MEMORANDUM

Date: March 9, 2020

To: The Honorable Chairman and Members
Pima County Board of Supervisors

From: C.H. Huckelberry
County Administrator

Re: **Community Garden and Farming Associated with Regional Flood Control District Property and our Office of Sustainability and Conservation**

Enclosed is a report I requested regarding the Las Milpitas Community Farm, a cooperative program between multiple County departments, the Community Food Bank and the University of Arizona.

The report is self-explanatory and examines another benefit associated with implementing the Sustainable Action Plan for County Operations (SAPCO). Community gardens and farming are becoming a more important activity, particularly with our designation as the first city in the United States to receive a designation as a United Nations, Educational, Scientific and Cultural Organization (UNESCO) City of Gastronomy.

As the Regional Flood Control District (RFCD) continues to develop the regional flood control system, it is likely additional properties can be utilized for community gardens/farming. This is particularly true along the major watercourses of the Rillito, Pantano, Santa Cruz and Cañada del Oro Washes since these systems have access to the reclaimed water system. The new Regional Wastewater Reclamation system produces Class A+ reclaimed water, similar to groundwater in characteristics. Therefore, this water becomes suitable for meeting the irrigation demands of community farms and gardens, if allowed by regulatory agencies.

Another area where there will be increasing interest in community gardens and farms is in the urban watersheds where the RFCD is now developing stormwater detention facilities to lessen flood damages and risks. These urban detention basins can also be easily converted to community gardens if neighborhoods in the vicinity desire to implement same.

The largest example of urban stormwater harvesting continues to exist at the Kino Environmental Restoration Project (KERP), which captures stormwater to reuse for turf irrigation at the Kino Sports Complex. We are in the process of expanding the urban stormwater volumes that can be captured and reused to assist in the irrigation of the newly opened Kino Sports Complex-South. Through expansion of KERP, I am hopeful that we can achieve nearly 1,000 acre-feet annually of urban stormwater capture to irrigate the turf athletic fields at the Kino Sports Complex.

Attachment

c: Jan Lesher, Chief Deputy County Administrator
Carmine DeBonis, Jr., Deputy County Administrator for Public Works
Francisco García, MD, MPH, Deputy County Administrator & Chief Medical Officer, Health and Community Services
Linda Mayro, Director, Office of Sustainability and Conservation
Suzanne Shields, Director, Regional Flood Control District

PIMA COUNTY
Sustainability, Conservation & Historic Preservation

To: C.H. Huckelberry
County Administrator

Jan Lesher
Chief Deputy County Administrator

Date: Feb. 7, 2020

Through: Carmine DeBonis
Deputy County Administrator, Public Works

From: Linda Mayro LM
Director, OSC

Re: SAPCO Update on Food Systems Autocase™ Study at Las Milpitas Community Farm in Collaboration with Multiple County Departments, the Community Food Bank and the UA

As you requested, this memo provides an update on the Food Systems section of the Sustainable Action Plan for County Operations (SAPCO) and recent work the Sustainability Division has been doing with multiple County and outside partners in advancing this concept. The Food Systems section on was added to the Landscape Chapter in 2018, as part of the five-year SAPCO update.

Background

Community-led interest in the local food movement, food security, food and nutrition education, and food systems stability supported by local urban and suburban agriculture continues to grow. The term "food systems" may be defined as, "*all processes and infrastructure involved in feeding a population: growing, harvesting, processing, packaging, transporting, marketing, consumption, and disposal of food and food-related items. It also includes the inputs needed and outputs generated at each of these steps. A food system operates within and is influenced by social, political, economic and environmental contexts.*" Locally, the rise in interest in food systems is due in part to the UNESCO City of Gastronomy designation the region received in 2015; however, local food production has been a source of community pride and interest here long before its uniqueness was internationally recognized.

Our regional interest in urban agriculture is not new or unique, and researchers around the country and around the world are studying similar trends and have documented numerous social, environmental and economic benefits associated with local food system development. As a result, many municipalities are exploring options for making additional land available to support the expansion of urban farming through tax credits and no to low cost leases. Within the Tucson-Pima metro area, there are an estimated 28 community gardens and farms currently in operation. Pima County and the Regional Flood Control District operate or lease at least five sites for gardens/farms and lease one site for a farmers market.

In meetings with a number of community organizations to discuss and learn more about the current state of urban agriculture in the region, staff learned there are also a number of informal education programs geared towards providing training and skills for startup commercial growers. Likewise, among these organizations there is a growing interest in access to land for urban farming to support the expansion of food production and the local food economy.

With this background, in the winter of 2019, staff began to search for case studies to inform the food systems sections of SAPCO, but found few relevant examples from which to understand the range of costs and benefits associated with such work in the desert southwest. As staff explored this predicament with the development team at Autocase™[1], a software modeling company contracted by the Regional Flood Control District (RFCD) to support Green Infrastructure planning and other studies, we found a mutual interest in adapting this platform to model a local food system pilot which would be first ever use of the tool for this type of analysis.

