Joint Training School on Urban Food Production

COST actions TU1201 and TD1106

21-24 October 2014

Urban Planning Institute of the Republic of Slovenia, Ljubljana, Slovenia
COST Actions Urban Allotment Gardens TU1201 and Urban Agriculture Europe TD1106

Documentation of Joint Training School on Urban Food Production

Ljubljana, 21-24 October 2014

Partners of Joint Training School on Urban Food Production:

COST Action TU 1201 chaired by Runrid Fox-Kaemper, Dipl.-Ing. Architect, Head of Research Group „Built Environment“, ILS Research Institute for Regional and Urban Development gGmbH, Office Aachen, Germany – Grant holder of the JTS.

COST Action TD 1106 Urban Agriculture Europe, chaired by Prof. Dr.-Ing. Frank Lohrberg, RWTH Aachen University, Aachen, Germany

Urban Planning Institute of the Republic of Slovenia represented by Ina Šuklje Erjavec, M.Sc of landscape architecture as Local organizer of the Joint Training School.

Report prepared by

Mag. Ina Šuklje Erjavec
Jana Kozamernik

Photography

Jana Kozamernik
Andrej Erjavec
Maja Simoneti

Illustrations used are from different resources (individual authors – tutors and participants - workshops groups).

The publication is supported by COST.

December 2014
Report on Joint Training School on Urban Food Production

Ljubljana Joint Training School on Urban Food Production was organized by Urban Planning Institute of the Republic of Slovenia together with the COST Actions TU1201 (Urban Allotment Gardens) and TD1106 (Urban Agriculture Europe). It was arranged for Students (at master or PhD level) and early stage researchers (who are in the early phase of their career with at least PhD degree and not more than 8 year work experience after graduation). The joint training school has linked knowledge, work and experience gathered from two COST Actions considering urban food production.

All participants actively participated in 9 workshops on different research areas (planning and policy, sociology, ecology, urban design): Walk Through Urban Gardens, Understanding Ecological Food Growing, Understanding the Site, Environmental Aspects of Urban Food Production, Social Aspects of Urban Food Production, Economic Aspects of Urban Food Production, Comprehensive Development of Urban Food Production, Designing Urban Food Production?, Designing Planning Processes for Urban Food Production, Different Levels of Governance Regimes and Policies.

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Tutors and participants of Joint Training School on Urban Food Production

a. Tutors and speakers

1. Mag. Ina Šukljje Erjavec
   Landscape architect, Urban Planning Institute of the Republic of Slovenia, Ljubljana, Slovenia; as tutor, speaker and organizer of JTS in Ljubljana
   Workshop 7: DESIGNING URBAN FOOD PRODUCTION?

2. Dr. Andrew Adam-Bradford
   Geographer, Horn of Africa Unit - Human Relief Foundation, United Kingdom; as tutor and speaker - Workshop 9: DIFFERENT LEVELS OF GOVERNANCE REGIMES AND POLICIES

3. Dr. Luke Beesly
   The Hutton Institute, United Kingdom; as tutor and speaker - Workshop 3: ENVIRONMENTAL ASPECTS OF URBAN FOOD PRODUCTION (soil survey and evaluation)

4. Dr. Paulo Brito da Luz
   National Institute of Agrarian and Veterinary Research, Lisbon, Portugal; as tutor and speaker - Workshop 3: ENVIRONMENTAL ASPECTS OF URBAN FOOD PRODUCTION (irrigation, agro-environmental indicators)

5. Nataša Bučar Draksler
   Landscape architect, private allotment gardens organizer, NGO/associations supporting urban gardening in Slovenia MULE http://www.srce-me-povezuje.si/drustvo-mule and PRIDELAJ.SI http://pridelaj.si/, Slovenia; as tutor and speaker - Workshop 2: UNDERSTANDING ECOLOGICAL FOOD GROWING

6. Dr. Majda Čerič Istenič
   Professor of rural sociology at Biotechnical faculty, University of Ljubljana, Slovenia; as speaker - Workshop 4: SOCIAL ASPECTS OF URBAN FOOD PRODUCTION

7. Andrej Erjavec
   Institute of quality of life, Ljubljana, Slovenia; as tutor and speaker - Workshop 7: DESIGNING URBAN FOOD PRODUCTION?
8. **Dr. Darja Fišer**  
Organizer of the national crops2swap movement and gardening festival Chelsea Fringe Ljubljana, Slovenia; *as tutor and speaker - Workshop 1: WALK THROUGH URBAN GARDENS*

9. **Dr. Matjaž Glavan**  
Assistant Professor for GIS systems in agriculture at the Biotechnical Faculty, University of Ljubljana, Slovenia; *as speaker - Workshop 5: ECONOMIC ASPECTS OF URBAN FOOD PRODUCTION*

10. **Dr. Maria Partalidou**  
Lecturer in Rural Sociology, Aristotle University of Thessaloniki, School of Agriculture, Department of Agricultural Economics, Thessaloniki, Greece; *as tutor and speaker - Workshop 4: SOCIAL ASPECTS OF URBAN FOOD PRODUCTION*

11. **Dr. Marina Pintar**  
Professor of agricultural land use planning at the Biotechnical Faculty, University of Ljubljana, Slovenia; *as speaker - Workshop 5: ECONOMIC ASPECTS OF URBAN FOOD PRODUCTION*

12. **Mag. Maja Simoneti**  
Landscape architect, urban planning policies, Institute for Spatial Policies/Ljubljana Urban Planning Institute, Ljubljana, Slovenia; *as tutor and speaker - Workshop 1: WALK THROUGH URBAN GARDENS*

13. **Martin Sondermann**  
Geographer, Leibniz University Hannover, Institute of Environmental Planning, Germany; *as tutor and speaker - Workshop 8: DESIGNING PLANNING PROCESSES FOR URBAN FOOD PRODUCTION*

Dr. Rozalija Cvejić  
Research Assistant in environmental planning, Department of agronomy, Biotechnical faculty, University of Ljubljana, Slovenia; *as participant and tutor - Workshop 6: COMPREHENSIVE DEVELOPMENT OF URBAN FOOD PRODUCTION*

Mojca Nastran  
Research Assistant at the Forestry Department of the Biotechnical Faculty, University of Ljubljana, Slovenia; *as participant and tutor - Workshop 6: COMPREHENSIVE DEVELOPMENT OF URBAN FOOD PRODUCTION*
b. Participants

1. **Ivana Blagojević**, Serbia
   Faculty of Agriculture, Department for Fruit sciences, Viticulture, Horticulture and Landscape Architecture, University in Novi Sad

2. **Rozalija Cvejić**, Slovenia
   Department of agronomy, Biotechnical faculty, University of Ljubljana; *also as tutor*

3. **Lea Egloff**, Switzerland /Germany
   Zurich University of Applied Sciences in Wädenswil

4. **Sonja Fahr**, Germany
   RWTH Aachen University

5. **Vasiliki Giatsidou**, Greece
   School of Agriculture, Aristotle University of Thessaloniki

6. **Carsten Alexander Heinrich**, Germany
   Department of History of Architecture and Conservation at RWTH Aachen University

7. **Amparo Herrera-Dueñas**, Spain
   Vertebrate Biology and Conservation, Complutense University of Madrid

8. **Zoe Heuschkel**, Germany
   University of Applied Science in Osnabrück

9. **Snežana Jovičić**, Serbia
   Faculty of Sciences, Department of Biology and Ecology, University of Novi Sad

10. **Sarah Liebing**, Germany
    Research Institute for Regional and Urban Development in Aachen; ILS in UAG

11. **Petra Matijević**, UK/Slovenia
    Department of Anthropology and Sociology SOAS, University of London

12. **Zorica Medo**, Serbia/Germany
    Technical University of Berlin

13. **Mojca Nastran**, Slovenia
    Forestry Department of the Biotechnical Faculty, University of Ljubljana; *also as tutor*

14. **Andreea Oarga**, Romania
    Slovene Human Resources Development and Scholarship Fund

15. **Valentina Palermo**, Italy
    Department of Civil Engineering & Architecture, University of Catania
16. **Kristina Piškur**, Slovenia  
   Faculty of Social Sciences, University of Ljubljana

17. **Xavier Recasens**, Spain  
   Universitat Politècnica de Catalunya, Barcelona; Agronomist in Badalona City Council

18. **Veronika Reven**, Slovenia  
   Municipality of Ljubljana, Urban Planning Department, Office for development and renovation of public spaces, Ljubljana

19. **Zala Schmautz**, Switzerland/Slovenia  
   Sanitary Engineering, Faculty of Health Sciences, University of Ljubljana

20. **Sean Shanagher**, Ireland  
   Ballyfermot College of Further Education

21. **Mari Shioya**, Slovakia  
   Institute of Forestry Ecology, Slovak Academy of Sciences & Institute of Management, Slovak University of Technology

22. **Giorgia Silvestri**, Italy  
   Science in Environmental Science at Pisa University

23. **Jenny Sjöblom**, Sweden  
   Swedish University of Agricultural Sciences, Alnarp

24. **Lucie Sovová**, Czech Republic  
   Faculty of Social Studies – Environmental Studies, Masaryk University in Brno

25. **Andrew Speak**, UK/Poland  
   Adam Mickiewicz University, Poznan; University of Manchester

26. **Rebecca St. Clair**, UK  
   University of Salford

27. **Basak Tanulku**, Turkey  
   Camlica Cad. Muhurdar Cikmazi Beylerbeyi Istanbul

28. **Dimitra Theochari**, Greece/Germany  
   National Technical University of Athens

29. **Attila Tóth**, Slovakia  
   Department of Garden and Landscape Architecture, FHLE, SUA Nitra

30. **Pedro António de Matos Parente Vasconcelos**, Portugal  
   City Hall of Vila Pouca de Aguiar, Portugal
31. Zala Velkavrh, Slovenia, ProstoRož

32. Krista Maria Willman, Finland School of Management, University of Tampere, Finland

33. Žana Mehić, Slovenia/Germany

34. Nils Kreynhop, Germany

c. Additional – invited participants

1. Jana Kozamernik, Landscape architect, external coworker at UIRS, Ljubljana, Slovenia

2. Jurij Kobe, department for Environmental Protection, Municipality of Ljubljana, Slovenia

3. Katja Rakovec, Zavod BOB, Slovenia; as stakeholder

4. Anja Manja Segulin, Zavod BOB, Ljubljana, Slovenia; as stakeholder

5. Nežka Agnes Vodeb, Zavod BOB, Ljubljana, Slovenia; as stakeholder

6. Janja Merkač, Zavod BOB, Ljubljana, Slovenia; as stakeholder

7. Jan Hočevar, Zavod BOB, Ljubljana, Slovenia; as stakeholder

8. Borut Melik, Zavod BOB, Ljubljana, Slovenia; as stakeholder
# Joint Training School on Urban Food Production

**COST actions TU1201 and TD1106**  
21-24 October 2014, Urban Planning Institute of the Republic of Slovenia, Ljubljana, Slovenia

## Program

**October 21\(^{th}\), Tuesday**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Location</th>
<th>Tutors</th>
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</thead>
<tbody>
<tr>
<td>09:00 – 09:15</td>
<td>Registration and coffee</td>
<td>Library lecture room of UIRS (ground floor – entrance from the passage)</td>
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<td>09:15 – 10:15</td>
<td>Introduction</td>
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<td></td>
<td>• Short presentation of the Municipality of Ljubljana</td>
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<td></td>
<td>• Introduction to WORKSHOP 1 with an overview of different urban garden types and initiatives in Ljubljana (Mag. Maja Simoneti and Dr. Darja Fišer)</td>
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<tr>
<td>10:15 – 12:30</td>
<td>WORKSHOP 1</td>
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<td></td>
<td><strong>WALK THROUGH URBAN GARDENS</strong></td>
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<td></td>
<td>Site visit workshop with comprehensive on-site assessment and discussion of 3 different types of Urban food production in the vicinity of UIRS: traditional Gardens of Krakovo, an urban farm of Andrej Peršin and guerrilla gardens near Gradaščica.</td>
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<tr>
<td>12:30 – 13:30</td>
<td>Lunch break</td>
<td>restaurant Spirit of Ljubljana, Grudnovo nabrežje (pre-paid by participants)</td>
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<tr>
<td>13:30 – 16:30</td>
<td>Site visit by bus to Savlje area</td>
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<td><strong>URBAN FOOD PRODUCTION IN LJUBLJANA</strong></td>
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<td></td>
<td>Bus starts after lunch from Grudnovo nabrežje.</td>
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<tr>
<td>16:30 – 18:30</td>
<td>WORKSHOP 2</td>
<td>seminar room UIRS (2(^{nd}) floor)</td>
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<td></td>
<td><strong>UNDERSTANDING ECOLOGICAL FOOD GROWING</strong></td>
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<td></td>
<td>Group work on 5 scenarios of ecological gardening according to the “Garden Cards” Methodology.</td>
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<tr>
<td>19:00</td>
<td><strong>Tutor:</strong></td>
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<td></td>
<td>Nataša Bučar Draksler, landscape architect, private allotment gardens organizer, NGO/associations supporting urban gardening in Slovenia: MULE <a href="http://www.srce-me-povezuje.si/drustvo-mule">http://www.srce-me-povezuje.si/drustvo-mule</a> and PRIDELAJ.SI <a href="http://pridelaj.si">http://pridelaj.si</a></td>
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<tr>
<td>Time</td>
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<tr>
<td>09:00</td>
<td>Introductory presentations of the workshops and field work</td>
<td>Library lecture room of UIRS (ground floor – entrance from passage)</td>
<td>Dr. Rozalija Cvejić and Mojca Nastran: Livada case study area</td>
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<td>Dr. Paulo Brito da Luz</td>
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<td>Dr. Luke Beesley</td>
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<td>Dr. Maria Partalidou</td>
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<td></td>
<td>Stakeholders – for new Community gardens; Zavod BOB (NGO specializing in project learning of young adults)</td>
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<td>coffee available in between presentations</td>
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<tr>
<td>10:30</td>
<td>JOINT WORKSHOP</td>
<td>Transfer by taxi vans to Livada area</td>
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<td>UNDERSTANDING THE SITE – Livada case area</td>
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<td>Field work with tutors of days 2 and 3</td>
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<td>Site analyses will be performed in 5 groups, taking into account aspects, such as location, soil, water and users.</td>
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<td>Discussion with stakeholders “Zavod BOB”.</td>
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<td>In case of bad weather we will go to Gostilna Livada earlier to continue with work there.</td>
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<tr>
<td>12:30</td>
<td>Lunch break</td>
<td>Gostilna Livada (pre-paid by participants)</td>
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<tr>
<td>13:30</td>
<td>WORKSHOP 3</td>
<td>ENVIRONMENTAL ASPECTS OF URBAN FOOD PRODUCTION</td>
<td>Dr. Paulo Brito da Luz, National Institute of Agrarian and Veterinary Research, Lisbon, Portugal</td>
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<td></td>
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<td>Gostilna Livada seminar room</td>
<td>Irrigation (design and management), Agro-environmental Indicators</td>
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<td>Workshop on optimizing the water situation, making use of local soils and waste resources and adding value to urban food plots (carbon storage, waste water treatments etc.). Planning for inclusion of soils, waters and waste conservation into new urban food-producing plots.</td>
<td>Dr. Luke Beesly, The Hutton Institute, United Kingdom Soil survey and evaluation</td>
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<tr>
<td>16:00</td>
<td>WORKSHOP 4</td>
<td>SOCIAL ASPECTS OF URBAN FOOD PRODUCTION</td>
<td>Dr. Maria Partalidou, Lecturer in Rural Sociology, Aristotle University of Thessaloniki, School of Agriculture, Dep. Of Agricultural Economics, Thessaloniki, Greece</td>
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<td></td>
<td>Gostilna Livada seminar room</td>
<td>Dr. Majda Čerič Istenič, Professor of rural sociology at Biotechnical faculty, University of Ljubljana</td>
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### October 23th, Thursday

