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STATE OF THE TUCSON FOOD SYSTEM

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The mission of the Center for Regional Food Studies is to integrate social, behavioral, and life sciences into interdisciplinary studies and community dialogue regarding change in regional food systems. We involve students and faculty in the design, implementation, and evaluation of pilot interventions and participatory community-based research in the Arizona-Sonora borderlands foodshed surrounding Tucson, a UNESCO-designated City of Gastronomy, in a manner that can be replicated, scaled up, and applied to other regions globally.

I. INTRODUCTION

The Sonora-Arizona borderlands region encompassing southern Arizona and northern Mexico arguably boasts some of the most impassioned advocates of an ecologically sustainable and socially just food system than anywhere else in North America. Its designation as a City of Gastronomy by UNESCO in 2016 attests to the region's rich agricultural and food heritage and knowledge.

The annual State of the Tucson Food System (STFS) report seeks to support the efforts of diverse social actors and institutions working across various sectors of the Sonora-Arizona borderlands food system by collecting and synthesizing the most recent data available to underscore successes, problems, and barriers.

Founded in 2016, the Center for Regional Food Studies at the University of Arizona launched the first STFS report. The inaugural STFS report provided baseline data around recent food system developments and initiatives happening in Tucson and southern Arizona more broadly. In its second year of publication, the 2017 STFS report focused on seed-saving and sharing networks within the Greater Tucson region and their implications for preserving and protecting biodiversity.

Based on feedback from various organizations, groups, and individuals, the third year of the report reflects a slight departure from how the contents of this report have been compiled in previous years. The contents of the 2018 STFS report have been organized around a particular framework, namely *Whole Measures for Community Food Systems* (2009) -- a comprehensive toolkit that has been used by municipalities across North America for community development and planning purposes. The toolkit offers one means to documenting change in the Sonora-Arizona regional food system by assembling data around a set of variables and through a process that can be revised and replicated over time. As such, the 2018 report can be viewed as a tool for food system stakeholders to engage in a process of planning and setting priorities for changes to local, regional, and binational food system practices and policy-making.

Despite the name of the report, our geographic focus is actually southern Arizona, specifically Pima, Santa Cruz, Cochise, and Yuma counties. From our conversations with stakeholders in the Greater Tucson region, it is clear that future iterations of the report should draw from binational data to develop a more comprehensive borderlands planning strategy for strengthening the regional food system. As detailed in *Hungry for Change: Borderlands Food and Water in the Balance* (2012), Nogales is the third highest entry point for food into the United States while border residents suffer from disproportionately severe rates of poverty and food insecurity. Noting the striking economic disparities along the U.S.-Mexico border, the *Hungry for Change* authors suggest that rates of food insecurity in Sonora, Mexico are four to six times higher than in Arizona. Ideally, the University of Arizona may partner with scholars based at one of its partner institutions in Mexico to develop a collaborative and applied research agenda that addresses binational food system challenges as well as to produce bilingual versions of the STFS report.



Photo: Alize Wilson-Ramirez

II. METHODS

Successful local food systems (LFS) are characterized by synergistic relationships that empower whole communities to improve food security, stimulate the local economy, and invest in sustainable agriculture, while mitigating food related health disparities (WMCFS 2009). *Whole Measures for Community Food Systems*, or *Whole Measures CFS*, offers a novel approach to evaluate these highly dynamic variables which contribute to the LFS. Based on the community evaluation tool entitled *Whole Measures: Transforming Our Vision of Success*, *Whole Measures CFS* was designed by the Community Food Security Whole Measures Working Group, a joint task force between the former Community Food Security Coalition of Portland, OR and the Center for Popular Research, Education, and Policy (C-PREP) in Rochester, NY.

Whole Measures CFS uses a values-based approach to expand on traditional statistical output and outcome measures by exploring the nuances of the many indicators which contribute to the overall health and success of a community and its local food system (WMCFS 2009). Six values-based fields are used to evaluate community food system development: **Vibrant Farms, Healthy People, Justice and Fairness, Thriving Local Economies, Sustainable Ecosystems, and Strong Communities.**

To inform these six fields, from October to November of 2018 we collected secondary data on southern Arizona's food system. An initial data solicitation was sent to 34 stakeholders and potential collaborators in southern Arizona's food system who were identified from previous reports and referrals from area experts. Additionally, this solicitation was circulated on the Center for Regional Food Studies' electronic listserv. Subsequent follow-up interviews were conducted with initial respondents as well as with supplemental referrals from participating stakeholders. Data contributions included organizational reports, yearly outputs and outcomes, peer-reviewed journals, internally generated white papers, and aggregated data from searchable databases maintained by local and federal government branches and nongovernmental organizations. In effort to fill any gaps after initial

community-based data collection, we conducted a variable-based literature search through *Web of Science* and archived publications from the College of Agriculture and Life Sciences (CALIS) at the University of Arizona. All statistical representations presented in this report were previously aggregated and calculated by secondary sources unless otherwise specified.