Las Milpitas Farm and the Community Food Bank

After further research and discussions with the Community Food Bank (CFB), Las Milpitas de Cottonwood Community Farm (LMF) was selected for the Autocase™ analysis.

Owned by the Regional Flood Control District (RFCD) and operated by the Community Food Bank, Las Milpitas farm is located on nearly a nine-acre parcel on the west bank of the Santa Cruz River, on Cottonwood Lane and south of Silverlake Rd., near Paseo de las Iglesias Park and adjacent to The Loop (Figure 1.). As noted above, Pima County and the Regional Flood Control District have been involved with local food production for many years. RFCD has worked with the CFB at Las Milpitas since 2001. When started, it was part of City High School, which is still involved. It is operated by the CFB through a no-cost lease agreement with the RFCD. The 25 year renewable lease will come up for renewal in 2026.

Figure 1. Las Milpitas de Cottonwood Farm in Google Map
2405 S Cottonwood Ln, Tucson, AZ 85713

CFB describes Las Milpitas and its offerings as follows:

" Las Milpitas de Cottonwood as a six-acre community farm (on a nearly 9 acre RFCD parcel), located on the banks of the Santa Cruz River, that provides materials and support for local residents to grow food for themselves, making healthy, local food more accessible to low-income families. The farm offers family garden plots, gardening supplies, and educational workshops at no cost. Our farm is a unique community-building space where neighbors can gather, connect, learn, and share. The farm is also an educational site where we train and build leaders in desert food cultivation through workshops, work days, and partnerships with local schools. At Las Milpitas, we aim to bring residents from all areas of Tucson together to build community and create strong leaders who can create and advocate for a resilient, sustainable local food system."

[1] Autocase™ is a software-modeling tool used with technical client support to run TBL analyses of green design features for buildings and landscapes. For the Las Milpitas project, the Autocase technical team created a customized analysis of a desert food garden and farm based on actual data and design parameters for Las Milpitas Farm and supplemental input provided by the project team, which involved LMF staff, UA researchers and County experts.

The Las Milpitas Autocase Project

The Autocase™ collaboration with the CFB offered mutual benefits and the Project Team grew to include staff experts from County departments: OSC, RFCD, PDEQ, CDNC, NRPR; the Pima County Seed Library; and four staff from Las Milpitas Farm. Additionally, CFB offered to provide detailed information on operations so that the team could derive a better understanding of the full range of social, environmental and economic costs and benefits associated with operating a community-based urban farm on leased Pima County lands. Through addition of researchers from the University of Arizona's College of Architecture, Planning and Landscape Architecture, Arid Lands Resource Sciences and Climate Extension and Geospatial Modeling, the project team expected to gain insights on whether and how, community farms might further support food justice and climate resilience in Pima County.

The project began to get off the ground when RFCD generously provided the use of their existing Autocase™ license and the economic modeling team at Autocase™ agreed to customize their platform to support the triple-bottom-line (TBL) addressing the social, economic and environmental benefits analysis of a food system project. Additionally, Pima County's Regional Wastewater Reclamation Department (RWRD) working with RFCD and Tucson Water agreed to extend the County's discounted reclaimed water rate to the farm for use in operations and in the Autocase analysis.

The Sustainability Division then co-developed a project charter (Attachment 1) with the CFB. Spring 2019 saw the formation of work groups whose task was to collect data on the site design, vegetation, surrounding property values and NOAA climate projections, among many other items and actual operational data and production values for LMF, to generate a Net Present Value (NPV) for the farm. Determining the farm's NPV was necessary as it is a fundamental input into determining the farm's TBL. In this instance, unlike most applications, NPV calculations were adjusted to account for social and environmental benefits such as community health and well-being and wildlife habitat conditions.

We are pleased to report that the LMF Autocase™ project team in association with the CFB has recently completed the TBL analysis of LMF and a first draft of the report. We anticipate circulating a more polished draft to our internal partners for review and comment by next month, followed by a final report in April 2020.

The results of all three different modelled scenarios, which factored in farming with different sources of water under two different future climate projections, resulted in net positive TBLs in each case. This strongly suggests that lending support to and investing County resources in similar projects would be a positive financial investment that provides social and environmental benefits.

