Soil and Compost Fact Sheet

Disclaimer about this Fact Sheet: The Law Center's Fact Sheets are compiled largely by copying and pasting data and quotes from other publications. We find this data helpful in our work, in setting priorities and advocating for public policies. We haven't edited this document for widespread publication, but we casually share it in case others find it helpful. We've done our best to cite to our resources correctly, but may have gotten sloppy in places. Also, we haven't verified the accuracy of this data. We consider these Fact Sheets to be works in progress.

Purpose of this Document

How do different composting methods, quality, and applications of compost contribute to:

- Air quality and soil fertility
- Toxic remediation in soil
- Runoff prevention and soil moisture retention
- Carbon sequestration
- Methane emissions reduction
- Green jobs
- Food security

In particular, our goal is for policymakers to enable and support diverse, decentralized, and small-scale composting operations. This document is a place to begin compiling data and science to support our argument that diverse and small-scale composting methods can produce better quality compost and therefore contribute more to all of the above.

Compost and Air Quality

How does compost improve the air? How does it sequester carbon? How does it pollute the air? How does large-scale composting result in CO2 emissions from transport?

"The U.S. Environmental Protection Agency (EPA) created a Waste Reduction Model (WARM) to help track and report greenhouse gas (GHG) emissions reductions from several different waste management practices. WARM calculates and totals GHG emissions of baseline and alternative waste management practices—source reduction, recycling, anaerobic digestion, combustion, composting and landfilling.

"The only GHG emissions from composting that WARM (version 12 documents) currently includes are emissions associated with transporting and processing the compost in aerated windrow piles. Transportation energy emissions occur when fossil fuels are used to collect and transport yard trimmings and food scraps to a composting facility, and then to operate the composting equipment that turns the compost.[1] And although the EPA is evaluating whether

[1] WARM Version 12, US EPA, https://web.archive.org/web/20130202010053/http://www.epa.gov/climatechange/waste/downloads/Composting.pdf (last visited July 2018).

other emissions (CH4 (methane) and N2O (nitrous oxide)) also occur during composting (as microbial processes decompose compost feedstocks) WARM's current assumption is that well-managed compost piles are adequately aerated and emit negligible levels of methane and nitrous oxide. WARM, Version 14 includes newer studies on compost operations' emissions of nitrous oxide and methane, and states: "**Overall, EPA estimates that centralized composting of mixed organics results in net carbon storage of 0.18 MTCO2E per wet short ton of organic inputs composted and applied to agricultural soil."**[2]

Decrease and sequestration of CO_2

"One practice that has been found to increase carbon storage in the soil is the addition of organic matter, and compost in particular, to farms and/or rangelands. The addition of compost results in the slow release of fertilizer to the soils as the compost decomposes, and improved soil moisture conditions; both result in increased plant production. In turn, more plant growth leads to more CO2 being removed from the atmosphere through photosynthesis and thus more CO2 being transferred (i.e., sequestered) through the plant to the soil as roots and detritus"[3]

"Results from [Marin Carbon Project (MCP's)] work indicate that a single application of a half-inch layer of compost on grazed rangelands significantly increases plant growth (by 40 to 70 percent), and increases soil water holding capacity. Modeling results further indicate that soil carbon sequestration could increase by at least 0.4 metric tons (MT) per acre annually for 30 years without re-application. Scaling up from MCP's results indicates that applying compost at this rate on 50 percent of the rangeland area in California could offset 42 million metric tons (MMT) of CO2e annually, an amount equivalent to the annual GHG emissions from energy used by the commercial and residential sectors in California. "[4]

"Mitigation measures drawn from the San Joaquin Valley Unified Air Pollution Control District and South Coast Air Quality Management District rules are estimated to reduce organic emissions by 15 percent to 30 percent, and are more likely to be adopted at small scale composting operations."[5]

[2] WARM Version 14, US EPA, https://www.epa.gov/sites/production/files/2016-03/documents/warm_v14_management_practices.pdf (last visited July 2018).
[3] "Final 2017 Clean Air Plan, Volume 2", BAAQMD, Apr 2017.
[4] "Final 2017 Clean Air Plan, Volume 2", BAAQMD, Apr 2017.
[5] "Final 2017 Clean Air Plan, Volume 2", BAAQMD, Apr 2017.

