



Materials Management



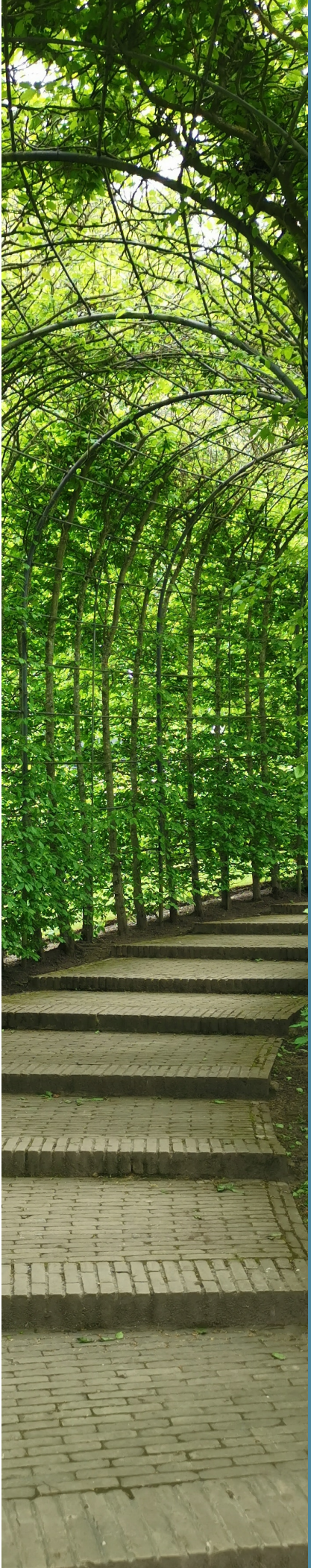
Garden Workbook:



**Climate &
Sustainability
Alliance**

Table of Contents

Introduction	1-2
Materials Goal 1	3
Materials Goal 2	4-6
Materials Goal 3	7-8





Introduction

The world's growing population has increased the demand for materials, thus increasing the decomposition of materials in landfills that contribute to climate change. According to the EPA, landfills are the second largest producer of methane emissions (a far more potent GHG than carbon dioxide) in the United States. Many businesses and institutions are now reliant on what is called the "spatial fix," partnering with suppliers in distant states or countries for cheaper materials. By recycling and reusing, public gardens can reduce the amount of new materials from distant sources that need to be mined, harvested, and processed, which significantly decreases energy use and environmental pollution.

The Materials Management Attribute focuses on how public gardens can protect ecosystems and respect cultural and community values through responsible use and disposal of materials. Best practices for reducing, reusing, and recycling materials can reduce harmful impacts to ecosystems and human health. Salvaging materials and waste reduction are essential components to the productive and sustainable use of materials across their entire life cycle. Sustainable materials management is also an opportunity for gardens to showcase their regional identity by thinking sustainably about all facets of public garden management from landscaping to construction to maintenance. It is also a way for public gardens to encourage conservation efforts by educating communities on how to reuse and recycle effectively.

This document lists the Goals and Key Performance Indicators (KPI) that have been identified as standards for gardens to better address this Attribute in their policy and practice. Please refer to this document as a workbook for what items to prioritize (as it makes sense for your garden needs).



