

Implementing Sustainable Food Forests

A Transfer Workshop for Stakeholders in Arizona

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January 2020

Sustainable Food Economy Lab

ASU School of **Sustainability**
Arizona State University

Sustainable Food Economy Lab

The *Sustainable Food Economy Lab* supports and advances sustainable food economies and enterprises through solution-oriented research in collaboration with stakeholders and researchers. We believe in the value of food that is healthy and delicious, fairly priced and broadly accessible, while produced in environmentally friendly ways along the entire life cycle, with high standards of animal welfare. We also believe in the value of food that provides decent, stable jobs, while supporting local communities and cultures.

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Citation

Albrecht, S., & Wiek, A. (2020). *Implementing Sustainable Food Forests – A Transfer Workshop for Stakeholders in Arizona*. Sustainable Food Economy Lab, School of Sustainability, Arizona State University, Tempe, Arizona.

Photos

Photos by courtesy of Kelly Baur.

Acknowledgements

This work was partially funded by the Robert Bosch Stiftung, Program “Research for Sustainability”, Project “Processes of Sustainability Transformation” (12.5.F082.0021.0), carried out jointly by researchers from Leuphana University of Lüneburg, Germany and Arizona State University, USA.

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Table of Content

Preface.....	5
Sustainability Problems and Food Forests as Solution	6
Basics of Food Forests	7
Examples of Food Forests by Main Function	8
Food Forests in Arizona	10
The Food Forest Project at <i>Spaces of Opportunity</i>	11
Design of the Food Forest at <i>Spaces of Opportunity</i>	13
Transfer Workshop Basics	14
Challenges and Coping Tactics for New Food Forest Projects	16
Potential Actions of Support	19
<i>Action Options for Researchers and Educators.....</i>	<i>19</i>
<i>Action Options for Food Outlets and Consumers.....</i>	<i>19</i>
<i>Action Options for Policy Makers and Government Administrators.....</i>	<i>20</i>
Outlook.....	21
References.....	22

Preface

Food forests address a number of climate change and sustainability challenges. They mimic natural forest ecosystems with a majority of plants being edible such as fruits, nuts, vegetables, mushrooms, and medicinal plants. In the U.S., more than 90 food forests and forest gardens exist.

In Arizona, there is a growing community of practitioners and scholars interested in creating new food forests by using available evidence from existing ones (U.S. and worldwide). While there is strong interest, knowledge, skills, and resources are limited, and thus a support network is needed.

Over the past two years, researchers in the *Sustainable Food Economy Lab* at ASU's School of Sustainability have visited and conducted a broad comparative study on food forests in North America, South America, and Europe (Albrecht & Wiek, 2020a). In addition, we have visited several food forests (and forest gardens) in Arizona and engaged with various partnering organizations to create a food forest at [Spaces of Opportunity](#) (urban farm incubator) in South Phoenix (Albrecht & Wiek, 2020b). An in-depth comparative study is currently also being conducted on a food forest project in Lüneburg, Germany (Albrecht & Wiek, 2020c). From our research projects and practical collaborations, we got the impression that the time is ripe to bring the community of food forest stakeholders together.

So, we organized a stakeholder workshop in December 2019 with the objectives: to familiarize participants with food forests in Arizona (case studies); to discuss opportunities, challenges, and coping strategies when implementing food forests in Arizona; and to provide networking opportunities for stakeholders from different parts of the state.

The workshop brought together 16 participants from universities, government agencies, and non-profit organizations across Arizona, including practitioners, scholars, experts, entrepreneurs, and newcomers. The workshop activities offered a variety of options for exchange and joint learning. The insights are compiled in this report.

On request of several participants, we also provide some background information on food forests, the challenges they address, and the benefits they are generating. We are currently finishing a series of relevant publications that we will make accessible to the participants, too.

It seems that the community of food forest stakeholders is off to a good start with respect to exchanging insights and experiences, informing about upcoming opportunities, coordinating activities, and partnering on new food forest initiatives. This should provide motivation for further growing a state-wide food forest movement over the coming years and decades.

Sustainability Problems and Food Forests as Solution

The dominant industrial food system in North America and Europe is characterized by unsustainable development, contributing to land degradation, water contamination, climate change, negative health impacts, as well as an unfair distribution of economic benefits. The transformation of this food system towards sustainability requires widespread innovations. Recent research has accumulated valuable insights on sustainable solutions in all domains of the food system (Weber et al., 2019).

One of them are food forests. Food forests exist around the world and are one of the oldest ways of food production, mimicking natural ecosystems by using multiple layers including trees, bushes and groundcover (Ford & Nigh, 2009). They offer a promising solution to produce healthy food, including fruits, vegetables, herbs – in environmentally sound, economically viable, and socio-cultural acceptable ways.

In addition, food forests provide co-benefits such as shading structures and cooling effects (mitigating urban heat islands), among others. Sufficient green infrastructure effectively reduces and buffers urban heat and air pollution. High vegetation density and strategic placement of green spaces can further increase cooling effects through accumulation, in particular in urban areas. In addition, edible and community-engaging spaces may decrease traffic and mitigate contributing factors to heat and air pollution. Food forests adopt the biodiverse, multi-strata design of nature, and have been demonstrated as effective solutions for mitigating urban heat and air pollution (Salbitano et al., 2015). Furthermore, food forests benefit the community by providing visually pleasant environments.