Transportation Emissions

The resulting average transportation emissions for the collection of "feedstock" (food waste, yard trimmings and mixed organics) and delivery of compost to the end user are 0.008 $MTCO_2E$/ton of feedstock.[6]
[Note: $MTCO_2E$= Metric tons CO_2 Emissions; transportation emissions specific to CA]

Methane Emissions

"Methane (CH4) is 20 times more serious in terms of greenhouse effect than CO2. If the raw material spread on the fields does not cause CH4 emission, according to Beck-Friis et al. (2000), emission rates of CH4 during composting of organic wastes with different management strategies can vary from 0 to 119 g CH4 m−2 day−1. Variation of emitted quantities of CH4 illustrates the fact that composting practice is either a negligible source of CH4 emission or an important source of pollution when anaerobic conditions prevail, e.g. up to 22% of total greenhouse gas emission at a dairy farm-scale (Amon et al., 2001)"[7]

High Quality vs Low Quality Compost

Moisture Balance in Compost

"A moisture content of 50-60% is generally considered optimum for composting. Microbially induced decomposition occurs most rapidly in the thin liquid films found on the surfaces of the organic particles. Whereas too little moisture (<30%) inhibits bacterial activity, too much moisture (>65%) results in slow decomposition, odor production in anaerobic pockets, and nutrient leaching"[8]

Product Quality, Classifications, and Use Regulations

Several approaches have been used to set product quality regulations, including: risk-based standards, best achievable technologies, and no-net-degradation of background soils. Combining these different underlying regulatory and scientific approaches with the political process of regulatory development results in a wide range of compost quality standards. The various states in the U.S. which have regulated compost have generally used a risk-based approach, while several Canadian provinces and European countries have adopted more stringent standards based on existing concentrations of metals in clean soils.

Where risk-based standards are used, maximum contaminant levels are established based on

[6] "Method for Estimating Greenhouse Gas Emission Reductions from Diversion of Organic Waste from Landfills to Compost Facilities", California Air Resource Board, May 2017.
[7] Josephine Peigne & Philippe Giradin "Environmental Impacts of Farm-Scale Composting Practices", Water, Air, and Soil Pollution Journal Vol. 153 Issue 1-4, March 2004
[8] "Composting for the Homeowner", University of Illinois Extension, 2018

available research. Compost that meets these standards can be applied without restrictions and result in an acceptable risk to human or environmental health. Establishing product use restrictions for compost that doesn't meet the strictest standards, but meets less strict standards, could provide for the beneficial use of these composts while still protecting health and the environment.

Different classes of composts could be established based either on specified maximum contaminant levels or on specified input feedstocks. Rules could restrict the use of the different classes of compost to different applications, thus allowing a balancing of agronomic benefits against environmental risks. Compost meeting the most stringent standards could be allowed to be used without restriction, while compost that meets less strict standards could be restricted to use in non-food chain crops or to applications where people are unlikely to come into direct contact with the compost.[9]

Compost Feedstock & Environmental Impact

Different types of composted materials raise different environmental concerns. The primary concerns with yard-waste compost include weed seeds, herbicide or pesticide persistence from the base material, and plant pathogens. Even the nutrients in yard waste compost can have adverse environmental impacts if not managed properly. In contrast, concerns regarding composed biosolids include trace elements, trace synthetic organics, and pathogens. All of these constituents, if found in excessive amounts, have the potential to degrade the environment and affect human and animal health.

"The environment is protected against this potential degradation in at least three ways: 1) Compost quality is high, due to industrial pretreatment of wastewater and hazardous waste programs, keeping the contaminants out of biosolids and other composts; 2) Proper management practices for compost and organic residuals are used including calculating appropriate application rates, maintaining buffers from waterways and conducting environmental monitoring; and 3) Characteristics are present in the soil, composts and biosolids to "treat" and bind contaminants."[10]

"Although the common perception of biosolids is that it contains large amounts of contaminants, surprisingly it is the nutrients (primarily nitrogen) contained in biosolids and other organic residuals that restrict application rates. Many studies have documented this; seldom have heavy applications posed problems from contaminants, whereas over-application will invariably cause

[9] Biomass & Bioenergy (Vol. 3, Nos 3-4, pp.127-143), 1992.
[10] Chuck Henry (University of Washington) and Karen Bergeron (King County Department of Natural Resources) "Compost Use in Forest Land Restoration," USEPA, July 2005.

nitrate leaching. Proper nutrient management – controlled application rates such as that used for any fertilization – will reduce risk of it occurring."