United Nations Sustainable Development Goals

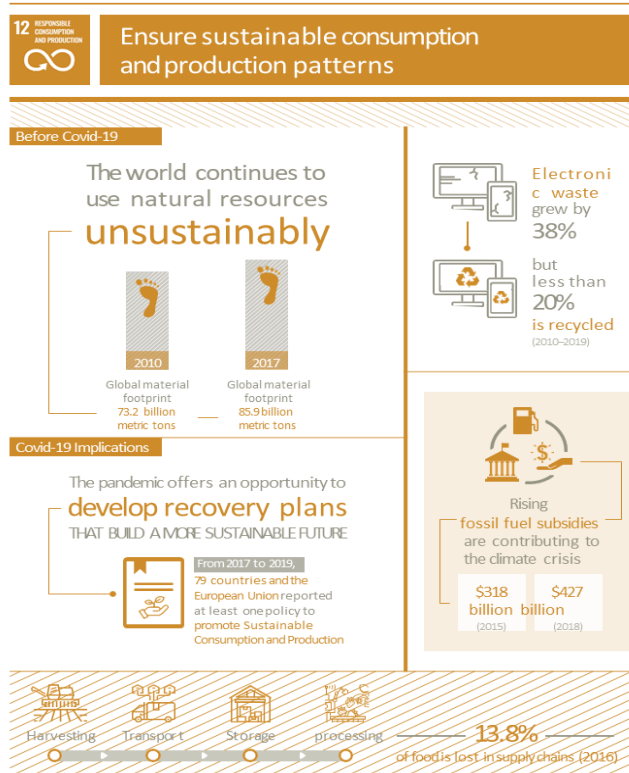
The Public Gardens Sustainability Index is intended to share examples of how gardens are contributing to specific SDG goals and to inspire gardens to advance their own garden programs to further the mission of their institution while connecting to local, national, and global sustainability efforts. This Index is a guide on how to “get started” implementing the Sustainable Development Goals (SDGs) from 2015. It aims to help gardens of all sizes and governance models understand the SDG Agenda, to start an inclusive dialogue on SDG implementation, and to prepare SDG-based local or national development strategies (or align existing plans and strategies with the goals).



Sustainable consumption and production is about doing more and better with less. It is also about decoupling economic growth from environmental degradation, increasing resource efficiency, and promoting sustainable lifestyles.

Sustainable consumption and production can also contribute substantially to poverty alleviation and the transition towards low-carbon and green economies.

Click on the picture to the right to learn more about this SDG and to find materials, infographics, and progress updates.



Access more data and information on the indicators at <https://unstats.un.org/sdgs/report/2020/>



Materials Management 1: Implement a plan/policy to purchase or select materials that are extracted using sustainable practices and contain non-hazardous chemicals and recycled content.

Key Performance Indicator (KPI)

- a. Garden has guidelines, manuals, procedures for sustainable materials management.
- b. Garden develops and follows best practices for purchasing products and materials.

Outcomes

- a) 1) Garden has rigorous staff onboarding process and training for those that are maintaining grounds, buildings, and infrastructure, 2) minimizes and tracks use of pesticides, insecticides, and other chemicals used for plant health and operational norms for grounds, buildings, and infrastructure, 3) restricts chemical use and construction/renovation activities in or near specific garden areas or facilities (Ex. rare plant species, historic buildings), 4) reuses plant and building materials for construction and design activities, 5) minimizes use of tools and equipment for maintenance that have adverse environmental impacts (gas-powered tools), limiting and monitoring use of petroleum. 6) regularly schedules maintenance of existing structures, hardscapes, benches to extend lifecycle.
- b) 1) Garden phases out or stops purchasing non-certified office supplies (Ex. paper without a FSC logo), Styrofoam, plastic, or other harmful sources or products from non-transparent companies, 2) purchases materials from local/regional sources when possible (Ex. garden construction materials are sourced regionally or on site reducing transportation emissions/distance travelled for material goods), makes purchasing decisions based on what can be recycled locally, and/or partners with local manufacturers for products produced with zero waste, 3) creates a sustainable purchasing policy that includes purchasing products with recycled content and local and sustainable soil amendments and plant materials (Ex. staff use known contractors for sustainable best practices), 4) visitor services (cafes, restaurants, gift shops) purchase fair trade products, food supply materials, and packaging that can be recycled or reused and does not end up in the waste bin (no plastic, no straws, etc.).

Suggested Strategies



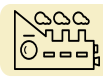
If your garden does not have one, develop a maintenance plan. Identify material and product suppliers who can help achieve goals created in your operations/maintenance plan that focus on sustainable materials management. Build into this plan a process for reviewing supply chains and the list of regularly used external sources for supplies and contract work.



