We should Ethically Dispose of our Food Waste

What is Food Waste?

- The act of wasting food is referred to as food wastage (“Food Waste Definition”).
- This can be food that is lost in the process, edible food not consumed that spoils, and inedible parts of food that decompose
- Large portion of food supply ends up as waste.

Food Lost in the Process

- Agriculture (growing, use of resources, and processing)
- Growing- crops do not germinate, leading to a lower crop yield
- Resources- crops photosynthesize, and have limiting factors such as water, sunlight, nutrients, and air quality (Carbon Dioxide)

“Getting food from the farm to our fork eats up 10 percent of the total U.S. energy budget, uses 50 percent of U.S. land, and swallows 80 percent of all freshwater consumed in the United States” (Gunders 1).

- Processing- industry malfunction, harvesting

“Around 1.4 billion hectares of agricultural land is used to produce food that is lost or wasted. That’s 28% of the world's total agricultural area” (The World Counts).

Edible Food not Consumed

- This is the biggest issue in domestic situations; “17 percent of total global food production is wasted… 11 percent in households” (“Stop Food Loss and waste, for the people, for the planet”). This can be due to not using food before it expires or spoils, making too much food for the household consumption, or having remaining ingredients for food being thrown away.

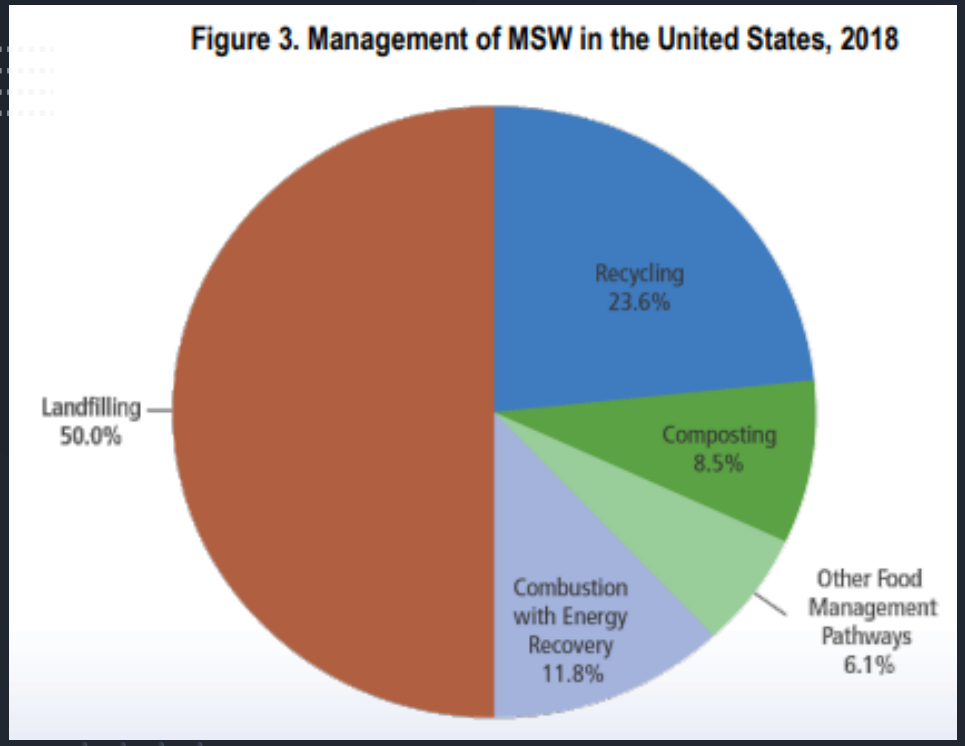
- Supply and not enough demand (product not sold fast enough)