Reducing Pathogens

"The EPA has developed standards for the level of pathogens in biosolids and biosolid products. Class A means that the treatment process results in a biosolids or biosolids product that has indicator organisms below the limits of detection for the methods specified in Part 503. is essentially pathogen free. The Class B means that, whereas most of the pathogens have been killed, a few (<1%) may survive. Class B biosolids have undergone a Process to Significantly Reduce Pathogens (PSRP) and that do not pose a threat to public health and the environment as long as actions are taken to prevent exposure to the biosolids after use. In contrast to Class B, Class A materials have undergone a Process to Further Reduce Pathogens (PFRP), such as high temperature digestion, composting or heat drying. This means that the concentration of fecal coliform is less than 1000 per g dry solids or salmonella is below the detection limit. Properly managed, a compost will be a Class A product."

"The survival time for most microorganisms following land application is typically very short but is dependent on a variety of soil and climatic conditions including temperature, moisture content and pH. Bacterial pathogens will generally die off to negligible numbers within 2 to 3 months following application. Viruses can survive up to 3 months, while protozoa will survive for only a few days (Kowal 1985). In any case these microorganisms will not leach through the soil system to present a public health problem for the receiving ground waters. They will remain in the surface soils for the duration of their survival period. Where surface runoff occurs, pathogens will be filtered out by the fine particles in the forest floor and soil within the buffers and be kept from entering into receiving water bodies."[11]

Interpreting Compost Test Results

"A compost manager is faced with a large range of possibilities when testing. Parameters often include pH, soluble salts, organic matter content, percent solids (or conversely percent moisture), total nitrogen, water holding capacity, phosphorus, C:N ratio, maturity and density. Others may include carbonates, ammonia, heavy metals, pesticides, herbicides, bacteria (generally fecal coliform and Salmonella), and more. Some labs offer a testing package that includes a particular group of analytes. The best times to test depends on the purpose. Testing of feedstocks and testing during the composting process can help a producer determine an appropriate mix or make process modifications. Prior to marketing, the best time to test compost is when the product is "finished." "Finished" will have a different meaning to different people and for different uses. It is the point when the compost manager feels that a product is ready for intended use and

[11] Chuck Henry (University of Washington) and Karen Bergeron (King County Department of Natural Resources) "Compost Use in Forest Land Restoration," USEPA, July 2005.

reflects the product being offered to consumers. Technically, fully finished compost has reached the point when it is no longer thermophilic and it has gone through sufficient curing to be stable and mature."[12]

pH: Most composts have a pH of between 6 and 8. Each specific plant species requires a specific pH range. Based on the amount of compost applied, as well as its pH, its addition can affect the pH of the soil or growing media.[13]
Salt: Most composts have a soluble salt conductivity of 1.0 to 10.0 dS/m, whereas typical conductivity values in soil range from 0 to 1.5 in most areas of the country.[14]
Organic Matter: Organic matter content is the measure of carbon-based materials in compost… There is no ideal organic matter content for compost, and it may vary widely, ranging from 30 to 70%.[15]
C: N Ratio: The C:N ratio is the relative proportion of total carbon to total nitrogen in the compost. A "typical" compost recipe may start with a C:N ratio of about 30 (30 parts C to 1 part N). As composting proceeds, microbes in the mixture use the carbon substrates as their main energy source, oxidizing it and releasing carbon dioxide gas. Assuming that nitrogen is conserved (not lost as a gas or leached) in a moist, well-aerated pile, the C:N ratio decreases with time. Depending on the nature of the starting materials, a final ratio of 15 to 20 generally indicates a finished product. As stated for total nitrogen, an evaluation of other test values and knowledge of the compost's history and appearance can help interpret C:N ratio values.[16]
Moisture: "Overly dry compost (35% moisture, or below) can be dusty and irritating to work with, while very wet compost (55 to 60%) can become heavy and clumpy, making its application more difficult and delivery more expensive. A preferred moisture percent for finished compost is 40 -50%."[17]
Macronutrients: Phosphorus (P), Potassium (K), Calcium (Ca), and Magnesium (Mg) are reported in their total forms from acid digestion. Values given indicate the total nutrient value of the compost sample. It has been estimated that 50% of P, Ca and Mg, and 85% of K are available the first season of application.[18]
Micronutrients: Boron (B), Zinc (Zn), Copper (Cu), and Iron (Fe) are reported on a dry weight basis in mg/kg, and indicate the total nutrient value of the compost sample. Little information is available to interpret the significance of these values in compost.[19]
Heavy Metals: Lead (Pb), Nickel (Ni), Cadmium (Cd), and Chromium (Cr) are also reported on a

