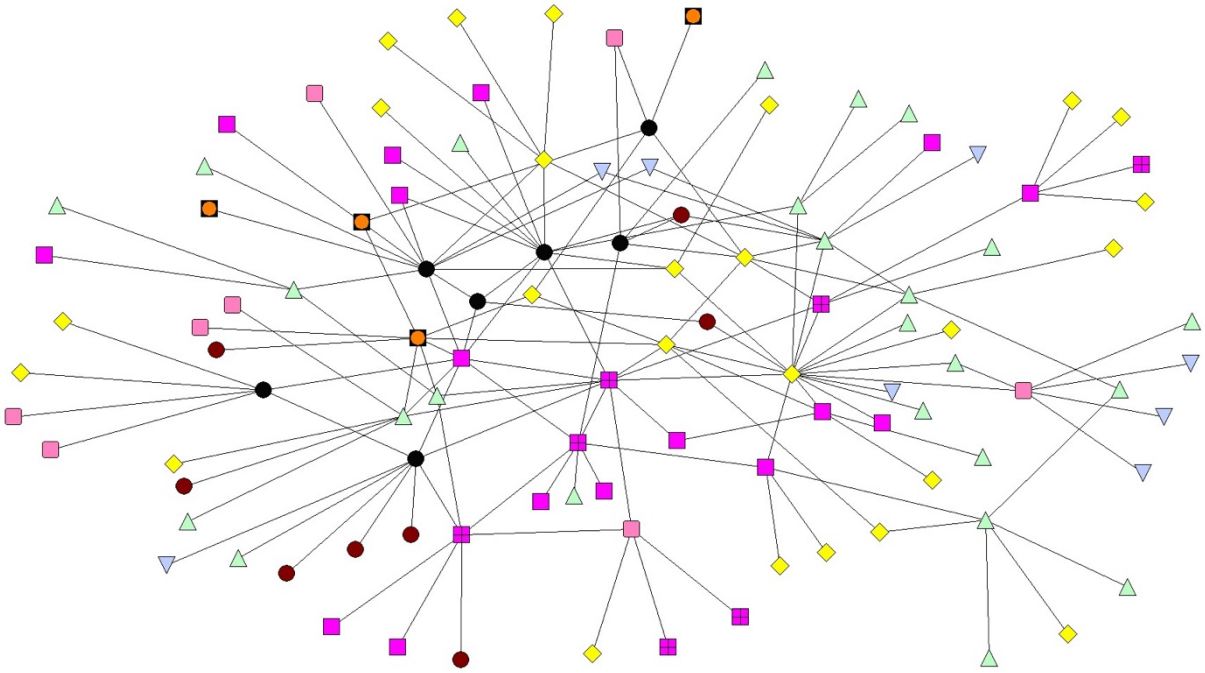
BUILDING COMMUNITY NETWORKS THROUGH COMMUNITY FOODS



Presented to:

Maricopa County Food System Coalition
Food Assessment Coordination Team (FACT)

Maricopa County FOOD SYSTEM COALITION

With Funding from:

Gila River Indian Communities

Presented by:
Ken Meter — Crossroads Resource Center (Minneapolis, MN)
Megan Phillips Goldenberg — New Growth Associates (Saline, MI)
Paula Ross — University of Toledo, Retired (Toledo, OH)

June 23, 2018

TABLE OF CONTENTS

OVERVIEW

Purposes:

To strengthen local community networks, promote health, and retain local wealth through economic activity generated in Maricopa County.

Goals:

1. The Maricopa County Food System Coalition desires to build its capacity to clearly articulate the existing assets, needs, and opportunities for supporting actors and processes within the Local Food Supply Network.
2. The Maricopa County Food System Coalition desires to build a comprehensive understanding of the relationships, connections, shared values, and motivations that drive community food system efforts outside of the work underway by well-known Food Access Organizations.

Activities:

Perform interviews with key stakeholders addressing the following questions:

1. What are the emerging community food networks in the region?
2. What factors enable or constrain these networks?
3. What factors enable or constrain the scaling up of local food in the region?

Key Funder:

Gila River Indian Communities

STAKEHOLDER ENGAGEMENT

The following 33 people made significant time and informational contributions to this study by partaking in interviews and offering data useful to our research. We are indebted to all.

First Name	Last Name	Organization/Association	Position	Location
Rosanne	Albright	City of Phoenix	Food System Program Manager	Phoenix
Janna	Anderson	Phoenix Pinnacle Farms	Owner	Laveen
David	Brady	Sun Produce Coop	Board President	Pinal County
Dean	Brennan	Arizona Local Food Summit	2018 Summit Coordinator	Chandler
Chad	Chase	Arrandale Farms	Owner	Phoenix
Peter	Conden	Mesa Community College	Program Director	Mesa
Anne	Costa	Honor Health Desert Mission Food Bank	Nutrition Outreach Coordinator	Phoenix
Sean	Duncan	Duncan Family Farms	Co-owner	Buckeye
Cindy	Gentry	Maricopa County Department of Public Health	Food Systems Coordinator	Phoenix
Elyse	Guidas	Farm Express Mobile Market	Executive Director	Phoenix
Clint	Hickman	Hickman Family Farms	VP of Sales	Maricopa County
RJ	Johnson	Peddler's Son Produce	Local & Organics Curator	Phoenix
David	Laney	Maricopa County Food System Coalition	Member	Phoenix
Frank	Martin	Crooked Sky Farms	Owner	Phoenix
David	Martinez	St. Mary's Food Bank *[Now at Arizona State]*	Community Engagement Manager	Phoenix
Joseph	Martinez	Arizona Microgreens	Owner, Farmer	Phoenix
Paris	Masek	Green on Purpose Food Hub	Coordinator	Phoenix
Natalie	Morris	Local First Arizona	Director of Food Initiatives	Phoenix
Bo	Mostow	Uptown Farmers Market	Manager	Phoenix
Julie	Murphree	AZ Farm Bureau	Director of Outreach	Gilbert
Kristen	Osgood	Stern Produce	Sustainability Director	Phoenix