#### Morning session

<table>
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<tr>
<th>Time</th>
<th>Workshop</th>
<th>Description</th>
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</table>
| 09:00 – 11:00 | WORKSHOP 5 | **ECONOMIC ASPECTS OF URBAN FOOD PRODUCTION**

*(seminar room UIRS (2nd floor))*

What and where are the reasons that the majority of mainstream food production is organised in the way as we know it today? Why do we need Urban Food Production and where is the line between urban and rural? What are the economic advantages or disadvantages of urban food production? What are the examples (winter wheat, milk, salad, strawberries) of how food prices are calculated from production to consumer? What are the economic views of vegetable gardens in Slovenia and Ljubljana?

**LEARNING FROM FOODMETERS PROJECT**

*Dr. Marina Pintar*, Professor of agricultural land use planning at the Biotechnical Faculty, University of Ljubljana

**ECONOMIC BACKGROUNDS OF FOOD PRODUCTION**

*Dr. Matjaž Glavan*, Assistant Professor for GIS systems in agriculture at the Biotechnical Faculty, University of Ljubljana

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<tr>
<th>Time</th>
<th>Workshop</th>
<th>Description</th>
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| 11:00 – 13:30 | WORKSHOP 6 | **COMPREHENSIVE DEVELOPMENT OF URBAN FOOD PRODUCTION**

*(seminar room UIRS (2nd floor) and UIRS meeting room (1st floor))*

**LEARNING FROM GREENSURGE PROJECT**

Group work on 5 scenarios of urban food production development for 2 case studies: a new community garden at Livada (3) and an urban agriculture area in Savlje (2)

**Tutors:**

*Dr. Rozalija Cvejić*, Research Assistant in environmental planning, Department of agronomy, Biotechnical faculty, University of Ljubljana, Slovenia

*Mojca Nastran*, Research Assistant at the Forestry Department of the Biotechnical Faculty, University of Ljubljana, Slovenia

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<th>Time</th>
<th>Activity</th>
<th>Description</th>
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<tr>
<td>13:30 – 14:30</td>
<td>Lunch break</td>
<td><em>(lunch in a restaurant of your choice near UIRS)</em></td>
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#### Afternoon session

<table>
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<tr>
<th>Time</th>
<th>Workshop</th>
<th>Description</th>
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| 14:30 – 18:00 | WORKSHOP 7 | **DESIGNING URBAN FOOD PRODUCTION?**

*(seminar room UIRS (2nd floor) and UIRS meeting room (1st floor))*

Group work on 5 proposals of spatial organization and design interventions for the scenarios developed in the previous workshop: the new community garden at Livada (3) and the urban agriculture area in Savlje (2)

**Tutors:**

*Andrej Erjavec*, architect, Institute of quality of life (In.Ka.Bi.), Ljubljana, Slovenia, together with

*Mag. Ina Šuklje Erjavec*, UIRS, Slovenia, and other tutors

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<th>Time</th>
<th>Activity</th>
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<tr>
<td>19:30 –</td>
<td>Common evening</td>
<td>in Club Daktari</td>
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October 24th, Friday

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<th>Time</th>
<th>Event</th>
<th>Location</th>
<th>Tutor</th>
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<tbody>
<tr>
<td>09:00 – 10:00</td>
<td>Presentations from representatives from the City of Ljubljana</td>
<td>seminar room UIRS (2nd floor)</td>
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<td></td>
<td>Open questions of planning, design and governance of urban food</td>
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<td>production in Ljubljana</td>
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<td><strong>coffee available in between</strong></td>
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<tr>
<td>10:00 – 12:30</td>
<td><strong>WORKSHOP 8</strong></td>
<td>seminar room UIRS (2nd floor)</td>
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<td></td>
<td>DESIGNING PLANNING PROCESSES FOR</td>
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<td>Martin Sondermann, geographer, Leibniz University Hannover,</td>
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<td>URBAN FOOD PRODUCTION</td>
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<td>Institute of Environmental Planning, Germany</td>
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<td><strong>The central aim of the workshop is the</strong></td>
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<td><strong>design of the “ideal” planning processes</strong></td>
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<td><strong>encompassing four stages:</strong></td>
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<td><strong>spatial analysis,</strong></td>
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<td><strong>zoning,</strong></td>
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<td><strong>site design</strong></td>
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<td><strong>and implementation.</strong></td>
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<td>12:30 – 13:30</td>
<td><strong>Lunch break</strong></td>
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<td><em>(lunch in a restaurant of your choice near UIRS)</em></td>
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<td>13:30 – 16:00</td>
<td><strong>WORKSHOP 9</strong></td>
<td>seminar room UIRS (2nd floor)</td>
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<td></td>
<td>DIFFERENT LEVELS OF GOVERNANCE REGIMES AND POLICIES</td>
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<td>Dr. Andrew Adam-Bradford, geographer, Horn of Africa Unit -</td>
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<td></td>
<td><strong>Understanding urban agriculture</strong></td>
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<td>Human Relief Foundation -</td>
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<td><strong>governance and different policy models</strong></td>
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<td>governance and policies, United</td>
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<td><strong>and regimes with</strong></td>
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<td><strong>with step by step learning about the RUAF policy formation</strong></td>
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<td><strong>Multi-stakeholder Policy Formulation and Action Planning for</strong></td>
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<td><strong>Sustainable Urban Agriculture Development.</strong></td>
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<td>16:00 – 16:30</td>
<td><strong>Coffee break</strong></td>
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<tr>
<td>16:30 – 18:00</td>
<td>Wrap up and presentations of the results</td>
<td>seminar room UIRS (2nd floor)</td>
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Documentation of Joint Training School on Urban Food Production

October 21\textsuperscript{th}, Tuesday

1. Introduction
Welcome speech by organizer of JTS in Ljubljana, Mag. Ina Šuklje Erjavec (general information, about Joint training school, COST projects, schedule and all tutors of Joint training school, distributions of participants in groups for workshops and information about planned fieldtrips).

Short presentation of the Municipality of Ljubljana – LOCAL AGRICULTURAL SELF SUPPLY IN THE MUNICIPALITY OF LJUBLJANA (urban structure of the city, self-supply, agriculture and allotment gardens in Ljubljana)
Speaker: Jurij Kobe (Department for Environmental Protection)

Ljubljana JTS Urban Food Production 2014, Day 1: morning presentations at UIRS

Annex 1: Presentation: Local Agricultural Self Supply in the Municipality of Ljubljana (Jurij Kobe, MOL)
2. WORKSHOP 1

a. **Introduction:** overview of different urban garden types and initiatives in Ljubljana
   Speakers: Mag. Maja Simoneti and Dr. Darja Fišer

b. **Walk through urban gardens - Site visit**
   Tutors: Mag. Maja Simoneti, Dr. Darja Fišer
   Photo: Maja Simoneti, Jana Kozamernik

Site visit was made by foot to the different, bottom up gardening areas in the vicinity of UIRS, exploring their characteristics and discussion with tutors about. Participants had also the possibility to speak with the gardeners on site, as in the picture above where Irena Woelle a designer of visual communications and an urban food production and many other important points of life and nature activist and coordinator of many community gardening sites. She explained very interesting aspect of the Community garden “Velika čolnarska” – it is a temporary garden on a private site that is not in use at the moment (waiting for new developers) in the middle of the city, between the private houses. The idea was born within the group of participants of the workshop on permaculture workshop. The garden site itself as well as gardening and harvesting is not divided among members into plots and individual activities but they do everything together.
Ljubljana JTS Urban Food Production 2014, Day 1: Walk through the gardens - More traditional allotment gardens near along Gradaščica river

Annex 2:
- Presentation: Urban Gardening (Mag. Maja Simoneti, Dr. Darja Fišer)
- Presentation: Typology of Urban Gardens in Ljubljana (Dr. Darja Fišer)
3. **Urban food production in Ljubljana - site visit to Savlje area**  
(North part of Ljubljana city)

Tutors: Dr. Marina Pintar, Nataša Bučar Draksler, Andrej Erjavec, Rozalija Cvejič and Mojca Nastran

**Annex 3: Basic information about Savlje area (location, soil, land use and irrigation)**  
(Dr. Marina Pintar)

The site visit of urban food production area Savlje in Ljubljana was organized by tutors as well as by local organizers UIRS, providing the bus and other support for the visit. The site visit was supported by documents and information presented on the way there and enabled participants of the JTS to experience and discuss the contrast between both of the urban agriculture areas and urban garden sites of different origins and ways of management.

The Savlje site visit was also an introduction to the Workshops 6 and 7 dealing with comprehensive development, planning and design of urban food production and case study visit for the case studies 2 groups of participants were working latter within those workshops.

*Ljubljana JTS Urban Food Production 2014, Day 1: aerophoto of the Savlje area within nothern part of the City of Ljubljana*
The participants visited 2 different types of professional farms, both located within the city municipality of Ljubljana and supplying its local markets as well as providing sales of their harvest and products on site. The first one was more vegetable production oriented, using also greenhouses for growing and the other a cattle ecological farm with diary production. Both farms are part of the village, captured into the city quite long ago already, now closely linked to the city with the urban public transport as well as big densely populated urban neighborhoods nearby.

The situation is very interesting not only from spatial but also from sociological points of view because people living very nearby, are perceiving themselves very differently as urban inhabitants and as villagers.

Participants had the opportunity to see both farms and discuss with farmers about their experiences, attitudes and needs for better development;

*Ljubljana JTS Urban Food Production 2014, Day 1: site visit of Ljubljana urban agriculture area Savlje; Case study area for urban agriculture. Discussion with the farmer on the farming area.*
Ljubljana JTS Urban Food Production 2014, Day 1: site visit of Ljubljana urban agriculture area Savlje; Case study area for urban agriculture. Visit of vegetable farm: greenhouse and private store on site.
Ljubljana JTS Urban Food Production 2014, Day 1: site visit of Ljubljana urban agriculture area Savlje; Case study area for urban agriculture. Visit of one of the farmers in the area (eco-farm, small private store).
Besides farms, participants visited also some allotment gardening sites, one owned and managed by Municipality of Ljubljana within an abandoned area of military waste across the neighborhood as well as private ecological urban gardens for rent (Pridelaj.si), developed and managed by private investor Nataša Bučar Draksler who was also the JTS tutor and explained in detail development and management issues of her allotment gardens.
Annex 4:

- **Presentation: Understanding Ecological Food Growing with Garden Cards** (Nataša Bučar Draksler)
- **Instructions for Garden Cards** (Nataša Bučar Draksler)
October 22\textsuperscript{th}, Wednesday

1. Introductory presentations of the workshops and field work

   Speakers: Dr. Luke Beesley, Dr. Paulo Brito da Luz, Dr. Maria Partalidou, Dr. Rozalija Cvejić and Mojca Nastran: Livada case study area

Annex 5:

- \textit{Presentation: Urban Food Production: Environmental Challenges – introduction} (Dr. Paulo Brito da Luz)
- \textit{Presentation: Farming urban soils} (Dr. Luke Beesley)
- \textit{Presentation: Social aspects of Urban Food Production} (Dr. Maria Partalidou)
- \textit{Presentation: Livada case study} (Dr. Rozalija Cvejić and Mojca Nastran)
2. Joint workshop Understanding the site – Livada case area
Field work, site analysis – location, soil, water, users
Additional participants: stakeholders Zavod BOB, Ljubljana
Ljubljana JTS Urban Food Production 2014, Day 2: Joint workshop: Understanding the site; Presenting of group of stakeholders – future users of allotment garden site – Zavod BOB.
3. Workshop 4 – Social aspects of urban food production
   Tutor: Dr. Maria Partalidou
   Social views on food production and urban gardener profile
   Speaker: Dr. Majda Čerič Istenič
Ljubljana JTS Urban Food Production 2014, Day 2: Workshop 4: SOCIAL ASPECTS OF URBAN FOOD PRODUCTION.
From Workshop report (Dr. Maria Partalidou):

Agriculture and the city have been going hand-in-hand for centuries. Nowadays, Urban Food Production is of great importance in contemporary societies; as urbanization is growing, food prices are still going up and food travels from all over the world in order to reach urban dwellers. Amidst the current economic crisis, with alarming phenomena of neo-poverty and malnutrition, UA takes yet another crucial role in supporting vulnerable groups in cities and creating new jobs for unemployed. The module focused on two main points: how did we get to that chaos in food provisioning, the motives and other socioeconomic characteristics of urban farmers (either for hobby, or professionals) and the strengths, weaknesses and difficulties of these initiatives concerning both social and economic aspects.