Using this type of methodology encouraged a variety of enthusiastic key community stakeholders to contribute data and guidance for this year's report. However, some challenges and limitations have generated valuable insights for how to approach the data collection process in subsequent years. The initial data solicitation process proved to be an efficient strategy for mass dissemination of a formal call for collaboration as well as informing our stakeholders of the Center's updated theme and research goals for the 2018-2019 State of the Tucson Food System report. The months of October and November are the height of festival season in southern Arizona, meaning that many local organizations that operate exceptionally well with limited resources were functioning at full capacity when they received the data solicitation. It should not be overlooked how our invitation to collaborate in the data compiling process impacted the limited time and resources at the disposal of these organizations for additional compilation of reports and organizational data. This method of data sourcing also relied on the availability of current secondary data from federal and state governmental agencies, some of which could be considered outdated by several years. For example, the 2017 USDA agricultural census has not yet been released, and there are severe gaps in data availability with regards to Supplemental Nutrition Assistance Program (SNAP) and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) enrollment by county in southern Arizona. Furthermore, accessing federal and state level data on purchasing requires filing a petition under the Freedom of Information Act which can take anywhere from four weeks to six months to be approved (FOIA 2018).

III. FINDINGS

a. Vibrant Farms

The 2014 census counted more than 2,000 farms in southern Arizona. In Cochise County, there are 1,093 farms with an annual production upwards of \$150 million covering 916,672 acres with an average farm size of 839 acres. Pima County is home to 855 farms with an annual production of \$97 million. Much of Arizona's ranching and cattle industry is concentrated in Santa Cruz County, where some 236 farms cover 214,930 acres and bring in over \$15 million annually (USDA NASS 2014).

In comparing agricultural production across Arizona's border counties, Matt Mars and Hope Schau (2017) recently reported that "nearly 80 percent of the 855 farms in Pima County operate on 50 or less acres, while 56 percent of Santa Cruz farms and 44 percent of Cochise farms are limited to the same range of acreage. Ten percent of the region's farms sell over \$100,000 of food products per year. Conversely, approximately 70 percent of southeastern Arizona farms sell less than \$10,000 of product per year for an annual sales total of over \$2.7 million, which includes \$2 million of direct farmer-to-consumer transactions," (p. 577).

Lettuce (25 percent), dairy products and milk (17 percent), cattle (16.7 percent), miscellaneous crops (12.6 percent), and hay (4.8 percent) account for Arizona's top agricultural commodities (USDA ERS 2018a). Pima County ranks 5th in the state for barley production, 6th for cotton and 7th for alfalfa hay. Yuma County ranks 1st in the state for Durum Wheat and vegetable production, 3rd for cattle and 4th for cotton, barley and alfalfa production. Yuma County has been known as the "Winter Salad Bowl Capital" as it produces almost all of the vegetables consumed in the United States during the winter months aside from that which is imported from Mexico. Cochise County ranks 4th in the state for cattle ranching, 3rd for barley production, and 5th for Durum Wheat and alfalfa hay (Arizona Farm Bureau 2018).

According to the US Bureau of Labor Statistics North American Industry Classification System (NAICS), the mean annual wages for southern Arizona laborers in the crop production subsector, which includes "establishments such as farms, orchards, groves, greenhouses, and nurseries, primarily engaged in growing crops, plants, vines, or trees and their seeds" is \$35,264.25 (USDOL BLS 2018). That said, presenting this number objectively may undermine the social and cultural nuances of southern Arizona's agricultural economy: payable wages and tenable crops are often directly connected to migrant labor and access to capital (Vázquez-León 2009). For example, Latinx farmers in southern Arizona are often excluded from federal subsidies due to an emphasis on fruit orchards and high-value vegetable crops like chillies and elote (white corn), as opposed to commodity crops (Vázquez-León 2009). Between 1995 and 2005, the total amount of subsidies granted to 39 Hispanic-owned farms (\$1,166,067) was 98.8 percent less than the \$92,255,324 in subsidies granted to 812 Anglo-owned farms in southeastern Arizona (Vázquez-León 2009).

Small-scale growers in southern Arizona continue to face numerous economic and environmental constraints including access to capital, land, and water. The Center for Regional Food Studies co-sponsored the 2018 Food and Farm Finance Forum in Gilbert, AZ organized by **Local First Arizona** that brought together more than 200 farmers, ranchers, food artisans, distributors, market managers, and other local food and food access advocates. Presentations and workshops fostered discussion and strategies centered on building a diverse and more prosperous food system in Arizona. Workshop topics included impactful investing, agricultural co-op development, local food distribution, urban agriculture, resources for food entrepreneurs, and funding and marketing for producers.

The Southern Arizona Young Farmers and Ranchers Coalition (SAYFRC), an official chapter of the National Young Farmers Coalition (NYFC), formed in the summer of 2018. SAYFRC is a network of emerging farmers, ranchers and their supporters that advocate for policies to benefit the next generation of farmers. With more than 20 or so active participants and a listserv of 130 members, SAYFRC strives to educate members about state and federal policies affecting agrarian livelihoods, and to teach, share, and advocate for innovative, traditional, and indigenous growing practices. There is also the Farmer Education Resource Network (FERN) whose mission is "to secure local food sources in the desert Southwest through educational exchanges

between current producers engaged in diverse ecologically conscious agriculture, and a new generation of food producers.”

b. Healthy People

Community health is often indicative of the local food system: access to a varied and nutritional diet plays an integral role in overall health throughout the life course and directly affects the ability of an individual or group to positively engage in the community.

