

Modular 2: reducing food waste

OSU Recyclers 101

- Borrow or rent baking sheets, row to tillers, check out books. Supports local service industry purchasing. Supports unfair labor outside of the USA.
 - Tool libraries.
 - Kitchen chairs. Such as canners, dehydrators, juicers, and mixers.
 - Special event Rental, Such as tables, chairs, reusable, washable, Dishware.
- Maintenance and repair Right to repair movement at repair org. Organs right to repair law at Senate Bill 1596.
 - Do-it-yourself and how to videos for sewing and bike repair etc.
 - Higher local repair shops or people.
 - Buy remanufactured
 - Buy Recycled.
- Tips for thoughtful consumption.
 - Start with a shopping list and stick to it.
 - Buy long-lasting products that can be repaired.
 - Invest in high quality and energy-efficient products.
 - Avoid disposables by buying durable and reusable items.
 - Carry reusable bags.
 - Shop where you can buy in bulk.
 - Be picky about packaging. Say no to bags you don't need. Avoid single use, reuse, or recycling the bags you use.
- Questions to ask.
 - How long will the product last? Will buying this keep me from buying disposables in the future?
 - Is it repairable?
 - Is it a classic? Will I be happy years later?
 - What will I do with it after? It's not useful? Recycle. Reuse. Recovered.
- Simple solutions that have a big impact.
 - Switch to LED light bulbs.
 - Buy renewable energy from your electric company.
 - Shop at the farmer's market.
 - Purchase certified organic produce.
 - Eat seasonal foods.
 - Buy fresh whole food in fewer prepackaged foods.
 - Eat lower on the food chain, such as eating more vegetables than meat.
 - Buy from artists that make things from scraps or waste.
- When you're done. Donate, garage sale or re-gift.
*Conscious consumption allows you to control your habits rather than being controlled by them.
Leaving you with more time that genuinely matters. *

- Be a leader.
 - Speak up.
 - Ask for no double begging.
 - Let the store know what kind of packaging you prefer.
 - Don't buy products that won't last and let the manufacturers know why you aren't buying their goods.
 - If you have a question about a product or environmental claim, call the 1800 number or write to the manufacturer.
 - When you find a good product, tell the manufacturer how happy you are.
 - Ask for information and share your concerns.
- Making Effective environmental choices.
 - What efforts benefit the environment the most?
 - Make your own Items such as jewelry, clothing. Machinery.
 - Watch What We Eat; Food accounts for a big share of our total consumer impacts. It is responsible for more than 70% of water used in 26% of greenhouse gas emissions and 40% of land use. Almost 40% of. Common water pollution and 22% toxic water pollution. It also impacts both toxic and common pollution and greenhouse gases.
 - How do we operate our homes. How we eat cool, light and furnishing is vital when it comes to being good stewards. Also, water, sewage, and solid waste. These are responsible for 35% of greenhouse gases, more than 32% of common pollution, and more than 19% of toxic air pollution. Water pollution is another factor, more than 21% common water pollution and approximately 13% of toxic water pollution Come from household operations. An average family uses more than 300 gallons of water a day.
 - The things we buy. The pesticides and fertilizers we use in our yards are responsible for 14% of combined toxic and common water pollution.
 - How do we build homes. The impact of maintenance repair in mobile home water impacts approximately 10% of the toxic and common water pollution. New home building accounts for 25% of threats to wildlife and natural ecosystems by land use.
- 7 rules for wise consumers.
 - Give special attention to major purchases.
 - Home remodeling and major repairs are another area for considering long term durability.
 - Sometime New Is better when considering replacing outdated technology.
 - Sometimes harm is expensive.
 - Size of home has a direct impact on the amount of energy required to heat it, cool it, and maintain it.
 - Give special thought to recreational purchases too.
 - Analyze your consumption quantitatively.

<https://canvas.oregonstate.edu/courses/2012763/files/108957091?wrap=1>

<https://canvas.oregonstate.edu/courses/2012763/files/108957089?wrap=1>

<https://canvas.oregonstate.edu/courses/2012763/files/108957090?wrap=1>

<https://www.repair.org/>

Modular 3: recycling processes

- When we recycle, we protect nature by preserving forests and reducing strip mining, thereby decreasing air and water pollution, reducing fossil fuel use and greenhouse gas emissions, creating jobs, and increasing US competitiveness.
- Approximately 90 cities in Oregon are required by this law to offer recycling program opportunities to the Recycling Act. See below Oregon recycling laws website from DEQ.
- There is a website called Organ Solid Waste Characterization and Composition study. For extra information.

Material recovery.

- In part through Oregonians recycling efforts, 2,000,400 and 810 tons of material were recovered in 2022.
- DEQ estimates that material recovery reduces greenhouse gases by 3.1 million metric tons of carbon dioxide equivalents compared to a scenario where all waste was disposed of.
- 2024 DEQ released Oregon's consumption.
- Based on greenhouse gas inventory, 1990 through 2021.
- Most human activities that Resulted in greenhouse gases are consequences of consumption, for example, energy, goods and services by household and governments.
- Focus should be on reducing our purchase of goods and addressing efforts in recycling.
- Recycling 1 bottle of glass will illuminate a 100 Watt incandescent light bulb for four hours or a CFL for 17.4 hours.
- It takes 95% less energy to make a can from recycled aluminum than it does to make a can from virgin materials. We can make 20 recycled cans from the same energy it takes for one virgin can.

Organ bottle bill

- Oregon bottle bill passes in 1971.
- Bottle bill is successful 1972
- New additions made to Bill in 1977
- Updated to include bottled water 2007 through 2009
- Updated to include sports and energy drinks in 2011.
- Bottle drop added in 2011.
- Redemption rate drops.
- Nickel deposit increased to a dime in 2017
- Redemption rates remain high in 2023.

What is recyclable?

- The majority of materials found in garbage is recyclable or compostable. This doesn't mean it can be collected at the curb.
- Labels can be misleading. It may have a recycling sign, but your local recycler may not have the capacity yet.