The workshop was divided into three parts. The goal of the first part was to test an image-based methodology for the Social construction of the rural and the urban. Students were asked to identify the leading images of the rural and the urban within a set of 50 different given photos. During the second part of the workshop students were introduced to another binary “local or global” food systems. The aim of this task was to identify the actors in the food system, what are the emerging issues, how do we feed the city, what small farmers, in the peri-urban can do etc. The third part of the workshop was devoted to urban garden allotments. The students got familiar to emerging food provisioning practices such as urban agriculture and how it contributes to social inclusion.

Annex 6:
- Workshop report (Dr. Maria Partalidou)
- Presentation: Who are the gardeners and what motivate them to grow their own food? Results from FOODMETRES (Dr. Majda Čerič Istenič)
4. Workshop 3 – Environmental aspects of urban food production
   Irrigation and Agro-environmental indicators
   Tutor: Dr. Paulo Brito da Luz
   Soil survey and evaluation - Farming urban soils
   Tutor: Dr. Luke Beesly

Annex 7:
- Presentation: Urban Food Production: Environmental Challenges – Field Work (Dr. Paulo Brito da Luz)
- Presentation: Urban Food Production: Environmental Challenges – Workshop 3 (Dr. Paulo Brito da Luz)
- Presentation: Urban Food Production: Environmental Challenges – Annexes (Dr. Paulo Brito da Luz)
- Workshop Exercises: Pressurized Irrigation – Sprinkler (Dr. Paulo Brito da Luz)
- Presentation: Farming urban soils (Dr. Luke Beesly)
- Article: Harmony Park - A Decision Case on Gardening on a Brownfield Site (Dr. Luke Beesly)
October 23rd, Thursday

Additional participants: Stakeholders Zavod BOB, Ljubljana

1. Workshop 5 – Economic aspects of urban food production
   Learning from Foodmeters project
   Speaker: Dr. Marina Pintar
   Economic backgrounds of food production
   Speaker: Dr. Matjaž Glavan
Annex 8:
- Presentation: Learning from Foodmeters project (Dr. Marina Pintar)
- Presentation: Economic backgrounds of food production (Dr. Matjaž Glavan)

2. Workshop 6 (parallel workshop):
Comprehensive development of urban food production – learning from Greensurge project
Livada case area – allotment garden and youth place
Tutors: Dr. Rozalija Cvejić, Mojca Nastran, Mag. Ina Šuklje Erjavec
Aditional active participants: Stakeholders Zavod BOB, Ljubljana
Ljubljana JTS Urban Food Production 2014, Day 3: Workshop 6: Comprehensive development of urban food production (Livada case area) – work in groups and presentation of results
3. Workshop 7 (parallel workshop):
   Designing of urban food production?

* Savlje village development – urban agriculture area

Tutors: Andrej Erjavec, Mag. Ina Šukljje Erjavec

Annex 12: Presentation: designing urban Food Production?
Ljubljana JTS Urban Food Production 2014, Day 3: Workshop 7: Designing urban food production? – working in groups, presenting results
October 24th, Friday
Additional participants: Stakeholders Zavod BOB, Ljubljana

1. Presentation of representatives from City of Ljubljana
   Speakers from Municipality of Ljubljana: Jurij Kobe, Veronika Reven

   Annex 9:
   - Presentation: Rural development in Ljubljana municipality (Jurij Kobe, Municipality of Ljubljana)
   - Presentation: Allotment gardens in the Municipality of Ljubljana (Veronika Reven and Mateja Doležal, Municipality of Ljubljana)

2. Workshop 8 – Designing planning process for urban food production
   Tutor: Martin Sondermann
Ljubljana JTS Urban Food Production 2014, Day 4: Workshop 8: Designing planning process for urban food production

**Annex 10:**  Presentation: *Designing planning process for urban food production*  
(*Martin Sondermann*)
3. Workshop 9 – Different levels of governance regimes and policies
   Tutor: Dr. Andrew Adam-Bradford

Annex 11: Presentation: Different Levels of Governance Regimes and Policies
          (Dr. Andrew Adam-Bradford)
4. Conclusion of JTS

Ljubljana JTS Urban Food Production 2014, Day 4: Conclusions with representatives from both COST Actions and Zavod BOB.

Ljubljana JTS Urban Food Production 2014: a gift from Municipality of Ljubljana: T –Shirts for all
Participants and tutors (almost all) of Ljubljana JTS Urban Food Production 2014
Presentations, reports and other material (Annexes 1 - 11)

Annex 1:  Presentation: Local Agricultural Self Supply in the Municipality of Ljubljana (Jurij Kobe, MOL)

Annex 2:  Presentation: Urban Gardening (Mag. Maja Simoneti, Dr. Darja Fišer)  
Presentation: Typology of Urban Gardens in Ljubljana (Dr. Darja Fišer)

Annex 3:  Basic information about Savlje area (location, soil, land use and irrigation)  
(Dr. Marina Pintar)

Annex 4:  Presentation: Understanding Ecological Food Growing with Garden Cards  
(Nataša Bučar Draksler)  
Instructions for Garden Cards (Nataša Bučar Draksler)

Annex 5:  Presentation: Urban Food Production: Environmental Challenges – introduction (Dr. Paulo Brito da Luz)  
Presentation: Farming urban soils (Dr. Luke Beesley)  
Presentation: Social aspects of Urban Food Production (Dr. Maria Partalidou)  
Presentation: Livada case study (Dr. Rozalija Cvejić and Mojca Nastran)

Annex 6:  Workshop report (Dr. Maria Partalidou)  
Presentation: Who are the gardeners and what motivate them to grow their own food? Results from FOODMETRES (Dr. Majda Čerič Istenič)

Annex 7:  Presentation: Urban Food Production: Environmental Challenges – Field Work (Dr. Paulo Brito da Luz)  
Presentation: Urban Food Production: Environmental Challenges – Workshop 3 (Dr. Paulo Brito da Luz)  
Presentation: Urban Food Production: Environmental Challenges – Annexes (Dr. Paulo Brito da Luz)  
Workshop Exercises: Pressurized Irrigation – Sprinkler (Dr. Paulo Brito da Luz)  
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Article: Harmony Park - A Decision Case on Gardening on a Brownfield Site

Annex 8:  Presentation: Learning from Foodmeters project (Dr. Marina Pintar)  
Presentation: Economic backgrounds of food production (Dr. Matjaž Glavan)
Annex 9:  
**Presentation: Rural development in Ljubljana municipality** (Jurij Kobe, Municipality of Ljubljana)  
**Presentation: Allotment gardens in the Municipality of Ljubljana** (Veronika Reven and Mateja Doležal, Municipality of Ljubljana)  

Annex 10:  
**Presentation: Designing planning process for urban food production**  
(Martin Sondermann)  

Annex 11:  
**Presentation: Different Levels of Governance Regimes and Policies**  
(Dr. Andrew Adam-Bradford)  

Annex 12  
**Presentation: designing urban Food Production**  
(Andrej Erjavec and mag. Ina Šuklje Erjavec)
Reports of working groups (Annexes 12 - 16)

Annex 12: Report from Working Group 1
Annex 13: Report from Working Group 2
Annex 14: Report from Working Group 3
Annex 15: Report from Working Group 4
Annex 16: Report from Working Group 5
LOCAL AGRICULTURAL SELF SUPPLY IN THE MUNICIPALITY OF LJUBLJANA

Ljubljana, 21. 10. 2014
Jurij KOBE (Department for Environmental Protection)
Mateja Doležal, Veronika Reven (Department for Urban planning)

Why sustainable local food system?

Food sovereignty & self sufficiency
Environmental protection - Short Food chains
Food security

More than 2/3 of entire municipality consists of agricultural & forest lands
Total area = 275 km²
Forest = 108 km²
Agricultural land = 107 km²
*Data from real estate cadastre

Strategy for rural development 2014 -2020(draft)

Strategic objective 1
High quality products for self supply (agriculture & forestry) through optimal use of local resources

Number of farms
Average area of active lands per farm

<table>
<thead>
<tr>
<th></th>
<th>1991</th>
<th>2001</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>1343 farms</td>
<td>915 farms</td>
<td>815 farms</td>
<td></td>
</tr>
<tr>
<td>4,3 ha active lands/farm</td>
<td>6,3 ha active lands/farm</td>
<td>7 ha active lands/farm</td>
<td></td>
</tr>
</tbody>
</table>

5678 ha active lands:
- 2066 ha Arable lands & meadows
  - 175 ha vegetables
  - 88 ha potatoes
  - 637 ha cereals
  - 1085 ha fodder plants
- 3504 ha pastures
**Total agricultural area**

<table>
<thead>
<tr>
<th>Land cadastre</th>
<th>2001</th>
<th>2010</th>
<th>decrease (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11,142 ha</td>
<td>10,667 ha</td>
<td>4,3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Statistical data</th>
<th>2001</th>
<th>2010</th>
<th>decrease (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5,914 ha</td>
<td>5,678 ha</td>
<td>4,0%</td>
</tr>
</tbody>
</table>

**Optimizing sales channels of agricultural products**

- local markets
- home delivery
- local events
- seasonal market stall sale
- direct sale on the farm

**Challenges**

- Direct sale to public institutions
- Adding value to agricultural & forest products: fruit & vegetable processing, development of complementary activities
- Promotional activities
  - Spatial regulations - the spatial placement of farm buildings and facilities for the needs of gardening
  - Encouraging of gardening at the allotment areas

**Allotment gardens in the City of Ljubljana**

<table>
<thead>
<tr>
<th>1984</th>
<th>1995</th>
<th>2008</th>
<th>2010 (spatial plan)</th>
</tr>
</thead>
<tbody>
<tr>
<td>289 areas</td>
<td>378 areas</td>
<td>218 areas</td>
<td>23 areas</td>
</tr>
<tr>
<td>200 ha</td>
<td>267 ha</td>
<td>130 ha</td>
<td>45 ha</td>
</tr>
</tbody>
</table>

**Note:**
Data for the years 1984-2008 represents the actual situation (appropriate and inappropriate areas, authorized and unauthorized areas), the figure for 2010 represents the planned area for the planned plots (land use).

---

**Allotment gardens in the City of Ljubljana**

- Planned areas for allotment gardens in Municipal spatial plan (2010)
- Planned and designed allotment areas owned by the Municipality
- Agricultural land – private owners
Designed allotment gardens areas

Štepanja vas
- 14 allotment plots
- equipped with sheds, children’s playground, parking places, water supply connector to the distribution network, composters, mobile toilets and waste containers

Dravlje
- 51 allotment plots
- the same equipped as at Štepanja vas, but without connection to the water distribution network

Savlje – former military dumpsite
- 50 allotment plots

Agricultural land – private owners

- initiatives at agricultural areas - Municipality also has an intermediary role between the owners of agricultural land and gardens seekers (1,5 ha)

Thank you for your attention
Urban gardening

Mag. Maja Simoneti, Institute for Spatial Policies
and
Dr. Darja Fišer, crops2swap (or Zelemenjava in Slovene)
working together in urban gardening group within Network: Mreža za prostor

Joint Training School on Urban Food Production
COST actions TU1201 and TD1106
21-24 October 2014, Ljubljana, Slovenia
Urban Planning Institute of the Republic of Slovenia

Why urban gardening?

• it is a genuine and rewarding activity
• growing food – knowing food
• enjoying results of your work
• socialising
• contact with nature
• freedom of outdoors
• relaxation
• community building
• new urban practices and economies: urban revitalisation, crop
  swapping, outdoor education, cooking, tourism, ...