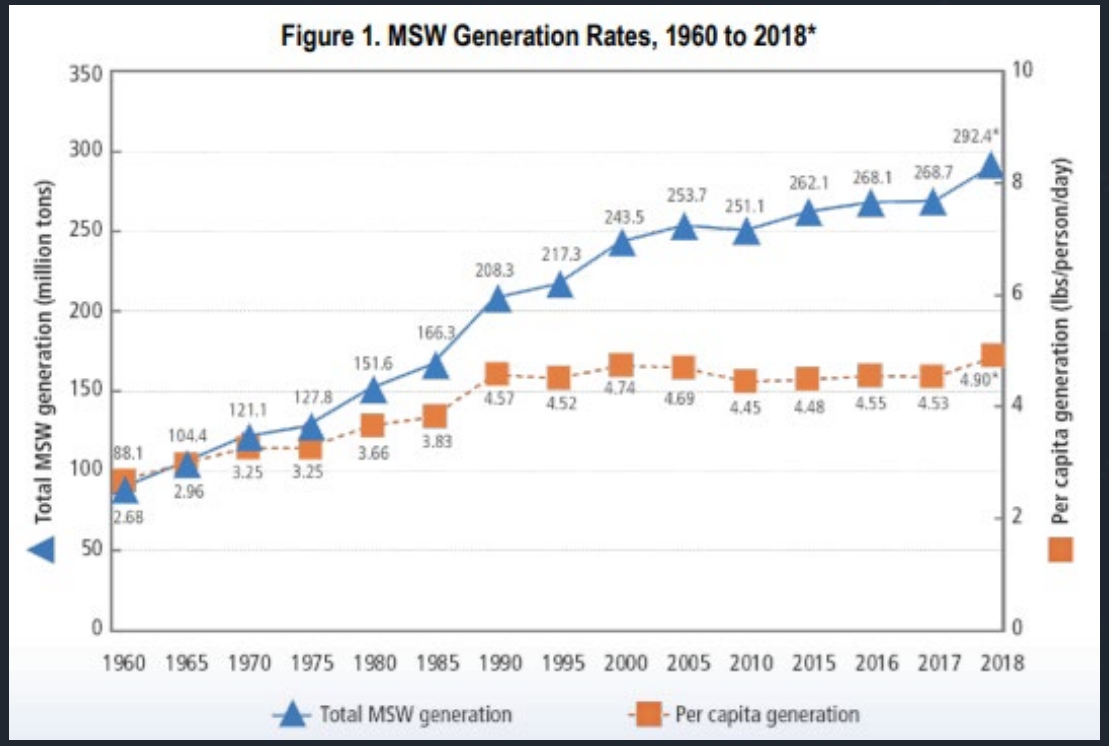
Inedible Parts of Food

- Inedible parts of foods automatically go towards waste
- Along with other food waste, emissions (methane CH4), and leachate is produced
- This happens when food waste is not treated properly and is sent to a land fill

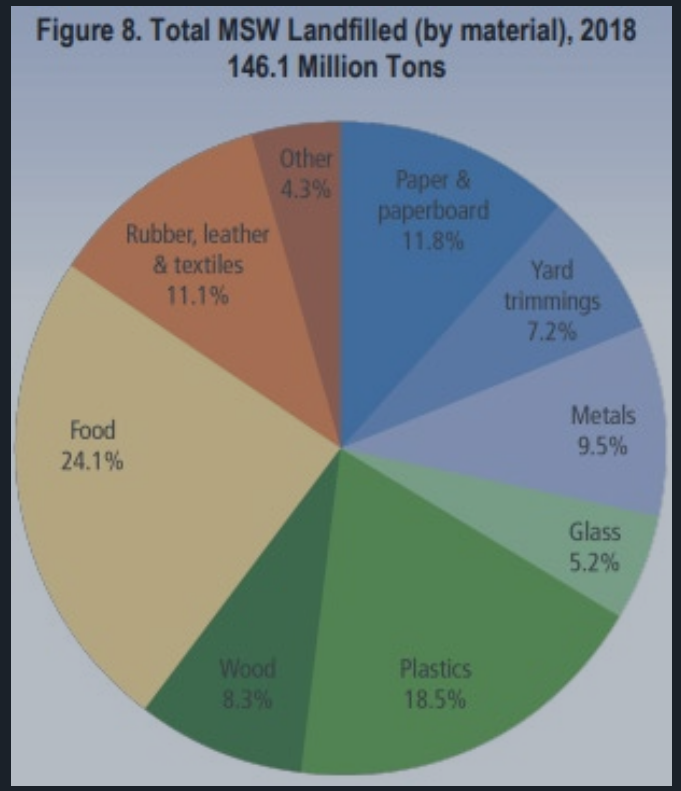
“about 95% of discarded food ends up in landfills… [food waste] is the largest component of municipal solid waste [in land fills] at 21%” (“Food Waste”).