Close to 1.5 million residents inhabit Arizona’s border counties (USDA ERS 2018b). The latest census data reflect that southern Arizonans are coping with poverty at rates higher (Cochise 21.1 percent; Pima 18.2 percent; Santa Cruz 20.9 percent; Yuma 19.3 percent) than the average for Arizona state (14.9 percent) (USDA ERS 2018c). Food insecurity in southern Arizona is slightly higher (Cochise 14.5 percent, 18,540; Pima 14.1 percent, 141,120; Yuma 16.1 percent, 32,800) than the state average (13.1 percent), with the exception of Santa Cruz County (8.3 percent) (Feeding America 2018). In 2016, the average childhood food insecurity rate in southern Arizona, including Yuma, Pima, Santa Cruz, and Cochise counties was 25.3 percent (compared to 14.9 percent statewide and 17.5 percent nationally) with 75,220 food insecure children (Feeding America 2018).

It is estimated that 600,000 adults in Arizona are currently living with diabetes (AZDHS 2018b). Examining the prevalence of diabetes by county in southern Arizona shows that Yuma (13.1 percent), Pima (9.8 percent), Santa Cruz (10.0 percent) and Cochise (11.4 percent) fall within three percent (+ or -) of statewide prevalence (10.3 percent)¹.

Examining eligibility and enrollment of federally funded nutritional programming such as the **Women, Infants, and Children (WIC)**

Arizona are low, particularly in Pima County: only 14.7 percent of Pima County residents were reported to use SNAP.

The USDA’s (2018b) data on WIC show that participation of eligible WIC recipients in Arizona (50.8 percent) is similar to the national average (52.7 percent). When Arizona’s participation rates of eligible WIC recipients are stratified by *women, infants, and children*, eligible *women* show only 4.2 percent less participation than the national average, while participation of eligible *infants*, and *children* also remain quite close. The most recently published data on WIC enrollment among eligible populations in southern Arizona show that participation varies significantly by county, most notably in Santa Cruz County which boasts a rate of participation of 91.1 percent (AZDHS 2013a).

Although WIC and SNAP enrollment varies across southern Arizona, several institutions and local organizations are investing in long-term community health through nutrition education programming. Each year, the **UA Community and School Garden Program (CSGP)** invests 12,000 hours of volunteer labor into the local community. This includes 120 UA student interns working with K-12 educators to provide applied gardening experiences to over 4,000 students at 22 schools and 3 community gardens. In addition to reported increases in participants being able to recognize healthy foods, understand the importance of biodiversity, and acquire increased awareness of social and environmental justice, the majority of participating students and teachers reported that participating in this school-based community garden program increased their connectedness and engagement with their respective schools (Korchmaros and Haverly 2017).

Located in Central Tucson, the UA Cooperative Extension’s **Tucson Village Farm (TVF)** offers programs on agriculture, nutrition, and

SOUTHERN AZ COUNTIES	2012-2016: % OF POP. USING SNAP (% MARGIN OF ERROR) ²
Yuma	19.6% (1.1)
Pima	14.7 % (0.4)
Santa Cruz	25.5% (2.5)
Cochise	16.2% (1.2)

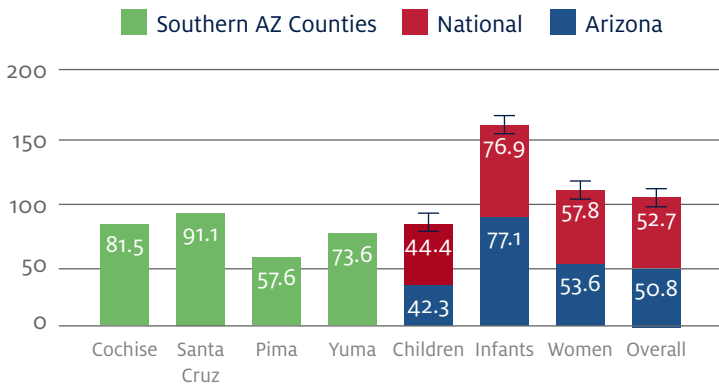
Program and the **Supplemental Nutrition Assistance Program (SNAP)** provides initial insight into community health and resource engagement in southern Arizona. The most recent data published by the US Department of Agriculture (USDA) shows the estimated participation rates of all eligible people in Arizona is 70 percent while participation by working poor is 62 percent (USDA 2018a). County-level data in southern Arizona is not as readily available. However, comparing the calculated rate of SNAP participation from 2012 to 2016 (FRAC 2016) and estimated SNAP eligibility from 2018 (Feeding America 2018) offers a close approximation for rate of enrollment by county. By comparison, the estimated rates of enrollment in southern

healthy living for Pre-K and K-12 students. Between 2010 and 2015 TVF had more than 23,000 school-aged children visit and participate in educational programming (Nabhan, Bellante, and Martin 2017). In 2017, TVF delivered an additional 44,000 hours of programming to 12,913 youth and adults (TVF 2018). TVF Instructional Specialist, Parker Filer adds that “In addition to making STEM education something tactile and tasty, gardening helps the next generation to discover and appreciate local food -- for their own health and the health of the community. I think that’s a large part of why teachers and parents are booking group field trips to TVF a year in advance.”