[12] Bonhotal J, Harrison EZ. Testing Composts. Cornell Waste Management Institute. 2004, updated 2015. 6 p.
[13] "Test Methods and Parameters", US Composting Council, 2018.
[14] "Test Methods and Parameters", US Composting Council, 2018.
[15] "Test Methods and Parameters", US Composting Council, 2018.
[16] UMass Soil and Plant Tissue Laboratory Fact Sheets. February 2014.
[17] "Test Methods and Parameters", US Composting Council, 2018.
[18] UMass Soil and Plant Tissue Laboratory Fact Sheets. February 2014.
[19] UMass Soil and Plant Tissue Laboratory Fact Sheets. February 2014.

dry weight basis in mg/kg, and indicate the total level of metals in the compost sample. Regulations governing the heavy metal content of composts derived from certain feedstocks have been promulgated on both the State and Federal levels. Certain heavy metals are known to cause phytotoxic effects in plants at high concentrations and specific plant species are known to be more sensitive than others. However, little information is available to interpret the significance of these values in compost.[20]

Particle Size: "A compost product's particle size may also determine its usability in specific applications. For example, a compost product with a maximum particle size of 1/2 inch or greater may not be acceptable as a turf top-dressing, whereas a product with a maximum particle size of 1/4 to 3/8 inch or less could be acceptable. Most composts that are used as soil amendments are screened through a 3/8 or 1/2 inch screen."[21]

Compost and Toxics Remediation

Compost and Fecal Matter

Composting and vermicomposting are considered two of the best techniques for solid biomass waste management. Centralized composting, which is one of the fastest growing industrial composting methods, has strict governmental guidelines, requiring thermal sanitation at 55 degrees Celsius for 3 days to prevent the survival of harmful bacteria. But in the case of vermicomposting, worms graze on the decomposer community at room temperature, preventing the onset of high temperatures, and so there are concerns that *E. coli*, a bacteria often found in fecal matter that can easily make its way into organic waste set to be composted, would not be eliminated. The results of several studies show that vermicomposting, or the process by which organic matter breaks down in the worm's digestive system, is a promising method in the complete inoculation of diseases and parasites, and sanitation of organic waste. Time and again, the worms worked their magic and produced compost that respected the regulatory bacterial count limits. When the normal compost microbes or worms were present, *E. coli* declined more rapidly. Without worms or with sterile compost, it took 18 to 21 more days to get there.[22]

Vermicomposting is therefore an extremely cost-effective tool for ruminant manure management. Vermicomposting is a mesophilic biooxidation and stabilization process of organic materials that involves earthworm, micronutrients, and microorganisms. Compared with composting, vermicomposting has higher rate of stabilization and greatly modifies the physical and biochemical properties of the decomposing manure back to trace minerals, with low C : N ratio and a homogenous end product.

---

[20] UMass Soil and Plant Tissue Laboratory Fact Sheets. February 2014.
[21] "Test Methods and Parameters", US Composting Council, 2018.
[22] Louise Hénault-Ethier et al, Persistence of Escherichia coli in batch and continuous vermicomposting systems, Waste Management (2016).