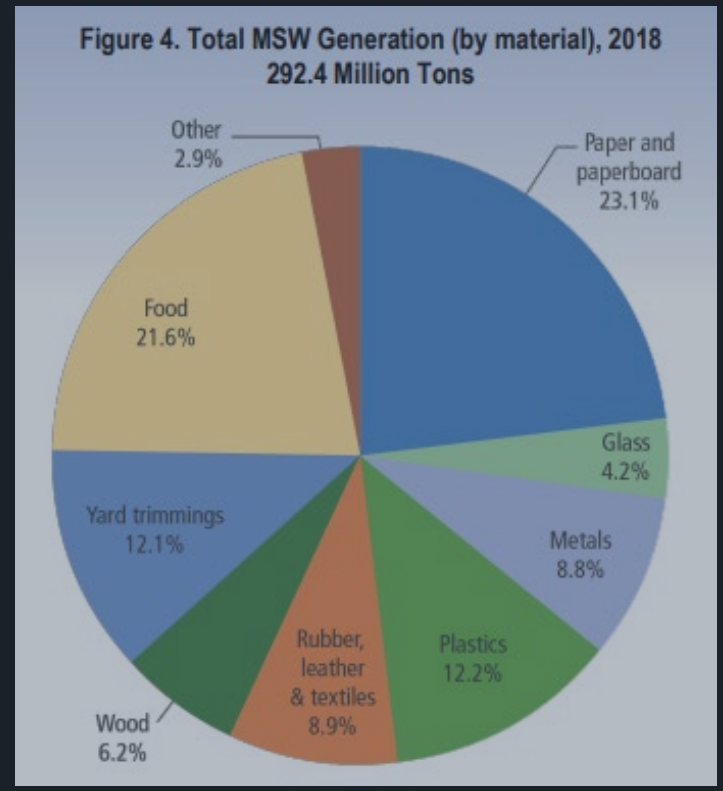
MSW Increasing





Food Waste and MSW





Where Else does the Food Waste End Up?

- Water sources
  - Contaminated ground water
  - Contaminated bodies of water (oceans, lakes, seas, rivers, etc.)
- Atmosphere
  - Methane emissions
  - Carbon Dioxide emissions (from industrial processes)
  - Carbon Dioxide emissions (from harvesting food)

Is this relevant?

- “Worldwide, one-third of food produced is thrown away uneaten” (“Food Waste”).
- “40 percent of food in the United States today goes uneaten” (Gunders 1). “34 million people [including 9 million children] in the United States are food insecure” (feeding America).
- The issue is also local to Florida
- Image (Smith 8).

Table 2. Food Service Sectors and Estimated Food Waste Generation

Type of Facility	No. in State	No. of Employees*	Estimated Lbs/ Employee/ Day	Est. Total Food Waste Generated/Yr. (tons)
Amusement parks	79	28,880	5.0	26,353
Cruise ships	27	8902	5.0	8,123
Hospitals	346	250,275	2.0	91,350
Military installations	15	Not available	0.4 - 0.6[1]	Not available
Nursing homes	937	82,342	4.0	60,110
Prisons	60	26,712	2.5[1]	12,187
Restaurants	16,807	389,116	4.5 - 7.5[1] 6.0 ave.	426,082
Schools, public K-12	2900	129,229	1.55[1]	36,556
Universities and colleges	153	29,993	1.55 - 7.0[1] 4.3 ave.	23,537

*The number of facilities

Case Study: Fair Oaks Dairy

To fund its anaerobic digester, Fair Oaks Dairy financed the project using industrial revenue bonds.

Capital costs

The total capital cost for the mixed-plug flow anaerobic digester that Fair Oaks Dairy installed and currently operates was $12 million. The farm operator financed 99 percent of the capital costs using industrial revenue bonds. The loan period for the industrial revenue bonds was 15 to 20 years.