¹Age adjusted diabetes mortality rates per 100,000 people for Yuma (28.1), Pima (28.1), and Santa Cruz (29.7) are elevated compared to both 24.5 per 100,000 in Arizona (AZDHS 2018b) and 21.3 per 100,000 in the United States as a whole (Murphey et al. 2017).

²Retrieved from Food Research & Action Center’s “FRAC analysis of 5-year 2012-2016 American Community Survey data”, in collaboration with Punam Ohri-Vachaspati, PhD, RD, Professor, Arizona State (www.frac.org/snap-county-map)

(%) Participation Rates of Eligible WIC Recipients



Southern Arizona maintains a strong tradition of investing in community health as it is also home to a variety of community-based health organizations. In Greater Tucson, **El Rio Community Health Center** serves 900 patients a day (76 percent of whom are living below the federal poverty line), offering behavioral health, exercise and wellness programs, and a novel Pharmacy-Based Diabetes Management program that mitigates expenses while fostering relationships between pharmacists and patients (El Rio 2018). Since 2003, **Clinica Amistad** has also been offering free diabetes services and referrals to patients without health insurance (Clinica Amistad 2017); an estimated 11.9 percent of children and 20.1 percent of adults are currently without health insurance coverage in Pima County (PCHD 2014). **Mariposa Community Health Center (CHC)** has been providing affordable health services in Santa Cruz County since 1980. Mariposa CHC currently delivers comprehensive services from four locations throughout Santa Cruz County including in Ambos Nogales. Additionally, the **Arizona Community Health Workers Association (AzCHOW)** represents a vast network of lay health workers who offer nutrition education and diabetes prevention programming in rural communities, particularly in southern Arizona (AzCHOW 2017).

c. Justice and Fairness

Many of southern Arizona's residents are living situated within "food deserts."³ One comprehensive study of Tucson found that residents of East and West Tucson had to travel on average four miles to purchase groceries. The researchers identified 38 census tracts as urban food deserts, but found that the number was cut in half to 19 census tracts when they included independent grocery stores (and not just supermarkets or large grocery stores) (Tong and Buechler 2016).

The Community Food Bank of Southern Arizona (CFB) has been leading regional efforts to ensure access to food for all residents of the region, distributing more than 34 million pounds of food annually, 45 percent of which is routed through partner organizations. In addition to its food distribution, in 2018 CFB provided nutrition and garden education to 4,217 K-12 students; engaged 1,839 adults and 420 families in nutritional health education; provided 5,870 seniors with monthly health and nutrition resources; provided 2,000 hours of skills and

leadership education to 200 partner institutions and supported two year-round farmers markets (CFB 2018). In the past year, CFB provided 102,662 community meals prepared by **Caridad Community Kitchen**. More than 178,788 unduplicated CFB clients also benefited from the The Emergency Food Assistance Program (TEFAP) (63 percent people of color, 24 percent white, 31 percent children, 17 percent older adults ages 60 and over). CFB helped to facilitate more than \$400,000 in statewide SNAP-match appropriation for local produce purchases. In addition, CFB has been proactive in analyzing the nutritional quality of its distribution programs and in implementing its nutrition policy.

Borderlands Food Bank and **Produce on Wheels** help to ensure food access through rescuing 30 to 40 million pounds of produce per year for redistribution in the border region to 4,992 registered households in Santa Cruz County and an additional 3,847 households in Mexico (Nabhan, Bellante, and Martin 2017).

There are several larger institutions in southern Arizona which have the potential to improve both food security and access to locally grown produce. In order to connect local producers to institutions in southern Arizona, CFB is coordinating the **Farm-to-Institution Value Chain Initiative**, a joint effort between regional small farmers, anchor institutions, and businesses like **Pivot Produce** to aggregate and facilitate purchasing of local produce by key institutions such as Tucson Medical Center and Tucson Unified School District (Audra Christophel, Personal Communication 11/26/18). In addition to serving nearly 14,000 pounds of fresh produce from as many as 15 local producers to feed local students in the 2017-2018 school year (Rani Olson, Personal Communication 11/15/18), Tucson Unified School District also incorporates food from 12 of its school gardens which have been certified through the state health department (Moses Thompson, Personal Communication 10/2/18). TUSD is considering a grant-funded pilot distribution project for the 2019-2020 school year which will further engage local producers to provide local fresh food for Tucson students (Rani Olson, Personal Communication 11/15/18).