Compost and Bioremediation

Bioremediation uses compost to clean and restore contaminated soils by degrading and binding contaminants in soil. The process has been used both in-situ, where compost and other amendments are incorporated into a contaminated soil, and by removing the contaminated soils and adding them to a compost pile.[23]

Compost Use in Forest Land Restoration

"High intensity wildfires can detrimentally alter many ecosystem functions. Loss of vegetation, and especially the organic duff covering the forest floor can change infiltration rates during heavy rainfall, leading to heavy runoff and subsequent erosion. Composted biosolids have successfully been used to accelerate revegetation and reduce particulate movement into water bodies (Meyer et al. 2001 & 2004). Plant biomass and percent cover were both shown to increase, and corresponding runoff quality improved."[24]

"Soil conditions on mine restorations represent conditions that are similar but significantly harsher than the mineral soil conditions characteristic of obliterated roads. Mine tailings generally have low pH and insufficient levels of nitrogen phosphorus and potassium, and high metal solubility. Biosolids compost and other organic amendments have been shown to improve soil properties on mine tailings. This improvement has been demonstrated to be a result of: 1) an increase in the soil pH in acidic soil; 2) improved available water capacity; and 3) increased nitrogen, phosphorous and micronutrients. The result of these soil applications is an improved success of revegetation efforts."[25]

Worms and Toxic Waste

"In the second, petroleum degradation in the contaminated, native soil from the remediation site was examined in the presence and absence of the E. fetida and A. caliginosa. The second experiment measured the effectiveness of earthworms on real-world soils that had weathered in the field for several decades. In the first degradation experiment, petroleum concentrations declined significantly ($p<0.01$) in the presence of E. fetida compared to controls. After 342 days, concentrations declined by 56% without the microbial inoculum and 63% with the microbial inoculum. Heavier and more complex hydrocarbons were more resistant to degradation. In the second experiment, petroleum concentrations declined by approximately 93% in the native soil in the presence of each of the worm species, significantly more than the declines observed in the controls. The results of these experiments show that earthworms accelerate degradation of