Food Systems and SAPCO

Since the ratification of the Paris Climate Agreement in 2016, which served as the guiding framework for updating SAPCO and included references to food security[2], the Intergovernmental Panel on Climate Change (IPCC) released a follow up report (2019) elevating the alarm about the pending global food crisis. The impact of

[2] "The activities and the actors in the food system leads to outcomes such as food security and generate impacts on the environment. As part of the environmental impacts, food systems are a considerable contributor to greenhouse gas emissions, and thus climate change. In turn climate change has complex interactions with food systems, leading to food insecurity through impacts on food availability, access, utilization and stability" (IPCC p. 5-8, 2019).

climate change such as droughts, floods, extreme weather and phenological disruptions[3] around the world are already creating food shortages and according to the report, have left an estimated half billion people undernourished. The IPCC also warns that food insecurity associated with climate change will continue to trigger cross-border migrations. Indeed, this factor has been identified as one of the drivers behind the wave of migrants arriving at the southern U.S. border from Guatemala and Honduras over the past decade. Acknowledging these considerations, staff identified Food Systems[4] as an important focus area to include in the County's updated Sustainable Action Plan. In researching this topic, staff also came to understand that the County has actually been involved in food systems work for decades.

In fact, the County's and Flood Control District's work on food systems spans a diverse and impressive range of activities -- from acquiring ranches through bond efforts to administering grazing leases and making leased lands available for cultivation to farmers and gardeners (the Community Food Bank, UA Cooperative Extension, Native Seeds Search and Mission Gardens); to promoting food tourism and establishing a Pima County Seed Library; and even leading early childhood education nutrition programs in partnership with the UA Cooperative Extension. Taken as a whole, these activities all contribute to a substantial body of work that could be viewed through a "food system" or "food security" lens.

Furthermore, since releasing SAPCO in 2018, ongoing developments continue to reinforce the value of Pima County's role in supporting local food systems efforts. From the decades' long County-led effort to establish the Santa Cruz Valley as a National Heritage Area, which was approved by Congress in 2019; to prominently featuring the historical connections to regional food offerings in the new Visitors' Center; the importance of Pima County's role in supporting and advocating for the region's unique desert farming and ranching traditions along with myriad food heritage activities and global cultural connections, is well-established.

Equally significant, the value of this work is not lost on the community. When Tucson and the surrounding region received the first UNESCO City of Gastronomy designation in the U.S. in 2015, the importance of local food to the regional economy, tourism and area attractiveness began to soar both, in awareness and appreciation.

Addressing SAPCO Information Needs

While Food Systems are firmly embedded in the latest SAPCO, there are aspects of this newly added section that still require development. To begin, we need to compile a baseline inventory of places and activities that comprise the County's existing contributions to food systems. For example, metrics need to be established for several target areas including: farmer's markets; community and heritage gardens; acres of working cattle ranches and grazing leases; acres under commercial agricultural production; food and nutrition programs; food heritage activities; and sites with composting and soil amendment activities.

Additionally, a number of important and outstanding questions need to be addressed, especially around the use of County water resources and the impacts of climate change on planning future food production. Other questions have emerged on how the County might establish criteria for future local foods agricultural production site selection and establish best management practices.

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[3] Climate change is disrupting the timing of successful pollination. Environmental variables influence both when plants flower and when insects pollinate. When those variables change, reproduction paths for an interconnected web of species can be profoundly affected (Solga et al., 2014).

[4] Food Systems refer to a series of interlinked activities that aims to integrate food production, processing, distribution, consumption, waste management, and relevant governance structures in order to enhance the environmental, economic, and social health of a particular place.

The Autocase™ project with the CFB was undertaken to establish the value of local food production and explore what the County's future involvement in food systems efforts might look like.

Anticipated Next Steps

In discussing results of the LMF Autocase™ Project with members of the project team, two reasonable next steps emerged, for which we request your approval:

1. Create a series of presentations to share project results with stakeholders and community members.
2. Host a facilitated workshop (potentially Summer 2020) with key CFB and County staff members to:
    - Define criteria and priorities for SAPCO food system sections; and
    - Develop processes and management guidelines related to possible expansion of local food production on County lands and elsewhere.

Executing these next steps would build off Pima County's decades-old legacy of involvement in regional food production – from acquiring and managing operating ranches and grazing leases, to making certain lands available for local gardening and farming. This work honors and advances the County's stewardship in protecting some of the oldest continuously cultivated lands in North America going back 4000 years and supports the County's ongoing work on community wellness. It is a natural evolution of the UNESCO City of Gastronomy designation (Pima County was a co-recipient in 2015) and internally led efforts to advance the recent federal designation of the Santa Cruz Valley National Heritage Area (2019). Importantly, this work also furthers the County's commitment to meeting the climate mitigation and adaptation goals of the Paris Agreement to address regional food security under threat from the effects of climate disruption.