Large food forests (>1 acre) exist in arid and semi-arid regions around the world, while in Arizona mostly smaller forest gardens and edible landscapes have been pioneered. While the benefits are undeniable, in particular in urban areas, they have some fallacies (Van Dooren et al., 2018). For example, food forests, similar to community gardens, are often challenged by the fact that purely volunteering-based initiatives often fail within a few years, in particular, in regions where volunteering activities are not common or not affordable. Alternative concepts of developing food forests with a stronger entrepreneurial component that provide real livelihood opportunities might be a promising way to cope with this challenge.

This insight has inspired a team of practitioners and ASU researchers to develop the first urban food forest in Phoenix. A designated 1-acre lot has been secured at [Spaces of Opportunity](#), a 19-acre incubator farm in South Phoenix. With support of food forest and permaculture experts, a site design has been developed with input from the community and various organizations active in South Phoenix.

South Phoenix is historically challenged by environmental degradation, economic marginalization, and racial exclusion. Housing regulations pushed communities of color south of the Salt River on contaminated industrial sites. Minority communities continue to live here, and, despite efforts by non-profit organizations and the city administration, still lack livelihood opportunities and educational attainment. Although historically a place of agricultural production, South Phoenix is an area with little to no access to healthy and affordable food in walkable distance. Sparse shade and green space combined with continuous development of building and infrastructures increases the urban heat island effect. There is a need for multi-functional solutions that address these inter-linked challenges. A food forest, as envisioned, could be one of them.

Basics of Food Forests

Food forests are coherent, multi-strata spaces with a majority of edible perennial plants, a tree canopy cover of more than 10% and a minimum size of 1 acre (~0.5 ha). Smaller spaces of multi-strata design can be distinguished as forest gardens. Food forests are intended to function as self-regulating ecosystems with forest-like ecosystem services. Depending on its surroundings (e.g., no other green infrastructure), food forests might require more than 1 acre to provide forest-like ecosystem functions. Figure 1 illustrates the basic layered structure of a food forest.

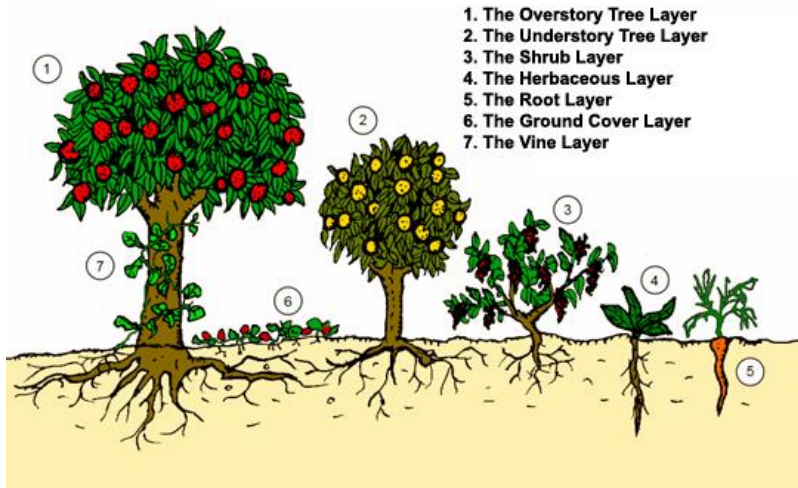


Figure 1: Seven layers of a food forest (Source: Graham Burnett)

Food forests are multi-functional spaces (Fig. 2). Food production and education often provide for livelihood opportunities and revenue. In addition, food forests can yield environmental co-benefits, including high biodiversity, cool microclimate (shade), and carbon sequestration, to name a few. They also often offer space for recreation and community development. Depending on its main and side functions, design and management of food forests vary.

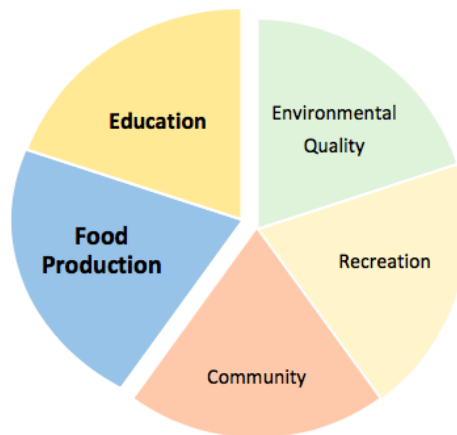


Figure 2: Functions of food forests

Examples of Food Forests by Main Function

As indicated above, food forests have several functions. Yet, in reality, most food forests were created and are managed with one or few main functions in mind such as food production, education, or community development (Albrecht & Wiek, 2020a, Bukowski & Munsell, 2018, Remiarz, 2017). In the following, we provide a few prominent examples for these main functions based on our own empirical studies (visits and interviews) and literature (e.g., McLain et al., 2012). (The photos are from indicated websites.)