Collecting recyclable material.

- In Oregon, recyclables are typically collected in one of four ways.
 1. Curbside collection
 2. Drop off recycling.
 3. Transfer station
 4. Bottle drop return locations. Oregon's beverage deposit system.

- Individual commodities recycling where one single item is clean and bailed to send to end use markets, Paper mills or steel mills.
- The individual collection works well, but most Oregon communities have made the switch to mixed or commingled recycling for curbside collection. These are considered inconvenient and collect fewer tons of material.

Curbside collection service

- Most of Oregon's curbside collection programs now have a commingled mix of recyclables with glass kept separate. This is called a dual stream sort.
- Commingled stream increased participants by 25%.
- Mixed recycling is sent to a material recovery facility that sorts and bales.
- Oregon law requires curbside recycling for communities of 4000 or more people. See link.

Mixed recycling

- In Oregon, glasses are separated from mixed recycling due to the amount of contamination to paper products.
- Source separated is the easiest.
- Commingled is a consuming processor and has more contamination.
- Apartment managers must educate new and existing tenants.

Recycling facilities

- Commingled recyclables are taken to a recycling facility to be sorted and processed to prepare them for sale to end users
- Construction and demolition facility debris delivered to facilities some local governments require such degrees to be delivered to these facilities for processing this is an. Element of Oregon opportunity to recycle laws.
- Concrete, rock, brick, sand is used to fill. For various projects.
- Wood, metal, and cardboard are separated.
- Dirty facilities. Is used to sort household garbage and then sort out recyclables. There are no facilities in Oregon.

Contamination

- Contaminants are sent to the landfills at an extra cost.
- Plastics like #5 and #6 need to be separated due to different melting temperatures.
- Contaminants are costly and discourage companies from procuring recycled materials. Some contaminants can be stickers on plastics and sleeves on bottles.
- Plastic bags are the single largest contaminant by volume at recycling facilities
- Portland estimates 20 to 30% of Labor costs are spent dealing with plastic bags and film plastic.
- Other contaminants.
 - Medical waste
 - Non-container glass, only glass jars in bottles.
 - Multi material paper packaging such as pizza boxes.

Multi material recycling

- Easy to separate like caps from bottles and cereal boxes from the bag inside
- What's difficult to separate? Juice boxes, Frozen box items. Most are multi-layered. Separating is difficult and expensive

- Flexible packaging laminates of several plastic films.

When in doubt, keep it out.

Recycling non-curb-side items.

- Retailers, some take electronics.
- Stores who take bags.
- Collection sites and depots.
- Transfer station
- Single material collection sites
- Recycling specific non-curb-side items
 - Motor oil
 - Tires, Oregon recovers 1/3 Of tire waste.
 - Wood, Oregon recovers 10.3% of wood waste.

Transporting recyclables

- DEQ found cleaner energy savings from recycling transport.

Manufacturing

- Manufacturers must make new products from recycled materials.
- Main issues consist of quality, price and convenience.
- Recycled materials are sold as commodities in the International Exchange.

Four basic types of recyclable material

1. Paper Types. - Office paper, newspaper, correlated cardboard, mixed wastepaper, milk, cartoons and aseptic containers.
2. Metal, steel, and aluminum.
3. Glass.
4. Plastics- 1,2,3,4,5, 6 Are different types of plastic and 7 is labeled biodegradable and compostable. These actually pose many issues for plastic recyclers.

Methods for forming plastic.

- Stretch blowing- Plastic bottles.
- Injection mold- Butter and yogurt tubs.
- Extrusion molding- Most used plastic forming process like tubes and pipes.
- Plastics weigh very little for the volume of space they take up.
- Agriculture plastic garden centers collect pots and twines. They get sorted and recycled. All manual Labor and no shortcuts.
- Plant based plastics from Pepsi Cola plants to make plastic with organic agriculture waste.
- Biodegradable or compostable plastics are not to be confused with plant based. They do not break down in compost or facilities.

Improving your recycling practice at home

1. Contact your hauler to order a recycling bin.
2. For inside the home, use containers to separate.
3. Teach your family members or housemates how to recycle correctly
4. Keep your eye on materials in the recycling bin to make sure it's done correctly
5. Occasionally check the trash to make Sure, people don't make mistakes or need reminders?
6. Make sure someone is responsible for taking to a site or curb.

7. Be open to change. Next slide. Remember, just because something says it's recyclable doesn't mean it's true.
- Keep glass separated
 - Don't mix materials like stuffed plastic in a can.
 - No food or grease on paper.
 - No lids or. Flat hand tops can be mixed with paper.
 - Clean aluminum.
 - Steel cans can keep lid inside to prevent harm.
 - Do not crush containers.

Buying post-consumer recycled content

- The three errors are represented by
 1. Collection and processing.
 2. Manufacturing.
 3. Purchasing.
- When shopping for recycled content.
 - Pre-consumer content refers to material that is recovered from waste from the manufacturer or converters, such as factory trimmings or leftover material.
 - Post consumer content on. On the other hand, comes from the recyclables we put into our recycling bin.

Both kinds save virgin resources.

