Urban Agriculture: Issues for Public and Environmental Health

Karen Rideout, MSc
National Collaborating Centre for Environmental Health

SOEH Seminar Series
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outline

• Introduction to urban agriculture (UA)
• Urban agriculture and public health
• Potential challenges of UA
• Environmental health issues
• Food safety and UA
• Role of public health professionals
• Discussion and questions
the many sides of urban agriculture

• Urban / peri-urban
  – Intersection of urban and rural
• Community gardens
• Commercial agriculture
• Backyards and balconies
• Temporary sites/'Guerilla’ gardens
• Victory gardens
• Entrepreneurial gardens
• School gardens
• Educational farms
• Recreational farms
UA is everywhere

- Global south
- Europe
- North America
- Vancouver & BC
Urban agriculture in Vancouver
Urban agriculture is growing

- Many municipalities are supporting urban agriculture and community gardening

- UBCM climate change initiative

  www.toolkit.bc.ca/
why urban agriculture?

- Local food supply
- Therapeutic, exercise
- Grow ethnic foods from home
- Social interaction
- Environmental
- Connection to nature/food
benefits of urban agriculture

- Food security & diet quality
- Community economic development
- Mental health
- Urban design & vibrant neighbourhoods
- Educational & skill building
- Local food
- Biodiversity
- Physical activity
- Productive vacant lots
- Beauty, nature
urban agriculture and public health

• Zoning & land access
• Air | water | soil quality
• Social stratification
• Agricultural pollution
• Food safety
• Animals & pests
• Safety & security
zoning & land

• Land access is the biggest challenge to urban farmers and community gardeners
• People will grow where they can find land
  – old industrial sites
  – vacant lots
  – railway lines
  – brownfield sites
  – private development sites
  – roadsides and boulevards
• Potential concerns re.
  traffic safety | air & soil pollution | fencing
air pollution

• Road traffic pollutes soil and plants:
  – Cd, Cu, Pb, Zn, Mo
  – Petroleum HCs (unburnt fuel)
  – PAHs (gasoline)
• Variable – Depends on wind, distance, traffic, soil characteristics

MITIGATION
• Pb particles can be washed off
• Boundary crops can act as a protective buffer
water

**IN**
- Use of non-potable grey water
  - Household or rain water
  - Lack of regulation
- Microorganisms
- Household chemicals

**OUT**
- Run-off from larger urban farms or those using chemical inputs or pesticides may contaminate surrounding properties or sewers
- Most community gardens have organic requirements
soil contaminants

Heavy metals:
- Pb, Zn, Cd, Cu, Hg, As

- Organic compounds:
  - PAHs, POPs, pesticides

- Pathogens

- Asbestos fibres
sources of soil contamination

- previous use of land (industrial, dry cleaning, photo processing)
- atmospheric deposition (esp. near roads)
- paint particles (Pb)
- contaminated fill
- water runoff
- composts and fertilizers
- pesticides
- sports and hobbies (e.g. airgun pellets)
- leakage of HCs (gas stations)
- wood preservatives (creosote, chlorophenols) in construction, raised bed frames, or rail lines
- waste disposal
- bonfires
- faeces
- burial of dead animals
- sewage sludge
a note about brownfields

- lack of access to land
- lack of awareness and resources
- private land ownership (e.g. property developers)
- gas stations and railway lines
soil contaminants

- Pathways of human exposure to soil contaminants
  - Uptake through plant roots
  - Deposition of soil particles on leaves, fruits, or roots
  - Consumption of soil by animals used for food, milk, or eggs

Photo: Wikimedia Commons
gardening on contaminated sites

- **Site mitigation:**
  - excavation & soil replacement (+/- geotextiles)
  - soil washing
  - soil vapour extraction
  - microbial remediation
  - phytoremediation (+/- chelating agents)

- very expensive, fast
- expense
- very expensive
- low cost; <1 year
- low cost; 2–5+ years
gardening on contaminated sites

• Design solutions:
  – raised beds
  – impermeable barriers with landscape fabric
  – buffers between garden and roads

Photo: Inside Urban Green

Photo: City Farmer

Photo: Wikimedia Commons
gardening on contaminated sites

• Planting options:
  – grow low accumulators in contaminated soil

• Soil conditioning:
  – lime raises pH to minimize cation (metal) uptake
  – compost neutralizes pH, making Pb less bioavailable
factors affecting metal bioavailability

• pH
• organic matter (elements bind to it)
• CaCO$_3$ – keeps pH>7, decrease availability
• % clay size – metals sorb to clays
• % plaster & concrete – affects pH & sulphate
• Redox
• Form of metal (particulate, soluble, organic)
• Concentration of other contaminants
## Plant Choices