1. Food Production

Name	<i>Den Food Bosch</i>
Location	Den Bosch, Netherlands
Created	2017
Size	2,5 acres
Management	Two food forest farmers with background in agriculture and forestry (degrees)
Organizational form	Foundation
Ownership	Land is owned by local water authority
Activities	Weekly on-site food sales and tours; Monitoring with local watershed management group and university (yield, biodiversity, water holding capacity)
More information	https://denfoodbosch.org/en/



2. Education

Name	<i>Mienbacher Waldgarten</i> [= "Food Forest"]
Location	Mienbach, Germany
Created	2010
Size	3,7 acres
Management	One farmer-educator
Organizational form	Privately owned
Activities	Tours, workshops and seminars (main income sources) on permaculture, self-sufficiency and food processing, on-site and at several schools (children and adults)
More information	http://mienbacher-waldgarten.de



3. Community Development

Name	<i>Beacon Food Forest</i>
Location	Seattle, USA
Created	2009/10
Size	8,6 acres
Management	30 core members in steering committee; teams for site development team, nutrition team, etc.; volunteers (2016: 14,500 volunteer hours, more than 80 regular volunteers)
Organizational form	Non-profit organization; since 2019 with two part-time staff members for fundraising, coordination, and community outreach
Activities	Monthly work parties, community events, private patches, collaboration with diverse NGOs
More information	https://beaconfoodforest.org



4. Other Functions and Examples

For additional and more in-depth case studies on the main functions of food forests, please consult Albrecht & Wiek (2020a) or other relevant literature (e.g., Riolo, 2019).

Food Forests in Arizona

A few food forests already exist in Arizona, for example, *Bean Tree Farm*, a 20-acre saguaro and ironwood forest farm with learning center, as well as *Wisdom Culture Life*, a 34-acre food forest with an off-grid start-up farm. These food forests are larger than 1 acre, which allows for developing critical ecosystem functions of a forest. That differentiates food forests from forest gardens and edible landscapes.

Several forest gardens and edible landscapes have been created especially in cities in Arizona, for example, *Epic Yard Farm* and *Longevity Garden* in Tempe, and a forest garden in the Dunbar/Spring Neighborhood in Tucson. In Phoenix, we have noticed a trend towards forest gardens that often include water-intense tropical plants. Please visit for an overview [this website](#) of Local First Arizona.

Due to the semi-arid climate of Arizona, a *sustainable* food forest would mainly consist of native and desert-adapted plants, and potentially (heirloom) Mediterranean plants to increase food productivity. Rainwater harvesting and drip irrigation are sustainable practices to conserve and efficiently use precious water resources. Figure 3 illustrates exemplary layers and plants of a food forest that would mostly consists of native and desert-adapted plants in Arizona.

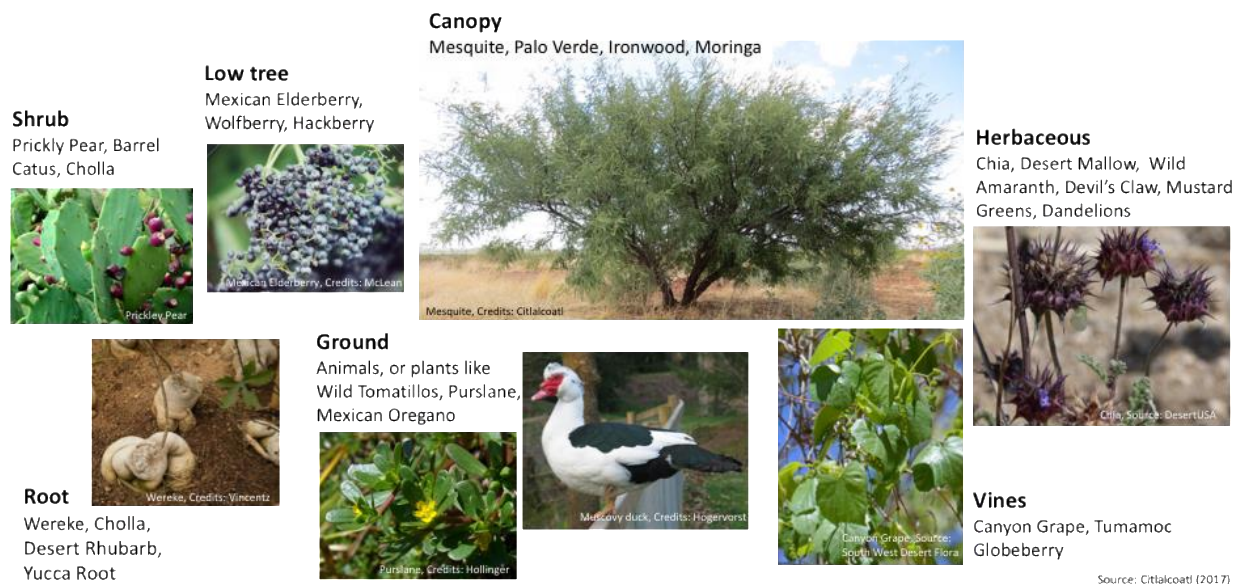


Figure 3: Exemplary layers of a food forest with native and desert-adapted plants in Arizona

There are several other food forests under development in Arizona. They are designed with sustainability in mind and they differ with respect to the main functions they ought to fulfill – ranging from food production through cooling effects to education.