<https://www.oregon.gov/deq/recycling/pages/oregon's-recycling-laws.aspx>

<https://www.oregon.gov/deq/mm/Pages/Waste-Composition-Study.aspx>

<https://www.oregon.gov/deq/ghgp/Pages/GHG-Inventory.aspx>

<https://www.oregon.gov/deq/recycling/Pages/Oregon's-Recycling-Laws.aspx>

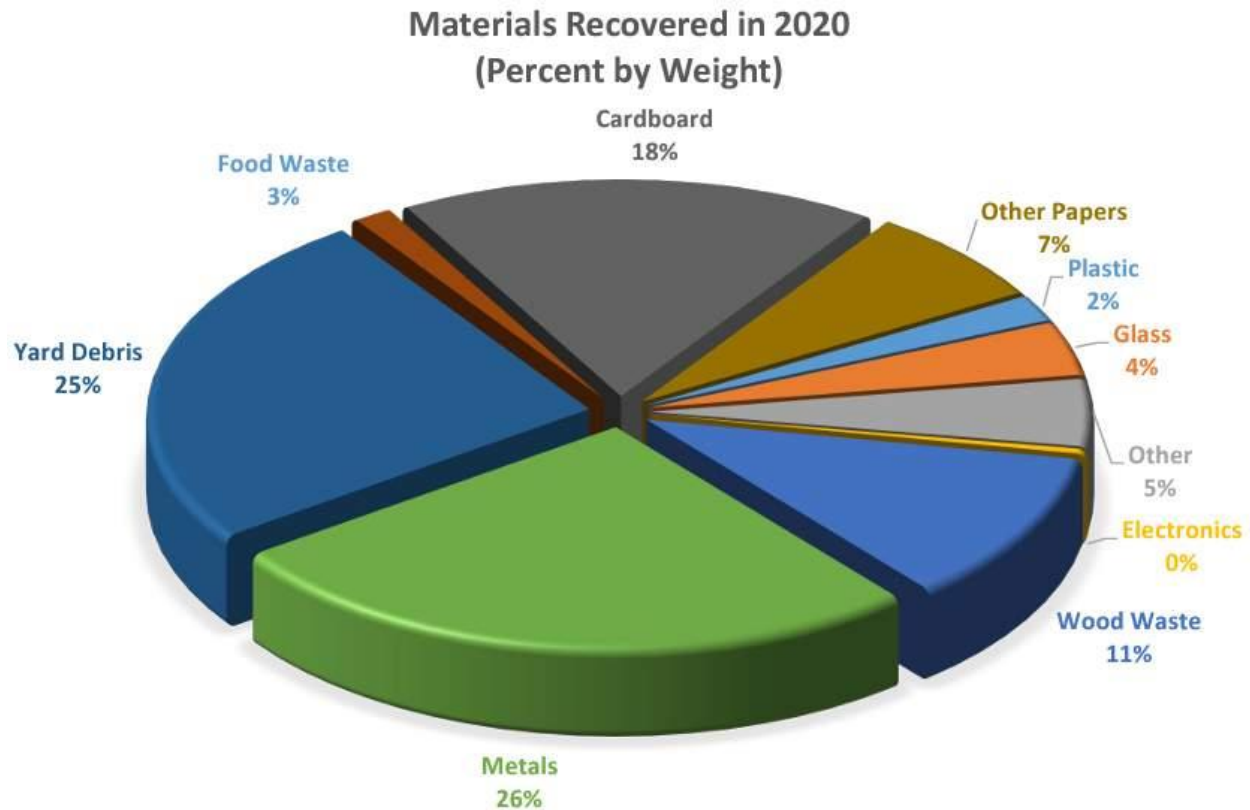
Module 4: organic waste at home

What is organic waste?

- Any waste derivative from a living Organism is organic.
- For most human history, all waste was organics
- Organics can be textiles, furniture, tires, etc., but we will not be talking about those in this section.

Why do we care about it?

- 2020 Organ material recovery and waste generation rates report Released in May of 2024.
 - Food accounts for 3%
 - Yard debris is 25.2%.
 - Would 10.3%.
 - Totalling 38.5% of landfill garbage is organic.



As we work to decrease the amount of material put into our landfill, these organics are an obvious place to start. No high recycling goals can be made without addressing organics.

- Keeping organics out of the waste stream will extend the life of landfills.

"When food is wasted, it also wastes the resources such as the land, water, energy and labor that go into growing, storing, processing, distributing, and preparing that food. Each year, food loss and waste from farm to kitchen embodies an area of agricultural land the size of California and New York combined, enough energy to power 50 million U.S. homes for a year, and emissions (excluding landfill emissions) equal to the annual CO₂ emissions of 42 coal-fired power plants".

2020 EPA Advancing Sustainable Materials Management: Facts and Figures Report

- Organic materials that biodegrade in a modern landfill produce methane gas, a potent contributor to global climate change.
- Landfilling organics is a Waste of energy resources required to grow them or create them in the first place. (embodied energy)
- Other disposal options aren't good either.
- Backyard burning Produces air pollution unless the energy created by the fire is harnessed for heat to make electricity, the energy embodied in the materials wasted.
- In Oregon, it is illegal to burn household waste because of health and environmental concerns.
- The better method of handling organics is creating compost results in a product that is so valuable.
 - Clean's water.

- Compost retains water (200 percent of its dry weight)
- Improved soil fertility
- Reduces need for pesticides
- Improves land cultivation
- Helps erosion.
- There are two primary methods for dealing with organics, reducing the amount of waste and composting the rest.

Reducing organic waste

- Grass cycling-
 - Grass clippings are the largest component of landscape waste
 - Grass cycling is leaving the clippings on the yard
 - Nutrients from the grass go back to the soil and reduce the need.
- Mulching
 - Mulch is organic material used to suppress weeds, keeps plants roots cool and moist, and prevents erosion and compaction
 - Ideal mulch costs nothing.
 - Made of Grass clippings, leaves, and pine needles
 - Woodchips are the best substitute for purchased bark products
 - Yard debris mulch can be applied just like compost mulches
 - Woody material requires nitrogen to break down and can rob annuals of Nutrient. It is recommended. You mix 3 parts woodchip material and 1 part nitrogen for a healthy balance.
 - Trees and shrubs can be mulched with half inch to 1-inch layers of grass or two to four inches of wood matter.
 - Avoid thick layers due to possibilities of anaerobic conditions arising. This will keep air and water away from plant roots.
- Turning in crop waste
 - All crop waste can be left on the surface to protect the soils from erosion and Compaction. If you use tilling, you can turn the crop waste into the soil.
- Rethink your lawn
 - Reducing lawns or eliminating them can reduce grass clippings.
 - Replace the lawn with ground covers and woodland gardens. So, leaves fall to the ground to fertilize and protect their roots.
- Planting Eco Lawn
 - Grow turf type grass covers that Is a mix of broadleaf in grass species
 - Requires little to no watering or fertilizing

Food waste prevention

- Food is important to address because it contributes to greenhouse gas emissions
- When food gets wasted, so are the resources that are used to produce, process, transport, prepare, store and dispose of.
- Food that goes to the landfill emits methane that is way more potent than carbon dioxide.
- Disposed food contributes to climate change because it uses resources like water, land, energy, labor, and capital.
- USDA estimates 30 and 40% Of the food supply is wasted in the US.