Food insecurity among college students is a growing concern across the country. While the University of Arizona does not currently have a cafeteria system that could potentially support local producers while mitigating food insecurity among college students, the UA Student Union has begun to work with the Farm-to-Institution Value Chain Initiative, and the **UA Campus Pantry** reports serving nearly 550 students within the 11 hours of its weekly distributions, roughly 250 of whom seek access more than one day a week (Bridgette Nobbe, Personal Communication 10/22/18). Students involved with UA Campus Pantry were instrumental in leading the construction of a rooftop greenhouse that is now using hydroponic technology to grow food exclusively for students and staff who utilize the pantry.⁴

³The American Nutrition Association defines food deserts as "parts of the country void 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."

⁴https://tucson.com/news/university-of-arizona-rooftop-greenhouse-helps-feed-students-staff-in/article_8c46c1a5-8ef2-5a21-b357-of1c1286c69a.html

d. Thriving Local Economies

Southern Arizona is comprised of a variety of local food entrepreneurs (LFEs) who promote and support the local food system through localized production, distribution, and consumption (Mars and Schau 2017). This social and economic synergism is further explained by Mars and Schau (2017): “the producers and purveyors who function as commercial LFEs supply the bulk of the locally harvested and produced foods that bring sustenance to the system. In turn, the organizers and narrators, who function as both social and commercial LFEs, create and enhance the market spaces through which the producers and purveyors access the customers needed to sustain and grow their local food enterprises” (p. 590).



Photo: Alize Wilson-Ramirez

Arizona is known for its impressive quantity of farmers markets compared to states similar in geography and ecology (Nabhan, Mars, and Glennon 2016). Pima County alone supports 22 farmers markets (City of Gastronomy 2018; Mars and Schau 2017), 10 of which accept WIC and SNAP electronic benefit transfer (EBT) cards, and four community supported agriculture programs (CSAs). In the city of Tucson, the food industry employs 39,000 people (14 percent of the city's jobs) and boasts twice the amount of food trucks and food carts per capita than New York City (City of Gastronomy 2018). Furthermore, 63 percent of the 2,500 restaurants and bars are locally owned and over 145 artisanal food products created with unique local ingredients from 45 local producers can be found throughout the city (Ibid). While the local food scene is especially vibrant in Pima County, Cochise and Santa Cruz counties also offer local farmers markets and CSAs in the towns of Marana, Bisbee, Douglas, Elfrida, Green Valley, Safford, St. David's, Sierra Vista, Sonoita, and Nogales (Arizona Department of Agriculture 2017; NCD 2018).

Pivot Produce plays a vital role in the local food economy. Founded in 2016, Pivot Produce serves as a marketing and distribution hub for small-scale organic growers in southern Arizona, and has sourced from 23 farm businesses and distributed to 29 local restaurants, breweries, and schools. Pivot Produce's reach and impact is impressive,

having sourced from farms as far as 121 miles from their warehouse, encouraged 18 restaurants to begin sourcing local produce, and introduced 12 farms to the restaurant market since the company's inception (Erik Stanford, personal communication).

The **Community Food Bank of Southern Arizona (CFB)** has invested significant resources in creating a thriving local economy, including grants, loans and culinary/vocational training for people facing obstacles to employment. In FY 2018, CFB provided partner organizations with a total of: \$175,000 in low interest loans; \$183,235 in capacity building grants; \$100,000 in public assistance benefits used to purchase local food products at farmers markets; matching SNAP sales at farmers markets for a total of \$18,000. CFB also generated \$370,000 through local food sales and trained 35 culinary students at La Caridad Kitchen totalling 10,636 hours (CFB 2018). Other organizations offering loans and micro-loans for local food entrepreneurs include the Community Investment Corporation and Local First Southern Arizona in partnership with the YWCA.

While southern Arizona is making strides in local food markets, there is still great potential for improving local produce sourcing and access to affordable processing. Each year 125,000 to 150,000 truckloads (carrying 40,000 lbs each) of produce cross the Nogales Port of Entry totaling nearly 5.9 billion pounds of produce (Nabhan, Bellante, and Martin 2017). According to Nabhan, Bellante, and Martin (2017) nearly 60 percent of the produce arriving in Nogales on the U.S. side, is “on consignment” or is contract grown, while brokers own the remaining 40 percent. When the broker-owned produce does not sell nationally, it may be discounted and sold locally, or donated to the two local food banks (The Community Food Bank of Southern Arizona and Borderlands Food Bank) and small-scale livestock producers and local roping arenas (Nabhan, Bellante, and Martin 2017).

Southern Arizona currently has a shortage of licensed commercial kitchen space, which complicates the processing and storage component in the local food economy (Moses Thompson, Personal Communication 10/2/18; Mars and Schau 2017). Although there is potential to process locally grown produce in no less than six certified commercial kitchens found in Santa Cruz and Pima Counties, there is limited cold storage space for fresh produce (Rani Olson, Personal Communication 11/1/18; Nabhan, Bellante and Martin 2017). Even when available, renting commercial kitchens for processing can be a costly endeavor for small-scale producers who must also factor in transportation and processing labor costs.

e. Sustainable Ecosystems

There are several organizations in southern Arizona working towards a sustainable ecosystem. Some of these organizations are focused on diverging food waste. **UA Compost Cats** has collected about 5 million pounds of food waste per year for the past two years (Nabhan, Bellante, and Martin 2017). The **Iskashitaa Refugee Network** annually glean and processes over 100,000 pounds of crops from backyards and local farms to process into value-added food products (City of Gastronomy 2018; Nabhan, Bellante, and Martin 2017), while teaching community members the importance of sustainable food systems, fruit tree identification, and harvesting techniques to increase community

food security (Iskashitaa 2018). **Scraps on Scraps** offers a subscription composting service to Tucson residents to dispose of their food waste.