Operating costs

The annual operating and maintenance costs for the digester are estimated to be $600,000. The methane gas is used to generate electricity and as a renewable transportation fuel (compressed natural gas, or CNG). The farm operator uses the electricity onsite and at the dairy visitor center to reduce its purchased electricity. The farm operator recovers waste heat from the genset to heat the digester. CNG from the digester is used onsite to power CNG tractor trailers that deliver milk to processing plants in three states and is sent by pipeline to a CNG vehicle-fueling station.

Possible Solutions and current standings

Converting waste into biofuel

- 50-70% Methane, 30-40% Carbon Dioxide (Tanigawa).
- Case study (Funding On-Farm Anaerobic Digestion 3).

Policies through taxes

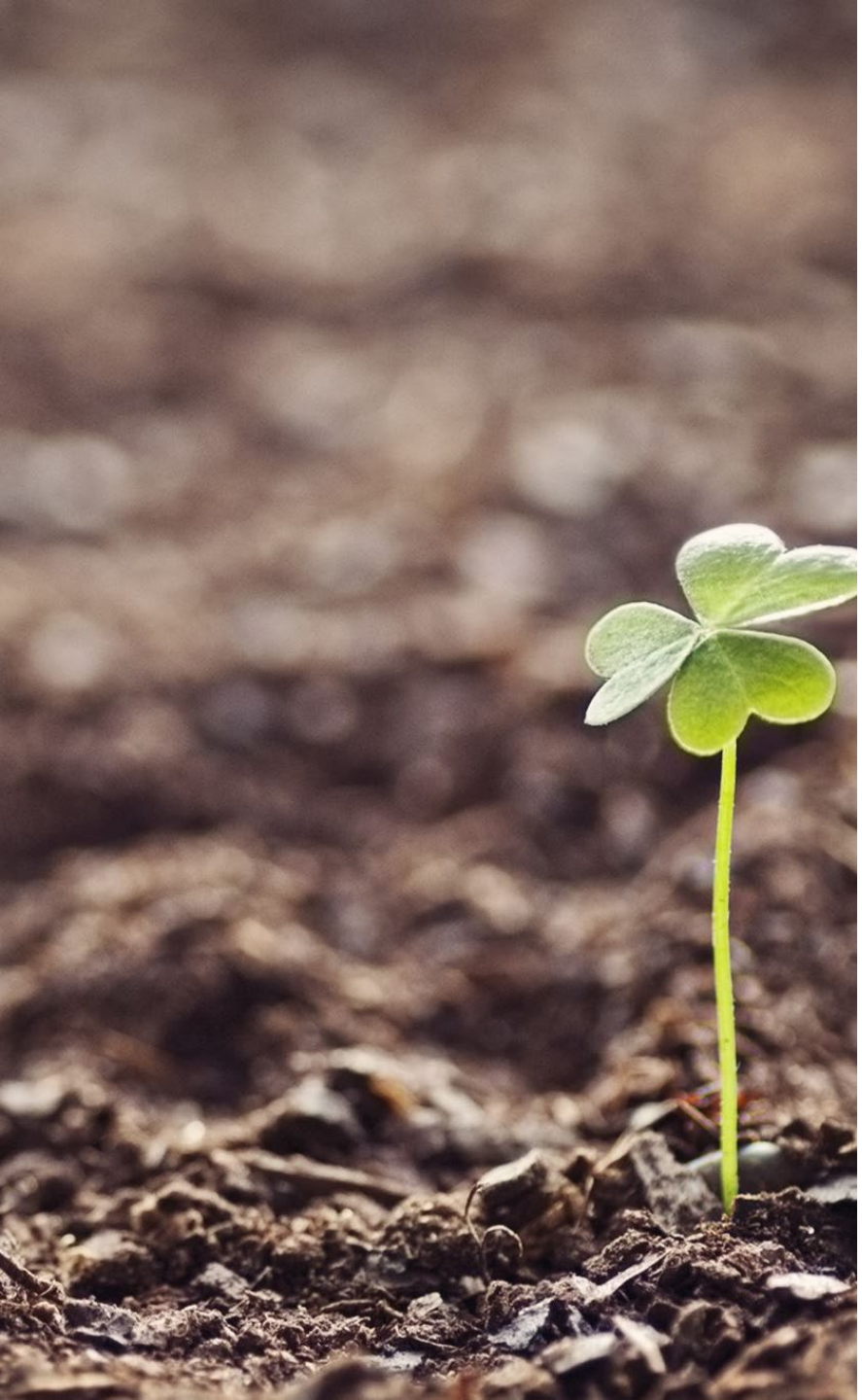
- Tax companies for increase in food waste and no tax if it is recycled
- No fluctuation, but high rates