Amy	Prestanski	Honor Health Desert Mission Food Bank	Community Benefit Planning Coordinator	Phoenix
Mark	Rhine	Rhibafarms LLC	Owner	San Tan Valley
Linda	Rider	Tempe Elementary SD	Director of Nutrition Services	Tempe
Chip	Satterlund	Community Exchange	Coordinator	Phoenix
Ashley	Schimke	AZ Dept. of Education	Farm to School Specialist	Phoenix
Erich	Schultz	Steadfast Farms	Owner	Queen Creek
David	Schwake	Litchfield Elementary SD	Food Service Director	Litchfield
Adrienne	Udarbe	Pinnacle Prevention	Executive Director	Phoenix
David	Vose	Blue Sky Organic Farms	Owner	Litchfield Park
John	Wann	Orchard Community Learning Center	Coordinator	Phoenix
Christopher	Wharton	ASU School of Nutrition and Health Promotion	Interim Director	Tempe
Kelly	Young	Field to Market	Educational Resource Manager	Washington, DC

EXECUTIVE SUMMARY

Farmers in Maricopa County appear to be among the most productive vegetable growers in the US, yet they may very well be the most isolated farmers, too. This is due to many factors: a lack of trust among growers, a lack of connection with civic leaders, and limited interest from consumers.

This is debilitating to the Phoenix community on many levels. On the simple level of economics, Maricopa County consumers spend at least $10 billion each year purchasing food sourced outside of the County, while neighboring farmers struggle to make a living. Moreover, City and County officials appear committed to a development strategy that will further erode financial resources by allowing new housing development that is likely to consume more in public services than it brings in property tax revenue. All of this plays out in a context in which water availability is uncertain and the medical costs of diabetes — largely attributed to faulty diet and exercise — total $4.8 billion per year for the state of Arizona (American Diabetes Association, 2012). Meanwhile, Maricopa County depends on $900 million of federal aid each year to provide food relief to low-income residents — roughly the same amount of money that farmers earn selling alfalfa, cotton, vegetables, and grains for export. This is a community heading to a crisis.

Yet the lack of connectivity in Maricopa County is also deeply problematic for social reasons. In a region that upholds a staunch individualist and libertarian ethic, it is very difficult to be resilient in the face of changing conditions that are increasingly more chaotic. Our sources told us that the region is polarized, with one interviewee naming the biggest threat as the “Lack of knowledge on the part of decision

makers about food and agriculture." Further, some respondents told us that the greatest promise for healing social wounds would be to build community-based food systems.

Our report focuses on the ways in which community foods organizing has built connections among residents over the past several decades. By mapping out the networks that farmers have built around themselves, we learned more about their social and commercial isolation. We learned that farmers' organizations such as the Farm Bureau and its Young Farmers and Ranchers group help to build support, but only in minimal ways for those farmers who are dedicated to growing for local markets. Both food businesses and nonprofits broaden and deepen that support leading to opportunities to collaborate, weaving a fabric of community, and significantly, laying the foundation for a stronger local economy with higher multipliers.

One stakeholder observed that Phoenix has "food silos" rather than a "food system." This appears totally apt. Addressing this isolation is our foremost recommendation. Four action priorities (which we hope will be taken in collaboration with local partners such as the Maricopa County Food Systems Coalition, Local First AZ, Sun Produce Co-op, Green on Purpose, and farmers' market organizations) are:

1. **In collaboration with local partners, convene informal meetings in which diverse farmers build trust among each other and with diverse civic leaders.**

2. **Mount outreach and education campaigns that persuade Maricopa County residents to buy food from farms in the County.**

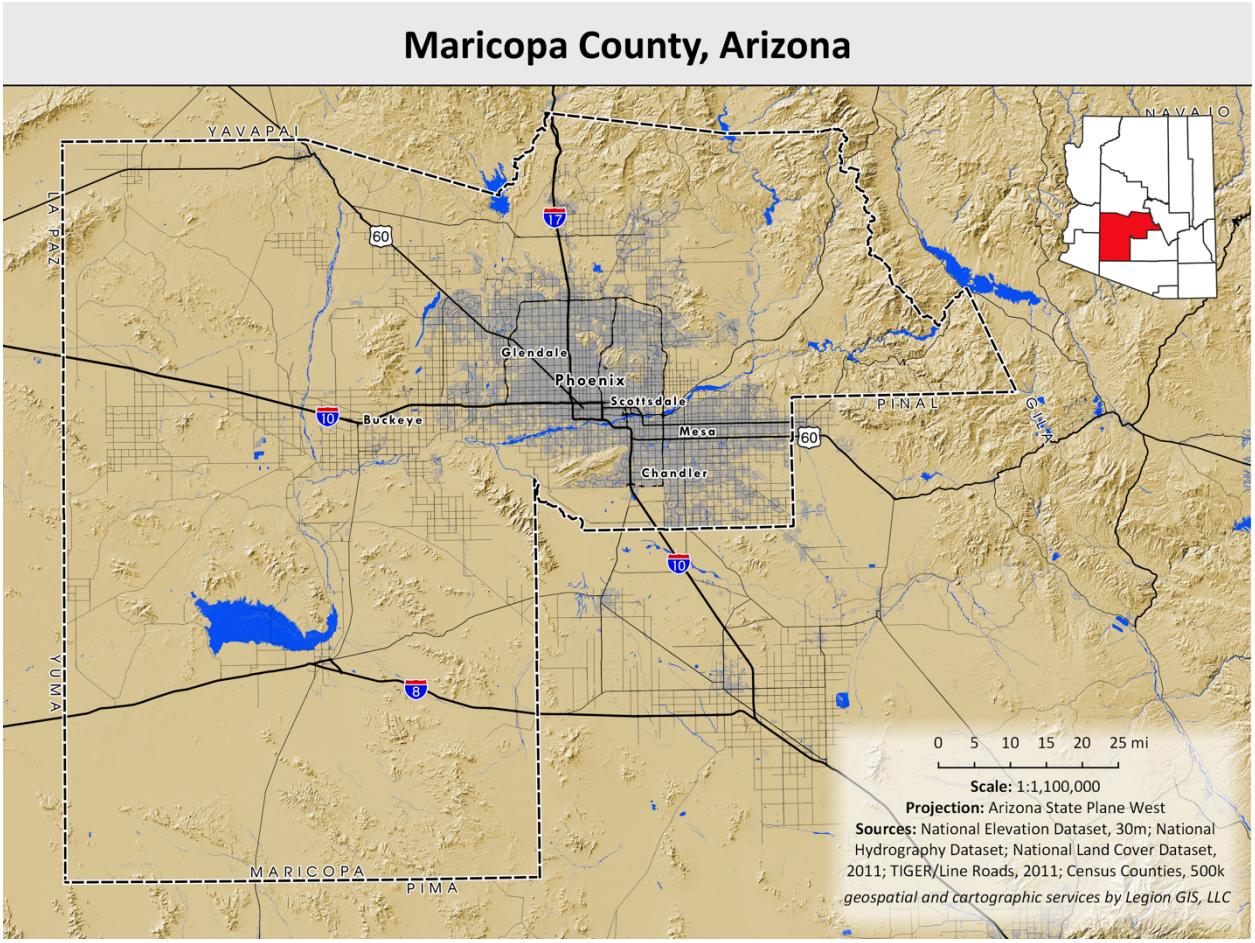
3. **Launch a long-term effort to grow new farmers in Maricopa County.**

