Soil Builders – Education in Action
Module 2: Drivers for Clean Water & Healthy Soils
Founded in 2002

We believe that increasing the use of compost in our communities will improve soil health, water quality, and our resilience to climate change

Mission:

Advance production and use of compost as vital to soil health through practices that contribute to water quality, plant vigor, and environmental resilience

Demonstrate the value of compost through education, policy, outreach, and partnerships to reduce waste, capture energy, and create jobs

501c3 - cooperative, stakeholder driven approach in our work
Soil Builders – Education in Action
Module 2: Drivers for Clean Water & Healthy Soils

- Natasha Duarte, Composting Association of Vermont
- Elly Ventura, Lamoille Regional Solid Waste Management District
Soil Builders Workshops

Compost-related eco-literacy for Lake Champlain Basin decision-makers, professionals and advocates.

Compost increases soil stability, fertility, water infiltration, and moisture retention.

Using compost in land management practices is a critical strategy for climate adaptation.
Soil Builders Workshop Topics

Soil health & water quality
Drivers for clean water & healthy soil
Best Management Practices for compost & compost-based products
Education in action – next steps
Soil Builders Workshop Topics

Soil health & water quality

Drivers for clean water & healthy soil

Best Management Practices for compost & compost-based products

Education in action – next steps
Project Partners

- Athena Lee Bradley, Compost Consultant, CAV Board Member
- Mark Companion, Lake Champlain Sea Grant
- Chuck Duprey, Naturcycle
- Brian Jerose, Agrilabs Technologies Inc., CAV Board Member
- Deb Neher, UVM
- Elly Ventura, Lamoille Regional Solid Waste Management District, CAV Board Member

Additional Thanks

- CAV Board of Directors

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### We’ve Got Work To Do

<table>
<thead>
<tr>
<th></th>
<th>% of World Population</th>
<th>% of Trash Created</th>
<th>Recycling/Composting Rate</th>
<th>Plastic Recycling Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>4%</td>
<td>12%</td>
<td>35%</td>
<td>9%</td>
</tr>
<tr>
<td>China</td>
<td>36%</td>
<td>27%</td>
<td>n/a</td>
<td>22%</td>
</tr>
<tr>
<td>India</td>
<td>36%</td>
<td>27%</td>
<td>66%</td>
<td>n/a</td>
</tr>
</tbody>
</table>
How did we get here?
It Doesn’t Have To Be Confusing
Every year, U.S. landfills and trash incinerators receive **167 MILLION TONS** of garbage.

> 50% of typical municipal garbage set out at the curb is compostable.

Landfills and incinerators are dangerous. Every bag thrown out contributes to:

- Pollution of surrounding soil, air, and water
- Climate change
- Health hazards to humans and animals

- 21% is food scraps alone
- 15% paper/paperboard
- 8% yard trimmings
- 8% wood waste

**SOURCES:**

To learn more, visit: [ilsr.org/compost-impacts](http://ilsr.org/compost-impacts)
Food waste in the U.S. is...

**Excessive**

40% of all food produced in the U.S. is wasted.

133 billion pounds of food wasted per year. That represents 1,249 calories per person, per day.

**Expensive**

$161 billion in uneaten food at retailers, restaurants, and homes costs $161 billion annually.

$1,500 per capita, this amounts to over $1,500 for a family of four.

**Environmentally Harmful**

Food makes up 20% of landfill weight—the single largest municipal waste source.

The methane released by food is a greenhouse gas 21 times more powerful than carbon dioxide.
FOOD INSECURITY
in the United States

food insecurity
the state of being without reliable access to a sufficient quantity of affordable, nutritious food.

FOOD INSECURITY HAS
MANY DIFFERENT FACES

WHAT?
Factors that may play a role in food insecurity

ETHNICITY / MEDICAL COMPLICATIONS
ECONOMIC HARDSHIP / HOUSEHOLD COMPOSITION

Something as simple as a broken car can lead to decreased $ for food

FOOD INSECURITY IS ASSOCIATED WITH NUMEROUS HEALTH RISKS

- Overweight/obese
- Diabetes/heart disease
- Illness/hospitalization
- Depression
- Malnutrition

50 million people in the U.S. can be classified as food insecure\(^1\)


photo credit: Food-Insecurity-Fact-Sheet.jpg (738×956) (eggnutritioncenter.org)
FOOD WASTE IN THE U.S. IS...

EXCESSIVE

40% OF ALL FOOD PRODUCED IN THE U.S. IS WASTED

EXPENSIVE

$161 BILLION
Uneaten food at retailers, restaurants, and homes costs $161 billion annually

$1,500
Per capita, this amounts to over $1,500 for a family of four

ENVIRONMENTALLY HARMFUL

Food makes up 20% of landfill weight—the single largest municipal waste source

The methane released by food is a greenhouse gas 21 times more powerful than carbon dioxide
Growing
Harvest
Distribution
Storage
Processing
On the shelves
In the home/biz

Composting Association of Vermont (CAV)
Reclaiming Organic Residuals For Good
Reduce Food Waste by 50% by 2030

- Partnership between the USDA and the EPA
- Announced in September 2016
- Supported by Food Retailers, Agricultural Industry and Charitable Organizations
  - US Composting Council
  - Feeding America
  - Food Marketing Institute

Sources: Environmental Protection Agency, Environmental Science and Technology, 2010
GREENHOUSE EFFECT

CARBON DIOXIDE

\[ CO_2 \]

METHANE

\[ CH_4 \]