In terms of water use, as much as 73 percent of Arizona’s water is consumed by agriculture. Since 79 percent of Arizona’s agriculture is exported, 67 percent of the state’s limited water supply is exported along with it (Bae and Dall’erbab 2018). Several institutions and organizations are working to improve use of local water and to disrupt



Photo: Hannah Williamson

extraction of water from the Colorado river, located hundreds of miles away which currently accounts for 40 percent of Arizona’s total water supply (Artiola, Uhlman, and Hix 2017). **Watershed Management Group** promotes hydro-regionalism, or “meeting a region’s water needs with renewable supplies from the local watershed” including watering that only uses rainwater, greywater and stormwater (WMG 2018). There is also a trend for using recycled water in conventional farming: recycled water accounts for nearly 260,000 acre-feet (or 4 percent) of annual water use in Arizona (Cusimano et al. 2015). The University of Arizona Water Resources Research Center (WRRC) found that while most reuse permits intended for agricultural irrigation use are concentrated near metropolitan areas, 15 percent of the reuse permits in Arizona which included agricultural irrigation came from Pima and Cochise counties (Rock, Solop, and Gerrity 2012). The Community Water Coalition of Southern Arizona has also been committed to water conservation and protection for rivers and riparian areas through various activism efforts and authoring assorted green papers to affect policy change (CWC 2017).

In Tucson, the **UA Community and School Garden Program (CSGP)** and **Tucson Village Farm** have both been engaging youth in environmental stewardship. In a recent program evaluation of

CSGP, students reported that working in their school garden both increased the awareness of the importance of rain and water use in growing food (87 percent elementary; 73 percent high school), and increased their knowledge of the importance of biodiversity “quite a bit” (74 percent elementary; 64 percent high school). Teachers and

PLAN TUCSON: CITY OF TUCSON GENERAL AND SUSTAINABILITY PLAN 2013⁵

Primary Goal: The City strives for...	Subsequent Goals: The City strives for...	Our progress toward these goals can be measured by:
A sustainable urban food system.	A community that is healthy physically, mentally, economically, and environmentally. A sustainable and diversified economy that maximizes Tucson’s strategic location and balances traditional import and export of resources with locally supplied goods and services to meet local demand. A community whose vibrant economy and quality of life benefits residents and attracts visitors. A community that is resilient and adaptive to climate change. A reduction in the community’s carbon footprint, and greater energy independence.	Amount of fresh food produced through local urban agriculture. Amount of fresh food sold locally at farmers markets or other direct farm-to-consumer activities. Ability of low-income families to access low-cost, healthful food. Percentage of residents within a walkable 1/4-mile of a healthful retail food outlet. Percentage of residents living in a food desert.

⁵Retrieved from Plan Tucson, City of Tucson General & Sustainability Plan: Urban Agriculture Goals, Policies, Metrics, and Sustainability Outcomes. November 13, 2013.

UA student interns also reported that participating in CSGP increased their “appreciation for earth’s processes and social and environmental justice” (Korchmaros and Haverly 2017: 4-7). Over the past two years, Tucson Village Farm has expanded its programs because of growing demand among students pre-K through 12th grade to get to know their food system.

Southern Arizona has an impressive seed conservation network: more than 2,000 varieties of desert-adapted seeds are accessible from five seed banks and all 26 county library branches in the state. County library users check out over 35,000 packets of desert-adapted seeds annually, including 141 food crops and nine wild edible species (City of Gastronomy 2018).

f. Strong Communities

Several food policy-oriented groups have been actively engaged in conversations to address regional food insecurity and food system issues, including: the City of **Tucson’s Commission on Food Security, Heritage, and Economy; Pima County Food Alliance; Tucson City of Gastronomy;** and **Healthy Pima.**

Groups such as **Iskashitaa Refugee Network** and the **International Rescue Committee** have been focused on alleviating food insecurity among certain segments of the population, specifically refugees. As part of its New Roots Program in 2017, the International Rescue Committee of Tucson taught 30 garden workshops and graduated three micro-producers who currently work with the Community Food Bank of Southern Arizona.

In addition to the 57 community gardens supported by **TUSD** and the **Community and School Garden Program** (City of Gastronomy 2018; Moses Thompson, Personal Communication 10/2/18), the **Community Food Bank of Southern Arizona** continues to support over 100 families at its Las Milpitas farm as well as at several of its own community gardens. In support of community-based agricultural projects, the **City of Tucson** offers reduced water rates to nonprofit community gardens through a new pilot program, including financing for the installation of a dedicated irrigation meter and backflow device used for watering (City of Tucson 2018).

