance of forest on the overall public attitude towards sustainability of forest management practices. To conclude, the impression of easy access and legibility are the major influential factors of public preferences of the young forests. Compensation of the lack of aesthetic value or ecological value in one stand should be made by its prevalence in another, thus, ecology-aesthetics balance would be possible at the scale of a patch.

Abstracts of Poster Presentations

Combining basic research, modeling and GIS techniques to maximize pollution mitigation by urban trees

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Trees in the city are a valuable tool to improve living and working conditions ameliorating, among all their benefits, also air quality. Air pollutants absorption by urban trees is being recently estimated using models and measured with different equipments both in field and laboratory conditions. We compared the ozone flux estimated by the UFORE-D Model with the ozone flux measurements both using the eddy covariance technique in a periurban Mediterranean forest close to Rome and using whole plant cuvettes in laboratory experiments. Results show how the model overestimates ozone flux compared with the eddy covariance measurements because it does not account for stomatal limitation related to drought. The reason of this divergence has been confirmed when the model was run with the stomatal conductance measured with Eddy Covariance instead of the one estimated by the model. The model is being parameterized to assure the best estimates for the Mediterranean climate and species of Rome, Italy.

The processes contributing to the ozone removal have been investigated in laboratory using the gas exchange technique at whole plant level. Tree species have been chosen among the most common species used in urban forestry in Rome. Different rates of ozone absorption have been measured for different tree species. Combining basic research and modelling has produced interesting results that need to be applied by city planners or managers to maximize environmental benefits in urban environment and consequently improve human health and well-being.

In this context we are applying these findings to the city of Rome. Land cover of Rome is being analyzed to identify possible planting locations and species are being selected depending also on their capacity to absorb pollutants. Different planting scenarios are being taken into account with the objective to demonstrate how number and characteristics of trees and planting location change the potential of trees on air quality improvement.

Abstracts of Poster Presentations

Trend of Urban Development and its Impact on Urban Forestry (Case study: Rasht city, Iran)

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The expansion of cities especially big cities in the world exacerbates the negative effects of urban development worsening environmental pollution, which is considered the most important. uncontrolled expansion of urban green areas, urban degradation, increasing marginalization and rising demand for land in the city that underlie the loss of green space within urban change is if such lands. Urban forestry in the urban environment so that as one indicator of community development are discussed. Accordingly the effects of urban development and urban forestry conducted. In the study of urban development during the years 1335 to 1384 and development of green space to urban levels, indicate that development has increased are the years are listed, but with the development of urban green space development is not, However, the level of green space compared of the year 1335 is increased, but not with increasing levels of urban development has caused the loss of green space in Rasht. And Rasht urban green space per Capital share of 54% per hectare has been to 11% hectares of green space in the city in 1384, green space which is the highest level of green space has decreased towards the development of the city.

Key words: Urban Forestry, Urban Development, Green Space

MEDways: State of the art and a new networking strategy for Mediterranean Urban and Periurban Forests

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Urban forestry became a very successful issue in Europe in the last decade. Nevertheless, urban forestry is still not widely used in South Europe and in the Mediterranean basin. There is a need to find out the causes of these North-South differences as well as to highlight the key-aspects and the peculiarities of Urban Forestry in the Mediterranean region. From the end of 2011 to the beginning of 2012, two events were held having different sound and audience, but both oriented to consolidate the relationships of Mediterranean countries on Urban Forestry issues: the workshop "MED-ways (Florence, Italy) and the creation of a Urban and Periurban Forestry Working group in the frame of SILVA MEDITERRANEA-FAO Commission (Antalya, Turkey). The aims of this paper are: i. to provide a first state of the art of urban and peri-urban forestry in the region; ii. To understand the major commonalities and peculiarities; iii. to highlight the strength and weaknesses in research and actions. This was primarily done by taking into account the scientific production, the institutions of education, the research centers and the good practices. Detailed profiles were then collected for 11 on 26 MED- countries. The research bases on a survey carried out on the references database Scopus. Subsequently, the major areas of research in individual countries and the state of university education have been enucleated. The grey literature was taken into account. A SWOT analysis was performed in order to highlight the main streams of research, the potential gaps or weaknesses, the peculiarities and opportunities that characterize the Mediterranean Urban and Periruban Forestry research. The search on Scopus was based on processing the recurrence of a combination of key words on 26 countries and refined by increasing the number of key words from the strictly UF ones to the key words concerning urban open spaces. At a first search, using 5 keywords, 153 papers were extracted. Adding 4 more KWs, 240 papers were finally sorted out. The majority of papers comes from just 8 countries (France, Greece, Italy, Portugal, Romania and Spain, Israel and Turkey). By checking the trend of the number of papers during the years, a impressive increasing frequency of contributions, especially since 2000, was registered. A very rich and varied mosaic of research and practice experiences came out from the cross-referenced analysis of country profiles: this confirms the need of establishing and rooting a new networking strategy for the Mediterranean countries in the area of Urban Forestry.