LANDFILL SITE

CONTAINS DECAYING ORGANIC WASTE FROM FARMS, KITCHENS, GARDENS, RESTAURANTS, MARKETS

LINER

PHENOLS
TOLUENE
BENZENE
POLYCHLORINATED BIPHENYLS
AMMONIA
DIOXINS
CHLORINATED PESTICIDES
HEAVY METALS
OTHER CHEMICALS

GROUND WATER
Heat Trapping Greenhouse Gases
Methane vs. Carbon Dioxide

1 lb. methane

23 lbs. carbon dioxide

1 lb. of methane has the equivalent heat trapping ability of 23 lbs. of carbon dioxide

NWFarmsandFood.com
LANDFILL SITE
CONTAINS DECAYING ORGANIC WASTE FROM FARMS, KITCHENS, GARDENS, RESTAURANTS, MARKETS

GREENHOUSE EFFECT
CARBON DIOXIDE $\text{CO}_2$
METHANE $\text{CH}_4$

PHENOLS
TOLUENE
BENZENE
POLYCHLORINATED BIPHENYLS
AMMONIA
DIOXINS
CHLORINATED PESTICIDES
HEAVY METALS
OTHER CHEMICALS

GROUND WATER
Vermont’s Universal Recycling Law (Act 148)

- Passed unanimously in 2012
- Rolled out from 2014-2020

The goal:
Improve capture and diversion rates to prevent valuable materials from being landfilled
Food Scraps Disposal Ban

Phases for food scrap generators within 20 miles of a facility

- 2014 > 104 tons/year (2 tons/wk)
- 2015 > 52 tons/year (1 ton/wk)
- 2016 > 26 tons/year ($\frac{1}{2}$ ton/wk)
- 2017 > 18 tons/year ($\frac{1}{3}$ ton/wk)

- 2020 all food scraps banned regardless of volume and distance
Vermont’s Clean Water Bill (Act 64, 2015)

Clean Waters are a Critical Community Asset

- Protect health
- Preserve the natural beauty
- Enhance the ecological values of our waters
- Are an essential legacy for Vermont’s Future Generations

Image credit: 1778011 from Pixabay
Vermont’s Clean Water Bill (Act 64, 2015)

“Healthy soil means soil that has a well-developed, porous structure, is chemically balanced, supports diverse microbial communities, and has abundant organic matter.”

The major problem is not runoff but infiltration - and this is where increasing soil health really comes into play.

Lake Champlain, TMDL Implementation Plan
Required Agricultural Practices (RAPs)

- Nutrient, manure, & waste storage standards
- Recommendations for soil health practices
- Requirements for vegetated buffer zones & livestock exclusion from surface water
Stormwater From Developed Lands

- Reduce or prevent water quality & flooding impacts during & after development
- Minimize stormwater impacts through construction and post-construction BMPs
Stormwater Permit Requirements

Erosion Prevention & Sediment Control

- Capture/filter runoff – perimeter & inlet control
- Runoff Reduction – site stabilization is required

Post-construction soil quality requirement

- Amend disturbed soil to 4+% organic matter content
Municipal Roads General Permit Requirements

- Stabilize road drainage systems
- Reduce potential road pollutants (excess nutrients, sediment, trace heavy metals, hydrocarbons, road salt)

✓ Opportunities to utilize compost to meet water quality & runoff reduction goals
What Is Compost?

- A soil amendment rich in organic matter made by the controlled biological decomposition of organic materials
- Made from a recipe of organic wastes
- Must go through an aerobic heating and curing process to be biologically stable and mature
- Improves biological, physical and chemical characteristics of soils
Estimated Carbon to Nitrogen Ratios

<table>
<thead>
<tr>
<th>Carbon Sources</th>
<th>C:N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yard wastes (leaves, dried grass clippings, chopped branches)</td>
<td>50 - 90:1</td>
</tr>
<tr>
<td>Straw</td>
<td>60 - 80:1</td>
</tr>
<tr>
<td>Paper (shredded)</td>
<td>160 - 180:1</td>
</tr>
<tr>
<td>Cardboard (shredded)</td>
<td>250 - 350:1</td>
</tr>
<tr>
<td>Wood shavings, chips, dust</td>
<td>250 - 500:1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nitrogen Sources</th>
<th>C:N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetable scraps</td>
<td>10 – 30:1</td>
</tr>
<tr>
<td>Fruit scraps</td>
<td>10 – 30:1</td>
</tr>
<tr>
<td>Grass &amp; garden gleanings</td>
<td>10 – 20:1</td>
</tr>
<tr>
<td>Chicken manure</td>
<td>10 – 25:1</td>
</tr>
<tr>
<td>Cow manure</td>
<td>20 – 30:1</td>
</tr>
<tr>
<td>Horse manure</td>
<td>25 – 30:1</td>
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</tbody>
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Fertilizing with carbon-rich Loop allows us to:

1. Grow bigger plants, which removes carbon dioxide (CO₂) from the air and returns carbon to the soil.

2. Reduce the use of synthetic fertilizers, which require a lot of energy to produce.

3. Store carbon in the soil (C sequestration).
Composting Association of Vermont (CAV)
Reclaiming Organic Residuals For Good
VT landfills ~77,000 tons of food scraps each year.

Composting the scraps instead of trashing them would...

reduce greenhouse gas emissions as much as not driving ~115 million miles.

That’s like driving around Earth 4,629 times!

Composting Association of Vermont (CAV)
Reclaiming Organic Residuals For Good

April 2019
Composting Creates Jobs

• On a per ton basis, diverting organics from landfills and making compost employs 2-4x more workers than landfills
  
  Supports local economy & keeps these resources available to build healthy soil

• Using compost in green infrastructure creates even more jobs:
  
  Erosion prevention & sediment control
  Rain gardens
  Green roofs
  Revegetation of disturbed sites
Soil Builders Workshop Topics

Soil health & water quality
Drivers for clean water & healthy soil
Best Management Practices for compost & compost-based products
Education in action – next steps
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