The **La Doce Barrio Foodways Project** serves as a recent example of efforts to support urban agriculture and food micro-enterprises at the neighborhood level. Utilizing a participatory process of citizen ethnography, the project’s methodology consisted of mapping green spaces and informal food practices, administering questionnaires, and conducting in-depth interviews with residents of Tucson’s La Doce neighborhood. In its final report, project partners called for the formation of a La Doce Community Land Trust and Community Fund to support local development and the acquisition of land, properties, and micro-lending programs, as well as to convene a La Doce Community Council “to coordinate a shared vision for systemic changes.” Tucson is also home to several other food justice advocacy organizations and community-based groups such as: **Flowers and Bullets, Tierra y Libertad, Food Security and Social Justice Network, Seeds Semillas, LEAF Network, Mission Garden, The Garden Kitchen, San Xavier Co-op Farm, and Sonoran Permaculture Guild.**



Photo: Hannah Williamson

IV. DISCUSSION

In what follows, we compare the findings presented above to particular indicators outlined by each of the value-based measures in the *Whole Measures for Community Food Systems* toolkit.

In terms of **Vibrant Farms**, our region has significant work ahead in ensuring that local, sustainable family farms are able to be economically viable. Resources are needed to: build capacity for farmers in sustainable farm practices; develop policies that encourage success in small and mid-scale farming ventures; guarantee protections for farmers and farmworkers, including ensuring fair wages and safe working conditions; and recruit and retain new generations of farmers.

With respect to **Healthy People**, there are commendable efforts already underway that connect people with the food system in our region “from field to fork,” including projects that: connect local food producers and consumers; increase knowledge of the dialectical relationship among food, environments, and people; teach “people of all ages the skills and knowledge essential to food production, preparation, nutrition, and enjoyment”; provide “safe settings and opportunities for people to directly experience the land”; and inspire “neighbors to grow food and to share food and food cultures” (WMCFS 2009). However, there is ample opportunity to improve on efforts in ensuring healthy food for all. Examples include decreasing “inequities across race and class that contribute to food insecurity and compromise health”; utilizing “a broad range of public investments and tools (such as land use planning) to increase access to healthy food”; and deepening “understanding of the interrelationships between food security, inequities across race and class, and health outcomes” (WMCFS 2009).

In terms of **Justice and Fairness**, several groups and organizations are leading the way in ensuring “access for all community members to fresh, healthy, affordable, and culturally appropriate food,” including through campaigns and initiatives with public institutions and local businesses that support justice in the community food system at large (WMCFS 2009). However, we were hard-pressed to find evidence of efforts that tackle injustices in the food system, including injustices against workers.

A select group of organizations are also leading the charge to promote **Thriving Local Economies**. Existing efforts include investment in community-based enterprise development and business incubator programs that help community members, youth, and food-insecure individuals to develop entrepreneurial skills and cultivate ownership. Nonetheless, much broader investment is needed to: promote “economic support structures for the next generation of producers”; ensure “that decisions about local economies are directed by members of the community”; build “community economic literacy to sustain long-term economic sustainability”; and promote “green building and energy conserving practices on farms and in facilities related to food processing or distribution” (WMCFS 2009).

Existing conservation and food waste diversion programs underscore efforts toward **Sustainable Ecosystems**, but these programs need much more support in addition to the related and most pressing issue of how our region’s agricultural and food distribution practices contribute to or mitigate climate change. Much more can be done to reduce reliance on fossil fuels, utilize renewable energy sources in food production and distribution, build healthy soils to help sequester carbon, provide “community opportunities to understand and make informed decisions about climate change,” and promote “policy changes to mitigate agricultural factors contributing to climate change” (WMCFS 2009).

Among all of the value-based variables, **Strong Communities** emerges as the one with the least supporting evidence, perhaps because it is one of the most challenging to measure. However, it is arguably the most important variable in that it is the necessary precursor to ensuring the success of the other five variables. Without strong communities, there is little foundation on which to build toward a vision of community food systems. Although we could infer through some of our data collection activities that there is “a broad range of community members involved in defining and supporting food-related goals,” we were not able to find evidence of how the region as a whole is faring in terms of building “capacity for and community control of food resources and assets,” balancing “community food goals with housing, transportation, and social goals,” and cultivating civic participation, political empowerment, and local leadership (WMCFS 2009).

V. RECOMMENDATIONS

1. Given southern Arizona’s proximity to the U.S.-Mexico border and the impact of multilateral trade agreements (e.g., NAFTA) on the food security and health of populations in both countries, the University of Arizona should partner with other universities in the borderlands region to develop a binational applied research agenda that seeks to address food system issues, promote human health and wellbeing, and mitigate climate change. In March 2018, the University of Arizona hosted “Surviving Peak Drought and Warming,” a multi-day workshop that included panels on local and urban food systems. We would encourage more of these types of events focused on the complex relationship of agrifood systems to climate change and how these issues traverse geopolitical borders.