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Avoid</th>
<th>Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cadmium</td>
<td>Lettuce, Spinach, Carrot, Mustard</td>
<td>Spinach, Pea, French bean, Squash, Tomatoes</td>
</tr>
<tr>
<td>Lead</td>
<td>Lettuce, Onion, Mustard, Collards, Mizuna, Sunflowers</td>
<td>Spinach, Pea, French bean, Squash, Tomatoes</td>
</tr>
<tr>
<td>Dioxin</td>
<td>Root crops, <em>Cucurbitaceae</em></td>
<td>Above-ground parts</td>
</tr>
<tr>
<td>General</td>
<td>Leafy greens</td>
<td>Fruiting plants</td>
</tr>
</tbody>
</table>
soil testing resources

– Resource Management Branch, BC Ministry of Agriculture and Lands Abbotsford, 604-556-3102

– Agrichem Analytical Saltspring Island
  www.agrichem.ca

– M.B. Laboratories Ltd. Sidney www.mblabs.com

– Exova (Nor-west Labs) Surrey
  www.bodycotetesting.com

– Pacific Soil Analysis Unit Richmond, 604-273-8226

– Caro Analytic Services Richmond & Kelowna
  www.caro.ca
agricultural pollution

• Pesticides
  – drift from peri-urban agriculture
  – untrained hobby farmers and gardeners
  – pets and children
• Fertilizers
  – improper use
  – pets and children
• Water runoff
UA and food safety

• Pesticide residues
  – Most backyard and community garden plots use organic methods
  – Community based growers using pesticides may not have adequate training
    • Poisoning risk
    • Runoff
    • Pets

• Sale of produce
  – Farmers’ markets, shops, CSA, “farm” gate
  – Value-added products (jams, pickles, etc)
  – Fruits and veg, eggs, meat
urban livestock

• Regulations vary by municipality
• Some cities allow backyard chickens
  – Victoria, Burnaby, New Westminster, Vancouver
  – New York, Seattle, Portland, LA, Chicago + others
  – Halifax, Toronto don’t allow
• Goats, guinea pigs, rabbits
• Land use and/or animal control by-laws
• In North America, other animals generally not permitted
FROM BARNYARD TO BACKYARD

BYLAWS: Urban hens have a patch of grass to call home again after Vancouver city council votes to allow the animals in yards. A4
health concerns with backyard animals

- Avian influenza
- Odour
  - Not a health risk
  - Control with proper hygiene
- Noise – only roosters
- Pests
  - rats, mice, etc.
- Cruelty to animals
  - not unique to food animals
- Predators
- Excrement and waste
How to Prevent and Detect Disease in Backyard Flocks and Pet Birds

1. Prevent contact with other animals and wild birds
2. Clean barns, tools, litter – keep food sealed
3. Report early signs of disease
4. Keep birds away from visitors
5. Segregate new birds for 30 days
pests

- Compost
  - rodents, flies
  - odour
- Animals
  - predators
  - odour
  - flies
- Generally from poor management or neglect, although rodents always a possibility
- Perception can be a problem
composting

- Put wire mesh under compost bin for rodent protection (prevents burrowing)
- Keep compost covered
- Bury food scraps well with soil and dry brown matter to kill fly larvae and minimize odour
- Avoid putting fatty foods and meat in domestic compost
- Vermicompost

www.cityfarmer.org
social issues

• Stratification / property values
• Community improvement
• Perception and aesthetics
• Conflicts over land use / access
safety and security

• tools and machinery
• syringes, glass
• physical strain, back injuries
• locked or not??
• access and lighting
role of public health

• Educate gardeners and public about:
  – proper handling, storage, preparation of fresh foods
  – food preservation (e.g. safe canning practices)
  – egg handling and animal hygiene (where permitted)
• Work with land owners to ensure soils are safe
  – Choice of crops
  – Barriers and creative garden planning
• Provide safety education for tools & chemicals
• Proper pest management practices
• Sales and processing (CSA, farm market, value-added)
gaps

- Food sales regulations
- Actual contaminant levels – soil testing
- Effective, low cost remediation
Research needs

- Small community/personal gardens vs commercial farms
- Soil testing and contaminants
  - Jurisdiction
    - Private or development land
    - Brownfield sites
    - Railway lines
  - Which contaminants?
  - Potential for plant uptake?
  - Mitigation options?
summary/conclusion

- UA is increasing for many reasons
- Regulations and guidelines are lacking
- Problems with perception, fear, aesthetics
- Major health issue is soil contamination
- Potential for chemical use in urban ag
Thank you!

karen.rideout@bccdc.ca
www.ncceh.ca | www.ccnse.ca
UA resources

- Resource Centres on Urban Agriculture & Food Security | www.ruaf.org
- Centre for Excellence in Brownfields Remediation | www.cemrs.qc.ca
- US EPA Brownfields and Land Remediation | www.epa.gov/brownfields
- Canadian Council of Ministers of Environment | www.ccme.ca
- American Community Gardening Association | www.communitygarden.org
- City Farmer | www.cityfarmer.info
- Vancouver Community Gardens | http://vancouver.ca/parks/parks/comgarden.htm
- Chickens in Vancouver | www.chickensinvancouver.com
- Vancouver Community Agriculture Network | http://vcan.ca/