4. **Collaborate with Tribal Nations and other stakeholders to ensure long-term water access.**

In addition, physical and knowledge infrastructure will be required to build stable community foods trade through these networks over the long term. These ancillary strategic steps, such as building infrastructure projects, establishing food hubs or other aggregation initiatives, increasing school purchasing, and fostering community gardening are all critical to implement — yet unless these efforts help build the social connectivity of residents in the region, and contribute to building trust among farmers and other stakeholders, they will be premature. All should be taken in collaboration with local partners such as those named above.

INTRODUCTION

Map 1: Maricopa County, Arizona



Map by Legion GIS.

Maricopa County & Phoenix, Arizona

Moving towards a community-based food system is especially important for Maricopa County given its staunch heritage of agriculture, its dependence on fragile water supplies, and the dramatic growth it has experienced in recent years.

Just after Arizona became a state, the 1920 Census of Agriculture counted 2,229 farmers in Maricopa County. It is very likely that many Native American farmers were not counted in this Census so this number is likely to underrepresent agriculture at the time. At the same time, the County had a population of only 34,488 and held 248,271 acres of farmland. Average farm size was 111 acres. While a

wide variety of crops and livestock were grown, much of this food was exported to metropolitan markets.[1]

Now, nearly a century later, the County holds a total of 2,479 farms — essentially the same number it had a century ago.[2] Far more acreage — total of 475,898 acres — is now farmed, and farmers sold $905 million of crops and livestock in 2012. Average farm size grew to 192 acres, with 1,500 (60%) of the County's farms less than 10 acres in size. Yet despite having the same number of farms as it held at statehood, Maricopa County now has 4.2 million mouths to feed, 120 times the population of a century ago. These tallies do not include tens of thousands of tourists or wintertime residents.

Current full-time residents buy about $12 billion of food each year. Our interviews suggest that only a small fraction of that food is grown within Maricopa County. We estimate that well over $10 billion leaves the County each year as consumers buy essential food items.[3]

This despite the fact that Maricopa County is the number one agricultural county in Arizona, ranking first in total cash receipts, and in sales of milk, eggs, ornamentals, and forage crops. The County also ranks second in cotton and vegetable sales, and third in sales of cattle (Census of Agriculture, 2012). More than one-quarter of all farm cash receipts in Arizona are earned by Maricopa County farms. A recent study estimated that agriculture in Maricopa County has an overall economic impact of $1.9 billion (Duval et al, 2018).

Curiously, however, recent population trends show a deep disconnect between farmers and consumers. While the County population rose 350% from 1969 to 2016 (that is, more than quadrupled), and personal income rose more than seven-fold to $185 billion over that time (even after adjusting for inflation), farm income has steadily eroded (See Appendix 2). The net cash income for all Maricopa County farmers combined — the amount farmers earned after production costs were subtracted from cash receipts for the products they sell — fell from $225 million in 1969 (in 2016 dollars) to $6 million in 2016 (See Appendix 2).

There were better years. Overall sales of crops and livestock by Maricopa County farms peaked at $2.3 billion in 1973-74 — more than double their current value. Yet recent trends are mystifying. Although hundreds of farmers stopped farming, production expenses rose 34% from 1991 to 2016 (adjusted for inflation), fueled by rising costs for animal feed. The largest and most reliable source of income for farm owners is to rent out their land, rather than farm it (See Appendix 2). This means asking someone else to shoulder the risks of farming.

---

[1] The 1920 Census of Agriculture shows that of the 67,136 cattle that were sold by Arizona farmers in 1909, only 9,361 were slaughtered in the state (Census of Agriculture 1920, p. 65). Cattle would typically be driven toward stockyards in distant states. Total livestock sales were $1.3 million. Of the $5.4 million of crops that were sold by Arizona farmers in that year, nearly half were forage and hay, most likely dedicated to feeding cattle living in the State. Arizona farmers spent $2.5 million on labor, and only $6,080 on fertilizers in that year. This suggests that while a considerable number of livestock appear to have been exported, raising these animals contributed strongly to both the Arizona farm economy and to supporting a population of laborers.