We look forward to sharing the report and results of Las Milpitas Autocase™ Project in March 2020. Pending your approval, we will provide your office with the schedule of presentations in the near future that will demonstrate the value and importance of local food production as an adaptation strategy to ensure food security in the face of climate change.

cc: Suzanne Shields, Director RFCD
Jackson Jenkins, Director RWRD
Ursula Nelson, Director PDEQ
Chris Cawein, Director NRPR
Danny Tylutki, Interim Director CDNC
Julie Robinson, Sustainability Manager

Attachment 1. Project Charter for Food Systems Autocase™ Study at Las Milpitas Community Farm

LAS MILPITAS AUTOCASE PROJECT

Project Charter and Workbook for Participants

AUGUST 22, 2019

PIMA COUNTY OFFICE OF SUSTAINABILITY, CONSERVATION AND CULTURAL RESOURCES
201 N Stone Ave 6th Floor, Tucson AZ 85701

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Autocase Analysis of the Community Food Bank's Las Milpitas de Cottonwood Farm

2405 S Cottonwood Ln, Tucson, AZ 85713

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Project Principals by Agency

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Project Charter

Description

Staff from the Community Food Bank (CFB), Pima County's Office of Sustainability (OSC), Pima County Regional Flood Control District (RFCD) and Autocase™ agree to assemble a team of experts to undertake a triple-bottom-line (TBL) cost-benefit analysis (CBA) of Las Milpitas Farm, located in Tucson. The deadline for completion of the analysis is on/near the end of June 2019.

The analysis will integrate actual operational data and production values for Las Milpitas, along with localized information on native vegetation, property values and NOAA climate projections, among other items to generate a Net Present Value (NPV) for the farm. Net Present Value is the difference between the present value of cash inflows and the present value of cash outflows over a period of time.

The purpose of the analysis is derive a better understanding of the full range of social, environmental and economic costs and benefits associated with operating a community-based urban farm on leased Pima County lands. Additionally, the working group wishes to gain insights on whether and how, community farms might further support food justice and climate resilience in the Tucson Area.

This joint effort addresses a Food Systems target in the Sustainable Action Plan for Pima County Operations (FY 2018-2025) and supports the mission of the Community Food Bank to partner with government agencies to revitalize neighborhoods and build a stronger food economy.

The results of the analysis and a report will be shared according to the details outlined in the attached Memorandum of Understanding.

Objectives

1. Form a trans-disciplinary and cross-sectional work group of experts to undertake a TBL-CBA analysis of an existing food production site on Pima County land.

2. Inform the TBL-CBA through the shared knowledge and contributions of member experts and collectively vet the assumptions that form the basis of analysis.

3. Use the results of the Autocase analysis to inform future food systems work, e.g. the full range of costs, considerations, risks and benefits associated with expanding food systems on appropriate Pima County properties under future climate scenarios.

4. Build relationships with stakeholders for future projects.

5. Showcase the triple-bottom-line benefits of the Las Milpitas Farm

Research Questions

1. What site should serve as the base case for the Las Milpitas comparison? (Decision by group made to use Las Milpitas site pre- herb garden. Stephen Kaplan procured a 1998 aerial image that shows a little native vegetation.)	WG1
2. What combination of site design elements & users yield the highest net present value (NPV) for a food production site compared to the base case?	
a. Land type (soil type/s, compost, mulch)	WG1
b. Topography (altitude, relationship to land form patterns)	WG1
c. Geographic location (food desert, types of access motorized vs. bicycle, bus, etc.)	WG1
d. Farm design (permaculture/guild garden, tilled beds, box plots, other?)	WG1
e. Water types (Tucson Water -irrigation, active rainwater harvesting, passive rainwater harvesting, reclaimed water)	WG1
f. Crops (table crops – best suited for desert gardens per LM staff; fruit trees, native plants - legume trees, cactus pads, fruit, buds, others?)	WG2
g. Users (types – personal gardener, market gardener, adult learner, child learner, others?)	WG2
3. What is the TBL of fruit trees/orchard trees vs. seasonal vegetable/root crops?	
a. Tree crops vs. seasonal vegetable crops	WG2
b. Native tree harvest yields vs. fruit tree harvest yields	WG2
4. What is the best value to use for soil carbon sequestration?	WG1
5. What are suitable values to include for evapotranspiration?	WG1
6. Does the NPV change positively or negatively under a *Representative Concentration Pathway (RCP) 8.5 greenhouse gas concentration trajectory* (temperature, rainfall, and possibly TBD other factors) over the next 100 years (demonstrate climate resilience benefits)?	WG4
7. Under the RCP 8.5 GHG trajectory, which design elements (more of/less of) would improve NPV?	WG4
8. Can the NPV of a community farm be correlated with food justice benefits (to be defined by the group)? (Group agreed to push discussion to WG2 to refine questions below)	WG2
a. How can we show the association between location of food system and alleviation of food desert/increase in food security/accessibility?	WG2
b. Autocase says it's tricky. May be able to produce a partial valuation. Need to dig deeper in the workgroup.	
c. Change the term "food justice" to something else. Food access? Food security?	
d. Should we bring equity into this?	
e. Try to analyze how food system relates to broader issues: food justice, community health benefit, food access, etc.	