Fabio Salbitano is professor at the University of Florence and currently teaching Urban Forestry, Landscape Ecology and Advances in Silviculture. The research related to urban forestry concerns: ecological history in urban landscapes; social involvement in planning, design and management; urban strategic planning; health/green infrastructure relationships. He is part of FAO urban forestry programs and coordinating WG7 (UPF) of FAO-SILVA MEDITERRANEA committee.

Abstracts of Poster Presentations

Satellite Monitoring of Vegetation Cover of Lal Bagh Botanical Gardein, India

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Lal Bagh Botanical Garden is a well known botanical garden in Bangalore (India), which spreads over 240-acres in the city centre, offering the best green space for people. The garden has over 1,000 species of flora and more than 100 years old trees providing natural condition for birds and animals to be active and breed. The park has some rare species of plants brought from Persia, France and Afghanistan and with an intricate watering system for irrigation, this garden is aesthetically designed, with lawns, flowerbeds, lotus pools and fountains. In the present study, as the main focus is on vegetation cover of Botanical Garden, an emphasis has been made to determine change in vegetation cover using NDVI imagery of 2005 Quick Bird Satellite. The NDVI one of the most popular vegetation index which provides accurate and reliable results on vegetative state and density of vegetation cover. NDVI value range between -1 and +1, is a grey scale continuous data set where vegetation cover is depicted as varying level of brighter patches as the shift towards darker regions of the grey due to presence of bare soil, water bodies etc., Basing on the NDVI values, the land use and land cover map and forest crown density map (FCDM) is prepared. The (FCDM) was categorized into four canopy density classes: <10% (non forest), 10-40% (open), 40-70% (medium) and >70% (dense) and in the Land use/Land cover map, 6 classes were made for the ease of analysis. The Lal Bagh imagery showed NDVI values in the range of -0.99481 to 0.96247. Land-use land-cover map of the study area revealed that Park supports varied landscape of water (14.09%), Impermeable and rock surface (26.71%), soil (20.65%), Scrub vegetation (21.21%), sparse vegetation (13.08%) and dense vegetation (4.16%). The forest crown density map revealed that majority of the vegetation cover (31.6818 acres) was under the crown density of 10-40%. The validation of results according to ground truth revealed that NDVI is the best tool for monitoring vegetation cover using Quick Bird data set. This study helps to demonstrate characterstic variation in vegetation distribution across 240 acres of botanical garden and it also show that Lal Bagh has very diverse habitat. Further it shows that the satellite imagery could play an important role in supporting urban vegetation cover inventories and in establishing automatic systems for inventory updates as well as vegetation monitoring. This role is especially important in metropolitan areas where the inventory has to cover thousands of square kilometers.

Abstracts of Poster Presentations

Ljubljana's urban forest management for safe and quality recreational experience

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Order declaring the Special Purpose Forest in Ljubljana bounds the municipality of Ljubljana to provide funds for costs incurred due to special arrangements or special management regime and infrastructure of this forest. This means a great responsibility for the municipality. Hence, they need good information about the forest and a technology adapted to the specificities of the urban environment. It is required to find innovative approaches and flexible technology.

In a case study research in a selected model area of the urban forest in Ljubljana (Slovenia) we will define and test a new approach to the management of such forests. We will focus mainly on factors influencing the quality and safety of recreation in urban forests. A remote sensing approach to analyse trees growing along the built trails could provide a cost effective data acquisition. Extracting potentially hazardous spots along the trails would reduce the person time needed to identify trees which falling dead parts could endanger the visitors. We will present preliminary results of the first attempts to use laser scanning and multispectral images on a part of natural urban forest in Ljubljana.

The methodology will be proposed as an optional part of a European urban and peri-urban forest monitoring proposal within LIFE+ - EMOnFUr project.