2. Southern Arizona counties and cities should implement measures to provide more support to small-scale and beginning farmers, identify incentive programs to integrate renewable energy with agricultural operations, and remove barriers to various forms of certification and entry to market for small growers. In addition, there is demand for more entrepreneurial training and loan programs for new food businesses in southern Arizona. Local First Arizona has been engaged on a statewide level around these issues and should be considered as a core partner on any future endeavors.
3. As soon as possible, existing food policy councils or similar entities throughout southern Arizona should review the existing state of the food system and in the context of community-wide public fora, initiate the value-based planning process as outlined by the *Whole Measures for Community Food Systems* toolkit.
4. Counties in southern Arizona should appoint councils and allocate the required resources to develop and implement integrated agrifood policies so that regional challenges and problems of agricultural production can be addressed alongside challenges with food security, public health, food justice, and food sovereignty.
5. There is need for deeper understanding and awareness of how the different food and agriculture-related struggles of specific populations (i.e., refugees and immigrants, Latinx, Native American tribes, the urban poor) form part of broader struggles for social justice in the Sonora-Arizona borderlands region. The Center for Regional Food Studies programming theme for the 2018-19 academic year is “Histories of our Foodshed” with the goal of examining how the multiple histories of the borderlands region shape present-day challenges around agro-ecological systems, resource distribution, and uneven life chances. Events have been focused on addressing food justice from a historical perspective. It is crucial that historically marginalized populations are represented on any governing body seeking to develop integrated agrifood policies. It is equally important that these groups are not only given a seat at the table but that they hold positions of leadership.

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APPENDIX

Privately Owned Crop Production Establishments (NAICS 111) in Southern Arizona, 2017

County	Yuma	Pima	Santa Cruz	Cochise
Number of Establishments	103	27	5	29
All Employees	3897	549	198	270

data taken from the United States Department of Labor Bureau of Labor Statistics Quarterly Census of Employment and Wages Original Data Value: NAICS category 111: Number of Establishments in Private NAICS 111 Crop production for All establishment sizes per county

Whole Measures for Community Food Systems

Vibrant Farms	<ul style="list-style-type: none"> • Supports local, sustainable family farms to thrive and be economically viable. • Protects and cares for farmers and farm-workers. • Honors stories of food and farm legacy through community voices. • Respects farm animals
Healthy People	<ul style="list-style-type: none"> • Provides healthy food for all. • Ensures the health and well-being of all people, inclusive of race and class. • Connects people and the food system, from field to fork. • Connects people and land to promote health and wellness.
Justice and Fairness	<ul style="list-style-type: none"> • Provides food for all. • Reveals, challenges, and dismantles injustice in the food system. • Creates just food system structures and cares for food system workers. • Ensures that public institutions and local businesses support a just community food system.
Thriving Local Economies	<ul style="list-style-type: none"> • Creates local jobs and builds long-term economic vitality within the food system. • Builds local wealth. • Promotes sustainable development while strengthening local food systems. • Includes infrastructure that supports community and environmental health.
Sustainable Ecosystems	<ul style="list-style-type: none"> • Sustains and grows a healthy environment. • Promotes an ecological ethic. • Enhances biodiversity • Promotes agricultural and food distribution practices that mitigate climate change.
Strong Communities	<ul style="list-style-type: none"> • Improves equity and responds to community food needs. • Contributes to healthy neighborhoods. • Builds diverse and collaborative relationships, trust, and reciprocity. • Supports civic participation, political empowerment, and local leadership.

TUCSON AND SOUTHERN ARIZONA COMMUNITY FOOD ASSETS (2018)

(11-9-18, COMPILED BY TUCSON CITY OF GASTRONOMY)

- 82 Annual Culinary Festivals and Events**
Events with foods or beverages as a focus and/or celebrating heritage foods
- 2 Community Farms**
Urban farms offering gardening plots or seed-to-table education
- 20 Community Gardens**
Plots available to community members to grow household food
- 18 Culinary Education Programs**
Educational culinary programs for career paths, industry certifications, state licenses, and/or high school or college credit
- 3 Culinary Training Programs for the Disadvantaged**
Free/discounted culinary and food service training for people facing obstacles to employment
- 16 Discount Produce Markets**
Discounted bulk produce pick-up sites
- 75 Free Food Distribution Sites**
Locations offering free food assistance or meals
- 20 Farmers Markets**
Locally grown produce and artisanal food products from southern Arizona
- 4 Food Heritage Gardens**
Botanical gardens exhibiting edible plants historically grown in the region
- 7 Food Research Centers and Extension**
University of Arizona facilities and programs for food research and education
- 4 Food Waste Diversion Programs**
Organizations composting food waste or harvesting unused foods from urban yards and nearby farms
- 24 Free Seed Libraries**
Desert-adapted seeds available on-site or through inter-library loan
- 10 Gardening and Healthy Cooking Classes**
Locations offering free or discounted seed-to-table education
- 7 Local Edible Seed and Plant Retailers**
Locations selling desert-adapted food seeds and plants
- 17 Local Food Retailers**
Locations selling locally produced and wild-harvested ingredients and artisanal products
- 20 School Gardens**
Plots used as educational tools and to supply cafeterias



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