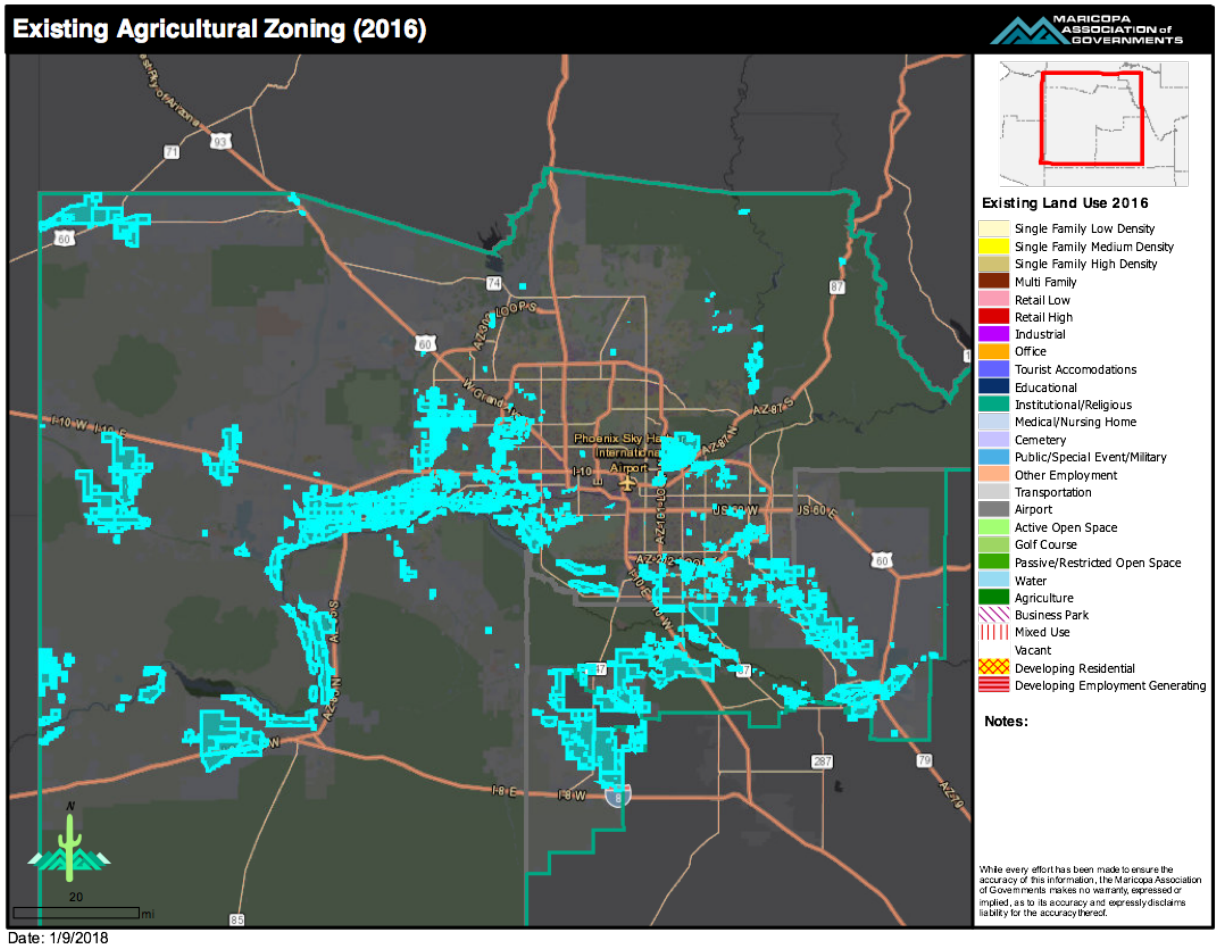
[2] In recent years, USDA NASS has made concerted efforts to ensure that more farmers of color are counted by the Census, and the 38% increase in the number of farms in Maricopa County from 2007 – 2012 is likely due to better counting.

[3] Calculation by Meter based on Consumer Expenditure data from Bureau of Labor Statistics.

Perhaps most tragically in an agricultural region, food stamps (SNAP benefits) are a more important source of income than farming itself, with a total of $737 million of SNAP benefits received by low-income people to purchase food. This food is largely sourced outside of the County, as well. These federal payments are now worth 80% of the value of all crops and livestock Maricopa County farmers sold in 2016, and 120 times farmers' net cash income (See Appendix 2). Moreover, despite rapidly rising incomes, nearly one of every three County residents (1.3 million people) lives in a household earning less than 185% of the Federal Poverty Level — hardly enough to cover basic costs (Federal Census 2012-2016).