Abstracts of Poster Presentations

Urban Forests and the Needs of Visitors Case Study of the Park-Forest Košutnjak

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The park-forest Košutnjak covers an area of 330 hectares at an altitude of 250 m. Košutnjak is a beautiful lookout point toward the center of Belgrade and a pleasant place to spend day in the nature. This area has a special importance from the viewpoint of the improvement and protection of the environment because it is located in the urban core of the city. This paper deals with the study of urban forest, with a special emphasis on the importance of its use and the needs of its visitors.

For the purpose of this research visitors of park-forest Košutnjak were explored, using the combined type of survey questions. Surveys were conducted using systematic sample. They were conducted in May and June 2010, with 100 visitors. The questionnaire consisted of closed questions and open questions.

Summary of the results show that this area is used more by male than female. Most of them use this area for active recreation. Most of the male population use area daily or several times a week, while female population comes several times a month. Most of the females use this area for walking. The most common usages are for sport, walking and relaxing. Most respondents who use this area, comes from neighborhood, which indicates the need for large number of such forests in the city. In terms of satisfaction with the management of this area most of them said that they are satisfied with the average score of the entire surface 3.07.

This study represents a pilot study and contributes to better understanding of the relationship between visitors of the forest and forest as resource, the recreational values of forests, their protection and preservation. Results indicate that knowledge about behavior and needs of visitors, knowledge of their habits and needs is very valuable in the process of planning managing the area. In order to preserve these areas and to manage them properly, visitors and users must be active involved, and their needs and benefits must be incorporated in the planning, development and management. Most respondents expressed positive attitudes towards participation in the management and further in improvement of the existing state of Košutnjak park-forest.

Keywords: Park-forest Košutnjak, urban forests, the importance of urban forest, benefits and visitors needs

Field Trips

On Wednesday 9th May and Friday 11th May we are pleased to be able to offer conference delegates field trips so that they can get first hand impressions of the urban forest and green areas of the City of Leipzig.

Wednesday afternoon, 9th May 2012

Boat trip from Leipzig´s City Harbour to Lake Cospuden (Group 1) and vice versa (Group 2)

Leipzig is sometimes referred to as "Little Venice" because of its network of natural rivers, canals and mill races; these lend the city its own particular charm. These include the large canal built in west Leipzig in the 19th century by Karl Heine, an industrialist, whose aim was to navigate all the way from Leipzig up to the international port of Hamburg. Today these waterways are used for sports and leisure activities. The canals are connected to two local rivers – the Elster and the Pleiße – and also lead as far as Lake Cospuden. This trip is your chance to explore the diversified floodplain landscape within the city of Leipzig from a boat and will pass by fine villas, through parkland and the unspoiled alluvial forest to Lake Cospuden.

Friday afternoon, 11th May 2012

Tour 1: The "Green Promenadenring"

Participate in a three kilometre walk around Germany's oldest inner-city landscape park, the "Green Promenadenring" around the city centre of Leipzig. The Park originates from the demolition of the city's fortification in 1777. The city didn't use the space for housing but for green space around the city centre. Since then for Leipzig's citizens, a walk "around the gate" has been seen as a courteous stroll often combined with business conversations!

Despite some losses, the Green Promenadenring is still present in its basic structure and many areas have been restructured in the last few years. The walkabout offers you a special "green" view on the city of Leipzig, because some representative buildings such as the New City Hall or the Thomas Church can be seen out of the green canopy. Along the route there are numerous memorials that celebrate the deserving citizens of Leipzig.

Tour 2: The "Green Arc" of Paunsdorf – a city urban nature safari

The "Green Arc" is a chain of green spaces surrounding a large high density housing area in the north-east of the city of Leipzig. Step-by-step, 120 hectares of former military training grounds and adjacent fallow land have been turned into a modern recreation area. The core of the Green Arc has been a unique grazing project, where

currently 13 water buffalo and nine Prezewalski's horses conserve 35 hectares of open landscape and contribute to the recreational value of the area.

The water buffalo and wild horses once belonged to the great native mammals of central Europe; they stay outside all year round and also breed on site. Since 2004, the grazing areas have developed impressively: the re-growth of trees has largely been stopped by the constant grazing; invasive plants such as the Canada goldenrod (Solidago canadensis) and dominating patches of Wood Small-reed grasses (*Calamagrostis epigejos*) have declined. Grassland has successfully spread. Thanks to the water buffalo, ponds and swamp areas have developed very well. Rare animal species have been found and repopulated suitable habitats in the area. Visitors can access and enjoy this site as a model of urban nature conservation, recreation and farming on a walking trail encircling the grazing area. For the inhabitants of the adjacent housing area, the wild animals have already become treasured members of their community.