Data Needs, Roles & Responsibilities

The success of this project will be determined in part, by the sustained involvement of project principals from Pima County, Autocase and the Community Food Bank. The principals will guide and participate in collecting data, participate in/lead meetings, and review Autocase results. Additional project participants may opt to join some or all meetings and discussions to learn and to contribute to the co-production of the project results.

Data Collection Needs

Checklist	Autocase Input Template	Responsibility
X	Original Site Design of Las Milpitas	WG1
X	Updated Site Design of Las Milpitas	WG1
	Tons (pounds) of cultivated produce provided by garden and what is the value of that produce ($/ton)? (List for various produce)	WG2
	Tons (pounds) of wild plant foods provided by the garden and what is the value of that food ($/ton)?	WG2
	Cost per acre foot of potable water to irrigate? What is the source of potable water? (% ground vs % surface)	WG2
	Proportion of the captured rainwater is not infiltrated and sent into the sewer system? (default = 0%)	WG1
	Of the potable water used for irrigation, what percentage does the utility assume is going to be sent to them to be treated?	WG1
	What is the property value in the base area?	WG1
	What are the number of student visitor hours per year, per acre?	WG2
	What are the number of gardener/farmer use hours per year, per acre?	WG2
	How many minutes are spent exercising (garden/farm activity) in the park each visit?	WG2
	What is the local availability of the opportunity? In other words, what is the availability of equal quality activities at other sites in the area?	WG2
	What is the expected carrying capacity [people? Or food?] of the facility?	WG2

	How accessible is the facility and what are the quality of roads around and within the facility?	WG2
	How are the environmental and aesthetic features of the facility?	WG2
Checklist	**Additional Inputs to Consider**	**Responsibility**
	Modeled Climate Projection Data for Pima County	WG4
	Factors and calculations for plant-water demand	WG1
	Measured values associated with food justice? Improved nutrition, reduction of diet-related disease? Social connections & capacity? Improved quality of life? Reclaiming farm heritage? Environmental stewardship?	WG2
	Value of soil C-sequestration?	WG1
	Value of soil microbial health?	WG1
	Value of Food and Green Waste Recycling?	WG2
	Value of chickens for eggs?	WG2
	Value of chickens for soil amendment?	WG2
	Value of wild plant foods harvested?	WG2
	What are the number of gardener/farmer use hours per year, per acre?	WG2
	Value of food sold at the Santa Cruz River Farmer's Market (added value to the farmer, regional economy)	WG2
	Costs of Operations	WG3
	• Electricity	WG3
	• Renewables	WG3
	• Potable water	WG3
	• Reclaimed water	WG3
	• Harvested storm water	WG3
	• Seed stocks	WG3
	• Fruit trees	WG3
	• Farm equipment (describe)	WG3
	• Farm materials (describe)	WG3
	• Salaries staff	WG3
	• Land lease	WG3
	• Insurance	WG3
	• Education materials/activities	WG3

Documenting Assumptions & Data Sources

The working group will discuss and document the data and assumptions used in the Autocase analysis. This documentation will provide a central resource for communicating these assumptions to external audiences and for comparative research and future project development.

Deliverables

Autocase will produce a short report with data visualizations on the Las Milpitas Farm TBL-CBA analysis. The Office of Sustainability, Conservation and Cultural Resources (OSC) will include the report in a package that includes a short overview of project, participants, results and recommendations for future work. The work group will iteratively review and comment on the analysis and report to produce the final deliverable.

Post-project Communications

The working group will agree on a framework for communicating the results of the analysis and for sharing the report to external audiences.

Anticipated Schedule & Work Commitments

Date	Meeting	Focus/Outcomes	Participants

May 28th 1-4pm	Group Meeting 1: Kickoff
	
	3 hours
		• Introductions/exercise (45 min)
		• Overview of SAPCO Food Systems Component (10 min)
		• Overview of Las Milpitas Farm (20 min)
		• Overview of Autocase (30 min)
		• Discussion: (60 min)
		  o Review and refine as needed: Meeting Management, Project Charter, Research Questions, Methods, Data, Definitions
		  o Identify data collection needs and responsibilities, form Work Groups
		• Wrap up, next steps (10 min)
			Pima County
			CFB
			Autocase
			UA partners
			FS
			Stakeholders

June	Work Groups: Data discussion 2-3 hours each group	Work Groups review data and other input material, refine research questions as needed, collect and organize data: WG1: Water/s, Soil types & Soil C-sequestration, Site Design, Evapotranspiration, WG2: Food Production/Harvesting/Social Benefits (including Food Justice, Public Health) WG3: Costs of Operation WG4: Autocase data input/refinement, climate model integration	Pima County CFB Autocase UA partners FS Stakeholders