Make sure your plant selections coincide with your commitment to use sustainable materials. Plants selected that require frequent use of pesticides may not align with your mission and the values of your community. Develop plant collection management procedures that prevent the introduction and accessioning of disease-prone plants that require chemical maintenance. Identify and reuse plants that are disease-free and show no signs of deterioration. Some native plant societies will rescue plants prior to construction and can also be a resource for conserving plants off site until they are ready to be replanted.

The 2016 Strategic Sustainability Performance Plan is an institution-wide initiative for all Smithsonian Institutions, including Smithsonian Gardens, to report sustainability successes and challenges from 2015. It identifies the sustainability strategies to be pursued in the year ahead, how progress will be measured, and the milestones to reach. It is a map the Smithsonian can follow towards a sustainable future. Within the Office of Facilities, Engineering and Operations, Smithsonian Gardens is also engaged in a department-wide strategic plan. The second goal, care for distinctive buildings and grounds, has the objective of promoting environmentally sustainable practices.





Energy Goal 2: Recycle and reuse materials for construction, renovation, restoration, maintenance, and educational purposes.

Key Performance Indicator (KPI)

- a. Garden follows sustainable best practices for maintaining, designing, and constructing garden areas/hardscapes.
- b. Garden educates the public on sustainable garden operations and completed construction projects through signage, messaging, or programming.

Outcomes

- a. 1) Garden uses recycled/used/salvaged materials or products with recycled content for maintenance, renovation, or construction projects, 2) uses certified wood products from non-threatened species, 3) uses paints, sealants, coatings with reduced VOC emissions associated with air pollution, 4) uses peat-free soil, compost, and other sustainable soil amendments, 5) areas have pathways that are built with recycled/salvaged materials and/or are natural where possible (non-powered mowed grass pathways), 6) practices Integrated Pest Management and uses safe and certified chemical products that are vetted, 7) Garden utilizes natural infrastructure to increase lifecycle as opposed to grey infrastructure.
- b. 1) Garden has sustainable food supply chain partnering with local farms, locally sourced food companies, or has edible plants grown on site, 2) sources local reused/salvaged materials for buildings and infrastructure including information on new garden areas or newly constructed buildings, pathways, facilities that utilized local materials (highlighting awards or certifications), 3) has different waste streams that include educational components on composting, recycling, and waste management; regularly ensuring the labeling of each stream/disposal bin and providing information on what is a waste, recyclable, or compost item (images), 4) sources local plant material and/or soil amendments, 5) has information on the handling of hazardous chemicals and wastes.

Suggested Strategies



Establish zones where no gas-powered equipment or chemical spraying are allowed, especially zones that are adjacent or nearby valuable ecological public lands outside garden walls and conservation areas. Use greener equipment in display gardens areas during visitor hours (battery operated/non-motorized tools).



Consider using hazardous materials and equipment only when occupants/visitors are expected to be at their lowest--to reduce exposure to air and noise pollution.



Identify regional sources for plants, soils, and other landscape materials, including those that are salvaged, reused, or contain recycled content.



Pre-Design Phase: Before building new structures with new materials, consider what can be reused on site. For example: Use stumps, dead trees, and other debris and convert them into signs, posts, markers, wayfinding, or other uses that can serve a purpose.

Materials Management Goal 2: Recycle and reuse materials for construction, renovation, restoration, maintenance, and educational purposes.

Suggested Strategies Continued



Make publicly available a statement that includes all or some of the following:

- A commitment to reducing environmental harms from extraction and any manufacturing processes through purchasing and using sustainably certified products.
- Evidence of diverting waste from landfills and a commitment to composting and recycling programs.
- Evidence of using recycled materials/content and reusing materials and sources that are local.
- Report the total weight or volume of materials that are used to produce the garden's primary products and services quarterly by:
 - Non-renewable materials used
 - Renewable materials used



Utilize product certification systems (standards and ecolabels) that incentivize transparency and safer chemistry. For example, track whether all new wood products are certified by the Forest Stewardship Council (FSC) or local equivalent for purchase orders outside the United States and purchase from suppliers who use non-threatened tree species.