UN imposing trade sanctions if members do not recycle, or plan to recycle, their food

- Too extreme, leading to more conflict

Apps to get food from grocery stores and restaurants

- Most of the food is lost in homes
- Overbuying food is still a problem

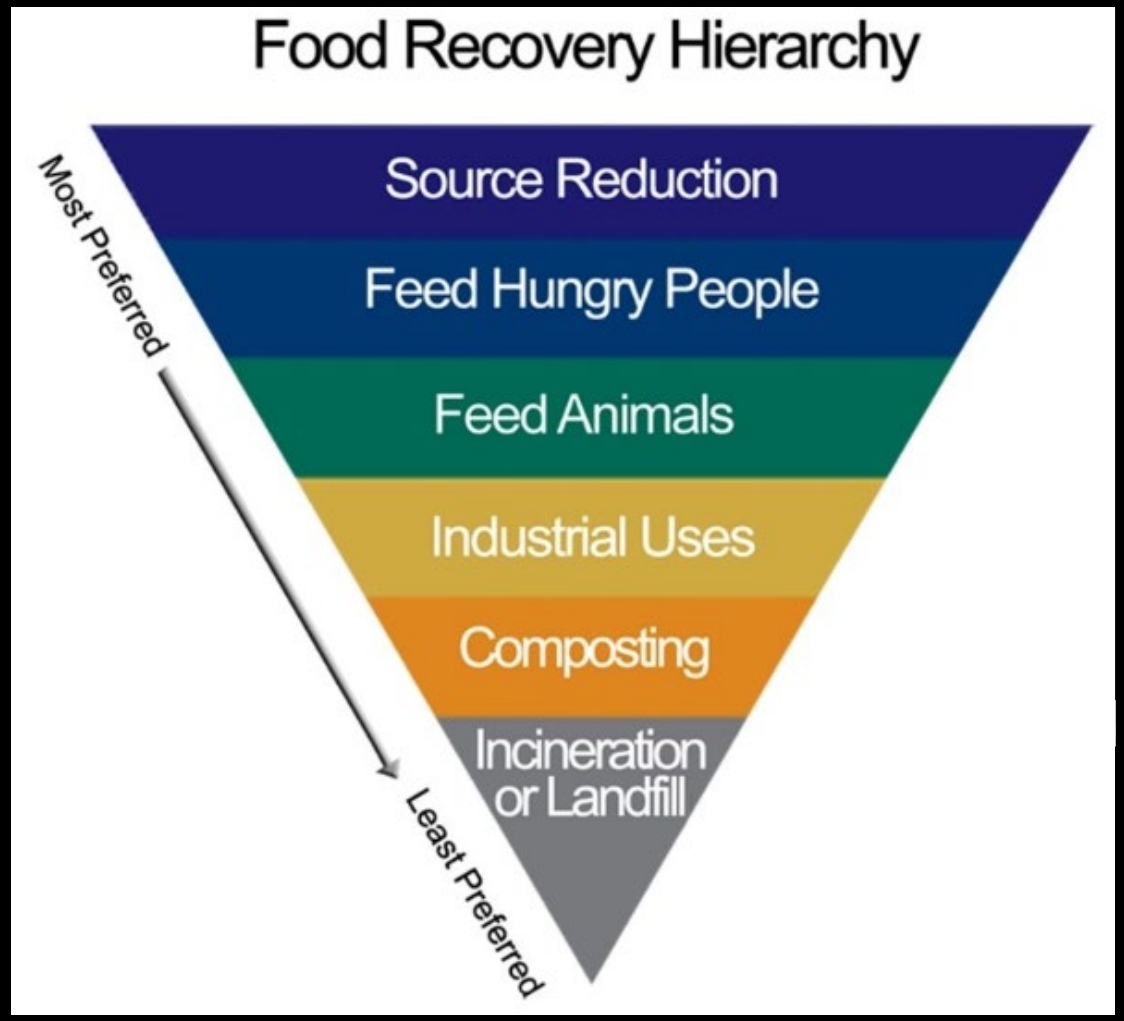


Agricultural Solution

- Cost
  - “Americans are throwing out the equivalent of $165 billion each year” (Gunders 1).
  - One of the biggest costs in this is water use
  - Drip Irrigation -> water is used most effectively
  - Highest average cost for materials and install is $1.78 million -> average farm at 445 acres, and the highest average cost at $4000 per acre (Farmer)(“Florida Agriculture Overview and Statistics”).
- This is done with water, and crops can change too
  - Water intensive crops (rice)
  - Switch to other crops (beans, peas)

Why this is the best

- Attacks the source rather than just trying to keep up with an increasing problem
- Better long term
- Image (“Food Waste Faqs”).



Sources

Advancing Sustainable Materials Management: 2018 Fact Sheet, United States Environmental Protection Agency, Dec. 2020, https://www.epa.gov/sites/default/files/2021-01/documents/2018_ff_fact_sheet_dec_2020_fnl_508.pdf.

Farmer, Tara. "Drip Irrigation System Cost." Edited by Kristen Cramer, *HomeGuide*, 5 Apr. 2023, https://homeguide.com/costs/drip-irrigation-system-cost#:~:text=Drip%20irrigation%20system%20installation%20costs,%24300%20to%20%241%2C200%20per%20zone.

"Florida Agriculture Overview and Statistics." *Florida Department of Agriculture & Consumer Services*, Comissioner Wilton Simpson, https://www.fdacs.gov/Agriculture-Industry/Florida-Agriculture-Overview-and-Statistics#:~:text=Farms%20and%20Land%20in%20Farms,30th%20in%20land%20in%20farms.