- USDA estimates that 31% of food purchased by consumers is wasted. This equals 133 billion and \$161 billion worth of food in 2010.

The economic cost of wasted food.

- The family of two adults and two kids lose about 1500 each year due to uneaten food.
- Cutting down food waste can feed more people, protect the environment, and slow climate change.
- See EPA- From farm to kitchen study ‘The environmental impacts of US food waste.’
- EPA finds all food waste, from production to consumption, ranges from 161 to 335 billion pounds Per year.
- Nearly half as wasted during the consumption stage.
- Fruits, vegetables, dairy, and eggs are the most common.
- Feeding America: Says there is an estimated 44 million food insecure Americans.
- This uneaten food contains enough calories to feed more than 150 million people each year.

The environmental cost of wasted food

- EPA reports for every 1000 tons of food waste landfills and estimated. 34 metric tons of methane are released.
- US food loss and waste embody 170 million metric tons of carbon dioxide greenhouse gases (This excludes landfill emissions). This amount is equal to 42 coal-fired power plants.
- EPA data shows food waste is the single most common material landfilled and incinerated in the US, compromising 24 and 22% of the landfilled and combustible municipal waste.

Food waste reduction goal

- In 2015, the United States announced a goal to cut food loss and waste in half by 2030
- The US still has a long way to go. In 2018, 335 lbs. of food wasted per person was sent to a landfill. In 2019 at 349 lbs. was accounted for per person.
- in March Oregon governor Kate brown signed the executive order 20-04 This order aligns with the DEQ's goal of reducing food waste by 50% by 2030.

Food waste reduction programs

- I'm a bad apple program, not letting good food go bad, to encourage Oregon households to reduce wasted food to avoid wasting money.
- Pacific Coast collaborative is a regional program that invites people to help identify solutions to institutional and systemic food waste.
- Food Waste Prevention Week, DEQ is partnered with the Food Waste Prevention Week. This is a multi-state movement, fun activities, social media interactions with prizes, encouraging people to show and share ways to reduce food Waste in their lives.

Reducing food scraps

- Two factors that say a great deal about our relationship with food
 - Over 70 billion of food waste reaches our landfills every year, contributing to methane emissions and wasting energy and resources across the food chain. - EPA, 2020.
 - In 2020, food scraps made up almost 3% of what we sent to Oregon landfills.
 - Most home and work food scraps come from buying too much and not using leftovers efficiently.
 - Menu planning can help reduce both sources of waste and save money.
- Strategies for reducing food scraps.

- Use by dates suggests when food is at its peak. Not when it spoils.
- The use by date does not. Indicate whether food is safe to eat or not.
- Sell by date on preserves also do not indicate when the food is spoiled. The sell by date is used for stores to rotate stock
- Unless damaged, frozen foods are good indefinitely.
- Smart shopping tips on Reducing food waste and saving money
 - Choose the meals you want to make
 - Check your food to see what you have to buy
 - Make a list and stick to it
 - Don't overbuy items on sale
 - Keep your eye on what's left over, Should I make less or buy less?
 - Cook once, eat twice.
- Reducing waste when growing your own
 - Share your bounty with family, neighbors, and friends.
 - Check for food sharing groups in your area
 - Donate to food banks, gleaners or charitable food programs
- Reducing food waste in the workplace.
 - Waste audit shows workplaces have organics as a primary piece of the waste stream.
 - OSU reduces food waste in 10 campus cafes catering, housing, food service through bulk purchasing, banning Styrofoam, paper implemented; all residential students are provided with a water bottle eliminating 30,000 disposable cups shaving \$30,000. Used on disposables and spent \$3,500 on reusables.
 - OSU Office. Has buckets for composting. They donate food cooked but not served, reducing impact economically and resource management.

What is Compost?

Compost is decomposed organic matter that improves soil health, supports plant growth, and helps keep valuable materials out of the landfill.

- Compost is both a noun (finished product) and a verb (the process).
- Made from yard debris, food scraps, and other organic materials.
- Adds nutrients and organic matter back into the soil.
- Helps retain moisture and reduce weed growth.

Why Compost?

Composting turns waste into a resource while helping the environment and improving soil.

- Reduces methane and greenhouse gas emissions from landfills.
- Keeps food scraps and yard debris out of the trash.
- Improves soil structure and water retention.
- Supports healthier plants and stronger root systems.

Compost Benefits for Soil

Compost feeds the soil ecosystem and improves growing conditions naturally.

- Breaks up heavy clay soils for better drainage.
- Improves sandy soils by holding water and nutrients.
- Slowly releases nutrients as plants need them.
- Increases beneficial microbial activity.

Common Uses for Compost

Finished compost can be used throughout the garden and landscape.

- Soil amendment: Mix **2–5 inches** into garden beds before planting.
- Potting mix: Use **1 part compost to 2 parts potting soil**.
- Mulch: Apply **1–2 inches** around vegetables and flowers.
- Trees and shrubs: Apply up to **6 inches** around the drip line.
- Lawn top dressing: Spread sifted compost over turf.
- Compost tea and compost extract provide liquid nutrients.

The Compost Recipe

Good compost depends on balancing carbon, nitrogen, air, water, and time.

- Use **2 parts brown materials** to **1 part green materials**.
- Ideal carbon-to-nitrogen ratio is **25–30:1**.
- Browns: leaves, straw, paper, wood chips.
- Greens: food scraps, grass clippings, fresh plant material.