---

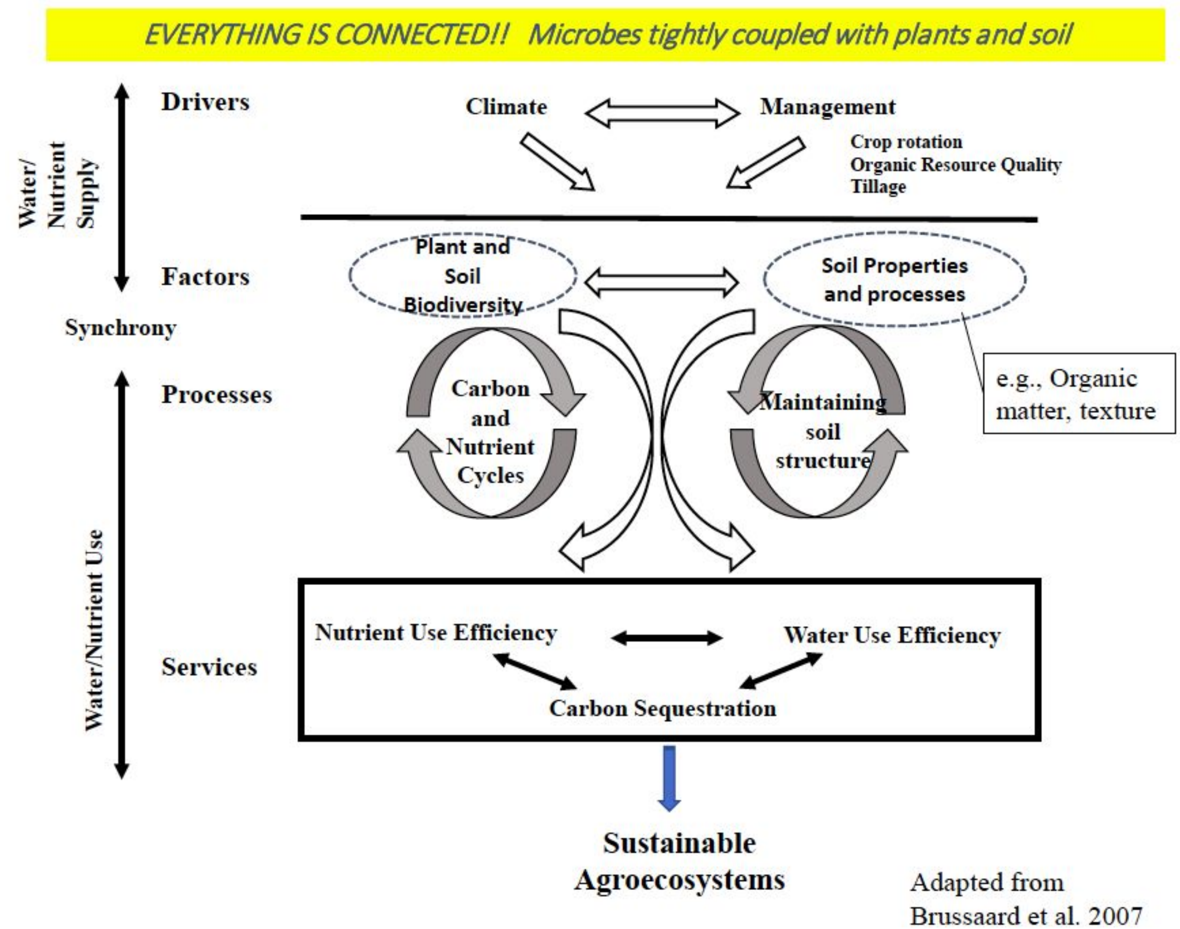
[23] Summarized from "Innovative Uses of Compost: Bioremediation and Pollution Prevention", USEPA 1997.
[24] Meyer, V. F., E. F. Redente, K. A. Barbarick, R. B. Brobst, M. W. Paschke, and A. L. Miller. "Plant and Soil Responses to Biosolids Application following Forest Fire," Journal of Environmental Quality, Volume 33, 2004, pages 873–881.
[25] Brown, S., C.L. Henry, R.Chaney, H. Compton, and P.S. DeVolder. "Using municipal biosolids in combination with other residuals to restore metal-contaminated mining areas," Plant and Soil, Issue 249, 2003: pages 203-215.

crude oil and are a promising candidate for the enhancement of crude oil bioremediation (vermiremediation)."[26]

Compost and Explosives-Contaminated Soil

"Windrow composting has been demonstrated as an effective technology for treatment of explosives-contaminated soil. During a field demonstration conducted by USAEC and the Umatilla Depot Activity (UMDA), TNT reductions were as high as 99.7% in 40 days of operation, with the majority of removal occurring in the first 20 days of operation. Maximum removal efficiencies for RDX and HMX were 99.8% and 96.8%, respectively. The relatively simple equipment requirements combined with these performance results make windrow composting economically and technically attractive"[27]

Benefits of Compost Application



[26] Luke Martinkosky, "Innovative Use of Earthworms for the Remediation of Soil Contaminated with Crude Oil", University of Washington Masters Theses, 2015.
[27] "Remediation Technologies Screening Matrix & Reference Guide, Version 4.0", Federal Remediation Technologies Roundtable,

Retains Soil Moisture and Saves Water

"To the many benefits of composting, add another: water conservation. When compost is added to bare soils as a thin layer, it is an effective barrier against evaporation of soil moisture, a practice called top- or side-dressing. Compost also reduces plants' needs for water by increasing how much water can be held by the soil - only a 5% increase in organic material quadruples the soil's water holding capacity...[A] 2000 study … found that increasing the water holding capacity of the soil by adding compost helped all crops during summer droughts by reducing periods of water stress. The amount of water in … 8 inches … of the compost amended soil increased to 1.9 inches compared with 1.3 inches in un-amended soil. Since vegetables require 1 inch of water a week, at field capacity, the compost amended soil held a 2-week supply of water."[28]

"In high clay content soils, compost will improve aggregation, allowing water to move through soil faster. Following a 2nd application of amendments (i.e., compost) all amended plots increased Plant Available Water by 5 to 45% compared to the control. This would have potentially reduced the average amount of irrigation water needed by 10 to 90%. At current prices, a reduction of one irrigation cycle would reduce energy costs by $270 to $620 on a 160 acre system, depending on the energy source used."[29]