While all of these efforts are applaudable, it would be unwise not to take full advantage of the available evidence from existing food forest project across the states, the country, and worldwide. In particular, being aware of the main stages of the implementation process, its opportunities and challenges, as well as how to cope with the latter, might significantly increase the chances of success.

The Food Forest Project at *Spaces of Opportunity*

[Spaces of Opportunity](#) is a coalition of non-profit organizations located in South Phoenix including the Orchard Community Learning Center, TigerMountain Foundation, Unlimited Potential, and Desert Botanical Garden, working in close collaboration with the Roosevelt School District, the city administration, and Arizona State University to address local sustainability and food challenges through urban agriculture and food entrepreneurship. The vision of *Spaces of Opportunity* is to provide families in South Phoenix with economic and livelihood opportunities as well as affordable access to healthy food, including recognition of cultural traditions and native plants. To this end, an incubator farm, community gardens, a food forest, and a farmer's market are being created on a 19-acre site in South Phoenix (at 1200 W. Vineyard Rd.). *Spaces of Opportunity* also collaborates with the nearby VH Lassen Elementary School, including the jointly operated Healthy Roots Café, located on the school premises.

The food forest is a key component of *Spaces of Opportunity* to create healthy food and provide livelihood opportunities to low-income community members while mitigating urban heat island effects and providing hands-on training on plants, urban agriculture, and food processing to children and adults. Food forest operations generate revenue and lead to the provision of livelihood opportunities, which enhances the chances of long-term maintenance and success.

Benefits of the food forest include:

1. Produces food that is healthy, organic, and accessible.
2. Creates long-term livelihood opportunities for community entrepreneurs.
3. Improves quality of life through cooler micro-climate, improved water and air quality (including storm water management and carbon storage), and biodiversity.
4. Educates people on native foods, healthy diets, healthy soil, diverse food production & processing, food entrepreneurship, and the collaborative economy.
5. Engages the community through participation in food production, e.g., through voluntary reward schemes, events, and educational programs.

In fall 2018, a team with representatives from the *Spaces of Opportunity* organizations and ASU formed to develop the food forest concept. In spring 2019, the team created a vision and action plan for implementing the food forest at *Spaces of Opportunity*. As part of this process, a site was selected and a basic design for the food forest created (see next section).

The operation of the forest includes a number of key actors. Two food forest entrepreneurs will be responsible for maintaining the forest, harvesting, processing, and marketing its produce, giving tours, and providing training – all activities from which they earn income. The food forest entrepreneurs will also be involved in developing partnership with local businesses, for value-added forest products. Managers and staff from the *Spaces of Opportunity* partner organizations will provide management and business development support, including consultancy services to other local food forest startups. Staff from partners, the VH Lassen Elementary School and other schools, will lead educational activities for children

and adults. The forest will also be site of ongoing research in collaboration with Arizona State University into the ecological, environmental, economic, and social impacts and best practices of the forest.

In the context of this workshop, we would like to shed more light on the specifics of the implementation process. While nearing its completion, it is still ongoing and has passed through a variety of phases (Fig. 4) that might be worthwhile considering when starting food forest projects across the state:

1. *Idea formation* with defining objectives and building the initial project team (securing some funds to support team in planning stage).
2. *Compiling an inventory of food forests* that go beyond self-sufficiency, scanning 200 food forests and forest gardens, and conducting interviews at 20 sites.
3. *Networking & site selection* informed by a set of criteria, GIS maps, and a database of potential municipal sites in Tempe and Phoenix. Made contact to leadership, discussed the project idea, and selected *Spaces of Opportunity* as the pilot site.
4. *Familiarizing* the newly formed team with food forest examples from the inventory, their management and business practices. Visiting local forest gardens to experience their design and management.
5. *Creating vision & building strategy*, producing an organizational chart of the food forest team, a vision narrative, a draft site plan, and an action plan with eight action domains, incl. financing, business development, land trust development, physical implementation, products development, and education.
6. *Implementing the strategy* with first actions focused on fundraising (~\$50,000 plus) for physical implementation and entrepreneurial scholarships. In addition, a detailed site plan was developed (see next page).
7. *Exploring transfer & scaling*: workshop with stakeholders (documented here; see below).