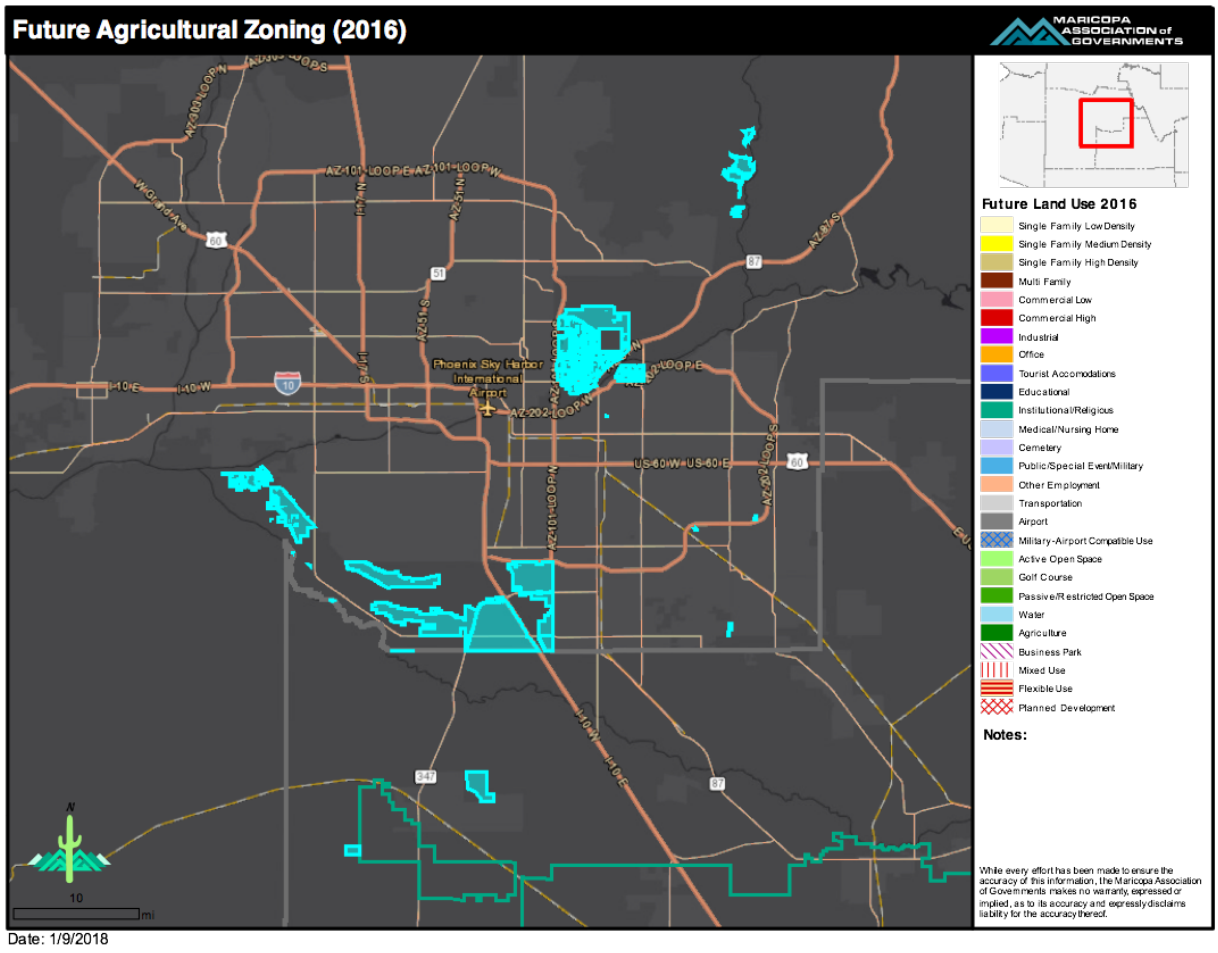
These trends are stark, but should also be considered in light of Maricopa County's development plans. The following two maps show current County land use, as well as projected land use in the future. Note that the County currently allocates only 4% (260,749 acres) of its land (5,902,858 acres) to agricultural zoning (much of this is not currently farmed, although considerable farmland does not appear to be subject to zoning), while future plans call for that to be reduced to 0.6% (37,427 acres).

Figure 1: Maricopa County Agricultural Zoning (2016)



Source: Maricopa Association of Governments web site. This map shows only the most urbanized parts of the County. Agriculturally zoned land is shown in light blue, with other zoning muted, so the legend on the right is not useful. http://geo.azmag.gov/maps/landuse/

Figure 2: Future Maricopa County Agricultural Zoning (as of 2016)



Source: Maricopa Association of Governments web site. This map shows only the most urbanized parts of the County. Agriculturally zoned land is shown in light blue, with other zoning muted, so the legend on the right is not useful. http://geo.azmag.gov/maps/landuse/

Clearly, Maricopa County has not dedicated significant attention to framing a policy that would ensure that its rapidly rising population would be able to eat food from nearby farms. Quite the contrary: those we interviewed often commented that developers own most all of the farmland, and policymakers largely believe new construction is the priority. The limits on the County's capacity to grow are obvious — water may be less available in the future, and the metro region ultimately holds limited power over its own water supply, since northern rivers feed the watershed, and treaties and legal precedents protect tribal water rights. Moreover, there is no clear indication that the costs of new housing development actually are covered by the new tax base generated (Farmland Information Center, 2016; See Appendix 2). The County appears to have addressed the future of its food supply rather reactively — assuming that someone, somewhere, will raise food that can be purchased, even at the cost of shipping $10 billion each year out of the County and overlooking the opportunity for farmers to contribute solid foundation for the Maricopa County economy.

Motivations for Commissioning this Work

As it wrestles with dynamics such as this, the Maricopa County Food System Coalition appointed a Food Assessment Coordination Team (FACT) to compile solid data about the farm and food economy of the County. The Gila River Indian Community (GRIC) funded this work. In a separate report, scholars examined the economic impact of the agricultural sector (Duval et al, 2018).

Methodology

For this report, consultants were asked by FACT to study the community networks that have been built by local leaders who are building a community-based food system for Maricopa County. To perform this research, we asked FACT to compile a long list of wise practitioners who would serve as candidates for in-depth interviews covering these food system networks. Local leaders then contacted people on this list, setting up 33 interviews with those named at the front of this report. These included farmers, food buyers, chefs, business people, food banks, nonprofit staff, City and County staff, and others who held expert opinions regarding the workings of the community-based food trade.

In two separate weeks of face-to-face meetings, consultants asked each interviewee to describe the work they do to promote community foods trade. We asked each person to identify the key strengths and weaknesses of the community-based food system, and to identify key opportunities for strengthening this work.

Finally, we asked each person to name the five principal partners with whom they collaborated. Recognizing this can be sensitive information; we promised each interviewee that we would not identify any individuals named as principal partners. We believe that our respondents offered us very comprehensive and honest information.

One additional methodological note: We interviewed farmers in August, during what is often considered a fallow period for farmers due to overbearing heat. It was our hope that farmers would be able to relax a bit during this slow period, and take time for thoughtful conversations. This turned out to be true, yet it also must be said that many farmers were in the middle of intense production seasons despite the extreme heat. Many had taken steps on their farms to ensure that production could continue through the hot weather. Nonetheless, each farmer we spoke with was generous with their time.