Keeps Local Waterways Clean

Compost vs. Fertilizer: "Fertilizer runoff is a serious environmental concern because of its negative impact on water supplies, wildlife and health, including eutrophication, which results in excess algae growth and oxygen depletion in lakes and stream, and methemoglobinemia, caused by too much nitrate-nitrogen in drinking water, and fish death."[30]

Oakland and Storm Water Runoff: "Lake Merritt, known as the 'Jewel of Oakland,' suffers from excessive nutrient loading from urban runoff. Low oxygen levels within the lake have classified the lake as an impaired body of water by the Environmental Protection Agency."[31] [above from 2004, unconfirmed if status still exists]

Prevents Soil Erosion

Erosion and Waterways: "The U.S. EPA has declared that sediment contamination of our surface waterways is the biggest threat to our nation's water resources. When eroded sediment is

---

[28] Rob Bennaton, "Composting and Water Conservation", University of California Agriculture and Natural Resources, 2015.
[29] "Increasing Soil Organic Matter with Compost", US Composting Council, [Date n/a but has to be 2011 or after due to 'strive for 5%' stamp on material
[30] Rachel Delp, "What are the Causes of Fertilizer Runoff?", SFGate
[31] John Nguyen, "Lake Merritt Nitrogen Project Pinpointing Nitrate Contributions to Lake Merritt", UC Berkeley, 2004

transported from its site of origin to nearby water bodies it also carries fertilizers, pesticides and other contaminants attached to the soil particles."[32]

Importance of Reducing Erosion: "According to the U.S. Department of Agriculture the United States loses more than 2 billion tons of topsoil each year to erosion. Erosion removes fertile soil rich in nutrients and organic matter, which reduces the ability of plants to establish, grow and remain healthy in the soil. A reduction in plant growth and subsequent plant residue causes less soil cover, allowing the erosion process to perpetuate and become worse. The danger in this process is that it can be imperceptible and eventually lead to infertile land void of topsoil."[33]

Economic and Social Benefits of the Compost Industry

Job Creation

"Achieving a 75 percent diversion rate for municipal solid waste (MSW) and construction and demolition debris (C&D) by 2030 will result in a total of 2.3 million jobs: Almost twice as many jobs as the projected 2030 Base Case Scenario, and about 2.7 times as many jobs as existed in 2008. There would be a significant number of additional indirect jobs associated with suppliers to this growing sector, and additional induced jobs from the increased spending by the new workers."[34]

"Composting creates at least twice as many jobs as landfills."[35]

"The urgent need to reduce our dependence on carbon and resource intensive industries will also create more winners than losers: 24 million new green jobs will offset an estimated 6 million job losses."[36]

- **Note:** Creation is up to 2013 and this is on a global scale.

Compost Facility Capacity in California

Need for New Facilities: "California has over 200 composting and anaerobic digestion (AD) facilities, but in-state management options for processing more organic materials are challenging...Total available capacity in the state is 1.9 million tons, well short of the composting capacity believed to be needed to support diversion rates mandated by SB 1383."[37] "Given these percentages, San Francisco discarded 191,781 tons of organic waste in 2014 and will have to reduce this amount to 95,891 tons in 2020 to contribute to California's SB 1383 goals.

[32] Mark Risse & Britt Faucette "Compost Utilization for Erosion Control", University of Georgia Extension, 2015
[33] Mark Risse & Britt Faucette "Compost Utilization for Erosion Control", University of Georgia Extension, 2015
[34] "More Jobs, Less Pollution: Growing the Recycling Economy in the U.S.", Tellus Institute,
[35] "About Zero Waste: Jobs & Economic Impact", Ecocycle solutions, 2018
[36] http://www.climateactionprogramme.org/news/global-green-economy-could-create-24-million-jobs-by-2030
[37] Craig Coker and Jeff Ziegenbein, "California Composting", BioCycle, March 2018.