Urban gardening in Ljubljana

• food garden as a cultural phenomenon – the majority of house &
garden owners in Slovenia keeps a kitchen garden in their backyard
• planned and self organised
• urban gardening – gardening on borrowed or occupied land, either
  with or without the owner’s permission and rent
• gardening is for everyone
• gardens are everywhere
• gardening is both traditional and trendy

Recent history of urban gardening in Ljubljana

• 1955: gardens for the new citizens are organised in the growing
  industrial town and national capital
• 1985: the new master plan tends to move gardening to the outskirts
• 1995: guerilla gardening has expanded along with lost land use and
  control, the municipality starts comprehensive research activity
• 2007: removal of illegal gardens in front of the central cemetery
• 2010: a new master plan defines gardening as permanent land use,
  new gardening rules are set, the first new sample allotments are
  organised
• 2014: interest for gardening is growing, guerilla gardening is
  expanding again
Urban gardening, 1984

Gardening in Ljubljana, 1996

New urban gardening policy, 2007

- special / important location was chosen
- gardens were radically erased
- to stop illegal gardening
- to demonstrate the political will for change
- new public space - a park as a substitute for the former exclusive land use

Urban gardening, 2010

New master plan, 2010

- a new master plan - gardening as permanent land use as well as allowed on specific areas
- new gardening rules and ordinance
- follows research findings and environmental acceptability
- pushes gardening out of the city centre
- aims to organise and control gardening practices in the city
Urban gardening ordinance

What happens?

- new area preplanned for gardening is much smaller than the area of the existing gardening practice
- on the outskirts of the city while people garden and wish to garden in the city centre as well
- the proposed design for the demonstration gardens proved to be too expensive
- the size, the location and budget are underestimated
- diverse range of practice
- organised by the municipality and private actors
- selforganised
- great majority of urban gardening is illegal

2013, Jane's Walk

Findings

- garden proximity is crucial /young & old, on foot & by bike, on a daily basis/
- the temporary nature of gardening is not an issue /when made clear/
- silent agreement can result in a very stable arrangement /a decade or more/
- official consent of the owner and the municipality would be highly welcome /illicit gardens are stigmatised/

Ljubljana, 2014

- big public interest in gardening – near your home, also in the centre
- new contexts of gardening are emerging: revitalisation of degraded areas, green space maintenance, temporary land use, cultural program, education
- offer of legal gardening areas is very limited
- expansion of guerilla gardening is on the rise again

Jane's Walk, 2013

- Krakovo gardens, cultural heritage, private ownership
- Trnovo, guerilla gardening, public ownership
- Kolezija, guerilla gardening, private ownership
- Kolezija, gardening for the elderly, public ownership
- Trnovo, windowsill gardening

Krakovo gardens, cultural heritage, private ownership
Trnovo, guerilla gardening, public ownership
Kolezija, guerilla gardening, private ownership
Kolezija, gardening for the elderly, public ownership
Trnovo, windowsill gardening
otroci iz masinj

in onkraj gradbišča vas vahimo na
blagovno menjavo sadik

v četrtek, 15. 5. 2014, od 15.00 do 18.00
bomo v stiku na neprehranobno stopnjo pred
oglasiščem sestanek ODKJ gradbišča na
Masinju 27 in Ludjani blagovno menjavo
sadik, ki imajo v zgajevih v naši moli bogi
zgraditi. Možno sadišče v osrednjem, totale, ljudi
in obširi prostor.
Če imate tudi vi kakšne sadike izdušite. In
te je dodani al sorazmog na druga
dostrošči. Če imate kakovosti hrčki, šep
zelje al minus načelnica, tudi radjen.
Ali vam boste za osrednje prizadevali s
sveto šalven.

Se vidimo!

prehod: 08.00 danes evakuacija na dne dobave 1.
Lessons learned

• plot gardening is a part of a contemporary city
• gardeners are very persistent – they easily migrate
• people wish to garden close to their homes
• temporary gardens are more desirable than dislocated permanent solutions
• equipment (shed, fence, playground, benches, litterboxes…) is not of key importance
• people tend to respect the measures taken by the municipality: they comply with the regulations and bans
• BUT much less so when the proposed planned are not put into effect
1. ALLOTMENT COLONIES
example: Litostroj Allotments

2. GARDENS WITH TRADITION
example: Krakovo Gardens

3. TEMPORARY USE
example: Beyond a Construction Site

4. MAINTENANCE
example: On the railway embankment

5. NEIGHBOURHOOD GARDENS
example: Allotments at Rimska cesta

6. BORROWED GARDENS
example: Allotments in Murgle

7. GUERILLA GARDENS
example: Allotments at Gradaščica

8. CONTAINER GARDENS
example: Savske naselje

TOWARDS A TYPOLOGY

ALLOTMENT COLONY LITOSTROJ

Initiation: Litostroj Gardening Society
Duration: 1955 – on-going
Location: behind the Litostroj factory complex
No. of allotments: about 50
Land owners: farmers, state institutions, private companies
Relationship between allotment holders and land owners: different arrangements paying for rent and water, just for water or nothing at all
Characteristics: a stable allotment colony dating to the construction of the neighbourhood
KRAKOVO GARDENS

Initiation: individuals
Duration: Middle Ages – on-going
Location: between Eiiprova and Krakovska Street
No. of allotments: about 30
Land owners: private owners
Relationship between allotment holders and land owners: different arrangements (renting, borrowing, sharing)
Characteristics: transition from commercial food growing to hobby gardening

ONKRAJ GRADBIŠČA

Initiation: cultural and art society Obrat
Duration: 2010 – on-going
Location: Disused construction site between Resljeva and Kotnikova Street
No. of allotments: 40
Land owners: City of Ljubljana
Relationship between allotment holders and land owners: contract for free temporary use
Characteristics: temporary use of a disused construction site that started during a cultural festival and evolved into a community garden
ALLOTMENTS ON THE RAILWAY EMBANKMENT

Initiative: Botanic Gardens & national TV
Duration: 2013 - on-going
Location: railway embankment between Botanic Gardens and Dolenjska Street
No. of allotments: 7
Land owners: city of Ljubljana and Slovene Railways
Relationship between allotment holders and land owners: agreement for free temporary use
Characteristics: temporary use and maintenance of an infrastructure corridor
ALLOTMENTS AT RIMSKA CESTA

Initiative: individuals
Duration: 2060 – on-going
Location: between Rimska and Aškerčeva Street
No. of allotments: about 5
Land owner: private owner
Relationship between allotment holders and land owner: agreement for free use in exchange for maintenance of the hedge
Characteristics: very old neighbourhood allotments in the very centre of the city

ALLOTMENTS IN MURGLE

Initiative: individuals
Duration: 2010 – on-going
Location: Murgle
No. of allotments: 13
Land owner: private owner
Relationship between allotment holders and land owner: agreement for free use in exchange of mowing
Characteristics: beginner- and family-friendly community garden in a suburb
ALLOTMENTS AT GRADAŠČICA

Initiative: individuals
Duration: 2050 – on-going
Location: next to the bridge across Gradaščica river at Barjanska Street
No. of allotments: about 20
Land owners: City Museum of Ljubljana
Relationship between allotment holders and land owners: guerilla gardening
Characteristics: guerilla gardens with a long tradition, lots of recent expansion
Initiation: Saprabolt Society
Duration: 2013 – on-going
Location: in a neighbourhood park at Savsko naselje
No. of allotments: gardens in raised beds and builders bags
Land owners: City of Ljubljana
Relationship between allotment holders and land owners: contract for temporary use
Characteristics: a social experiment in community gardening in a traditional neighbourhood
1 = professional food production; 2 = non-professional food production

**Water protection areas**

(Ministry of Environment, 2005)

**Land use**

Agrcultural land use and water protection zones on Ljubljana Field intersect

Lithology of the Ljubljana aquifer

Bračič Železnik et al, 2005

<table>
<thead>
<tr>
<th>Code of water body</th>
<th>Area (ha)</th>
<th>Water for use (e.g. irrigation) (m³/s)</th>
<th>Appropriate area for irrigation (ha)</th>
<th>Hydromodul (l/s/ha) 18 hour irrigation daily</th>
<th>Water requested for irrigation of the entire area (m³/s)</th>
<th>Share of potentially irrigated area (%)</th>
<th>Potentially irrigated area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SI VT310 VT Sava Medvode-Podgrad</td>
<td>22.297</td>
<td>1445.6</td>
<td>0.59</td>
<td>0.853</td>
<td>100</td>
<td>1445.6</td>
<td></td>
</tr>
</tbody>
</table>

irrigation areas (ha); available water from surface water bodies

Vodni vir Območje 3 km od vodoteka in 300 m nadmorske višine nad vodotokom

SI VT310 Vodni vir Območje 3 km od vodoteka in 300 m nadmorske višine nad vodotokom
UNDERSTANDING ECOLOGICAL FOOD GROWING with Garden Cards®

Nataša Bučar Draksler, landscape architect

1. Why Garden cards
2. How to draw a plan for organic gardening
3. Sorting vegetables according to nutrient availability
4. Crop rotation
5. Distribution at the patch
6. Timeline
7. Plant density, pH, sun

Planning is easier With Garden Cards

2. HOW ?

What do we like?

Choose your favorite vegetable

ORAC DRUŽINA IME RASTLINE

<table>
<thead>
<tr>
<th>ORAC</th>
<th>O</th>
<th>Oxygen Ac</th>
<th>Radical</th>
<th>Antioxidant Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>27426</td>
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What do we like?
2. GROUP VEGETABLES
   BY FAMILY

- combine cards in small heap by colour.
- The same colour means plants in the same family.
- Exception are RED cards. Those are other plants, among which only sunflower and Jeruzalem artichoke are family.

Cabbage family
- Beet family – spinach beet ...
- Cabbage family
- Carrot family
- Cucumber family
- Lettuce family
- Onion family
- Pea and bean family
- Potato family

3. DIVISION
   BY GARDEN BEDS

An agricultural technique in which, season after season, each field is sown with crop plants in a regular rotation, each crop being repeated at intervals of several years.

How much food plants need??
The pile at the back side tells us how much manure or compost plant needs.

What is one area?
It is a group of garden beds equally treated with nutrients
There are 3 areas at least:
- Intensive manured 1. area
- Middle manured 2. area
- Without manure 3. area
1. area
At the 1st area
We grow plants, which need
The highest amount of nutrients

2. area
There we grow plants, which need average overall fertility and do not tolerate fresh manure.
3. area
There we grow plants, which almost don’t need fertilisers. Or they can produce nitrogen from the air by themselves.

Some plants can grow at each area. With them we fulfill empty space among other plants. Undercropping / intercropping
4. CROP ROTATION

- If crops from the same family are grown in the same place year after year, related pests and diseases may become established. Plants from the same family have equal nutrient requirements. They are not good neighbours and must not grow at the same place year after year.

5. DISTRIBUTE VEGETABLE AT THE PATCH

- A - Distribute Garden cards at the patch in drills. Take care not to put the same colour (same family) side by side. But they may make a line longways.
- B - Distribute Garden cards at the patch with equidistant spacing
- Be aware of the effect of plant density

6. DESIGN THE SCHEME
Time schedule – **green** for sowing seeds

Don’t forget, some vegetables could be sown more often, to prolong the season (lettuce, radish, sweet corn, chicory …)

**Take note of sun or shadow**

**Take note of planting distance**

**Take note of acidity / alkalinity of soil**

**One month later**

**DRAW A PLAN.**

**Distribute and plant**
5. DISTRIBUTING THE VEGETABLES AT EACH PATCH

A. Distribute Garden cards® at each patch with equidistant spacing – clock.
B. Distribute Garden cards® at each patch with equidistant spacing – clock.

6. PLANNING THE PRODUCE YEAR

When you are satisfied with distribution, draw it onto a plan. Be aware of the effect of plant density. Distance is written at the bottom of the back side of each Garden card®. Crops, which need a lot of space when growing slowly, intercropping is the sowing of fast-growing or small vegetable on unused ground between slower-growing main crops. Interplanting is the sowing of two plants under one

7. MANAGING SOIL

Double cropping is the sowing on one ground between the clearance of one main crop and the planting of another. Area is a surface with the same amount of nutrients, treated the same way. Najboljša poljina in naj-manj v tretji. Area is a surface with the same amount of nutrients, treated the same way. Najboljša poljina in naj-manj v tretji.

8. SOWING VEGETABLES

Be ready to make compromises. Divide garden into equal-sized sections according to how many years rotation is to last. Let’s try to make compromises. Divide garden into equal-sized sections according to how many years rotation is to last.
Introduction

Overview

Sustainability of natural resources concerning urban food production.
Agro-environmental requirements and limitations.

1) In Europe climate change is expected to decrease precipitation and increase temperatures in the summer season. We face specific challenges in urban allotment gardens related to extreme events and water supply.

2) Considering drought periods, gardens will need irrigation solutions to assure crop water requirements. Precipitation extreme events and excessive irrigation tend to cause runoff and flooding damages. Inadequate irrigation design and management will lead to severe problems in water, soil and energy conservation.

3) Those negative impacts lead to the requirement for more sustainable and efficient land use practices, taking into account the interactions between water quantity, quality of soil and water and selected crops.

4) Site-specific studies involving the water balance, regarding a soil-plant-atmosphere system, are a key strategy guideline to ensure a reliable land use management.

Water in the Soil-Plant-Atmosphere System

Basic information to approach a water balance (with respect to water application or precipitation):

- Soil texture classes
- Field capacity and water storage
- Soil cover, slope and micro-relief
- Rooting depth
- Infiltration capacity
- Crop coefficient: Kc (curve and factors)
- Weather factors
- Surface runoff
- Drainage-Percolation
- Evapotranspiration: Eto and Etc
- Water quality parameters
Farming urban soils:
1) First steps to identifying risks; the evidence trail

Luke Beesley

What are soils?

