

Educational Permaculture Garden: Manual for Soil Health in Urban Areas

Sofia DiFrancesco, Leslie Hacker, Jake Hackney, Sydney McMillan, Logan Pastura, Justin Sikkema, Rachel Warm-Deutsch

Abstract

The importance of soil health receives little to no attention in urban communities, especially in poor neighborhoods lacking access to fresh nutritious food. Yet, high quality soil yields high-quality foods, and improving degraded or contaminated soils in vacant lots or existing community gardens can transform food deserts into food oases. To this purpose, we created a manual for an educational permaculture garden suitable for community-shared or individually-owned spaces. The manual achieves the following aims: (1) provides the foundational knowledge, generally lacking in urban communities, on soil health; (2) features gardening techniques grounded in permaculture principles for restoration and sustainable management of soil health; (3) develops a framework for community engagement, education, outreach, and self-reliance; and (4) enhances ecological awareness in urban landscapes. Interviews with local professionals and reviews of the literature informed the manual's guidelines for garden design and educational activities. An existing community garden in Lower Price Hill served as the case study due to its lead-contaminated soils and underutilized space for community benefit. Using the manual, we created an example of a garden design and suggested educational approaches specific to the site. The educational permaculture garden manual lays the groundwork for best practices for soil health in urban areas and community education and builds in the next steps for engagement, expansion, and maintenance.

Introduction

The global trend of urbanization and industrialization has led to a depletion of healthy urban soils, which in turn has had a negative effect on human populations and urban ecologies (Amundson et al., 2015). Soil health has been both directly and indirectly linked to surrounding human health (Li et al., 2018), and therefore producing, remediating, and protecting healthy soil will be necessary in developing (or redeveloping) sustainable urban areas.

In addition to producing food, urban gardens and green spaces also have the potential to reduce soil erosion, groundwater contamination, and air pollution as well as to increase urban biodiversity by attracting and housing healthy soil biota, insects, reptiles, birds and other animals (Brown et al., 2000). Studies have also suggested that the presence of urban garden projects reduce stress levels in nearby individuals and can be linked to decreased crime rates (Brown et al., 2000).

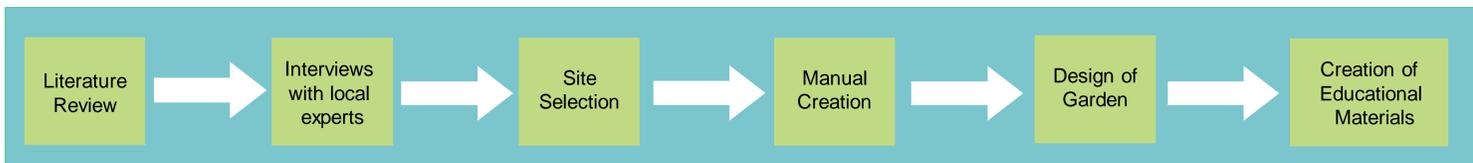
Society's adoption of agroecological methods and principles, such as permaculture, have the potential to substantially reduce energy, pesticide use, and water consumption, while also restoring soil health, sequestering carbon, increasing biodiversity and providing food.

Permaculture is an agroecological design philosophy that seeks create and manage landscapes in a way that replicates natural ecosystems. It is founded on three ethical points: Care of Earth, Care of People, and Share of Surplus or Fair Share. Permaculture includes a variety of holistic techniques that seek to grow food in ecologically and socially responsible ways.

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1. Observe & interact
 2. Catch & store energy
 3. Obtain a yield
 4. Apply self-regulation & accept feedback
 5. Use & value renewable resources & services
 6. Produce no waste
 7. Design from patterns to details
 8. Integrate rather than segregate
 9. Use small & slow solutions
 10. Use & value diversity
 11. Use edges & value the marginal
 12. Creatively use & respond to change

The 12 Principles of Permaculture
(Photo Credit: Nuturegreen.com)

Methods



Results

- Manual to create a community permaculture garden
- Educational signage
- Garden design using techniques described in the manual



SCAN ME

Use QR code or link below to access PDF of Manual

<https://documentcloud.adobe.com/link/review?uri=urn:aaid:scds:US:c49259cd-de0a-4cf8-8838-f4074cc8b2a2>



Garden plot used as model for design: 653 Neave Street, Cincinnati, OH 45204



Final permaculture garden design

Apple (2x)	Cherry (2x)	Pawpaw (2x)
Daffodils Repels pests (deer) Attracts pollinators Grass suppressant	Yarrow Attracts pollinators Nitrogen Fixator Dynamic accumulator	White clover Nitrogen fixer Grass suppressant
Garlic Chives Aromatic pest confuser Anti-fungal	Oregano Aromatic pest confuser Anti-fungal	Roman chamomile Aromatic pest confuser Edible herb
Comfrey Living mulch Dynamic accumulator Nitrogen fixer	Borage Attracts pollinators Living mulch	Lamb's Ear Dynamic accumulator Nitrogen fixer Attracts pollinators
Cleome Attracts pollinators	Echinacea Attracts pollinators	Bee Balm Attracts pollinators

Example plant guilds used in garden design

Discussion

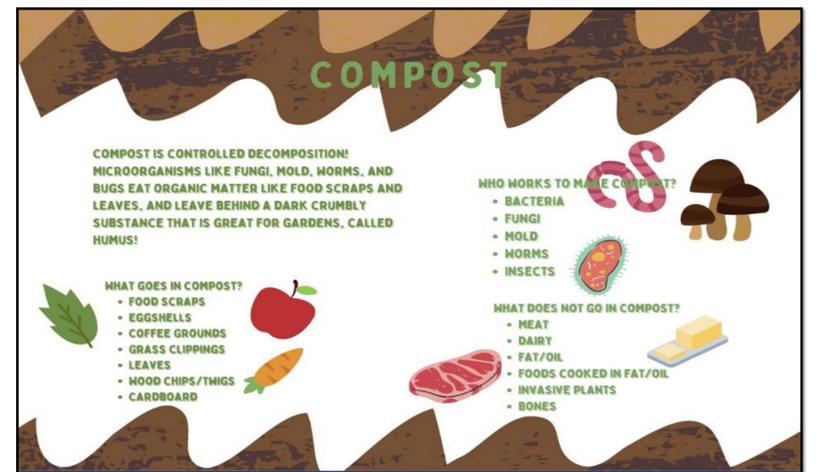
- Soil health is linked to human health
- Lessening the gap between humans and nature
- Creating food security in urban areas
- Educating communities on sustainable gardening
- Biodiversity integration

Conclusion

By creating this manual and educational materials we hope to educate the public about soil health, permaculture, and the natural world.

Future work

- Implementation of physical garden using manual
- Increase community involvement
- Expansion of educational material
- Survey design efficacy in community
- Adaptation of design; expand phase II and III of manual
- Potential use of garden design and manual by Community Matters at the Sassafras Garden



Example educational sign on compost



Example educational sign on pollination

Acknowledgements

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