Determine maintenance costs for all plant collections and compare which are highest and lowest. Establish a plan for reducing costs for specific plant collections through more sustainable maintenance practices (e.g., keep fuel logs for all mowers and vehicles).



Implement a system for tracking material type and where it's coming from. This will help your garden calculate the percentage of materials purchased that are local/regional and the distance travelled. See section 5 of SITES v2 Credit 5.6: Use Regional Material.



Recycling, salvaging, reusing, and tracking materials can become part of a garden's story. Practice what you preach and make that visibly apparent to your visitors when possible, whether that's signs, classes, or tours.

Educate and communicate to your stakeholders what you plan to do to reduce waste and what you have done that shows a commitment to sustainable materials management. Find ways to show this through pictures, blogs, or stories on your website or social media pages. Announce important sustainability milestones to the public through press releases, newsletters, and new web content (e.g., composting program, conservation partnerships).

Materials Management Goal 2: Recycle and reuse materials for construction, renovation, restoration, maintenance, and educational purposes.

Suggested Strategies Continued



Develop program(s) to educate the public on the benefits of composting, reusing materials, and recycling waste. Staff members are educated about composting methods. Compost some or all of the following:

- Food waste from on-site food sales
- Food waste generated by staff
- Waste generated from garden events
- Garden waste from horticulture activities



During construction or design of new garden areas, monitor to ensure that the specified local materials, plants, and soils are installed or used.

Confirm that plant re-wholesalers and retailers obtain their products regionally.

Recycle and reduce the use of paper, glass, plastic, metal, batteries, fluorescent bulbs, paint, computers, scrap metal, waste oil in both public and staff areas.

The Cornell Botanic Gardens' Brian C. Nevin Welcome Center was designed by Canadian architect, Baird Sampson Neuert. The Nevin Welcome Center is the culmination of many years of planning for improved visitor services. The completion of this building was the "grand finale" of improvements to infrastructure and visitor services at Cornell Botanic Gardens over the last decade.

LEED Gold (Leadership in Environmental Design) certified by the U.S. Green Building Council, the Welcome Center advances the identity of Cornell Botanic Gardens as a "green garden" and promotes its leadership role in environmental stewardship initiatives.

MATERIALS

- REGIONAL PRODUCTS: Products like New York state bluestone and others within a 500-mile radius were used.
- DURABLE WOOD: The hardwood façade and louvers, made of Ipe wood, are durable and sustainably harvested.
- DOUBLE GLASS: The windows used throughout the building are made of double glass panes that reduce heat loss.
- RECYCLED MATERIALS: Thirty percent of the building's materials are made from recycled content.



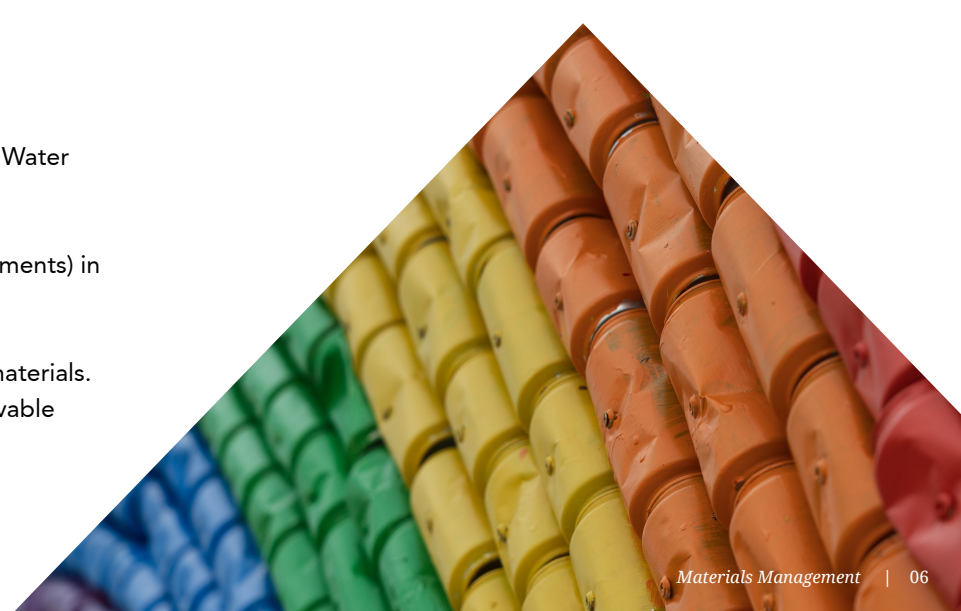
In concert with the construction of the Nevin Welcome Center, Cornell also made significant improvements to the surrounding botanical garden. These improvements started with a new parking area and tour bus drop off zone. The parking area and arrival plaza were partially constructed of Cornell Structural Soil, a special substrate design that allows better root penetration to encourage vigorous tree growth. The arrival plaza at the parking area is shaded by trees that will become part of their Urban Tree Collection.