“Mineral and/or organic materials forming the substrate supporting biological life…”

“Storage areas for carbon and vital nutrients”

“Buffers for toxic contaminants”

“Soils which are disturbed, influenced or added to by the action of humans…”

“and containing the presence of anthropogenic artefacts…”

“visible and invisible”

Visible

Invisible

“soil sealing and the loss of productive land”

“concentrated and contaminated runoff waters”

“forced to use contaminated and poor quality soils”

Source: European Commission

Heavy metals, Cd, Ni, etc

Organic contaminants from inks etc

Organic and metal contaminants from paints, preservatives
Sources of risk:
- Point or diffuse
- Historic or contemporary
- Can you identify the visible and invisible ones?
- What simple indicators can you use to help you?

Pathways:
- Direct contact with source, soil etc
- Through eating food grown in risk areas

Receptor:
- Age/demographic
- Exposure/consumption
Workshop 4: Social aspects of Urban Food Production
needs - values – perceptions - motivations

Dr. Maria Partalidou  Rural Sociologist
Lecturer, University of Thessaloniki, Greece
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http://rural-lab.agro.auth.gr/staff3.htm

- The first images of the city that come to our minds are buildings, roads, cars, lights, supermarkets open all day, with colorfully packaged food
- In a city that keeps growing bigger and hungrier

We have No idea where our food comes from!

Future Challenges
- Population increases globally
- Until 2025 over 60% will be living in cities
- Changes in dietary choices (too much meat=too much energy)
- Unemployment in cities
- Food prices are still going up
- Food miles

Something is really wrong with our food- system
Chaos in food provisioning
We have not been able to cover the needs of a great part of the world
whereas in other parts (mainly in cities) people actually die due to food choices and their attitudes connected to contemporary life in the city

the future of FOOD is the future of HUMANITY
Urban agriculture: pockets of rurality within the city:

• The engagement of urban residents in urban allotment gardens, in CSA schemes linked to peri-urban professional farms, and the establishment of inner-city farmers’ markets are part of the ‘ruralization’ of aspects of urban life.

The rural is not a unified, discrete and unambiguous space

Motivations for UA

<table>
<thead>
<tr>
<th>Greek case study</th>
<th>Greening the city</th>
<th>For the children</th>
<th>Socializing</th>
<th>Leisure</th>
<th>Access to food, crisis</th>
<th>Produce my own vegetables</th>
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How the workshop will work [16.30-18.30]

1. What is the current situation in your city: food provisioning in your homeland. Is it a food desert: food miles? (task for vegetables and fruits) [20’min]

2. Social construction of the rural and the urban: based on photos “sense of urban” and “sense of the rural” [20’min]

3. Place making of UA They are constructed and imagined as lived places (images of urban agriculture and UGAs based on pictures from homeland) [20 min]

The garden as a place for social interaction
Notes from the field

- **Take photos** of “space configuration” - boundaries “place making” and “personalization of plots”
- **Take notes** (talk to people!!)

“What need/s does the garden cover for you”?
“What was your motive?”

* Write down as much as you can about their personal characteristics (male, female, age, educational level, bonds to the rural, job etc)

---

How the workshop will work [16.30-18.30]

4. Results from the **matrix of needs** - notes from the ground [30 min]

**Short report**: how you would answer to the different needs (matrix) by proposing what activities? [30 min]

---

You can learn so much just by observing.
To what we are striving?

Urban Green Infrastructure can be used as a tool for integrated spatial planning and governance to deal with urban challenges, from climate change adaptation and biodiversity loss to enhancing human health and wellbeing, social cohesion and economic sustainability.

The most important principles for UGI planning and governance:
- Multi-functionality
- Connectivity
- Multi-level
- Social inclusiveness
- Adoption of a communicative approach

Strong relationship between UGI and objectives of social cohesion (as well as BD)

Introduction to the Livada Case Study

Mojca Nastran and Rozalija Čopić
Biotechnical Faculty, University of Ljubljana

Community participation
- Local governments do not always need to act as initiators, implementers and managers, but can instead act as facilitators of initiatives to enhance UGI which are led by other actors. Such diversity in steering methods can boost local efforts to protect and enhance UGI’s, broaden financial sustainability and enrich community participation.

Ecosystem values and functions
- The concept of GI has gained prominence during recent years as a strategic approach to develop “an interconnected network of green space that conserves natural ecosystem values and functions, and that provides associated benefits to human populations”

Green economy
- UNEP (2011) defines a green economy as one that results in "improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities". In its simplest expression, a green economy is low-carbon, resource efficient, and socially inclusive. In a green economy, growth in income and employment are driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of BD and ESS.
Livada case study

From field visit of Livada to Task of the workshop 6:

- Zone new urban green space implementing requirements of both GS and needs of Zavod Bob
- Our task is NOT to end up with a list of wishes and measures, but more!
- Our task is to create balanced set of measures, equally considering their direct and indirect impacts, that will successfully lead towards our goals.

workshop 6: incomprehensive development of urban food production

Rozalija Cerčič, Mojca Nastran,
Biotechnical Faculty, University of Ljubljana

Task of workshop 6:

- Zone new urban green space implementing requirements of both GS and needs of Zavod Bob
- Our task is NOT to end up with a list of wishes and measures, but more!
- Our task is to create balanced set of measures, equally considering their direct and indirect impacts, that will successfully lead towards our goals.

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Measure
Social complexity: operational definition (Radej, 2014)

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To refresh: sites visited $\rightarrow$ we will form groups

LIVADA
- 6000 m²
- Intended for community gardens by Municipality
- River Ljubljanica
- Path of Remembrance and Comradeship
- Slight waterlogging
- Outside strict center
- Vicinity of dwellings

SAVLJE

Social learning mechanisms of multi-party collaboration to deliver social learning (van Herk, 2013):

- communities of practice
- learning and action alliance
- socially embedded institutions
- learning platforms or arenas
- learning networks for sustainable development
- learning organisation and networked organisations
- LEARNING ALLIANCE
  - “a group of individuals or organisations with a shared interest in innovation and the scaling-up of innovation, in a topic of mutual interest”

We will help ourselves: Learning alliance with Zavod Bob

- Institute Bob is NGO specialized in project learning of young adults
- the whole is more than the sum of the parts
- don’t do everything at once
- programme „under construction”
- temporary use of space
- live space
- creative interaction with neighborhood
- mobility

Desiderata:

- motivation: public interest & window of opportunity
- needs: complex & multidisciplinary, all aspects of development must be met (environmental, social, economic)
- motto: the whole is more than the sum of the parts
- limitations: low installation and maintenance costs
- content
- potential: tangible results in policy-making, design & planning, implementation
- do not forget: how to step out? afterlife?

References

Agriculture and the city have been going hand-in-hand for centuries. Nowadays, Urban Food Production is of great importance in contemporary societies; as urbanization is growing, food prices are still going up and food travels from all over the world in order to reach urban dwellers. Amidst the current economic crisis, with alarming phenomena of neo-poverty and malnutrition, UA takes yet another crucial role in supporting vulnerable groups in cities and creating new jobs for unemployed. The module focused on two main points: how did we get to that chaos in food provisioning, the motives and other socioeconomic characteristics of urban farmers (either for hobby, or professionals) and the strengths, weaknesses and difficulties of these initiatives concerning both social and economic aspects.

The workshop was divided into three parts.

The goal of the first part was to test an image-based methodology (see Schmid and Patzel, 2010) for the Social construction of the rural and the urban. Students were asked to identify the leading images of the rural and the urban within a set of 50 different given photos.

Onwards students discussed and reflected upon the symbolic and guiding images and how these are constructed by the media or by everyday interaction; elaborating also on their own photos (that they were asked to bring prior to the school as task). Some overall points were that the distinction between ‘urban’ and ‘rural’, between the city and the country, is one of the oldest and most pervasive binaries (Woods, 2011) but students believe that today such kind of dichotomic relationships does not exist. Within cities one can find pockets of rurality (ruralisation of aspects of urban life) and vice versa. The point was that we have to see this relationship through the lens of a symbiosis: What the city can do for the rural and what the rural can do and how to take care of the city for the benefits of the society.

At this point students were also asked to identify “what is urban in urban agriculture”. And some of their points are raised here.
1. the opportunity to organize meetings/ workshops/ events with different people from different backgrounds/ education. Urban Agriculture is really important for socialization into the city, to build social ties in the neighbourhood, for social integration of foreigners, to improve quality of deprived neighbourhoods. Urban Agriculture supports learning processes especially due to the practical activities (learning by doing) and the high sharing of ideas opinions in the garden. Urban Agriculture supports the improvement of civic duty, participation and action by the citizens. Through the “rural” practices, participants can improve the “urban” quality of life and wellbeing of their city.

2. “Urban” in Urban Agriculture is sense of place
3. Social : doing together
4. Its location within the urban area
5. Quantitative (% grey VS green)
6. Spontaneous and experimental gardening, not professional
7. if the garden is surrounded by contemporary buildings, it creates ambience of urban. In the opposite, if it is surrounded by houses in agricultural fields it is rural.
8. Its link and the ability access with/ to urban population
9. The limitations, demands and needs coming from “urbanity” of life and place
10. Purely spatial definition (land use) Agriculture= growing food & Urban= complex land use (Built up, Residence, Entertainment, Transport infrastructure, Industry)
11. More/ different infrastructure, facilities and opportunities through the proximity to the city and many people at one place (city).
12. Reduce food miles, could be agricultural activity between the concrete buildings.
13. The connection between farm activities with the city/ citizens. Farmers change their business model to connect with the costumers (direct sales, educational and leisure activities).
14. Urban people visiting the farm.
15. the actors, the air, immediate proximity of farm to central services and population centre, people and setting, the closest place portraits free
16. As landscape architect, I consider Urban Agriculture as a must and I believe Urban Agriculture is about multifunctionality and bringing together uses that do not naturally come together. For example, a park that is productive in a very dense urban area, centrally in the city. The park provides value for a farmer to live from; it is maintained only from the farmer and is a place for citizens to be in agriculture areas.
17. Urban is a “fancy” label nothing more, related (functionally or spatially) to or included in the urban area.
18. why does it matter???

During the second part of the workshop students were introduced to another binary “local or global” food systems. The aim of this task was to identify the actors in the food system, what are the emerging issues, how do we feed the city, what small farmers, in the peri-urban can do etc. Using the tables provided by the students (asked to develop prior to the school) students articulated the current situation in their city: food provisioning in their homeland and food miles (Lang, 2005)? Finally they discussed on what do they consider as «local» (Committee of the Regions, 2011) Some of the issues raised was that people,
especially in cities, do not really know where food comes from, as they are detached from the rural and the actual food production and this distance between the production and consumption is not only a geographical or economical one but it is also a social and political distance. People are disconnected from the political, environmental, economic and social impacts of their food choices.

The third part of the workshop was devoted to urban garden allotments. The students got familiar to emerging food provisioning practices such as urban agriculture and how it contributes to social inclusion. They were introduced to the results of FOODMETRES project (The 7th Framework Programme funded by European Commission) by Majda Černič Istenič with special focus on the identification of social groups to which gardeners belong, their motivations to grow their own food and their perception of ecological and social benefits of growing own food. They were divided into groups and one representative of the Zavod BOB network was appointed to them in order to elaborate on the needs and motivations of the group. Students were asked to make a list of needs and motives for the Zavod BOB case and propose tailored made actions for the urban garden. Each group gave an oral short presentation of the proposal.

References:

Lang, T. (2005). ‘Food Control or Food Democracy?: re-engaging nutrition to civil society, the state and the food supply chain’, Public Health Nutrition, 8, 6A: 730-737.
Who are the gardeners and what motivate them to grow their own food? 
Results from FOODMETRES

Majda Černič Istenič
University Ljubljana
Biotechnical Faculty

Sample of the survey
- Internet survey carried out during May – July 2014
- Sample:

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<td>Home gardeners</td>
<td>36</td>
<td>53,7</td>
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<td>Public and private allotment gardeners</td>
<td>31</td>
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<td>Total</td>
<td>67</td>
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</table>

Gender, age and education
Mean age: 56,8, no statistical significant differences among groups

Working status and income class

Type of housing and origin of residence

Motivations for growing own food
- In both groups grow your own is more related to own personal benefits (healthy and safe food, relaxation and exercise) than to environmental benefits, but significantly less to save money
Perception of ecological and social benefits of growing own food

- Organic food production is more valued by Allotment holders than Home gardeners.
- Home gardeners are critical towards ecological impacts of Allotment holders' practices.
- The awareness of the impact of urban gardening on "Zero carbon footprint" is not very high in both groups.

What are your observations?
URBAN FOOD PRODUCTION:
ENVIRONMENTAL CHALLENGE

Field Work

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Tel: 0 351 21 440 3566

Joint Training School
21-24 October 2014
Ljubljana, Slovenia

Hydrologic Cycle

Soil. Texture Classes

Soil-Water

Soil-Water
Soil-Water

Irrigation (Microsprinkler catalogue)

Application Rate (mm/h) = Flow (L/h) / Area (m²)
Water application = Application rate x time

Evaluation of an irrigation period of 3 hours:
Possibilities of surface runoff and percolation:
(a) Application rate = Infiltration capacity
(b) Water application – Available water capacity
considering sandy loam and clay loam soils (0.5 m depth):

Drainage
Introduction

1) The improvement of water governance must take into account the resources conservation (soil, water and energy), as well as the competitiveness of the agro-forestry management. Climate factors uncertainty determine the need for more suitable technologies on farm irrigation projects, adequate to each specific soil-plant-atmosphere system.