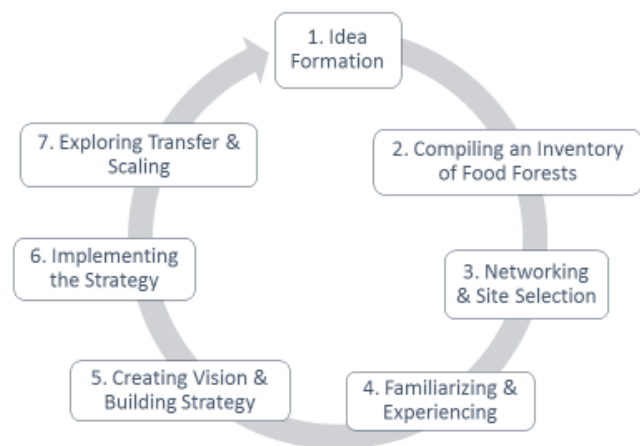


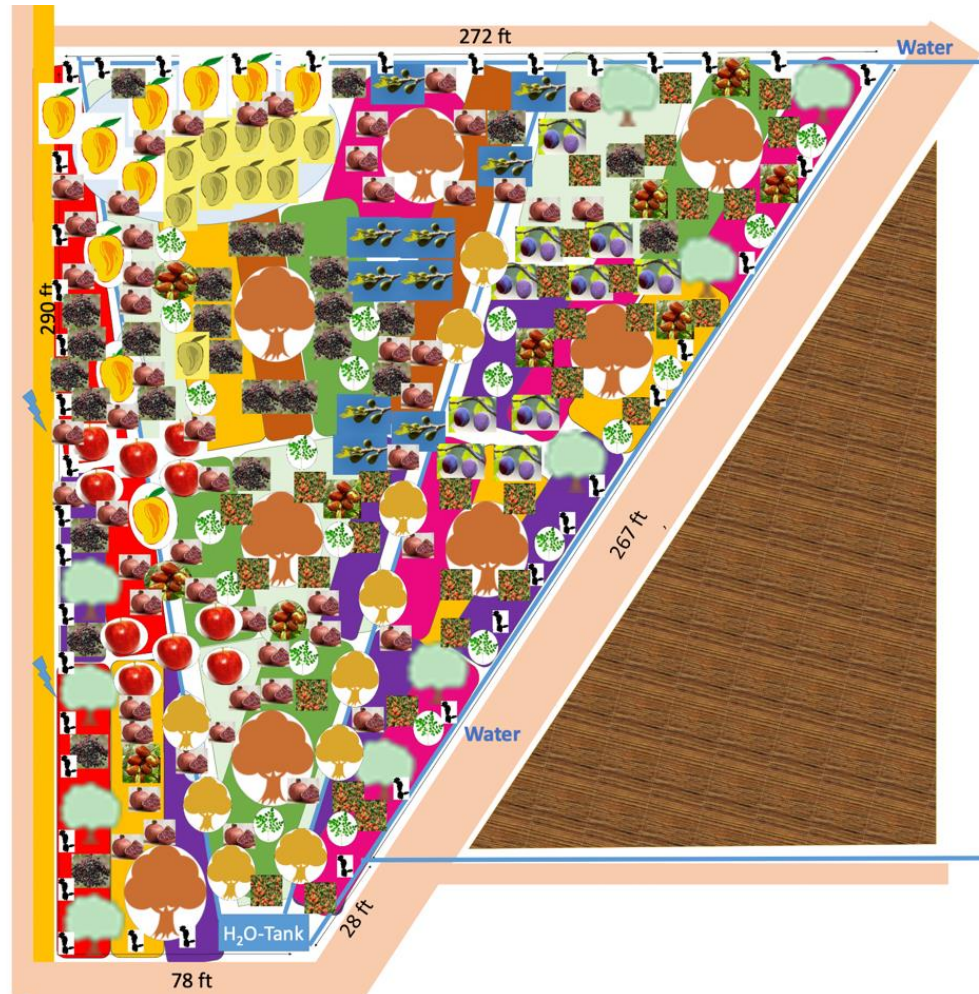
Figure 4. Sequence of implementation phases for food forest initiatives

There are various ways of successfully planning, developing, and implementing a food forest. We do not suggest that the process outlined below is the only one or the best one to do so. However, the outlined process was successful so far and has allowed integrating a number of perspectives and areas of expertise. We went to several iterations on some of the activities described, but also kept the overall process in focus – continuously moving forward towards the implementation.

Design of the Food Forest at *Spaces of Opportunity*

The design for the food forest site in the southwestern section of *Spaces of Opportunity* (1200 W Vineyard Rd, Phoenix) was developed in collaboration with the farmer and permaculture designer Zotero Citalcoatl.

The forest consists of mostly native and deserted adapted plants and Mediterranean heirloom plants. Plants are selected to produce market-viable fruits, nuts, vegetables, mushrooms and medicinal herbs.



Canopy Trees	Fruit Trees	Bushes	Ground
Carob	Apple	Pomegranate	Egyptian Onion
Mesquite	Fig	Elderberry	Lavender Lemon
Moringa	Peach	Wolfberry	Verbena
	Plum	Prickly Pear	Hibiscus
	Quince	Yaupon	Chiltepin
	Jujube		Aloe Vera

Transfer Workshop Basics

The stakeholder workshop took place at Arizona State University (Tempe Campus) on December 2, 2019. It brought together 16 people from universities, government agencies, and non-profit organizations, including entrepreneurs, city representatives, agroforestry experts, educators, and future food foresters.