Air and Water

Microorganisms work best when compost is moist and well-aerated.

- Compost should feel like a wrung-out sponge.
- Turn piles regularly to add oxygen.
- Air helps reduce odors and increase temperatures.
- Too much moisture can create anaerobic conditions.

Pile Size and Temperature

The right pile size and temperature help compost break down faster.

- Minimum compost pile size: **3 feet x 3 feet**.
- Turn piles larger than **5 feet** monthly.
- Best composting temperatures: **110°F–160°F**.
- Maintain temperatures above **140°F** to destroy most weed seeds and pathogens.
- Turn approximately **5 times in 6 weeks** for effective hot composting.

Static Composting Systems

Static composting is simple and low-maintenance but takes longer to produce compost.

- Materials are added and left mostly undisturbed.
- Composting time ranges from **6 months to 2 years**.
- Best for yard debris and leaves.
- Not recommended for food scraps.

Pros

- Low cost.
- Little maintenance.

Cons

- Slow process.
- Limited food waste handling.

Active Composting Systems

Active composting creates high-quality compost faster through turning and management.

- Requires regular mixing and moisture monitoring.

- Temperatures can reach **120°F–160°F**.
- Produces finished compost in **4–12 months**.
- Suitable for food scraps when animal-proofed.

Pros

- Faster compost production.
- Higher quality compost.
- Handles food scraps.

Cons

- More labor and maintenance.
- Purchased systems can be expensive.

Anaerobic Composting/Digesters

Anaerobic systems compost without turning by keeping materials enclosed.

- Use sealed containers with tight-fitting lids.
- Helps reduce visible clutter.
- Requires balancing moisture levels carefully.
- Add dry materials if odors develop.

Raw Materials for Composting

Not all organic materials belong in a backyard compost pile.

Good Materials

- Leaves.
- Grass clippings.
- Fruit and vegetable scraps.
- Pine needles.
- Dead plants.
- Small woody materials.

Avoid

- Poison hemlock.
- Diseased plants unless using hot composting.
- Noxious weeds unless compost temperatures exceed **140°F**.
- Large limbs and logs.

Composting Food Scraps

Food scraps are valuable compost ingredients but require proper management.

- Food scraps are high in nitrogen.
- Start with fruits and vegetables if new to composting.
- Excess food scraps can cause odors.
- Add browns when piles become smelly.

Avoid

- Meat.
- Dairy products.
- Fatty foods.

Three Food Scrap Composting Methods

Soil Incorporation

Food scraps can be buried directly in soil where they decompose naturally.

- Bury scraps under at least **8 inches of soil**.
- Decomposition can take **1 month to 1 year**.
- Great around trees and shrubs.

Yard Debris Composting

Food scraps can be mixed into hot compost piles.

- Follow the **2:1 brown-to-green ratio**.
- Place scraps in the center of the pile.
- Use hardware cloth to deter pests.

Vermicomposting

Worm bins use red wiggler worms to convert food scraps into nutrient-rich castings.

- Use red wigglers, not earthworms.
- No meat or dairy products.
- Worm castings improve soil health.
- Rule of thumb: **1 square foot of bin surface per pound of food scraps per week**.

Curbside Composting

Many communities collect food scraps and yard debris for commercial composting.

- Accepts larger quantities of organics.
- Commercial facilities reach higher temperatures than home systems.
- Can often process meat, dairy, and compostable food service items accepted by local programs.
- Diverts large amounts of waste from landfills.

Commercial Composting

Commercial compost facilities process organic materials at a much larger scale.

- Use large windrows and specialized equipment.
- Reach temperatures higher than most home compost systems.
- Regulated by Oregon DEQ.
- Produce compost for farms, gardens, and landscaping.

Bioplastics and Composting

Bioplastics can create contamination problems in both recycling and composting systems.

- Often look identical to traditional plastics.
- Can contaminate recycling loads.
- Many do not break down in home compost systems.
- Some commercial composters will not accept them.
- Oregon composters have raised concerns about compostable packaging contamination.

Key Statistics to Remember

- **2:1** brown-to-green compost recipe.
- **25–30:1** ideal carbon-to-nitrogen ratio.
- **3 ft x 3 ft** minimum compost pile size.
- **110°F–160°F** ideal composting temperature range.
- **140°F+** helps destroy weed seeds and pathogens.

- **5 turns in 6 weeks** for effective hot composting.
- **4–12 months** active composting timeframe.
- **6 months–2 years** static composting timeframe.
- **1 sq. ft. worm bin surface** per pound of food scraps per week.
- **8 inches** minimum soil cover for buried food scraps.
- **2–5 inches** compost added to garden beds annually.

Resources

- [EPA Composting at Home](#)
- [EPA Indoor Worm Composting Guide](#)
- [Oregon Metro Composting Resources](#)
- [Oregon DEQ Composting Information](#)
- [Oregon DEQ Permitted Compost Facilities](#)
- [Metro Home Composting Guide](#)

<https://www.usda.gov/foodlossandwaste/why>

<https://www.epa.gov/newsreleases/epa-releases-new-food-waste-reports>

<https://www.oregon.gov/deq/recycling/Documents/2020MRWGRatesReport.pdf>

<https://www.oregon.gov/puc/utilities/pages/executiveorder20-04.aspx>

<https://www.oregon.gov/deq/mm/food/Pages/Food-Waste.aspx>

<https://www.oregon.gov/deq/mm/food/pages/bad-apple.aspx>

<https://pacificcoastcollaborative.org/food-waste/>

<https://www.foodwastepreventionweek.com/>

MODULE 5:

Commercial Waste Reduction & Recycling

Why Commercial Waste Reduction Matters

Businesses, schools, governments, and organizations can reduce costs and environmental impacts by preventing waste before it is created.

- Waste prevention saves money on purchasing and disposal.
- Reducing waste conserves natural resources.
- Prevention is more effective than recycling alone.
- Most environmental impacts occur before an item becomes waste.