Population growth will force San Francisco to develop 129,399 new tons of diversion capacity to meet this target in 2020"[38]

Community composting has the potential to process up to XX percent of this volume through local, decentralized networks where organic material is processed within the same community where it was generated.

Food Security

Supports Community: Local, decentralized composting is shown to be a cost-effective way to support any of the 10 Oakland community gardens.[39]

Importance of those gardens: "West and East Oakland are predominately African American neighborhoods that have long been considered food deserts (areas with limited access to healthy food). According to 2015 California Health Interview Survey data, in Alameda County (where West and East Oakland are located), 51% of low-income residents were food insecure, not always able to afford enough food. Over 1 in 5 adults (1 in 3 African Americans) in the county had obesity in 2015. Poverty and a lack of transportation can be barriers to accessing healthier food. When people cannot get to grocery stores that sell healthy foods, they may shop at nearby corner stores, which often carry foods high in fat, sugar, and sodium and fewer healthy options like fresh produce."[40]

Other Helpful Resources:

Testing and Assurance

USCC STA Program: The US Composting Council's Seal of Testing Assurance Program ('STA') is a compost testing, labeling and information disclosure program designed to give you the information you need to get the maximum benefit from the use of compost. The science behind the development of the STA Certified Compost Program and the various tests that are used is contained in 'Test Methods for the Examination of Composting & Compost' ('TMECC'). This publication includes a suite of physical, chemical and biological tests. These were selected to help both compost producer and purchaser to determine if the compost they are considering is suitable for the use that they are planning, and to help them compare various compost products using a testing program that can be performed by a group of independent, certified labs across the country and in Canada. List of STA-certified labs here.

---

[38] "Organic Waste Processing Capacity Study For the San Francisco Bay Area Region", SF Public Works, Dec 2016.
[39] "City of Oakland Community Gardening Program", Ecology Center, 2015.
[40] Trisha Chakrabarti, "Group Promotes Healthy Food Access in Oakland Food Desert", Centers for Disease Control and Prevention, 2016

The California Department of Food and Agriculture (CDFA) requires all fertilizer materials be inspected and approved before distribution in California. Their Fertilizing Materials Inspection Program (FMIP) is an industry funded program that ensures consumers receive fertilizing materials that meet the quality and quantity guaranteed on the product label. Investigators located throughout the state conduct routine sampling and inspections, respond to consumer complaints, and enforce the laws and regulations that govern the manufacturing and distribution of fertilizing materials in California. Environmental scientists and Research Analysts review product labels for misleading claims and compliance with the California Fertilizing Materials Law and Regulations. The Organic Input Material (OIM) Program registers fertilizing materials to be used in organic crop and food production. The program is mandated by the Legislature and supported by the industry. Products claiming to be appropriate for use in organic production are verified to comply with the California Fertilizing Materials Law and Regulations and USDA National Organic Program Standards. Effective January 2012, OIMs distributed in California shall be registered with the FMIP.

Labeling Claims

The AAPFCO (Association of American Plant Food Control Officials) is a council of state agricultural departments and regulates what can and cannot be said about the benefits of compost. The following list, from their *Rules and Regulations for Bulk Compost* has been accepted as valid labeling claims for the benefits of compost:

- Improves soil structure and porosity – creating a better plant root environment
- Increases moisture infiltration and permeability, and reduces bulk density of heavy soils, improving moisture infiltration rates and reducing erosion and runoff
- Improves the moisture holding capacity of light soils – reducing water loss and nutrient leaching, and improving moisture retention
- Improves the cation exchange capacity (CEC) of soils
- Supplies Organic Matter
- Aids the proliferation of soil microorganisms
- Supplies beneficial microorganisms to soils and growing media
- Encourages vigorous root growth
- Allows plants to more effectively utilize nutrients, while reducing nutrient loss by leaching
- Enables soils to retain nutrients longer
- Contains humus – assisting in soil aggregation, making nutrients available for plant uptake
- Buffers soil pH

Gathering Compost Data

Selected Plant and Soil Laboratories in Northern and Central California
Solvita DIY Compost Test Kit
Interpreting Your Compost Test Results

Sustainable Economies Law Center

[US EPA WARM software tool](#)
[Cornell Waste Management Institute Compost Fact Sheets](#)