Initially, we had hoped to integrate a food forest experience into the workshop to create a shared point of reference (and some tangibility for newcomers). Unfortunately, we were not successful in securing a tour. The second-best option, we thought, would be to provide a culinary experience instead. Thus, we sourced locally and provided a lunch buffet that was inspired by potential produce from food forests, i.e., perennial plants. The buffet offered, among other edibles, yaupon tea, prickly pear lemonade, mesquite bread, pecan spread, carob treats, wolfberry, pickled asparagus and mushrooms (see picture).



The objectives of the workshop were:

- Familiarize participants with sustainable food forest examples (worldwide) as well as with the implementation process of the food forest at *Spaces of Opportunity*
- Facilitate exchange and discussion on implementation opportunities, challenges, and coping strategies as well as implementation support for food forests in Arizona
- Provide networking opportunities among people with an interest in food forests (or edible landscapes) from diverse backgrounds

Invitations were sent out “strategically” to have representation from all areas relevant to the implementation of food forests (Fig. 5).

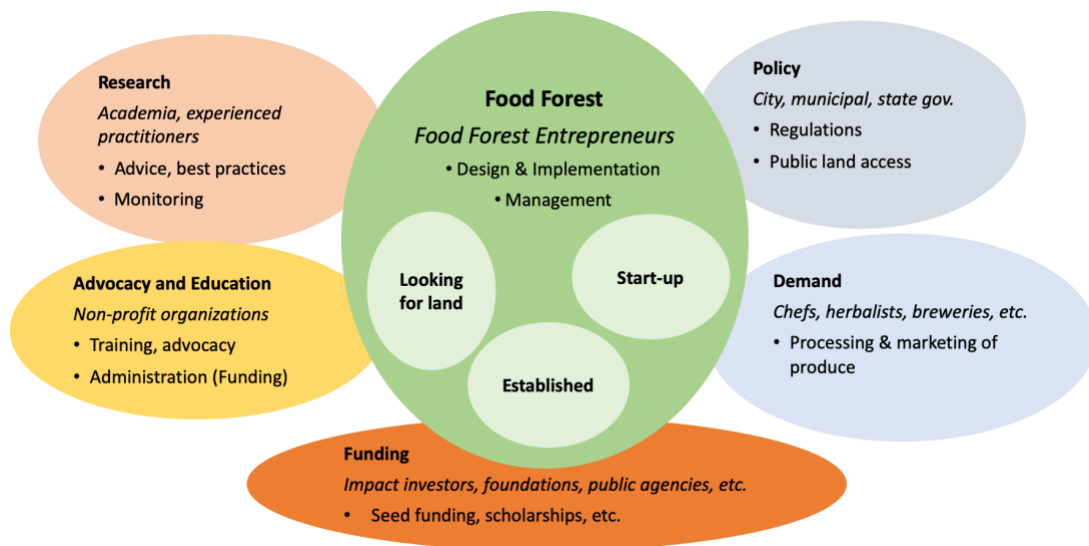


Figure 4: Network of actors relevant to support food forest implementation

The following participants followed our invitation (Tab. 1).

Table 1: Workshop participants with position, institution, and location

	Position and Institution	Location
James Allen	Prof, School of Forestry, College of the Environment, Forestry and Natural Sciences, NAU	Flagstaff
Darren Bingham	Master Student, Sustainable Communities, NAU	Flagstaff
Amy Bird	Senior Manager, Social Enterprise Lending, RSF - Social Finance	Phoenix
Kelly Hedberg	Program Instructor & Founder, DIG IT! Outdoors	Tempe
Valentina Hernandez	Director of Integrated Nutrition Services & Health Education Manager, Mountain Park Health Clinic	Tempe
Braden Key	Director of Sustainability, City of Tempe	Tempe
Carol Manetta	Founder, Reap Goodness (Start-up worker coop etc. / food forest project)	Tombstone
Andy Mason	Coordinator, Southwest Agroforestry Action Network (SWAAN); former Director, National Agroforestry Center, US Forest Service	Carefree
Susan Norton	Program Manager, University Sustainability Practices, ASU	Phoenix
Van Patterson	Start-up Food Forester, Master of Sustainability Solutions Alumni, ASU	Tucson
Josh Pike	Intern, Sustainability Office, City of Tempe	Tempe
Kate Radosevic	Food & Farm Initiatives Manager, Local First Arizona	Phoenix
Eric Sirvinskas	Master Student, Sustainable Communities, NAU	Flagstaff
Will Taff	Intern, Sustainability Office, City of Tempe	Tempe
Kristen Theos	Start-up Food Forest Manager, AZ Worm Farm	Phoenix
Samantha Zah	Local Climate Action and Local Food Economy Coordinator, City of Tempe	Tempe

Challenges and Coping Tactics for New Food Forest Projects

After the introduction to food forests and the implementation process of the food forest at *Spaces of Opportunity*, participants were grouped to explore three food forest start-ups by workshop participants (see pictures below). The initiators facilitate rich discussions about the various challenges they have encountered and coping tactics they have applied.



Van Patterson explaining challenges of conserving earthwork in Tucson.