The second week of interviews was held in February, with interviews conducted by a separate interviewer. While this might have introduced both a time gap and a lack of consistency to the interviews, we are pleased to discover that our findings were consistent across the two weeks.

Our research team coded the responses given by our interviewees, and prepared spreadsheets for Paula Ross, retired researcher from the University of Toledo, to create visual displays using Social Network Analysis (SNA) software. The platform used was UCINET. Honoring our commitments, we do not identify any individuals on these maps, and analyze these networks only in relation to broader themes. Results will be kept confidential long after the end of this project.

Profiles of Key Farm and Food Businesses

We begin, as any discussion of food should, with the farmers.

Crooked Sky Farms. Photo by Ken Meter.

Crooked Sky Farms

Owner: Frank Martin
Location: Phoenix

One of the pioneers in producing for local markets, Frank Martin has experienced great disruption in building his farm business. Starting on a one-acre plot in Waddell decades ago, he moved to a 5-acre plot behind a house, then launched a partnership with a landowner in Glendale. After launching Arizona's first Community Supported Agriculture (CSA) operation on an 18-acre site there, serving primarily the Tucson market, the owners suddenly sold the land, forcing Frank to move. At his next location, he leased land from an owner who wanted to own the 1,400-member CSA operation Frank had built, and who ultimately brought in a second farmer to compete with Frank.

Finally, Frank was able to procure his current farm on South 27th Avenue and West Lower Buckeye Road in Phoenix. This farm is now the central location for his complex operation. "You have to develop a new plan every time you move," Frank lamented. While he noted that "Getting a lease is really easy," since so many developers own land they are not ready to build upon, "No farmer can afford to buy this land," given competing buyers with deep pockets.

Frank now leases land in four different locations in Phoenix. These range from 10 to 40 acres in size, from which he serves 400 CSA customers, about a dozen restaurants, several grocers, and distributors. He raises a wide range of products. “We grow everything,” Frank added. Yet he finds markets quite limited. “We need the ability to sell everything we grow.”

To hedge against the uncertainty of land tenure in the city, and to diversify the crops he can grow, Frank also farms a property in Duncan, Arizona, and owns another three miles from there in Virden, New Mexico. He explained that the two eastern farms in the Gila River valley lie at a higher elevation where it is easier for him to grow crops such as watermelons, chiles, and bell peppers.

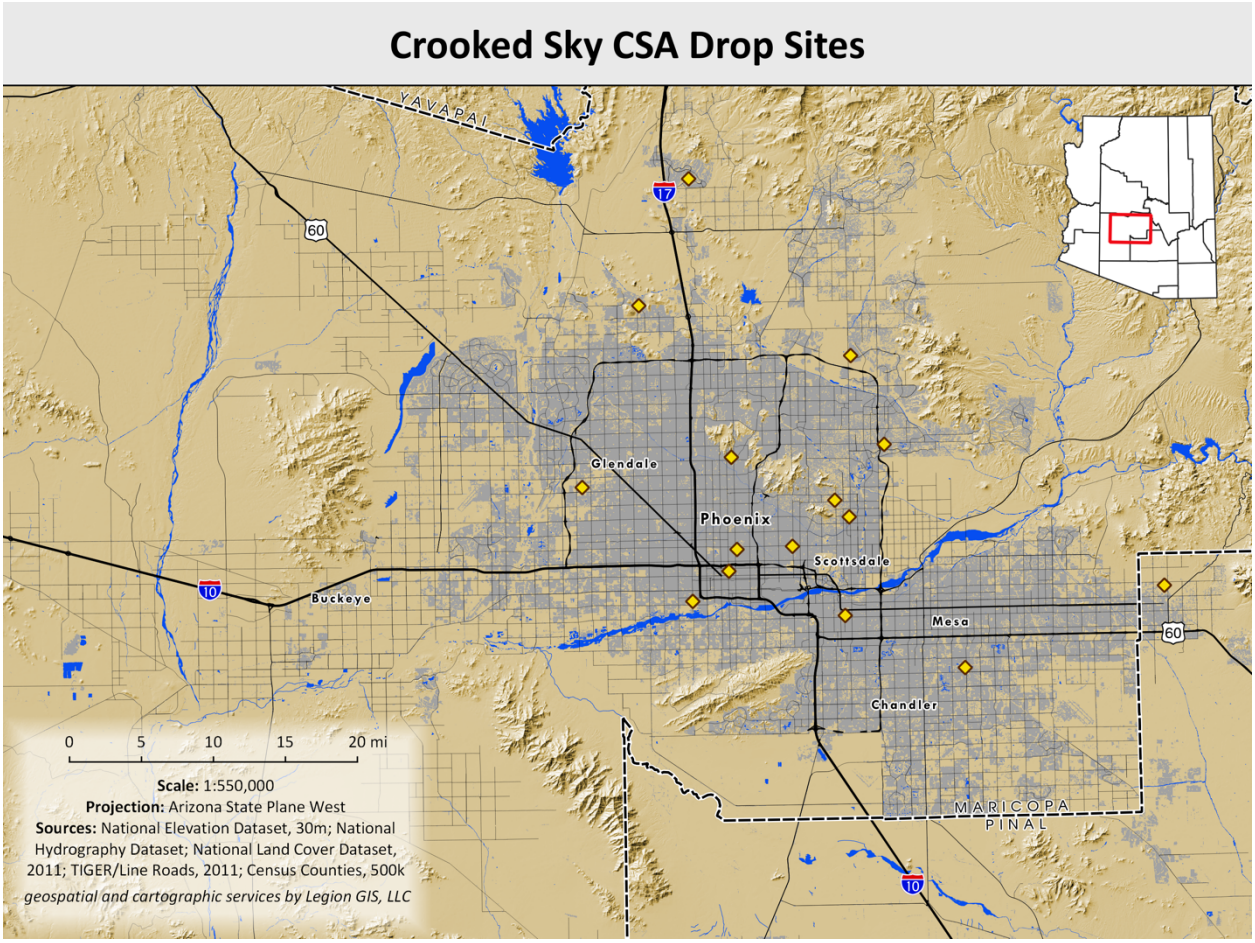
Frank purchases most of his seeds from Johnny’s Selected Seeds (Maine) and Baker Creek Seeds (Missouri), and also saves seeds from his own produce and plants them. Having grown up poor, he is dedicated to feeding those who have been marginalized, so he donates about 100,000 pounds of produce each year to food banks and pantries.

