**Lawns in Urban Landscapes**

- **Turf grass is everywhere**
  - 63,000 square miles
  - 25% of land cover in urban areas
- **Green Carpet Syndrome**
  - Ubiquitous - lawn in untenable places
  - Uniform – maintain at all costs

_Lawns influence our lives in ways we don’t consider_

**Conventional Lawns: Inputs**

- **Fossil fuel**
  - A one-third acre lawn consumes 18 gallons of fossil fuel per year
- **Fertilizer**
  - 70% of U.S. homeowners regularly fertilize their lawn
  - 3 million tons per year applied to residential lawns
- **Pesticides**
  - 67 million lbs of synthetic pesticides on residential lawns each year
  - Homeowners use 3 times more pesticide per acre than farmers

- **Water**
  - Typical suburban lawn uses 10,000 gallons of irrigation water per year
  - Residential lawns consume 2.5 billion gallons per year

_How did we ever survive without the lawn?_
Less than 50% of soluble fertilizers make it to the grass. Fertilization is inherently inefficient process.

Only 40% of applied pesticides make it to the turf within 7 days of application.

If conventional lawn care is inefficient, what happens to the inputs?
Water Impacts

**Quality**
- MN
  - 25% to 99% of storm water samples found four lawn pesticides
  - range 0.7 to 6.8 μg/l
- Nationwide
  - 100% of surface waters, 33% GW have pesticides
  - Average nitrate in residential stormwater: 0.6 mg/l
  - Average TP in residential stormwater: 0.30 mg/l

**Ann Arbor Study**
- Ordinance restricting phosphorous on lawns
- One year later
  - 28% reduction in TP
  - 13% reduction in DP
- Results not universal

Air Impacts

**Pollution**
- Lawnmower emissions in 1 hour = car driven between 20 to 100 miles.
- VOC’s - structural/landscape pesticides add 226 lbs/day
- Pesticides drift & evaporate
  - Increases inhalation, ingestion and tracking
- Lawn garden pesticide can persist indoors for up to one year post-application

**Climate Change...**
- 580 millions gallons of gasoline used in lawnmowers.
- Synthetic fertilizers and pesticides are manufactured using fossil fuels – additional environmental burden

Lawns: A Sea of ‘Not-So’ Green
Health Effects - Pesticides (acute)
- Accidental Poisoning
- Asthma
- Neurological Damage
  - Cancer
  - Immune System Damage

Health Effects - Pesticides (chronic)
30 Most Common Lawn Pesticides

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probable/Possible Carcinogens</td>
<td>13</td>
</tr>
<tr>
<td>Birth Defects</td>
<td>13</td>
</tr>
<tr>
<td>Reproductive effects</td>
<td>21</td>
</tr>
<tr>
<td>Neurotoxicity</td>
<td>15</td>
</tr>
<tr>
<td>Kidney/Liver damage</td>
<td>26</td>
</tr>
<tr>
<td>Sensitizer/Irritants</td>
<td>27</td>
</tr>
<tr>
<td>Potential endocrine disruptors</td>
<td>11</td>
</tr>
</tbody>
</table>

Adapted from Beyond Pesticides, Health Effects of 30 Commonly Used Lawn Pesticides

Wildlife Toxicity

<table>
<thead>
<tr>
<th>Wildlife toxicity of 30 common lawn pesticides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birds</td>
</tr>
<tr>
<td>Fish/Aquatic Organisms</td>
</tr>
<tr>
<td>Bees</td>
</tr>
</tbody>
</table>

The American Society for Prevention of Cruelty to Animals reported over 30,000 pesticide-poisoned pets in a single year. 1
Chemical Paradox – lawn “care” not “healthy” lawns

- Stunt turf growth
- Inhibit beneficial microbes
  - Recycle nutrients
  - Suppress disease & pests
- Kill beneficial insects
- Harm earthworms—nature’s aerators and fertilizers
  - Increases compaction
  - Compacted lawns contribute up to 40% to runoff volume

3 Things to Consider

Conventional lawn care is...

1. Inefficient
2. Potentially harmful
3. Unnecessary

There has to be a better way to both have a lawn and reduce its impacts.

Natural Lawn Care 101
A Systems Approach

Does Natural Lawn Care work?

NLC: First the soil...
- Biggest component of system is soil
- Healthy soil = healthy turf
- Strive to restore soil integrity
  - Organic matter
  - Soil biology
  - Chemistry

What do you think?
...and then the grass.