Kristen Theos talking about water conservation challenges at the site she manages in South Phoenix.



Carol Manetta outlining her vision of a rural food forest on 60 acres in Tombstone.

The discussion yielded a number of relevant insights and connected stakeholders to ongoing initiatives. The insights are summarized in the following table (Tab. 2).

Table 2: Overview of four food forest start-ups in Arizona, their challenges, and coping tactics

Project	Team	Size & Location	Main Function	Stage	Challenges	Coping Tactics
ASU & Spaces of Opportunity	University & NGOs	1 acre, South Phoenix	Food production & education	Phase 6: Fundraising	<ul style="list-style-type: none"> • Securing seed funding • Lack of entrepreneurial borrowers 	<ul style="list-style-type: none"> • Networking • Proposal writing • Moving forward with in-kind contributions
AZ Worm Farm, Kristen Theos	Business	1 acre, South Phoenix	Year-long food production	Phase 6: Planting	<ul style="list-style-type: none"> • Draught-appropriate & cost-efficient irrigation (current: flood irrigation) • No water conservation culture • Immediate production vs. careful planning • High revenue, high-water, exotic crops vs. draught tolerant native crops 	<ul style="list-style-type: none"> • Rainwater capture & harvesting • Using building roofs (government, MPH, etc.) for water donations • Arizona Rare Fruit Growers • Desert Harvesters
Van Patterson	Private	3.3 acres, Tucson	Draught-tolerant food production + transfer & scaling	Phase 6: Earthwork & planting	<ul style="list-style-type: none"> • Conservation values vs. development decisions (removing or keeping existing plants, fencing to protect crop from wildlife, digging by hand to preserve existing vegetation) • Soil quality limiting crop choices 	<ul style="list-style-type: none"> • Fenced veggie garden • Swales • Soil amendments
Reap Goodness, Carol Manetta	NGO & universities	60 acres, Tombstone	Local food production, processing + showcase	Phase 5: Vision & strategy building	<ul style="list-style-type: none"> • Funding • Student transport logistics • Water scarcity • Native Indian American hesitation about collaboration due to political context • Informal land agreement 	<ul style="list-style-type: none"> • Approach municipalities & associations for rural development funding • Water retention • Collaborations • Agro-tourism & contracts with local restaurant

Table 3 provides an overview of the various implementation challenges that exists for local food forest initiatives, clustered by using the network categories introduced above (Fig. 5).

Table 3: Overview of food forest implementation challenges in Arizona

Areas	Main Challenges
Funding	<ul style="list-style-type: none"> • Seed funding • Lack of entrepreneurial borrowers
Research & Expertise	<ul style="list-style-type: none"> • Logistics of student transport • Site-specific physical design (water harvesting, infrastructure, existing plants, soil profile) • Lack of expertise by decision makers
Demand	<ul style="list-style-type: none"> • Lack of knowledge on specialty crops • Fast revenue vs. growing time • Contractual requirements by large buyers (e.g., limiting other partners, timeframe)
Policy	<ul style="list-style-type: none"> • Lack of distinct, administrative definition of food forests • USDA funds only for agricultural producers (not urban)
Advocacy & Education	<ul style="list-style-type: none"> • Fear of wildlife, insecurity • Climate-inappropriate plant preferences • Food safety issues, e.g. at foraging and tasting events

The compiled challenges provide an evidence-supported reference point for actions in support of food forest initiatives. They spread across all relevant areas of support (funding, policy making, demand, etc.) and require a coordinated effort to avoid unnecessary redundancies and to utilize synergies. Not all challenges are “deal-breakers” though. It is important to prioritize the challenges as funds, time, and capacities are limited.

The compiled challenges provided a robust base for an informed discussion about actions of support.

Potential Actions of Support

In the second small-group discussion round, participants explored potential actions that stakeholder groups could take to support food forest initiatives (cf. Fig. 5, above). The three action areas (and corresponding stakeholder groups) addressed by the participants (based on their preferences) were: research/education, demand, and policy.

Action Options for Researchers and Educators

- Collaborate with universities' agro-business schools: courses, classes, internships
- Involve students in research (1-2yr timeframe): surveys, case studies, short-term studies
- Establish public demonstration sites with associated research (e.g., on campus) in each city
- Inform policy making
- Provide evidence (database) on:
 - Types of food forests & income by function
 - Yield, plants, viability
 - Management practices (e.g., pest control)
 - Matrix of benefits (e.g., CO₂, micro-climate, health, food, property value, soil, water)
 - Rate of adoption



Action Options for Food Outlets and Consumers

- Attract institutional customers such as organizations (schools, clinics, etc.), restaurants, resorts
- Offer flexible contracting or co-harvesting to attract more institutional customers
- Initiate fundraising efforts for food foresters (CSA model)
- Support storytelling, education, and awareness building at events (e.g., by cities, LFAZ), e.g.,
 - on food processing of native foods
 - cooking demonstration and taste education
 - on food forests as a solution for food insecurity, diabetes, recreation, etc.
- Strengthen local supply chains, e.g., establish infrastructure for delivery of fresh, local food