Frank said the biggest problem he encounters is finding good labor. “We need people who know how to work. You can’t find them at any money. Some people come out and they last 30 minutes.” Nonetheless, he has established a core of 15-20 solid workers, and mainly recruits through those who already work for him.

“Farmland on the fringes of Phoenix is really fragmented now,” Frank said. While his central farm has been farmed continuously since the opening of the Salt River Project in 1918-1920, and likely was farmed by Native American tribes long before that, it is endangered today. “When farmers stop farming land, it ceases to exist as farmland.”

Frank sees similar trends within his own family. Having built this strong farm operation, and even though a son works for him, he said, “My kids have no desire to farm.” As for Frank himself, “I want to farm until I die.”

Map 2: CSA Drop Sites for Crooked Sky Farm



Source: Crooked Sky Farm web site. Map by Legion GIS.

Arrandale Farms

Owners: Chad Chase & Anthony Chase
Farmer Interviewed: Chad Chase
Location: Phoenix

Chad and Anthony Chase are new urban farmers who sought out land in the former Hallcraft Farms subdivision of Phoenix, drawn there because of its heritage as a farming community. Today, however, the area is primarily a suburban housing tract, with the few remaining farms scattered among residential neighborhoods. While there is an active homeowner's association, there are only a few who farm.

As newcomers, the Chases decided to venture into farming by taking deliberate steps. "We are starting out small scale and trying things out to see what is profitable," Chad explained. "An urban farm is a different kind of beast. We don't want to become a nuisance to our neighbors." Chad says he has relied heavily on a Young Farmers Coalition sponsored by the Arizona Farm Bureau for support in devising his farming strategies. He also networks with other southern fruit growers.

Arrandale Farms. Photo by Ken Meter.

With an easy smile, Chad joked that when he started farming one-and-a-half years before, “Chickens were my gateway livestock.” Raising eggs gave him confidence and determination to add other animals to help build soil quality and create the most efficient farm possible.

Now the Chases also raise alpacas for their wool, fruits and vegetables on their 2-acre farm. Currently they sell a limited number of produce items, including broccoli, cucumbers, carrots, tomatoes, citrus fruits, and figs. They planted grape vines, and have expanded the orchard to include tropical fruits, peaches, nectarines, plums, and apples. To extend their marketing reach, they have invested in a freeze-drier so they can sell dried fruit off-season.

They market most of their products through the Community Exchange (see profile on page 27), which charges a small commission for carrying their food items, and saves them the expense of staffing a stall themselves. “They are a real asset for a starting grower,” Chase added.

Yet starting small also poses some difficulties. State regulations limit them to selling 750 dozen eggs per year from their farm. Chad said they are allowed to sell these eggs at the farmers’ market, as long as they do not wash them.[4] But since they raise eggs without a formal license, they cannot market the eggs using terms “local” or “farm fresh.” If they wanted to exceed the current egg limit, they would have to

[4] If the amount of 750 dozen eggs produced in a calendar year is exceeded, the “nest run” producer must convert to a "fee-paying producer." This requires packing graded eggs in the proper weight classes. It also requires a quarterly inspection fee payment to the Department of Agriculture. This "mill fee" is currently 3.0 mills per dozen, 9 cents for each 30-dozen case of eggs produced. This fee funds the inspection program. https://agriculture.az.gov/sites/default/files/Nest%20Run%20Producer%20Info_App%20%2812-8-17%29.pdf

wash the eggs, which requires tremendous hand labor, or investing in a $6,000 machine. Their calculations show that to pay for that equipment, they would need more chickens than they are allowed to raise on the property they farm, because the City has set a limit of 20 hens per half-acre. “Right now we are capped at 80 hens,” He added that regulations have strange inconsistencies: if their farm were only one half-acre larger, “We could sell an unlimited number of eggs.”

In part to make visible the conundrums such restrictions pose, and hopefully to rationalize City regulations, Chad has joined a new agriculture subcommittee for the City of Phoenix. Yet Chase also recognizes that this discussion may be a difficult one: Ultimately, he said, “We will probably buy property outside of the City. “There, we can build infrastructure to the maximum capacity.”

Chase also acknowledges that they have certain advantages over many starting farmers, since “we have money.” This allows them to make patient decisions with considerable comfort. This also makes it easier for a starting farm to donate some of their products. “We will sell or give away food to the underserved.”

Duncan Farms

CEO: Arnott Duncan
Person interviewed: Sean Duncan, Supply Chain Manager
Location: Buckeye

Sean Duncan. Photo by Ken Meter.

The Duncan family corporation holds deep roots in Arizona, but is also diversifying to other parts of the US. Arnott Duncan was a fourth-generation farmer in 1985 when he left his family’s farm to raise

conventionally raised cotton and alfalfa on a 50-acre farm in Buckeye. That land is still part of the Duncan farm, but now the family farms more than 8,000 acres in Maricopa County and has purchased new farms in California, Oregon, and New York State. The firm has grown from about a dozen employees to more than 200.

The family has also devoted considerable energy to engaging the Phoenix public at its Buckeye location. Giving farm tours helped persuade the family to adopt organic growing practices. Sean Duncan said that his mother Kathleen began to lead farm tours on their property "in order to reduce the urban-rural divide. People were coming to the edges of our fields, so we had to essentially farm those fields organically [for safety reasons]." By following organic practices, "We began to see there were benefits agronomically to using organic methods, and we decided to be proactive in making that change."