The grazing area is complemented by further park areas with opportunities for sports and recreation, private gardening plots, small woods, sheep grazing land and meadows with fruit trees. A promenade connects the different recreational areas and five distinctive viewing platforms. Altogether, the housing area has greatly benefited from the varied recreational offerings of the Green Arc.

Tour 3: "Stadtgärtnereiholz" - model area for a action research project "Green Urban Redevelopment: Planting Urban Woodlands in Inner-City Areas to Foster Land-Use Change – A Contribution to Urban Development"

The City of Leipzig administration sees the development of open spaces as an essential means for stabilization and improvement of city areas under pressure from economic and social change.

There is a current debate on urban shrinkage and set against the backdrop of the economic crunch, the planting of woodlands in cities could prove an alternative both to scrubland and to intensively structured and maintained parks and gardens.

Until now, the issue of urban woodlands has largely focused on city fringes. The aim of this action research project, funded by the German Federal Agency for Nature Conservation is to identify the conditions needed to promote urban woodlands and find ways to actively manage the development of woodlands and areas already containing woodland-type shrubbery.

Using model areas, trials will be conducted to ascertain how land can be claimed and new woodlands planted including the level of management effort involved in their long-term upkeep and acceptance. In contrast to traditional forestry approaches the idea is to look at urban woodlands from an interdisciplinary, integrated approach that takes in economic, social, nature conservation and urban ecology needs.

This trip includes visit to the first model area called "Stadtgärtnereiholz"

Field Trips

Tour 4: Green places for remembrance: Leipzig´s South Cemetery & Etzoldsch´s Sand Pit"

Leipzig's South Cemetery is the city's largest cemetery and justly known as one of Germany's most beautiful park cemeteries. There are numerous rare trees and other plants, beautiful rhododendron bushes and lots of historical monuments on its grounds. Among the celebrities buried here are Leipzig-born artists Max Klinger, Arthur Nikisch, members of the Baedeker family and the poet Christian Fürchtegott Gellert.

Remarkable buildings in the grounds include the main chapel, inaugurated in 1910 and built in the style of Historicism. There are also two other chapels, the crematorium and a 63m high bell tower which is the dominant building in the cemetery. The complex was built according to the model of the Benedictine monastery in Maria Laach in Bavaria. The South Cemetery is located near the Monument to the Battle of the Nations in Leipzig's south-east.

After the walk around the cemetery there will be a short visit to "Etzoldsch´s Sand-Pit". On the top of the detritus of the Pauliner Church demolished in 1968 which filled in a former sand pit, a plateau was created. An impressive sound-installation has been created as a place of remembrance of the Pauliner Church, the only Leipzig church to remain undamaged during the Second World War, yet later demolished in1968 during the former GDR regime.

Saturday 12 May: Excursion to Leipziger Neuseenland

09:00 – 09:45	Bus transfer from Leipziger KUBUS to Leipziger Neuseenland
09:45 – 10:15	Viewpoint Neukieritzsch with vista into the open pit mining area TB Schleenhain
09:45 – 12:00	Bus transfer to Lake Bockwitz (170 ha) and visit to nature conservation activities
12:00 – 13:00	Bus transfer to Lake Markkleeberg (252 ha) and visit to the Kanupark am Markkleeberger See
13:00 – 14:00	Lunch at the "Wildwasser-Terrasse im Kanupark"
14:00 – 15:00	Bus transfer to Lake Zwenkau (914 ha) and visit to the harbour construction site at Cap Zwenkau
15:00 – 16:30	Bus transfer to Lake Cospuden (436 ha) and visit to the area around the look-out Bistumshöhe
16:30 – 17:30	Bus transfer to Leipzig Main Station and Leipziger KUBUS

Photographs and Illustrations

Cover Photographs (from top left to bottom right):