Monitor pipes, hoses, and irrigation components (See Water Quality & Consumption Attribute).

Test new plant maintenance practices (e.g. soil amendments) in one section/zone of the garden before standardizing.

Evaluate how you are moving tools, equipment, and materials. Determine if there is a way to reduce the use of all drivable resources (mowers, tractors, vehicles).





Materials Management Goal 3: Reduce toxic and hazardous waste from all public garden management activities and divert, reduce, or eliminate waste to landfills.

Key Performance Indicator (KPI)

a. Garden develops and follows best practices for waste management.

Outcomes

a. 1) Garden waste streams are monitored and managed by staff or volunteers, tracking how often waste and recycling is picked up and disposed, 2) has current or future initiatives aimed at reducing hazardous waste, 3) has a recycling and/or compost program that extends to plant waste and food waste, 4) tracks where waste ends up off-site (diverting waste from landfills) identifying the closest recycling facilities, landfills, and transfer stations in community/region, 5) collaborates with local organizations, schools (K-12, colleges and universities), or government agencies to support projects and initiatives addressing sustainable waste management, 6) completes some form of a waste audit (there are a variety of waste audits depending on garden needs/capacity such as diversion rate, capture rate, or contamination rate of waste streams).

Suggested Strategies

Set solid waste reduction targets and communicate them to garden staff and volunteers. Review the following waste audits your garden might employ:

Process Audit:

Disposal-Collection-Removal: Ensure your garden has bins in several locations so that a guest can dispose of recyclables and waste and there are people responsible for regularly collecting them. Be sure all waste does not end up in the same waste stream (a waste dumpster). Your garden should know where waste is ending up (final destination such as a landfill).

Service Provider Audit:

Most waste removal organizations such as Waste Management will provide annual "Waste Reports" which will include your organizations weighted recyclable materials, waste materials, and potentially compost. While this provides useful estimates of your garden's performance, they are typically based on average pick up weights and are not precise measurements. The weights are typically based on dumpster weight pick-ups and do not account for contamination rates (e.g., waste that is in the recycling dumpster and should not be there).

Visual Audit:

Check what ends up in disposal bins or dumpsters. Does there appear to be items in each stream of waste diversion that should not be there? Is there a lot of a particular item you may be able to phase out or find a more sustainable variation? Items being misplaced in the wrong bins frequently could mean you need to improve the labeling of each stream/disposal bin or provide additional educational resources.

Detailed Audit:

This requires the most resources in staff hours (or a consultant service). Empty all collected waste to sort out correctly placed items and misplaced items (by weight). This process can be used to calculate diversion rate, capture rate, and contamination rate.