2) Design and management solutions in the irrigation sector shall solve conflicts concerning technical, environmental and economic issues.

3) The implementation of political strategies promoting irrigation evaluation frameworks, to assure an integrated and appropriate water management since consistent criteria and indicators are selected (and generated by advanced research), may be an effective way to avoid practices with negative impact.

Agro-Environmental Indicators

a) WATER USE
   - Water use intensity (water amounts)
   - Water stress (crop susceptibility to water deficit, evapotranspiration)
   - Water use efficiency-uniformity (runoff, percolation)

b) WATER QUALITY
   - Water contamination (pollution, nutrients and pesticides)
   - Salinity and Alkalinity

c) SOIL QUALITY – LAND CONSERVATION
   - Physical properties and conditions (depth, texture, structure, compaction, crust sealing)
   - Hydro-dynamic parameters (Ks, water holding capacity)
   - Soil erosion (erodibility)
   - Fertility (organic matter)
   - Salinity and Alkalinity (SAR)
   - Topography (slope, relief)

d) OTHER ECOLOGICAL ISSUES
   - Groundwater (level)
   - Energy conservation(pumping efficiency)
   - Crops (rotation and adaptation)

Irrigation Selection


Water in the Soil-Plant-Atmosphere System

Basic information to approach a water balance (with respect to water application or precipitation):

- Soil texture classes
- Field capacity and water storage
- Soil cover, slope and micro-relief
- Rooting depth
- Infiltration capacity
- Crop coefficient: Kc (curve and factors)
- Weather factors
- Surface runoff
- Drainage-Percolation
- Evapotranspiration: Eto and Etc
- Water quality parameters
Soil-Water

Crop Water Requirements

Crop-Soil-Water

Design Components - Layout

Irrigation (Sprinkler catalogue)

Irrigation (Microsprinkler catalogue)
Irrigation (Drip catalogue)

Water Quality


URBAN FOOD PRODUCTION:
ENVIRONMENTAL CHALLENGES

Annexes

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Joint Training School
21-24 October 2014
Ljubljana, Slovenia

Bod density
Ions dry soil per unit volume, determined by drying to constant weight at 105 °C, usually extracted on glass or grit. Bulk Ranges 2 mm or larger are usually excluded or corrected for after measurement.

Electrical conductivity (EC)
A measure of the ability of the soil water to transfer an electrical charge. Used as an indicator for the estimation of salt concentration, measured in mmhos/cm (dS/m), at 77 °F (25 °C).

ECe = Electrical conductivity of soil water extract.
ECi = Electrical conductivity of irrigation water.
ECaw = Electrical conductivity of applied water.

RAM = Sa x P
or
RAM = AWC x MAD
Main References (online)


**SAMPLE CALCULATION** (Excluding: System capacity, Total pressure, Pumping power and Layout with pipes and subunits/plots):

### GIVEN:

**Urban Allotment garden area (A):** 0.5 ha

**Crop Water Requirements:**
- Crop selection: Beans
- Reference Crop Evapotranspiration - ET₀ (meteorological broadcast/historical series) – 5 mm/day
- Crop Coefficient – Kᵣ: 1.1
- Crop Evapotranspiration – Etc = ET₀ x Kᵣ: 5.5 mm/day

**Soil:**
- Soil Texture: Sandy loam
- Water Application - Sprinkler Systems:
  - Spacing (sp x sp) - 12 x 12 m, Pressure – 2 Bar (Catalogue F33); Application Efficiency (AE) – 80%; Irrigation duration (T) - 3 hours

**Calculation:**

<table>
<thead>
<tr>
<th>Calculation</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available Water Capacity – AWC&lt;sub&gt;4&lt;/sub&gt;=a</td>
<td>120 mm/m</td>
</tr>
<tr>
<td>Management Allowable Depletion – MAD (table 3.3)</td>
<td>40%</td>
</tr>
<tr>
<td>Rooting Depth – Rd (table 3.4)</td>
<td>0.6 m</td>
</tr>
<tr>
<td>Water - Maximum Net Depth (mm) (AWC x MAD x Rd)</td>
<td>29 mm</td>
</tr>
<tr>
<td>Irrigated Area (a x sp x sp)</td>
<td>144 m&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Layout - Number of sprinklers (A/a)</td>
<td>35</td>
</tr>
<tr>
<td>Sprinkler Discharge - Dc (catalogue)</td>
<td>1020 L/h</td>
</tr>
<tr>
<td>Application Rate - AR (precipitation) - (Dc/a)</td>
<td>7.1 mm/h</td>
</tr>
<tr>
<td>Net Irrigation Depth - D – (AR x T x AE)</td>
<td>17.1 mm</td>
</tr>
<tr>
<td>Irrigation Interval (D/ETc)</td>
<td>3 days</td>
</tr>
</tbody>
</table>

**Evaluation of irrigation scheduling:**

- Soil texture: Sandy Loam. Kᵣ = 25 mm/h. Clay loam soil: Kᵣ = 2.5 mm/h = 7.1 mm/h. Thus, runoff/ponding problems (but first hour infiltration is above 25%) depending also on surface storage: slope (+5%) and residues (table "3")
- Irrigation duration 6 hours: 6 x 5.7 = 34.2 mm > 29. Thus, percolation problems Same D but Irrigation interval of 4 days: 5.5 x 4 = 22 mm of Etc > 17.1 mm. Thus, water deficits (Potential problems. Example: no soil water storage to compensate)

Obs: with drip irrigation systems, wetted or shade areas may influence application rates calculation and ETc
Farming urban soils:
2) Exploring and mitigating hazards

Luke Beesley

Where’s the risk?

A) ……………………………………?
B) ……………………………………?
C) ……………………………………?
D) ……………………………………?
G/H) …………………………………?

What do we measure?

The total amount of contaminant in the soil (% or mg/kg). By X-ray scanning or acid digesting soils.

The soluble concentration of contaminant extracted from the water in soil pore spaces (mg/l). By vacuum extraction of soil pore water.

Soils about the contaminants that can leach to waters or be taken up by plant roots.

Case study; UK community garden

- Rapid local industrialisation 1850-1950
- Not disturbed soils, but aerial pollution
- Previous investigations into contaminated lettuces etc
**UK Soil guide values**

<table>
<thead>
<tr>
<th>mg kg⁻¹</th>
<th>As</th>
<th>Cd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential 'direct contact with soil'</td>
<td>32</td>
<td>10</td>
</tr>
<tr>
<td>Allotments 'eating produce grown in soil'</td>
<td>43</td>
<td>1.8</td>
</tr>
<tr>
<td>Industrial</td>
<td>630</td>
<td>230</td>
</tr>
</tbody>
</table>

**Case study; central Madrid gardens**

- Previous industrial activity reflected in soil composition
- Measuring the 'total' and the 'plant available' concentrations
- Measuring the concentration in plant matter

Source: Clemente et al, 2008
F. El Retiro
- City central park
- Local authority site, planned, managed, wastes and soils controlled
- Education centre on site

D. Esta Es Una Plaza
- Derelict land, previously industrial?
- Use of local soils in beds and terraces
- Community led projects

What are your next steps...
- More samples, more analysis?
- Survey people on their intake of crops?
- Restrict children playing in the soil?
- Close the site down and remediate soils?

Discuss the options...

Farming urban soils:
3) Adding environmental value

Luke Beesley

<table>
<thead>
<tr>
<th>Soils</th>
<th>Initial findings</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>D. Esta Es Una Plaza</td>
<td>Medium/high level Ag, Hg, Pb</td>
<td>Old metal plating industry</td>
</tr>
<tr>
<td>F. Retiro</td>
<td>Low level Pb</td>
<td>Traffic emissions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Crops</th>
<th>Initial findings</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>D. Esta Es Una Plaza</td>
<td>Tobacco with Ag, Cu, Hg, Pb</td>
<td>Direct intake of metals</td>
</tr>
<tr>
<td>F. Retiro</td>
<td>Low level Pb</td>
<td>Minimal intake of metals</td>
</tr>
</tbody>
</table>
‘Improving’ soils?

-Tillage & ground preparation

-Adding organic fertilisers...

...composts, manures, ash waste etc
...can add C, N and other nutrients
...and can increase pH in acid soils

-Urban green-spaces can store C...
-especially when compost is applied
-urban soils can be manufactured to store C

-Adding compost changes soil chemistry
- Carbon dissolved in water acts as a ‘carrier’ for contaminants
- Thus, adding compost can cause contaminants to be more ‘mobile’ within the environment

-Adding biochar adds lots of carbon, but negligible nitrogen
-Large surface area can ‘adsorb’ contaminants
-Plants may avoid it
Some urban wastes may contain contaminants.

Painted and preservative treated wood contains As, Cr, Cu and other metals.

When burned the following ash is a concentrated source of metals.

Wood ash experiment; farm example

- Wood ash from local biomass energy boiler
- Mixed sources of wood, some ‘virgin’ other painted etc
- Added ash to soils at 3 and 10% volumes and grew Ryegrass

---

No ash

3% ash

10% ash

- Soil pH increased from 5 to 7.5
- Low amounts of ash increased Ryegrass biomass
- High amounts of ash; no plant growth
- Contaminants in plants?

---

Results

- Low amounts of ash increase pH, adds some useful nutrients and produce more biomass
- Increases in contaminants found in Ryegrass; impacts for grazing animals, crop plants etc
- Too much ash completely toxic; no plants will grow

Options

- Be careful to burn non contaminated woods?
- Add only small amounts of ash...how much?
- What can you recommend?
In March of 2009, Mr. John Holloway and his neighbors in the Harmony Park district of Kansas City, MO, were excited to begin gardening on a vacant city lot in their neighborhood. The neighborhood, like many in urban areas, had once been residential interspersed with small establishments including restaurants, shops, and businesses such as auto body shops and gas stations. The under-utilized lot had once had multiple abandoned houses on it that had been torn down about two decades earlier, but since then the lot had been empty, overgrown with weeds, and a neighborhood eyesore. Mr. Holloway, a leader in his community, hoped that a community garden would not only improve the aesthetics of his neighborhood, but also provide a local, inexpensive source of fresh fruits and vegetables for his neighborhood, which is located in a food desert. When concerns arose about soil contaminants on the site, Mr. Holloway grew panicked that a community garden on a brownfield site would do more harm than good in his neighborhood. This case focuses on Mr. Holloway’s decision of whether to continue gardening on the brownfield site in Harmony Park. The decision requires that students evaluate environmental, agronomic, human health, social, and economic issues related to the problem Mr. Holloway faces. Objectives of this case are for students to analyze and discuss data and concepts related to gardening on brownfield sites, urban soil contamination, urban food deserts, and human health.

In 2010, 83.7% of the United States population was living in urban areas, and that percentage is projected to increase in the future (U.S. Census Bureau, 2011); however, this population growth is not uniform throughout the various neighborhoods in cities. Many urban neighborhoods with higher poverty rates (30% or greater) have experienced a rapid decline in population since the 1980s. Nearly 15% of urban land in U.S. cities, or approximately 1,800 hectares per city, is vacant or abandoned (Pagano and Bowman, 2000). As urban populations transitioned to suburbs, inner-city businesses, houses, and parking lots were abandoned or razed, leaving open, vacant lots. Publicly and privately owned vacant lands and brownfields in many U.S. cities are quickly being converted to urban gardens and farms by individuals, families, neighborhoods, schools, nonprofit organizations, and many other groups or organizations. According to the Small Business Liability Relief and Brownfields Revitalization Act (U.S. Government Printing Office, 2002), brownfields are defined as “real property of which the expansion, redevelopment, or reuse may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.”

The United States has an estimated 450,000 to 1 million brownfields, many of which are often considered potential gardening sites due to their proximity to residential areas. This problem case is based on an actual situation faced by a neighborhood group that established a community garden on a brownfield site. Recommendation for best management practices (BMP) based on soil analyses for both agronomic and environmental parameters must be made to reduce any potential risk from gardening in the contaminated soil.

20 February 2008

John Holloway grew up in Harmony Park, and he built his life and career in this area of Kansas City. He saw firsthand that more and more of the neighborhood’s houses were left empty, unkempt, and eventually boarded up or razed. Mr. Holloway knew that he had to do something to remedy this and improve his neighborhood, his lifelong home. He was concerned that if nothing was done, his neighborhood would become nothing but endless vacant, unused lots and unsafe structures. Mr. Holloway envisioned a more prosperous and vibrant future for his neighborhood and fellowneighbors.

Abreviations: BMP, best management practice; DDE, dichlorodiphenyldichloroethane; DDT, dichlorodiphenyltrichloroethane; FDA, Food and Drug Administration; GPS, global positionning system; ICP-OES, inductively coupled plasma optical emission spectrometer; USDA-NRCS, United States Department of Agriculture Natural Resources Conservation Service; USEPA, United States Environmental Protection Agency; XRF, x-ray fluorescence spectrophotometer.
Neighborhood History

A great deal of Kansas City’s African-American history took place in the area of the city that included Harmony Park, and many of the city’s notable African-American leaders once resided here. In the last 50 years, the neighborhood experienced a population decline from 11,700 to 2,500. In 2008, nearly 38 hectares or approximately 25% of the land area in the Harmony Park neighborhood was vacant lots. After the decline in population, many historic buildings and residences fell into disrepair, and vacant lots turned into weedy sites or were used for illegal trash dumping. The sights of boarded-up homes and businesses and the demolition of condemned structures were not uncommon. A decline in the number of businesses throughout the Harmony Park neighborhood also forces current residents to travel farther from home for basic needs such as groceries, fresh produce, medicines, and clothing.