"Südfriedhof" provided by Grüner Ring Leipzig

"Cospudener See": LMBV

"Lene-Voigt-Park": UFZ, Hans Kasperidus

"Auenwald": UFZ, Hans Kasperidus

Map and Floor plan: UFZ

Material preparing on behalf of the EFUF conference organizers

F&U confirm, Leipzig, Germany

Print

DDF Digitaldruckfabrik GmbH, Germany

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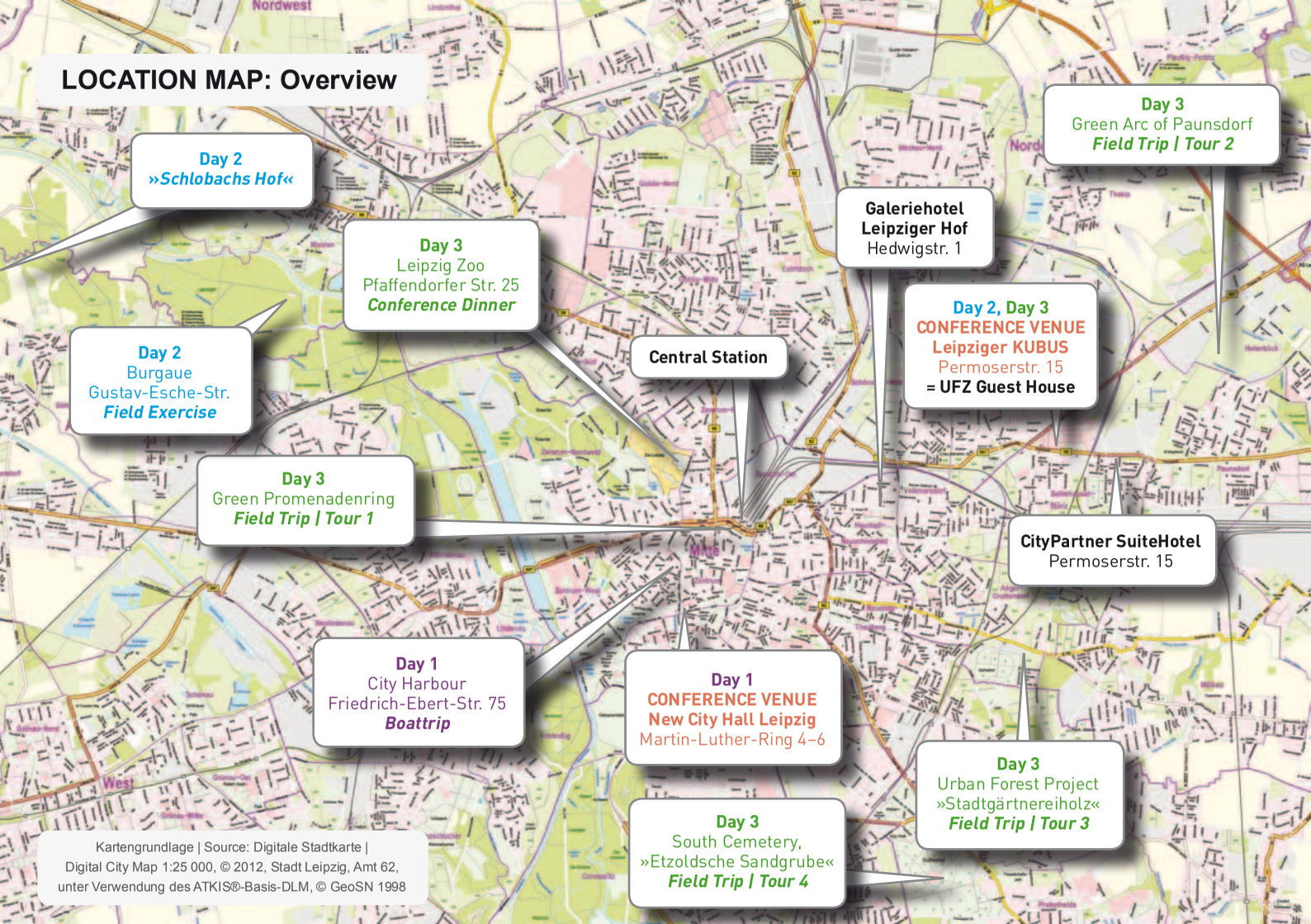
LOCATION MAP: Overview



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Supported by the German Federal Agency for Nature Conservation (BfN) with funds from the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety..

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City of Leipzig

EFUF European Forum on Urban Forestry

The Forum is associated with the **International Union of Forest Research Organisations' (IUFRO)** urban forestry group.

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