June	Work Groups: Data collection 6-10 hours	Per assignments identified in previous meeting, Work Group members collect and organize data for Autocase	Pima County CFB UA partners FS Stakeholders
June	Group Meeting 2: Review & Discuss Data 2 hours	Work Group Leads present information Group reviews and discusses information	Pima County CFB Autocase UA partners FS Stakeholders
June	Group Meeting 3: Review results of first Autocase analysis 2 hours	Review and discuss results of the first Autocase Analysis, identify needed revisions, Work Group assignments	Pima County CFB Autocase UA partners FS Stakeholders
June	Work Groups: Refine and revise as needed 2 hours	Refine and revise data inputs as needed, document assumptions	Pima County CFB UA partners FS Stakeholders
June	Group Meeting 4: Review Autocase Scenario 2 (if required) 2 hours	Group reviews results of second Autocase analysis, approves results or makes adjustments to delivery of project	Pima County CFB Autocase UA partners FS Stakeholders
June	Autocase	Autocase generates final report for Las Milpitas	Autocase
June	OSC 14 hours	Writes Executive Summary for Autocase Report	OSC
June	Group Meeting 5: Review and discuss final reports 1 hour	Review and comment on Executive Summary	Pima County CFB Autocase UA partners FS Stakeholders
July	OSC 14 hours	Integrate content revisions to report	OSC
July	OSC	Delivery final report for circulation	OSC

	2 hours		
July	Group Meeting 6: Next steps 1.5 hour	Project close-out, next steps	Pima County CFB Autocase UA Partners FS Stakeholders

Work Groups (as of June 4, 2019)

WG1: Water/s, Soil types & Soil C-sequestration, Evapotranspiration, Site Design		
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Sarah Brown	Southern Arizona Young Farmers and Ranchers Coalition	sarahlouisebrown12@gmail.com
WG2: Food Production/Harvesting/Social Benefits (including Food Justice, Public Health)		
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Emmanuel Morales	Active Community Member	azpermdesign@gmail.com
Justine Hernandez	PC SEED Library	Justine.Hernandez@pima.gov
Irene Ogata	Tucson Water Rep	Irene.Ogata@tucsonaz.gov
WG3: Costs of Operation		
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WG4: Data input, Climate Model integration		
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Agencies and Acronyms

CFB: Community Food Bank of Southern Arizona has the Mission to "Change lives in the communities we serve by feeding the hungry today, and building a healthy, hunger-free tomorrow."

Las Milpitas de Cottonwood: Run by the Community Food Bank of Southern Arizona, Las Milpitas de Cottonwood is a six-acre community farm, located on the banks of the Santa Cruz River, that provides materials and support for local residents to grow food for themselves, making healthy, local food more accessible to low-income families. The farm offers family garden plots, gardening supplies, and educational workshops at no cost.

The farm is a unique community-building space where neighbors can gather, connect, learn, and share. The farm is also an educational site devoted to training and building leaders in desert food cultivation through workshops, work days, and partnerships with local schools.

At Las Milpitas, the aim is to bring residents from all areas of Tucson together to build community and create strong leaders who can create and advocate for a resilient, sustainable local food system. POC is Elena Ortiz.

Native Plant Nursery: The Native Plant Nursery is located at the Pima County Natural Resources, Parks and Recreation main facility. All of the plants grown by the Native Plant Nursery end up in public spaces. At present, there are over 20,000 plants being grown for a variety of public projects, representing over 200 different species. In addition, the Native Plant Nursery maintains a native seed library of 130 species. The water source for the Native Plant Nursery is a high-nitrogen groundwater source which is not suitable for potable purposes, but excellent for plant propagation. The Native Plant Nursery does not sell plants to the public, however tours and volunteer opportunities are available.

NRPR: Pima County's **Natural Resources Parks and Recreation Department**. "From caring for stately saguaros in Tucson Mountain Park to overseeing after-school recreation programs, we add a vital dimension to the lives of our residents and visitors." The Native Plant Nursery is a unit within NRPR.

OSC: Pima County's **Office of Sustainability, Conservation and Cultural Resources**. OSC administers and reports on the Sustainable Action Plan for County Operations (SAPCO). "The Office of Sustainability and Conservation works to promote a sustainable and livable community and the conservation of Pima County's natural and cultural resources through the implementation of Board adopted policies that promote the environmental, social, and economic well-being of our region."

RFCD or the "District": Pima County's **Regional Flood Control District** "strives to use forward-looking floodplain management practices to minimize flood and erosion damages for all county residents, property and infrastructure. Regionally, the District is involved in a variety of flood monitoring, flood control and natural resource management activities. We also perform floodplain management activities within unincorporated portions of Pima County." Las Milpitas is situated on a RFCD-owned parcel, adjacent to Paseo de las Iglesias Park.

RWRD: Pima County's **Regional Wastewater Reclamation Department** "protects the public health, safety, and the environment by providing quality service, environmental stewardship, and renewable resources. We design, manage and maintain 3,500 miles of the sanitary sewer (conveyance) system and two metropolitan and six sub-regional water reclamation facilities."