A Neighborhood in a Food Desert

Low-income, minority neighborhoods in many cities throughout the United States are often disproportionately located in food deserts (Chung and Myers, 1999; Powell et al., 2007; Zenk et al., 2005). A food desert, as defined by Cummins and Macintyre (2002) is a “poor urban area, where residents cannot buy affordable, healthy foods.” The lack of access to healthy, fresh, affordable foods threatens the well-being of millions of Americans who live within food deserts, including the residents of Harmony Park.

Low-income urban residents face many obstacles to eating a healthy diet; one is a shortage of places to shop. Poorer neighborhoods throughout the United States have nearly 30% fewer supermarkets than the highest-income neighborhoods, so access to food is more often limited to smaller convenience stores (Chung and Myers, 1999; Giang et al., 2008; Morland et al., 2002a; Weinberg, 1995). Poor minority neighborhoods are even less likely to have access to a supermarket than poor white neighborhoods (Morland et al., 2002b; Powell et al., 2007; Zenk et al., 2005). The smaller convenience stores in these food deserts often offer a lower selection of higher priced, lower quality food items (Chung and Myers, 1999; Hendrickson et al., 2006; Zenk et al., 2005). Access to food is further limited for many low-income residents due to a lack of reliable transportation and the greater distance from home to store (Walker et al., 2010). The Harmony Park neighborhood does not have a local grocery store or supermarket, and gas station convenience stores are the only locations in the neighborhood where residents can purchase food items. Jackson County, MO, where Harmony Park is located, saw a 10 to 24.9% decrease in grocery stores and gas station convenience stores are the only locations in the neighborhood where residents can purchase food items from 2007 to 2008 (USDA-ERS, 2011).

The lack of affordable, healthy, and fresh foods decreases the ability of Harmony Park residents to maintain a healthy diet. Research has found that low-income populations, especially minorities, consume fewer fruits and vegetables than currently recommended by the Food and Drug Administration (FDA) (Krat et al., 2000; Resnicow et al., 2001). A healthful, balanced diet contributes to a healthy body and decreased instance of diet-related health issues (Ness and Powles, 1997; Van Duyn and Pivonka, 2000). Food desert neighborhoods are disproportionately affected by adverse diet-related health problems such as type 2 diabetes, cancer, obesity, heart disease, and premature death (Deaton and Lubotsky, 2003; Hendrickson et al., 2006).

Mr. Holloway and other community members were aware of these economic, social, and health problems in their neighborhood and set out to make changes for themselves, their friends, and neighbors. Efforts began in 2008 to revitalize this historic neighborhood. The Harmony Park Neighborhood Improvement Association formed and worked in conjunction with the University of Missouri-Kansas City and governmental groups to implement historic preservation plans for many buildings in the neighborhood and to transform many vacant lots into usable green spaces. The Harmony Park Neighborhood Improvement Association wrote an action plan, and its first recommendation was to “enhance self-sufficiency and economic growth through the development of urban agriculture on vacant lots.”

THE CASE

In early 2009, Mr. Holloway and his neighbors gathered to discuss what should be done with a vacant lot on Michigan Avenue. Mr. Holloway, president of the Harmony Park Neighborhood Improvement Association for 15 years and resident of the neighborhood, led the neighborhood gathering. As a prominent figure and friend to those in the neighborhood, Mr. Holloway is passionate about uplifting Harmony Park and reintroducing the neighborhood to the rest of the Kansas City metropolitan area as the historically and culturally rich community that it once was. His efforts already can be seen on many of the residential streets in Harmony Park. Houses that once were boarded up and abandoned are now hopeful reminders of the resilience of this neighborhood, standing strong with fresh paint and new windows, roofs, and residents. Although abundant strides have been made to revitalize the community, several vacant lots on each residential block are empty, weedy dumping grounds and remain eyesores. Mr. Holloway wanted to do something about the 38 hectares of unused, vacant lots throughout Harmony Park.

The Michigan Avenue Vacant Lot

An example is one of three vacant lots located on Michigan Avenue (Fig. 1). The 42 m by 37 m lot was situated within a residential area of the Harmony Park
neighborhood. To the north and south edges of the lot were two uninhabited, boarded-up houses (Fig. 2). The lot had a westerly ascending slope of 2 to 9% to an elementary school yard that was once the site of an auto body shop. The east edge was bordered by Michigan Avenue, across which was a row of inhabited houses. Four houses once stood on the site, but they fell into disrepair and were razed and cleared away in the 1990s. Remnants of these former houses, such as broken glass, bricks, paint chips, wood, and cement remained in the soil. The site’s soils were subjected to many anthropogenic impacts and were mapped by the U.S. Department of Agriculture–Natural Resource Conservation Service (USDA-NRCS) as an Urban land-Harvester complex, a soil formed in less than 40 inches of disturbed material over a truncated loess (Soil Survey Staff, 2001).

Mr. Holloway and neighbors wanted to craft something on the lot to improve the neighborhood. The group discussed many potential uses for the lot, including a park, a playground, a flower garden, and an orchard. In March 2009, Mr. Holloway and his fellow neighbors finally settled on the decision to establish a community garden. They envisioned a community gardening space with numerous plots to grow vegetables, fruits, herbs, and flowers. Each 28 square-meter plot was to be assigned to an individual or family in the neighborhood, and gardeners could keep what they grew and give away extra to neighbors. The garden would provide a local source of fresh produce for Harmony Park community residents that they wouldn’t have to venture far from home to get and that would improve the diets of these low-income individuals and families. Mr. Holloway thought a garden would be aesthetically pleasing as well, and a relaxing place for recreation and socializing.

By April 2009, the vacant lot on Michigan Avenue was cleared of weeds and loose debris and the soil was tilled in preparation for establishing a garden that spring and summer (Fig. 3). Even before the plots were delineated, all available plot spaces were claimed by Harmony Park residents. Elderly women, young men, and families with children were all excited to enjoy the recreation of gardening and to eat the fresh produce from their plots. The neighborhood was eager to move forward with plans for the community garden, and many gardeners began to plant early spring crops such as Swiss chard, lettuces, and spinach in anticipation of their first growing season on their new garden plots.

The Problem

One morning as Mr. Holloway was reading the paper and drinking his morning cup of coffee, he came across a newspaper article on President Obama’s new garden (Burros, 2009). The article read, “When the Obamas decided to turn some of the South Lawn at the White House into a kitchen garden, they did what many smart urban gardeners do: they had the soil tested for its nutrients and potential contaminants, like lead.” Mr. Holloway felt alarmed; he had not thought to have the soils tested for potential contaminants. He wondered what types of contaminants could possibly be in a soil in his neighborhood. “Surely we have nothing to worry about,” he thought. Mr. Holloway visited the garden that evening to pick his newest batch of ripe tomatoes and okra and saw the grandchildren of his elderly neighbor, Norma, playing in the soil of her garden plot as she weeded and watered her crops. He began to worry, thinking, “If our soil is contaminated, then are Norma’s grandchildren at risk from playing in the soil?” And what about the tomatoes and okra he had planned to bring home to family for dinner—could they be contaminated, too? Although a garden was a beautiful addition to their neighborhood, Mr. Holloway did not want to put any of his friends or family at risk. He decided to add his new harvest of fresh veggies to the compost pile instead of taking them home for dinner. He needed more information before he could feel safe eating anything grown on the site.

The next day, Mr. Holloway called the extension service at the nearby land-grant university to request help with his problem. Mr. Holloway knew he needed to determine whether it was safe to garden on and eat food from the community garden lot; he especially wanted help figuring out how to better manage the urban soils to keep everyone healthy. What good is a beautiful community garden in a food desert if it could be hurting everyone he loves? The garden was supposed to improve his neighborhood’s health and vitality, not threaten it.
Soil and Plant Tissue Sampling and Testing

Soil scientists from a nearby university came to help Mr. Holloway assess the soil quality, potential presence of contaminants, and any potential human health risks of the Michigan Avenue community garden site. Screening of the site for trace elements (specifically lead [Pb], cadmium [Cd], and arsenic [As]) was done using a field portable x-ray fluorescence spectrophotometer (XRF) analyzer (Thermo Scientific, Billerica, MA) (Fig. 4 and 5). Measurements were taken every 3 m across the site in a rough grid pattern. The XRF measurements were geo-referenced using a global positioning systems (GPS) unit. Total soil lead concentration maps were created using this spatial data to determine areas of high or low total soil lead concentrations (Fig. 6). Eight soil samples were collected from the site for confirmation analysis of the total soil lead concentration by laboratory digestion using method 3051A (USEPA, 2007) followed by analysis using an inductively coupled plasma optical emission spectrometer (ICP-OES) (Table 1). Soil samples were collected from areas where compost had been added to garden plots where compost had not been added. Soils were digested as described before and the total soil lead concentration was also measured for these samples using the same ICP-OES method (Table 2).

The soil scientists told Mr. Holloway that the common sources of trace elements in urban environments included the past use of leaded paint and gasoline, historical pesticide use, and industrial and commercial activities. The potential sources of contamination of urban areas like the Michigan Avenue lot are shown in Table 3. Additional soil samples were collected to analyze for chlordane (C1–C3, Fig. 6), dichlorodiphenyltrichloroethane (DDT), and dichlorodiphenyldichloroethylene (DDE) (C4–C9, Fig. 6). Chlordane, a pesticide and common persistent urban organic contaminant, was used to treat house foundations for termites and is commonly found in soils around house foundations or where previous structures stood. Because houses border the lot and rubble from formerly razed houses was found on the site, the soil scientists told Mr. Holloway that additional soil tests would need to be conducted to determine if chlordane was present in the soil. The soil scientist also explained that DDT was a commonly used insecticide before it was banned in the United States.

Table 1. Total soil lead concentrations of the Michigan Avenue vacant lot in the spring of 2009.

<table>
<thead>
<tr>
<th>Soil sample</th>
<th>Total lead mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>288</td>
</tr>
<tr>
<td>2</td>
<td>254</td>
</tr>
<tr>
<td>3</td>
<td>335</td>
</tr>
<tr>
<td>4</td>
<td>173</td>
</tr>
<tr>
<td>5</td>
<td>252</td>
</tr>
<tr>
<td>6</td>
<td>141</td>
</tr>
<tr>
<td>7</td>
<td>183</td>
</tr>
<tr>
<td>8</td>
<td>185</td>
</tr>
<tr>
<td>Average</td>
<td>226</td>
</tr>
</tbody>
</table>

Table 2. Average total soil lead concentrations of the Michigan vacant lot before and after the addition of compost in the spring of 2009.

<table>
<thead>
<tr>
<th></th>
<th>Average total soil lead mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before or after adding compost</td>
<td>Before adding compost: 245 ± 21</td>
</tr>
<tr>
<td>After adding compost</td>
<td>145 ± 20</td>
</tr>
</tbody>
</table>
in 1972, and it is found in soils where pesticide spray was common, so tests would be done to determine its presence. DDE is an intermediate product of DDT degradation in the soils and can be found in the soils where DDT was applied. Chlordane, DDT, and DDE in the soil samples were extracted using the EPA 3540C, the Soxhlet extraction method, and were analyzed using gas chromatography following EPA 8081A method. The concentration of chlordane was below the minimum detection limits of the laboratory method (i.e., 0.05 mg/kg). Concentrations of DDT and DDE were low: the range of DDT concentration was 0.04 to 1.3 mg/kg, and maximum DDE concentration found was 0.04 mg/kg. Testing concluded that these pesticides were not a great concern at this site.

**Background on Brownfields and Urban Soils**

Natural and urban-derived soils vary considerably. Urban soils are often highly disturbed and/or contaminated due to human activities (Bullock and Gregory, 1991; Cruul, 1999; Reimann and De Caritat, 2000). Urban soils are often more physically, chemically, and biologically heterogeneous than naturally derived soils, posing unique management issues. Previous land use and human activities on and around an urban site (e.g., industries, automobile emissions, lead paint, mining, and use of man-made products) can lead to increased accumulation of trace elements and organic compounds or soil contamination (Boyd et al., 1999; Mielke et al., 1999; Mielke and Reagan, 1998; Nriagu, 1979, 1996). Lead, cadmium, and arsenic are the most pervasive contaminants in urban soils. The following table provides examples of urban site uses and their contaminants:

<table>
<thead>
<tr>
<th>General source</th>
<th>Examples of previous site uses</th>
<th>Specific contaminants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paint (before 1978)</td>
<td>old residential buildings; mining; leather tanning; landfill operations; aircraft component manufacturing</td>
<td>lead</td>
</tr>
<tr>
<td>High-traffic areas or near roadways</td>
<td>next to trafficked roadways or highways; near roadways built before leaded fuel was phased out</td>
<td>lead, zinc, polycyclic aromatic hydrocarbons (PAHs)</td>
</tr>
<tr>
<td>Treated lumber</td>
<td>lumber treatment facilities; structures built with treated lumber</td>
<td>arsenic, chromium, copper, creosote</td>
</tr>
<tr>
<td>Burning wastes</td>
<td>landfill operations</td>
<td>PAHs, dioxins</td>
</tr>
<tr>
<td>Contaminated manure</td>
<td>copper, zinc salts added to animal feed</td>
<td>copper, zinc</td>
</tr>
<tr>
<td>Coal ash</td>
<td>coal-fired power plants; landfills; homes with coal furnaces</td>
<td>arsenic, selenium, cadmium, sulfur</td>
</tr>
<tr>
<td>Biosolids</td>
<td>wastewater treatment plants; agriculture</td>
<td>cadmium, copper, zinc, lead, persistent bioaccumulative toxics (PBTs)</td>
</tr>
<tr>
<td>Petroleum spills</td>
<td>gas stations; residential/commercial/industrial uses (anywhere an aboveground or underground storage tank is or has been located)</td>
<td>PAHs, benzene, toluene, xylene, ethyl benzene</td>
</tr>
<tr>
<td>Pesticides</td>
<td>widespread pesticide use, such as in orchards; pesticide formulation, packaging, and shipping</td>
<td>lead, arsenic, mercury, dichlorodiphenyldichloroethylene (DDT), chlordane, and other chlorinated pesticides</td>
</tr>
<tr>
<td>Commercial or industrial site use</td>
<td></td>
<td>PAHs, petroleum products, solvents, lead, and other heavy metals (such as cadmium, arsenic, chromium, lead, mercury, and zinc)</td>
</tr>
<tr>
<td>Dry cleaners</td>
<td></td>
<td>stoddard solvent and tetrachloroethene</td>
</tr>
<tr>
<td>Metal finishing operations</td>
<td></td>
<td>metals and cyanides</td>
</tr>
</tbody>
</table>
most common contaminants in urban environments. Trace elements occur in small quantities and are found naturally in many soils; however, urban soils often contain elevated concentrations of non-naturally occurring trace elements and compounds due to human activities (Finster et al., 2004). Soils are a sink for many trace element contaminants, and most of these urban soil contaminants are persistent, immobile, and non-biodegradable (Boyd et al., 1999; Finster et al., 2004; Mielke et al., 1999; Mielke and Reagan, 1998; Watt et al., 1993).