The Waste Hierarchy

The best waste is the waste we never create in the first place.

- 1st: Prevent and reduce waste.
- 2nd: Reuse materials.
- 3rd: Recycle materials.
- 4th: Recover energy.

- Last: Disposal in a landfill.

Commercial Recycling Programs

A successful recycling program starts with knowing what materials are generated and where they are coming from.

- Conduct a waste assessment.
- Identify recyclable materials.
- Place containers where waste is generated.
- Train employees and users on proper sorting.
- Track recycling and disposal results.

Common Commercial Recyclables

Many materials thrown away in workplaces can be recovered through recycling programs.

- Paper and cardboard.
- Plastic bottles and containers.
- Metal cans.
- Glass containers.
- Electronics and specialty materials.

Waste Audits

A waste audit helps identify what is being thrown away and where opportunities exist to reduce waste.

- Measures waste generation.
- Identifies recyclable materials in the trash.
- Helps improve collection systems.
- Supports cost-saving decisions.

Employee Education

People are the key to making any recycling or waste reduction program successful.

- Clear signage improves sorting.
- Consistent training reduces contamination.
- Education helps increase participation.
- Feedback keeps programs effective.

Composting at Work

Food scraps and other organic materials can often be composted instead of landfilled.

- Reduces landfill disposal.
- Supports soil health.
- Can lower disposal costs.
- Works best when contamination is minimized.

Buying Smarter

Waste reduction starts with purchasing products that create less waste.

- Buy reusable products when possible.
- Choose durable materials.
- Reduce unnecessary packaging.
- Purchase recycled-content products.
- Repair and reuse before replacing.

Event Waste Reduction

Planning ahead can significantly reduce waste generated at meetings, conferences, and community events.

- Use reusable serviceware.
- Prevent food waste through accurate planning.
- Set up recycling and compost stations.
- Prioritize reduction and reuse over disposal.

Oregon Recycling Requirements

Oregon has long supported recycling through policies that provide opportunities to recycle at home, work, and in the community.

- Communities over 4,000 people must provide recycling opportunities.
- Businesses with 10 or more employees and 1,000+ square feet should have recycling services available.
- Education is a key part of Oregon's recycling system.

Environmental Benefits

Reducing waste protects resources, reduces pollution, and lowers greenhouse gas emissions.

- Recycling reduces demand for raw materials.
- Waste prevention saves energy.
- Composting reduces methane generation.
- Recycling supports Oregon's circular economy.

Key Statistics to Remember

- The U.S. recycling and materials management system continues to focus on waste prevention first, followed by reuse and recycling.
- Oregon recycled approximately **1.4 million tons of material**, reducing greenhouse gas emissions by about **2.9 million metric tons of CO₂ equivalent**, comparable to removing approximately **690,000 vehicles** from the road.
- Businesses with **10+ employees** and **1,000+ square feet** should have recycling opportunities available under Oregon's Opportunity to Recycle framework.

Resources

- [OSU Recycling 101 Program](#)
- [Association of Oregon Recyclers Recycling 101](#)
- [OSU Waste Hierarchy Resources](#)
- [Oregon DAS Waste Reduction and Recycling Resources](#)
- [OSU Recycling Guide](#)
- [OSU Low-Waste Event Guide](#)
- [Oregon Opportunity to Recycle Information](#)

MODULE 6: Household Hazardous Waste

What is Household Hazardous Waste?

- Household hazardous waste is any product used around the home that can harm people, animals, or the environment when disposed of improperly.
- The average household can store up to 100 pounds of hazardous products in garages, basements, kitchens, and sheds.
- Hazardous products are found in homes, farms, businesses, and industries, but business hazardous waste is more heavily regulated.
- Always read labels before using, storing, or disposing of chemical products.

Reading Product Labels

- Product labels tell us how dangerous a product is and how to handle it safely.

Signal Words

- **Danger** – Extremely hazardous; may be poisonous, corrosive, or highly flammable.
- **Warning** – Moderate hazard; use with caution.
- **Caution** – Lower hazard but still requires safe handling.

Hazard Categories

- **Flammable/Combustible** – Can catch fire easily.
- **Explosive/Reactive** – May explode from heat, pressure, or shock.
- **Corrosive/Caustic** – Burns skin and destroys materials.
- **Toxic/Poisonous** – Can cause illness, injury, or death.
- **Radioactive** – Damages living cells and genetic material.

Common Household Hazardous Products

- **Pesticides** – Weed killers, insecticides, slug bait, flea products.
- **Paints & Solvents** – Oil-based paint, paint thinner, varnish, stains.
- **Cleaners & Disinfectants** – Drain cleaners, oven cleaners, toilet bowl cleaners.
- **Pool Chemicals** – Chlorine and sanitizers.

- **Automotive Products** – Motor oil, antifreeze, batteries, brake fluid.
- **Mercury Products** – Thermometers, thermostats, fluorescent bulbs.

Why HHW Matters

- Hazardous chemicals can cause burns, poisoning, respiratory problems, and long-term health impacts.
- Children are especially vulnerable to accidental poison exposures.
- Some chemicals bioaccumulate in fish, wildlife, and people.
- Improper disposal can contaminate soil, groundwater, rivers, and streams.

Safe Use Practices

- Buy only what you need.
- Follow label directions.
- Wear gloves, goggles, and other protective equipment.
- Use products in well-ventilated areas.
- Never mix chemicals together.
- Store products in original containers whenever possible.
- Keep chemicals away from children and pets.

Safe Disposal Hierarchy

- Use the product completely whenever possible.
- Share usable products with neighbors or community members.
- Use local hazardous waste collection programs.
- Use special recycling programs for banned materials.
- Never dump chemicals on the ground or into waterways.

What NOT To Do

- Do not pour chemicals down drains or toilets.
- Do not dump chemicals into storm drains.
- Do not pour products on driveways, roads, or bare ground.
- Do not burn hazardous products.