Soil Test First

Soil Chemistry
- pH: Lawns prefer close to neutral
  - 6.3 to 6.8 optimal
- Nutrients
  - Big Three (N-P-K)
  - Ca to Mg ratio (7:1)
  - Micronutrients
- Can effectively “halve” nutrient recommendations under a natural program - $$
Soil Structure

- Organic matter (OM)
  - Renewable resource
    - Plant/animals/insects add OM
    - Microbes recycle OM, feed plant
    - Healthy turf growth
  - Soil conditioner
    - Loosens clay - binds sand
  - Ideally 5% OM or more

- Clay – prone to compaction
- Sand – leaches easily

Soil Biology

Starting from Scratch
New Lawns
- Good top soil
- Cool season grasses
  - Always match grass to site conditions
  - Fescues (tall and fine) great
  - Perennial ryes establish quickly
  - Kentucky bluegrass = high maintenance
- Sod versus seed
- Low/No Maintenance alternatives.
  *Existing lawns can be renovated...*

Maintenance

Cultural Practices
*Deceptively simple, yet underappreciated:*
- Water Properly
- Mow Correctly
- Thatch, Aeration and Overseeding
Fertilizers - ‘Feed the Soil’

Confusion: Organic vs Natural

- Organic – anything that contains carbon
  - All plastics are organic
- Natural – plant or animal based organic matter
- Different levels of natural/organic
  - Full natural: no synthetics
  - Bridge products: some synthetic
  - Biosolids: sustainable?
- Application

Natural-Based Fertilizers

- Advantages
  - Organic N less water soluble – locked into soil profile
  - Restores soil OM – soil organisms convert as needed
  - More product gets to plant – less total N required ($)
  - Less salts – decreased salinization potential
  - Fewer disease outbreaks
  - Consistent feed overtime
  - Slower growing = less mowing ($)
- Drawbacks
  - Slower acting (yet longer lasting)
  - Microbial breakdown essential
  - Cost – appears more expensive upfront
Clippings: Waste or Resource?

- Can reduce total N requirement by 50% or more
  - Fertilizer recommendation: 87 to 174 lbs or N/acre/year
  - One acre clippings = 235 lbs of N/acre/year
  - Implication - mature turf can often go without fertilizer
- No increase in ammonia volatilization
- Less likely to leach/runoff
- Recycled matter/energy – only in presence of microbes

Getting Microbes Back into Soil

1. Compost
   - Nutrients, OM & microbes
   - Improves soils structure & water retention
   - Smooth lawn surface
2. Teas
   - Just the microorganisms
   - Mycorrhizae: the fungal wonder of the turf world

Disease, Pests & Weeds
Dealing with Pests & Disease

- Best offense is a good defense – healthy, dense turf
- Cultural practices limit weeds, pests & disease
- Microbes
  - Endophytes – insect control
  - Nematodes – grub control
- Least-toxic/botanicals
  - Still pesticides…potentially hazardous
  - Often indiscriminate

Weed Control = Cultural Practices

What is a weed?

- Historical perspective
  - 60 years ago
  - Today
  - Dandelions

Weeding the natural way
1. Seed inhibitor: Corn Gluten
2. Spot treatment: vinegar sprays
3. Hand weeding (where feasible)
Benefits – Economic Savings

Costs Over 5 Years
Synthetic vs Natural

<table>
<thead>
<tr>
<th>Year</th>
<th>Synthetic</th>
<th>Natural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>$7,745</td>
<td>$5,317</td>
</tr>
<tr>
<td>Year 2</td>
<td>$8,319</td>
<td>$5,789</td>
</tr>
<tr>
<td>Year 3</td>
<td>$8,946</td>
<td>$6,310</td>
</tr>
<tr>
<td>Year 4</td>
<td>$9,631</td>
<td>$6,377</td>
</tr>
<tr>
<td>Year 5</td>
<td>$10,381</td>
<td>$6,359</td>
</tr>
</tbody>
</table>

Five Year Savings with Natural Program = $14,870 per acre

Benefits – Environmental & Social

- Reduced synthetic fertilizer, pesticides, irrigation, fossil fuel use

<table>
<thead>
<tr>
<th>Seattle Study – Environmental Value</th>
<th>Annual Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced soluble products</td>
<td>$16 - $21</td>
</tr>
<tr>
<td>Less fossil fuel for mowing</td>
<td>$8</td>
</tr>
<tr>
<td>Irrigation savings</td>
<td>$42</td>
</tr>
<tr>
<td>Lower hazardous waste disposal costs</td>
<td>$5 - $6</td>
</tr>
<tr>
<td>Decrease in storm water detention &amp; diversion capacity (one time)</td>
<td>$31</td>
</tr>
</tbody>
</table>

- Growing public demand for sustainability

Your choice....

…natural or conventional?
More resources

- Safer Pest Control Project – fact sheets, articles, videos
  - www.spcpweb.org
- Grow Smart, Grow Healthy
  - Consumer guide to least hazardous pesticides and fertilizers, overview of NLC
- Recommended reading
  - The Organic Lawn Care Manual – by Paul Tukey

THANK YOU

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