Action Options for Policy Makers and Government Administrators

- Build coalitions between city-county-national level
- Identify potential homeowner associations (HOA) for collaboration (patchwork of regulation but partly innovative, sustainability targets, e.g., water saving, sustainable landscaping)
- Show successful pilots in HOA, parks, right-of-way landscapes
- Anticipate arguments against and prepare counter arguments (food safety, pests, property value)
- Define food forests in public documents: USDA Farm Bill, state policy, city policy
- Influence Forest & Farm Bill Coalition
- Access funds for food forests, e.g. from USDA Forest Service
- Develop policy documents:
 - Check match of urban community garden policy in Tempe and other cities
 - Model maintenance agreements (easy to reproduce templates with standards for upkeep, harvesting, management of fallen fruits and animals)
 - Rezone parks and public spaces as eligible for food production
 - Work towards water policy that supports multi-functional landscapes (e.g., lower water price for food-producing sites)



Outlook

There was broad agreement among all participants that such stakeholder workshops offer valuable opportunities for learning, exchange, and networking. Participants also concurred that a strong support network of stakeholders fulfilling and coordinating different functions is an important condition for growing the movement and succeeding in food forest implementation initiatives.

For the emerging stakeholder network, a few key action items were proposed:

- Sharing progress on the presented and other food forest projects in Arizona on an annual base
- Gathering annually for a state-wide conference / symposium on food forests
- Jointly visiting and learning more about food forest projects in Arizona
- Exchanging relevant information on food forest opportunities

A few specific opportunities were shared after the workshop:

- Potential site visit at Bee Oasis forest garden in Mesa in spring
- SWAAN Conference in Tucson, March 17-19, 2020. With keynote speaker Dr. Kathleen Merrigan, ASU Swette Center for Sustainable Food Systems, and Brad Lancaster, Rainwater Harvesting for Drylands and Beyond. Please visit: <https://swaan-site.org>

The conference includes several field trips:

- Mission Garden, Tucson: Timeline gardens covering 4000 years with extensive tree and garden plantings
- Dunbar-Spring Neighborhood, Tucson: Neighborhood foresters' tree-planting program in public rights-of-way supported by water harvesting and Brad Lancaster's permaculture homestead with water harvesting, solar power and edible trees
- Harris Heritage Growers, Sonoita: Tour of U-Pick Family Farm in southern Arizona with trees, crops and animals

There are also significant food forest activities advancing in Europe (Van Dooren et al., 2018). It would be beneficial to utilize our international scholars to keep informed and transfer relevant insights from these projects, too.

References

- Albrecht, S. & Wiek, A. (2020a, in prep). Food Forests around the World – Size, Function, Viability, and Sustainability. Working Paper. Center for Global Sustainability and Cultural Transformation, Leuphana University of Lüneburg and Arizona State University.
- Albrecht, S. & Wiek, A. (2020b, in prep). Creating Sustainable Food Forests – Insights from a Case Study in Phoenix, Arizona. Center for Global Sustainability and Cultural Transformation, Leuphana University of Lüneburg and Arizona State University.
- Albrecht, S. & Wiek, A. (2020c, in prep). One Step Forward, Two Steps Back – The Attempt and Perils of Developing a Food Forest through a Multi-Stakeholder Coalition in Germany. Working Paper. Center for Global Sustainability and Cultural Transformation, Leuphana University of Lüneburg and Arizona State University.
- Bukowski, C. & Munsell, J. (2018). The Community Food Forest Handbook. How to Plan, Organize, and Nurture Edible Gathering Places: Chelsea Green Publishing.
- Ford, A., & Nigh, R. (2009). Origins of the Maya forest garden: Maya resource management. *Journal of Ethnobiology*, 29(2), 213–236.
- McLain, R., Poe, M., Hurley, P. T., Lecompte-Mastenbrook, J., & Emery, M. R. (2012). Producing edible landscapes in Seattle's urban forest. *Urban Forestry & Urban Greening*, 11(2), 187-194.
- Remiarz, T. (2017): Forest Gardening in Practice – An Illustrated Practical Guide for Homes, Communities and Enterprises. Hampshire, UK: Permanent Publications.
- Riolo, F. (2019). The social and environmental value of public urban food forests: The case study of the Picasso Food Forest in Parma, Italy. *Urban Forestry & Urban Greening*, 45.
- Salbitano, F., Borelli, S., & Sanesi, G. (2015). Urban forestry and agroforestry. In: de Zeeuw, H., & Drechsel, D. (Eds.). *Cities and Agriculture: Developing Resilient Urban Food Systems* (pp. 285-311). Oxon: Routledge-Earthscan.
- Van Dooren, N., Oosterhof, G., Stobbelaar, D., & Van Dorp, D. (2018). The emerging practice of food forest – a promise for a sustainable urban food system? *Proceedings of the 4th European Agroforestry Conference – Agroforestry as Sustainable Land Use*. Nijmegen, NL, May 28-30, 2018.
- Weber, H., Wiek, A., & Lang, D.J. (2019, in press). Sustainability entrepreneurship to address large distances in international food supply. *Business Strategy and Development*.