Household Hazardous Waste and Water Quality

- Chemicals can damage wastewater treatment systems.

- Toxic products kill beneficial bacteria in septic systems.
- Some contaminants pass through treatment plants unchanged.
- Mercury and other toxins can enter fish and move up the food chain.

Special Waste Materials

Pharmaceuticals

- Never flush unused medications.
- Use medication take-back programs and drop boxes.
- Pharmaceuticals in waterways can impact fish and aquatic ecosystems.

Mercury

- Mercury is a toxic metal that bioaccumulates in the environment.
- Exposure can affect memory, learning, hearing, and child development.

Fluorescent Bulbs

- Fluorescent bulbs contain mercury and require special disposal.
- Take bulbs to HHW facilities or approved recycling programs.

Paint

- Oil-based paint is a hazardous waste.
- Latex paint has lower toxicity but should still be managed properly.
- Oregon's Paint Care program provides statewide collection sites.

Batteries

- Batteries contain heavy metals and should not be thrown in the trash.
- Lithium batteries create serious fire hazards when damaged.

Antifreeze

- Antifreeze is toxic to people, pets, and wildlife.
- Never pour antifreeze on the ground or into drains.

Sharps

- Needles and syringes must be placed in approved sharps containers.

- Sharps are illegal to dispose of in regular trash.

Asbestos

- There is no safe level of asbestos exposure.
- Removal and disposal are heavily regulated.

Lead Paint

- Buildings built before 1978 may contain lead paint.
- Lead dust is a major cause of childhood lead poisoning.

Materials Banned from Oregon Landfills

- Motor oil
- Lead-acid batteries
- Tires
- Computers
- Monitors
- Televisions
- Refrigerators and freezers
- Major appliances (white goods)

Less Toxic Alternatives

- Use baking soda, vinegar, and lemon juice for many household cleaning tasks.
- Choose water-based paints over oil-based paints.
- Reduce pesticide use through prevention and integrated pest management.
- Look for products certified by Green Seal, EcoLogo, EPA Safer Choice, or Design for the Environment.

Key Takeaways

- Read labels before using any chemical product.
- Reduce, reuse, and safely recycle hazardous materials whenever possible.
- Protect children, pets, water, soil, and wildlife from toxic exposures.
- Use local HHW programs and recycling services for proper disposal.
- The safest hazardous chemical is the one we never have to buy or use.

Resources

- EPA Safer Choice: <https://www.epa.gov/saferchoice>
- Oregon DEQ HHW Programs: <https://www.oregon.gov/deq>
- PaintCare Oregon: <https://www.paintcare.org>
- Call2Recycle: <https://www.call2recycle.org>
- Oregon E-Cycles: <https://www.oregon.gov/deq/ecycles>
- Oregon Health Authority Drug Take Back: <https://www.oregon.gov/oha>
- Poison Control Center: 1-800-222-1222
- National Pesticide Information Center: 1-800-858-7378
- Toxic Free Future: <https://toxicfreefuture.org>
- Environmental Working Group (EWG): <https://www.ewg.org/>

MODULE 7: Sustainable Materials Management

Sustainable Materials Management

- SMM looks at the whole life cycle of a product, from where it comes from to where it ends up.
- SMM helps us see the full environmental and health impacts of the things we make, use, and throw away.
- Looking at the big picture helps us focus our time and energy on actions that make the biggest difference.

Why SMM Matters

- Most environmental impacts happen upstream during resource extraction, manufacturing, and transportation, not at disposal.
- The U.S. consumes large amounts of nonrenewable resources such as metals, minerals, and fossil fuels.
- Smarter consumption and better product design can reduce our environmental footprint.

Externalized Costs and Benefits

- Externalized costs are environmental or social impacts that are not included in the price of a product.
- Pollution, habitat loss, and water contamination often become costs paid by communities and taxpayers.

- Externalized benefits include things like carbon storage, clean air, flood control, and wildlife habitat provided by healthy ecosystems.

Recycling and the Waste Hierarchy

- Recycling is important because it saves energy, conserves resources, and reduces greenhouse gas emissions.
- Reducing waste and using less material is usually the most effective environmental strategy.
- Recycling works best when paired with reduction, reuse, and smarter purchasing decisions.

Life Cycle Analysis

- LCA evaluates the environmental impacts of a product from raw material extraction through disposal or recycling.
- LCA helps us compare products and make informed decisions based on facts rather than assumptions.
- Sometimes the lighter or smaller product has a lower environmental impact, even if it is not recyclable.

The Natural Step Framework

- The Natural Step provides a framework for creating a sustainable future.
- Sustainability requires reducing pollution, protecting ecosystems, conserving resources, and meeting basic human needs.
- The framework helps governments, businesses, and communities move toward long-term sustainability.

Cradle-to-Cradle Design

- Cradle-to-Cradle design treats materials as resources instead of waste.
- Biological materials should return safely to nature and technical materials should stay in use through recycling and reuse.
- Designing products like natural systems helps create abundance instead of waste.

Product Stewardship and Extended Producer Responsibility

- Product stewardship shares responsibility for environmental impacts across everyone involved in a product's life cycle.

- EPR requires manufacturers to help manage products after consumers are finished using them.
- These programs encourage safer, more recyclable, and easier-to-repair products.

Supply Chain Management

- Supply chain management tracks materials from their source to the final consumer.
- Understanding supply chains helps businesses reduce waste, lower costs, and improve sustainability.
- Every step in a supply chain creates opportunities for environmental improvement.

Circular Economy

- A circular economy keeps products and materials in use for as long as possible.
- Repairing, reusing, refurbishing, and repurposing reduce waste and conserve resources.
- Circular systems help maximize the value of materials while minimizing environmental impacts.

Green Procurement

- Green procurement considers the total environmental impacts of purchasing decisions.
- Buying decisions should consider durability, toxicity, energy use, and overall life cycle impacts.
- Environmentally preferable purchasing supports sustainability goals.