“We are doing our part to protect the environment by recycling our most precious resource, water. Pima County uses its highly treated recycled, or reclaimed water, in a myriad of ways including irrigation of County parks, golf courses and ball fields.”

“Utilizing reclaimed water for irrigation is a highly sustainable activity that saves groundwater and Colorado River water for drinking. Reclaimed water is also used to sustain and improve aquatic and wildlife habitats, for dust control and for long-term storage in our underground aquifers. Experts from around the world visit Pima County to study the regional reclaimed water system, which demonstrates effective water recycling techniques in the desert.”

SAPCO: The acronym for Pima County’s **Sustainable Action Plan for County Operations (FY 2018-2025).** This Board-adopted plan directs staff to implement a series of actions to align County operations with the Paris Agreement by 2025. Food Systems is one component of the plan (pp. 28-29) which describes and authorizes staff to work advancing food systems initiatives that relate or link to County lands and facilities.

SEED Library: **Pima County’s Seed Library** is a collection of open-pollinated and heirloom seeds that you can borrow to plant and grow at home. By saving seeds as a community, we help create local seed stocks that are better acclimated to our unique desert climate and which support an abundant and genetically diverse landscape. We support gardeners from beginner to expert, and help you learn how to grow, harvest, and save seeds.

TCB: **Tucson Clean and Beautiful**, “is a non-profit environmental advocacy and action organization founded in 1985 to preserve and improve our environment, conserve natural resources, and enhance quality of life in the City of Tucson and eastern Pima County. These goals are achieved through educational and hands-on programs emphasizing personal action in recycling and waste reduction, land stewardship, urban forestry and beautification. Originally established to keep our community litter-free, TCB has grown to coordinate programs and projects with a diversity of partners including government agencies, community groups, businesses, and the support of thousands of volunteers.” TCB manages the **Trees for Tucson** program.

Tucson Water “is piloting a new program that offers a more affordable water rate to community gardens to support local, community agriculture. Community gardens are defined in the City of Tucson Unified Development Code (Article 11.3.2.B) exiting Tucson Water website as “An area of land operated not-for-profit to grow and harvest food crops primarily for the use of its members who typically cultivate individual garden plots.”

Key Terms

Autocase: “Is a software tool that provides cost-effective, sustainable, and resilient stormwater management, watershed/sewershed, and land planning solutions for your project or client by incorporating social, environmental, and financial value into the design and stakeholder outreach process.”

Climate Adaptation: Is a response to global warming (also known as "climate change" or "anthropogenic climate change"), that seeks to reduce the vulnerability of social and biological systems to relatively sudden change and thus offset the effects of global warming. Even if emissions are stabilized relatively soon, global warming and its effects should last many years, and adaptation would be necessary to the resulting changes in climate.

Climate Mitigation: Climate Change Mitigation refers to efforts to reduce or prevent emission of greenhouse gases. Mitigation can mean using new technologies and renewable energies, making older equipment more energy efficient, or changing management practices or consumer behavior.

Climate Resilience: "Climate resilience is the ability to anticipate, prepare for, and respond to hazardous events, trends, or disturbances related to climate. Improving climate resilience involves assessing how climate change will create new, or alter current, climate-related risks, and taking steps to better cope with these risks."

Food Desert: "The USDA defines food deserts as parts of the country vapid of fresh fruit, vegetables, and other healthful whole foods, usually found in impoverished areas. This is largely due to a lack of grocery stores, farmers' markets, and healthy food providers."

Food Justice: "Food justice has emerged as a way of applying food security and anti-hunger movements to policy. 'Theoretically, the food justice frame opens up linkages to a wider range of conceptual frameworks drawn from the literature on democracy, citizenship, social movements, and social and environmental justice.' Food justice emerged as a way of applying food security and anti-hunger movements to policy by drawing from established social and environmental theoretical frameworks. The food justice movement is related to food sovereignty in that it critiques "structural barriers communities of color face to accessing local and organic foods" (Alkon et al) that are largely due to institutional racism and the effect it has on economic equality."

Food System: "Includes all processes and infrastructure involved in feeding a population: growing, harvesting, processing, packaging, transporting, marketing, consumption, and disposal of food and food-related items. It also includes the inputs needed and outputs generated at each of these steps. A food system operates within and is influenced by social, political, economic and environmental contexts. It also requires human resources that provide labor, research and education. Food systems are either conventional or alternative according to their model of food lifespan from origin to plate."

National Climate Assessment (NCA4): The Global Change Research Act of 1990, mandates that the U.S. Global Change Research Program (USGCRP) deliver a report to Congress and the President no less than every four years that: "1) integrates, evaluates, and interprets the findings of the Program…; 2) analyzes the effects of global change on the natural environment, agriculture, energy production and use, land and water resources, transportation, human health and welfare, human social systems, and biological diversity; and 3) analyzes current trends in global change, both human-induced and natural, and projects major trends for the subsequent 25 to 100 years."