"Food Waste Definition." *Fusions*, European Union's Seventh Framework Programme, 2016, https://www.eu-fusions.org/index.php/about-food-waste/280-food-waste-definition.

"Food Waste Faqs." *USDA*, https://www.usda.gov/foodwaste/faqs.

"Food Waste." *The Nutrition Source*, Harvard, 30 Nov. 2022, https://www.hsph.harvard.edu/nutritionsource/sustainability/food-waste/.

Funding On-Farm Anarobic Digestion, Agstar - United States Environmental Protection Agency, Sept. 2012, https://www.epa.gov/sites/default/files/2014-12/documents/funding_digestion.pdf.

Sources (Cont.)

Gunders, Dana. “NRDC Issue Paper.” *Wasted: How America Is Losing Up to 40 Percent of Its Food from Farm to Fork to Landfill*, Natural Resources Defense Council, Aug. 2012, https://www.nrdc.org/sites/default//files/wasted-food-IP.pdf.

“Hunger in America.” *Feeding America*, https://www.feedingamerica.org/hunger-in-america#:~:text=According%20to%20the%20USDA%2C%20more,United%20States%20are%20food%20insecure.

Smith, Wayne H, et al. “Final Report - Food Waste Diversion in Florida.” *Food-Waste-Diversion-in-Florida-Final-Report.pdf*, Department of Environmental Protection State of Florida, Nov. 1998, https://floridaforce.org/wp-content/uploads/2019/04/Food-Waste-Diversion-in- Florida-Final-Report.pdf.

“Stop Food Loss and Waste, for the People, for the Planet.” *United Nations*, United Nations, https://www.un.org/en/observances/end-food-waste-day.

Tanigawa, Sara. “Fact Sheet: Biogas: Converting Waste to Energy.” Edited by Jessie Stolark, *EESI*, 3 Oct. 2017, https://www.eesi.org/papers/view/fact-sheet-biogasconverting-waste-to-energy#:~:text=Biogas%20contains%20roughly%2050%2D70,used%20as%20a%20soil%20amendment.

The World Counts, 2023, https://www.theworldcounts.com/challenges/people-and-poverty/hunger-and-obesity/food-waste-statistics.