 **Materials Management Goal 3: Reduce toxic and hazardous waste from all public garden management activities and divert, reduce, or eliminate waste to landfills.**

Suggested Strategies Continued

Eliminate and reduce toxic and hazardous waste by:

- Utilizing an IPM (Integrated Pest Management) certified practitioner or an IPM-certified nursery
- Practicing EBPM (Ecological Based Pest Management)
- Collecting used batteries monthly from staff and volunteers for proper recycling
- Managing diseased plants with alternatives to chemicals
- Cleaning products chosen from SC Johnson's Greenlist or equivalent
- Planting native species to promote beneficial insects
- Selecting plants that thrive in the garden-specific climate conditions
- Fertilizing with compost made on site
- Recording/tracking fertilizer applications and methods
- Recording pest control management applications
- Recording chemical use (fungicides, herbicides)
- Recording use of toxic cleaning products

Develop chemical inventories covering all chemicals used (pesticides, insecticides, fertilizer, cleaning products, etc.). In cases where the compilation of a complete chemical inventory is not feasible, the inventory requirements should cover chemicals and their life cycle stages thought to present the greatest hazards to employees, visitors, plant collections, and wildlife.

Providing staff training for the appropriate departments on chemical handling utilizing some or all of the following:

- Veriflora Certification Standards
- OSHA/Material Data Safety Sheets
- WHMIS (Canada) Standards

Queens Botanical Garden is partnered with the New York City Department of Sanitation for the NYC Compost Project. QBG serves as one of several compost sites for this project and uses the compost for food production and education on their urban farm.

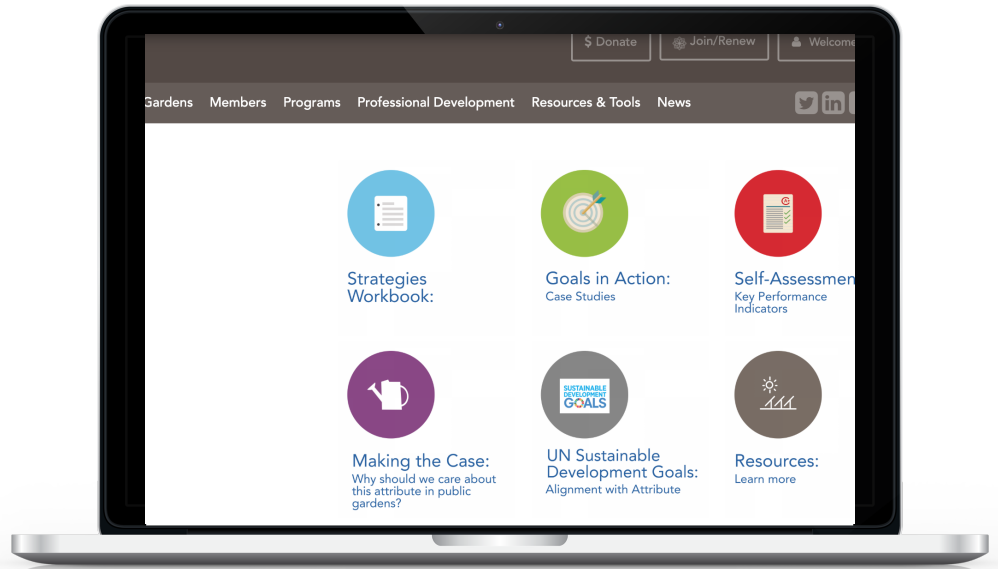
Queens Botanical Garden has served as one of the five composting sites for New York City's Compost Project since 1993. The Compost Project is part of New York City's Department of Sanitation (DSNY) and collects food scraps from each of the five city boroughs to be composted at participating sites. In 2013, QBG became the first site to establish an urban farm as part of the project. With education as a primary focus, the farm uses the compost to give garden visitors lessons in environmental sustainability and showcase connections between food waste and growing food. Production is still a key part of the farm, donating thousands of pounds of produce to local food banks. To accomplish all this, the QBG Farm brings on dozens of volunteers and a handful of interns to maintain the farm, further expanding their educational impact. The QBG Farm demonstrates how a unique partnership between a city department and botanic garden can reduce food waste (a major contributor of greenhouse gases) and recycle nutrients back into food while educating their local community and visitor base.





FOR MORE INFORMATION

Visit the sustainability index attribute pages for more case studies, resources, and a self-assessment!



<https://www.publicgardens.org/sustainability-index/attributes/materials-management>