Contaminated urban soils require unique management techniques due to their heterogeneity and potential contamination to reduce exposure pathways and any human health risks. Past and forgotten sources of contamination, razing of aboveground materials, and mixing of urban soils can lead to sites with variably distributed contamination, making understanding and minimizing human health risks difficult.

Urban soils are an important pathway for human exposure to trace elements and organic contaminants (Boyd et al., 1999; Gallacher et al., 1984; Mielke et al., 1999; Mielke and Reagan, 1998; Watt et al., 1993). This is troublesome, because common urban soil contaminants (e.g., lead and arsenic) are toxic to humans, especially children (Boyd et al., 1999; Finster et al., 2004; Hettiarachchi and Pierzynski, 2004; Mielke et al., 1999; Mielke and Reagan, 1998). Gallacher et al. (1994) found that residents living in areas with highly lead-contaminated soils had higher blood lead levels than residents of areas with minimally contaminated or uncontaminated soils. Humans may be exposed to soil contaminants through three main pathways: ingestion, inhalation, and dermal exposure (Boyd et al., 1999; Mielke et al., 1999; Mielke and Reagan, 1998).

The two main exposure pathways affecting urban dwellers, especially gardeners and farmers, are ingestion of soil dust and ingestion of food grown in contaminated soil (Cambra et al., 1999; Hawley, 1985; Hettiarachchi and Pierzynski, 2004). Direct ingestion of soil dust may be from putting soil or dirty fingers in mouths, which is a typical occurrence for young children when playing outdoors, or from soil dust that adheres to produce, hands, and clothing. Root crops grown directly in the soil and crops that grow close to the soil, such as spinach, often have soil dust adhered to the tissue when harvested (Finster et al., 2004). Ingestion of food grown in contaminated soil also may pose a risk to human health if the bioavailability of the contaminant is high and if translocation of the contaminant from soil into the roots, from the roots to shoots, and shoots to fruiting bodies. Hettiarachchi and Pierzynski (2004) defined bioavailability as the proportion of a soil contaminant that is available for absorption into an organism. Some researchers have attempted to develop rules of thumb for managing soils based on the measured contaminant concentration (Table 4).

Table 4. Recommended gardening practices based on results of soil test for lead, modified from Angima and Sullivan, 2008. The modification is the addition of the 250 to 400 category, which was added because of concerns specific to root crops (Ganga Hettiarachchi, personal communication, 25 Oct. 2013).

<table>
<thead>
<tr>
<th>Amount of lead</th>
<th>Gardening practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 50 mg kg⁻¹</td>
<td>Little or no lead contamination in soil. No special precautions needed.</td>
</tr>
<tr>
<td>50 to 250 mg kg⁻¹</td>
<td>Some lead present from human activities. Grow any vegetable crops. Choose gardening practices that limit dust or soil consumption by children.</td>
</tr>
<tr>
<td>250 to 400 mg kg⁻¹</td>
<td>Do not grow root crops. Choose gardening practices that limit dust or soil consumption by children.</td>
</tr>
<tr>
<td>400 to 1200 mg kg⁻¹</td>
<td>Do not grow root crops and low-growing (difficult to clean) leafy vegetables. Choose gardening practices that limit dust or soil consumption by children.</td>
</tr>
<tr>
<td>Greater than 1200 mg kg⁻¹</td>
<td>Not recommended for vegetable gardening. Mulch and plant perennial shrubs, groundcover, or grass. Use clean soil in raised beds or containers for vegetable gardening.</td>
</tr>
</tbody>
</table>

The two main exposure pathways affecting urban dwellers, especially gardeners and farmers, are ingestion of soil dust and ingestion of food grown in contaminated soil (Cambra et al., 1999; Hawley, 1985; Hettiarachchi and Pierzynski, 2004). Direct ingestion of soil dust may be from putting soil or dirty fingers in mouths, which is a typical occurrence for young children when playing outdoors, or from soil dust that adheres to produce, hands, and clothing. Root crops grown directly in the soil and crops that grow close to the soil, such as spinach, often have soil dust adhered to the tissue when harvested (Finster et al., 2004). Ingestion of food grown in contaminated soil also may pose a risk to human health if the bioavailability of the contaminant is high and if translocation of the contaminant from soil to the edible portion of the plant has occurred (Finster et al., 2004; Purves and Mackenzie, 1970). The bioavailability of an individual contaminant affects the plant uptake and translocation of the contaminant from soil into the roots, from the roots to shoots, and shoots to fruiting bodies. Hettiarachchi and Pierzynski (2004) defined bioavailability as the proportion of a soil contaminant that is available for absorption into an organism. Some researchers have attempted to develop rules of thumb for managing soils based on the measured contaminant concentration (Table 4). Individuals in direct contact with urban soil should be aware of these issues so they can minimize the environmental and human health risks associated with soil contamination.

THE DECISION FOR STUDENTS

Mr. Holloway is frightened to make a decision about promoting community gardening on the Michigan Avenue site. He wants to improve his neighborhood with this beautiful garden, to give his neighbors the opportunity for recreation and socializing while gardening, and to provide everyone with fresh, healthy, and local produce. But what if their health is at risk from lead contamination, if not other chemicals or metals? He is alarmed, but he doesn’t want to also alarm his friends. “We’ve put so much effort into this garden, and it has already become a bright spot in Harmony Park. What should I do?”

Case Objectives

1. Discuss issues related to brownfields, food deserts, urban soil quality and contamination, and growing food on mildly contaminated soils.
2. Discuss the common urban soil quality and contamination issues related to historical and current human impacts on urban lands.
3. Discuss how food deserts affect urban dwellers’ ability to access healthy, fresh foods.
4. Discuss the three pathways and the potential human health risks associated with exposure to contaminated soil.
5. Uncover relevant scientific information and evaluate its validity.
6. Analyze site-specific data on the contaminants tested and the potential risks associated with growing food crops on brownfields.
7. Formulate a BMP recommendation for gardening on a brownfield given that the gardeners have already begun growing on the site.
Mr. Holloway, as a leader in his neighborhood, has a responsibility to his neighbors and to the consumers of the produce from the garden to notify all who are involved of the mildly elevated concentrations of lead in the soil. Ask himself the following: What is the dilemma that Mr. Holloway faces? Should he and his fellow neighbors continue to garden on the site? Which BMPs would you recommend that Mr. Holloway and the other gardeners implement on the site? What if anything could be done on the site to ensure the health of growers and consumers?

### Questions to Stimulate Discussion and to Examine the Issues of the Case

Review the evidence of contamination on the site as well as the social, economic, human health, and environmental issues of this case and the following questions:

1. **What is the dilemma that Mr. Holloway faces?**
   Should he and his fellow neighbors continue to garden on and eat produce grown on the brownfield site? Is it a good idea to convert the vacant city lots in this neighborhood into community garden spaces to grow fresh foods for neighborhood consumption?

2. **Does Mr. Holloway have a legitimate reason to worry about the health of his neighbors, friends, and family who are gardening on the site?** Who will Mr. Holloway’s decision affect?

3. **Should Mr. Holloway tell the gardeners on the site about the contamination?**

4. **What are the benefits of locating the community garden on a brownfields site?**

5. **What are the disadvantages of locating the community garden on a brownfields site?**

6. **How are soils tested?** Is it like the television show “CSI: Crime Scene Investigation,” where you put a soil sample into an analytical machine and get a readout of all possible contaminants? Are there any university or private soil testing labs in your state? How much does it cost to test one soil for lead? Do the benefits of growing fresh produce for the neighborhood outweigh the disadvantages associated with the urban soils of the lot?

7. **Based on the evidence, what BMPs would you recommend that Mr. Holloway and the other gardeners implement on the site?** What if anything could be done on the site to ensure the health of growers and consumers?

### Answers to Questions, and Ideas for Classroom Management

1. **Mr. Holloway is a community leader.**

2. **The total soil lead concentrations are mildly elevated** (Table 1, 2, and 4), indicating the past human impacts have raised lead concentration above the natural soil levels. Mr. Holloway and the other gardeners should be aware that the soils they are growing in contain elevated levels of lead; however, these concentrations should not provoke panic for these gardeners. The main risk from lead is through eating or inhaling soil. Lead is not a plant nutrient, so uptake into plant tissues is not a concern.

3. **Mr. Holloway is a leader in the community, and many people are looking to him for guidance on whether or not they should continue to garden at the site.** His family, neighbors, and any other consumers of produce from the site will be affected by his decision to continue or to stop gardening on the Michigan Avenue lot. If they continue gardening without taking the proper precautionary measures, then they may be endangering themselves; however, the soil total lead concentrations are not elevated enough to warrant the immediate termination of gardening on the site. Precautionary measures would include the following. First, collecting and submitting soil samples to a laboratory would help them to assess the overall risk of gardening on the site. Second, if the soil is only mildly contaminated and is still safe for gardening, then the gardeners should avoid inhaling dust while working. One solution is to cover walkways with fabric or mulch to keep the dust down. If they are doing an operation that is particularly dusty, such as tillage, they should consider wearing a dust mask. Gardeners should also avoid the transfer of soil into their mouths, for example, to wash their hands and produce with soap and water before eating. Consumers should be told to wash produce thoroughly, peel root crops, and discard the outer leaves of leafy crops.

4. **Mr. Holloway, as a leader in his neighborhood, has a responsibility to his neighbors and to the consumers of the produce from the garden to notify all who are involved of the mildly elevated concentrations of lead in the soil.** Ask...
The urban soils on the site are highly heterogeneous, making management of the site more difficult. The total soil lead concentrations are elevated, whereas the levels of both DDT and chlordane were below the detectable limits in the soils of this brownfield site. These issues can make management decisions complex and difficult for gardeners to make. Expensive soil tests and potentially expensive risk mitigation techniques may be too expensive for a community gardening group to shoulder. Outside technical assistance is often required to determine the safety of and the BMP of a specific brownfield site.

Several students should contact and/or identify local soil testing laboratories and inquire about the availability, cost of testing, and turnaround time for total soil lead and for chlordane and DDT. (This question is posed so that students have an appreciation for the costs associated with testing for contaminants and why community gardens will likely not be able to afford extensive soil testing.) This question was designed to make students think about the potential positive and negative aspects of the proposed community garden. Many answers are possible. Students should identify that the addition of compost to soils on the site decreased the total soil lead concentration. How did it do this (dilution of the concentration and reduction of the bioavailability)? Gardeners could add compost to the entire site to reduce the total soil lead concentration in the surface soil. At the actual site, Mr. Holloway and the gardeners added compost to the entire Michigan Avenue community garden and incorporated it into the top 6 inches of soil. Mulch was also added to all walkways to reduce the amount of exposed soil and to minimize soil dust in the garden. Depending on the size of the community garden, the cost of bringing compost and/or mulch could be quite high. How would that be paid for? Raised beds created using imported topsoil would be another option, along with covered walkways. Gardeners should be advised to wear gloves while gardening or to wash hands after working in the soil. Children should be prohibited from putting soil in their mouths, and babies and toddlers must be closely monitored if they are going to be present in the garden. A fence would be a good measure to keep children and pets from passing through this mildly contaminated site. All produce should be thoroughly washed with soapy water to remove adhered soil particles prior to eating. Furthermore, urban soils are usually inherently poor and need to be improved by adding compost, testing for soil nutrients, and adding nutrients if needed. Adding compost will lead to increased productivity for food production. One important note is that commercial composting facilities are not permitted on contaminated sites. Therefore, the amount of contaminants present in the compost itself is usually very low. Composting garden materials upon the contaminated soils at the community garden should be avoided, as composting is often done directly on the soil surface, and this would lead to enrichment of the compost in lead. On-site composting should be confined to low-lead parts of the property, if possible.

REFERENCES