Sustainable Building

- Buildings contribute significantly to greenhouse gas emissions and resource use.
- Green building focuses on energy efficiency, healthy materials, water conservation, and reduced waste.
- Deconstruction and material reuse help preserve resources and reduce landfill waste.

Designing With Nature

- Designing with nature means working with natural systems instead of against them.
- Biomimicry uses nature's solutions to inspire sustainable products and technologies.
- Permaculture integrates human activities with ecological systems to create resilient and productive landscapes.

Oregon Recycling Modernization Act

- The RMA modernizes Oregon's recycling system and expands accepted recyclable materials.
- The law creates a consistent statewide recycling system and improves recycling access.
- Producers help pay for recycling programs through Extended Producer Responsibility.

Key Takeaway

- Sustainable Materials Management helps us understand the full impact of our choices and use resources more wisely.
- Combining reduction, reuse, recycling, product stewardship, green purchasing, and sustainable design creates healthier communities and ecosystems.

- Solving resource depletion and climate challenges requires looking at the entire life cycle of the materials we use.

Resources

- [U.S. EPA Sustainable Materials Management](#)
- [Oregon Department of Environmental Quality Materials Management Program](#)
- [The Natural Step](#)
- [Ellen MacArthur Foundation Circular Economy](#)
- [PaintCare Oregon](#)
- [Oregon E-Cycles Program](#)
- [EPA Environmentally Preferable Purchasing Program](#)
- [Recycling Modernization Act \(Oregon DEQ\)](#)

Module 8: Taking Action

Making a Difference Starts With Daily Choices

The biggest impact happens when we turn what we learn into actions at home, work, school, and in our communities.

- Small actions add up over time.
- Waste prevention has a larger impact than disposal.
- Everyone can influence others through their actions.

Follow the Waste Hierarchy

The most sustainable choice is preventing waste before it is created.

- 1st: Prevent waste.
- 2nd: Reduce consumption.
- 3rd: Reuse materials.
- 4th: Recycle materials.
- 5th: Recover energy.
- Last: Landfill disposal.

Focus on What Matters Most

Most environmental impacts happen during resource extraction, manufacturing, transportation, and use—not at disposal.

- Buy less when possible.
- Choose durable products.
- Repair before replacing.
- Avoid unnecessary packaging.

Be a Waste Reduction Leader

Sharing knowledge helps build stronger recycling and waste reduction programs in our communities.

- Lead by example.
- Share accurate recycling information.
- Support local sustainability efforts.
- Encourage others to participate.

Communication Matters

People are more likely to change behavior when information is practical, positive, and easy to understand.

- Focus on solutions.
- Use real-life examples.
- Listen before teaching.
- Connect actions to local benefits.

Reduce Waste at Home

Simple changes at home can significantly reduce waste and save money.

- Compost food scraps.
- Use reusable water bottles and mugs.
- Donate usable items.
- Buy only what you need.
- Reduce food waste through planning.

Reduce Waste at Work

Workplaces can reduce costs and environmental impacts through waste prevention and recycling.

- Conduct waste audits.
- Improve recycling access.
- Reduce paper use.
- Purchase reusable products.
- Educate employees regularly.

Get Involved in Your Community

Community action helps expand waste reduction efforts beyond individual households.

- Volunteer with local programs.
- Join sustainability groups.
- Participate in cleanup events.

- Support reuse and repair initiatives.
- Help educate others.

Buy Smarter

Every purchase is a vote for how resources are used and managed.

- Choose products with recycled content.
- Buy durable goods.
- Avoid single-use products.
- Support companies with sustainable practices.
- Consider the full life cycle of products.

Recycling Is Important, But Not Enough

Recycling helps conserve resources, but reducing and reusing create the greatest environmental benefits.

- Recycling comes after reduction and reuse.
- Not everything can be recycled forever.
- Cleaner recycling streams improve outcomes.
- Responsible end markets matter.

Oregon's Leadership in Sustainability

Oregon continues to lead through recycling, composting, environmental justice, and sustainable materials management programs.

- Recycling Modernization Act.
- Extended Producer Responsibility (EPR).
- Right to Repair efforts.
- Food waste reduction initiatives.
- Environmental justice programs.

Key Statistics to Remember

- The Recycling 101 course contains **8 modules** focused on waste reduction, recycling, composting, and sustainability.
- Students have approximately **15 hours** of coursework to complete the program.
- Oregon's Master Recycler model has trained thousands of Oregonians who have contributed more than **42,000 volunteer outreach hours** to waste reduction education.
- Prevention and reuse are considered more effective environmental strategies than recycling alone.

My Takeaways

Waste reduction starts with me, and every choice I make can help conserve resources, reduce waste, and influence others to do the same.

- Prevent waste first.
- Reuse whenever possible.
- Recycle correctly.
- Compost organic materials.
- Share knowledge with others.
- Support sustainable purchasing.
- Lead through action.

Resources

- [OSU Recycling 101 Program](#)
- [Association of Oregon Recyclers Recycling 101](#)
- [OSU Waste Hierarchy Resources](#)
- [OSU Recycling Guide](#)
- [OSU Sustainability Resources](#)
- [Oregon DEQ Responsible End Markets Program](#)
- [OSU Low-Waste Events Guide](#)

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Key Statistics Sources Used Throughout Curriculum

- U.S. generates **4.9 pounds of waste per person per day** (EPA).
- U.S. produces **12% of global municipal solid waste** with only **4% of the world's population** (Maplecroft).
- Oregon generated **6,091,756 tons of waste in 2022** (Oregon DEQ).

- Oregon generated more than **12 billion pounds annually** and **30 million pounds daily** (Oregon DEQ).
- Oregonians generated an average of **8.34 pounds per person per day** (Oregon DEQ).
- Recommended compost carbon-to-nitrogen ratio is **25–30:1**.
- Active compost temperatures should reach **110°F–160°F**, with **140°F+ for six weeks** helping destroy most weed seeds and pathogens.