National Climate Assessment (Southwest Chapter): "Responding to public demand for more localized information—and because impacts and adaptation tend to be realized at a more local level—NCA4 provides greater detail in the regional chapters compared to the national topic chapters. The regional chapters assess current and future risks posed by climate change to each of NCA4's 10 regions) and what can be done to minimize risk. Challenges, opportunities, and success stories for managing risk are illustrated through case studies."

Net Present Value (NPV): "Is the difference between the present value of cash inflows and the present value of cash outflows over a period of time. NPV is used in capital budgeting and investment planning to analyze the profitability of a projected investment or project. Autocase analyses generate the NPV of The TBL-CBA business case conducted in Autocase - a cloud-based software tool. This tool provides insights into the net present value (NPV) of costs and benefits of infrastructure projects, as well as the broader societal and environmental impacts over a 50-year time horizon using a 3% discount rate to convert all future cash flows into a present value.

Rainwater Harvesting (Active): "Active water harvesting, in contrast, uses rain barrels, cisterns, and other types of containers to store rainwater for later distribution."

Rainwater Harvesting (Passive): "Very simply, passive water harvesting works by shaping the earth to slow the velocity of runoff, infiltrate it into the soil, and direct it to where it can be beneficially used by vegetation"

Representative Concentration Pathway (RCP): NCA4 authors have grounded their assessment in an analysis of the widely used scenarios termed "Representative Concentration Pathways," or RCPs, that form the foundation for the majority of recent coordinated global climate model experiments. (RCPs are also discussed in this report's Front Matter.)

RCP2.6, RCP4.5, and RCP6.0 represent intermediate scenarios from the literature, resulting in primary energy use of 750 to 900 EJ (exajoules) in 2100 or about double recent levels; RCP8.5 is a much more energy-intensive scenario.

Comparing outcomes under RCP8.5 with those of RCP4.5 (and RCP2.6 in some cases) not only captures a range of uncertainties and plausible futures but also provides information about the potential benefits of mitigation. Comparing outcomes under the two pathways shows the degree to which significant emissions mitigation at the global scale can avoid some impacts and inform adaptation choices to the risks that are present even at the low-end scenario. The scenario range allows for an assessment of impacts at a variety of temperature thresholds.

> **RCP 8.5:** "Is a greenhouse gas concentration (not emissions) trajectory adopted by the IPCC for its fifth Assessment Report (AR5) in 2014. Four pathways have been selected for climate modeling and research, which describe different climate futures, all of which are considered possible depending on how much greenhouse gases are emitted in the years to come. The four RCPs, namely RCP2.6, RCP4.5, RCP6, and RCP8.5, are labelled after a possible range of radiative forcing values in the year 2100 (2.6, 4.5, 6.0, and 8.5 W/m^2, respectively). It is broadly accepted that the current global trajectory is the high concentration scenario, RCP 8.5."

Soil C-sequestration: "Because soil C plays essential roles in capturing rainwater, improving soil fertility, and "gluing" together soil particles to resist water and wind erosion, increasing soil C could be an effective way for humans to adapt to climate change in the Desert Southwest. Furthermore, by storing C in soil rather than emitting it into the atmosphere as potent greenhouse gases such as carbon dioxide (CO_2), increasing soil C also helps mitigate regional and global climate change. In Pima County, the need to quantify and increase soil C is not hypothetical. Pima County has signed onto the Paris Agreement run by the United Nations Framework Convention on Climate Change with the overarching goal of mitigating greenhouse gas emissions. Pima County operations currently emit roughly 108,000 tons of CO_2 per year into the atmosphere, but the goal of the County's Sustainable Action Plan is to emit 30% less by 2025, roughly 76,000 tons per year. Without significant upgrades to infrastructure in Pima County, achieving this goal partly depends on increasing soil C storage." (Blankenship, 2019)

Triple-Bottom-Line (TBL) Cost-Benefit Analysis (CBL): "An evidenced-based economic method that combines cost benefit analysis (CBA) and life cycle cost analysis (LCCA) across the triple bottom line (TBL) to weigh costs and benefits to project stakeholders. The TBL-CBA process quantifies total net present value, return on investment, and project payback. TBL-CBA uses location-specific data to give asset owners and design professionals the flexibility and capability to provide a rigorous analysis of investment alternatives through all stages of planning and design."

"Because it calculates both financial results and monetary values for social and environmental design impacts (valuing what have traditionally been considered intangible benefits such as reduced air pollution or enhanced

property values), it provides a common basis for evaluating the entire impact of a project across all three bottom lines (social, environmental or ecological, and financial).”