This decision was also motivated by Arnott's (Sean's father) discovery that "raising cotton and alfalfa did not fill him up" spiritually. He found himself studying the markets for vegetables and decided that was where his true interests lay. The family also started to view success as building entire food systems, not simply in forging a strong individual operation. That led them to appreciate the value of composting organic material on their farm to create new fertility. "Now we have a full-on composting operation." They rely heavily on horse, cow, and chicken manure, and collect landscaping trimmings from both public and private sources for composting, grow cover crops, and rotate crops annually to build fertility. Adding organic mineral blends, they also have begun to reduce tillage to foster better microbial growth.

Sean Duncan added that when one sets out to build a better food system, "There is no silver arrow. You have to look at everything." By 2001, Sean added, the family had built sufficient experience in organic production that "We believe in our organic practices. You don't have to worry about your neighbor's farm, and our customers value having a diversity of options."[5]

Today the family raises organic baby greens including a wide variety of lettuces and greens including red and green oaks, red and green romaine, red and green leaf, lolla rosa, tango, mizuna, red chard, green chard, tatsoi, baby kale, arugula and spinach. These are washed and packed at processing centers in Yuma County, the Salinas Valley, and the East Coast. Distributors in these locations sell packaged greens to the major firms globally, including in Canada and the United Kingdom. "We're the number two supplier of organic bagged salads," Sean said.

In addition to working with these processors, the family also sells organic specialty bunched greens (kales and chards), bunched herbs (cilantro, Italian parsley, curly parsley), bunched root crops (red, gold and Chiogga beets), romaine hearts and Salanova® lettuce for distribution to both institutional food services and retail stores.

With their four locations, the Duncans can leave Maricopa County fields fallow during the intense heat of the summer, while focusing their summer farming on their sites in New Cuyama, California; Merrill, Oregon; and Brockport, New York. They have been attracted to New York State because of the receptivity of the Wegman's grocery firm to working with them to offer locally raised produce. Sean added, "There is not a lot of infrastructure to support large-scale farming here [in Maricopa County]."

[5] Duncan farms sells both conventional and organic produce.

Sean added that labor is one of the family's constant concerns. "I don't really have a good solution for this now. We hire local people where possible, but also rely heavily on contract labor including the guest worker program." Yet that program is restrictive, too: "If we hire a group of workers for the harvest, we cannot ask them to do another job like weed control unless we rewrite the contract." While the family likes to adopt new technologies as they become available, and would like to automate, "That would require infrastructure here" [such as mechanics who can repair new equipment].

The family was forced to give up its farm tours in 2003, when the military base near their farm changed its policies and would not allow visitors so close to a defense installation. But the family continues to engage the broader community. Arnott Duncan served on the board of directors of St. Mary's Food Bank, and the farm donates almost a million pounds of food each year.

Rhibafarms LLC

Owner: Mark Rhine
Location: San Tan Valley, AZ

As the sun eased below the horizon, Mark Rhine welcomed us to join him at the end of a long workday. Like many farmers we spoke with, he had recently been displaced: a partnership that had run Rhibafarms from land in Gilbert failed, and Mark had to scramble to find a new location. After less than a year at his new farm, Rhine has made solid impacts.

He had occupied this new land in the San Tan Valley for only eight months when we visited, but the farm looked settled in, as if it had been rooted there for years. Mark took us on a whirlwind tour of his fields, which were a lush green in August, when many growers decide not to grow at all because the heat is so overbearing. Mark dismissed the idea that farming had to stop for the hot season, explaining that he built up so much organic matter in the soil that it retained water very well — and he had irrigation water to work with. He also mulches heavily with straw to help the soil retain moisture.

"This soil is just filled with nutrients," Rhine said, as he swept his hands over the fields. "You put some compost down and the organic matter draws the nutrients up for the plants to use." Mark's analysis carried considerable weight, since he sells millions of dollars of produce, ranks among the first 30 farms in the state to become GAP certified, runs the only Arizona farm GAP-certified to produce mushrooms, and opened the first commercial aquaponics operation in Arizona. He applies the effluent from his fish farm to his fields to add fertility.

Mark added that he farms with a "passion for local food," yet he also offered a caution that seemed curious: "I want to make sure farmers are part of that." He added that while the Phoenix region is eager to open new farmers' markets, "there are less than 10 farms that can supply them." The market is strong, he added, "but there are not enough farmers, for sure."

Mark has decided to focus on selling to major grocery chains and larger distributors. He said that he became weary of selling at farmers' markets since it was too "up and down." Some vendors, moreover, were buying products from Mexico and passing them off as their own. While some markets have clamped down on such practices, and Gilbert is "pretty clean," Rhine abandoned farmers' market sales. He added that he does not like the CSA model, because it is too unpredictable. Rather, he has found more stable markets with larger buyers.

Mushroom Cultivation at Rhibafarms. Photo by Ken Meter.

The Safeway and Albertson's chain, he added, approached him to ask if he would grow for their juice bars. This was an unusual market segment that valued foods that are denser with nutrients than typical produce. "I was very lucky. They had a very pleasant buyer. I told him I would grow for him but I was not going to sign a contract."

One of Rhibafarms' key products is microgreens. Wheat grass grown in a proprietary production system inside former shipping containers has become one of his leading products for the juice bars. Mark said he can sell $85,000 of greens per year from a single container. He also raises mushrooms in such a climate-controlled container. He raises chickens and ducks for their eggs, and sells brassicas and zucchini squash at considerable scale. Rhine has planted a new fruit orchard. He added that his best-selling item "far and away" is peanuts, valued by a local brewer to make a peanut brittle beer. This brewer also uses beets and pomegranates from Rhibafarms for other brews.

Owning several trucks, Rhibafarms also capitalizes on delivery efficiencies: the same trucks that convey food to buyers return with green matter and coffee grounds for composting. These are mixed with mulch, wood chips, and horse manure to make a rich soil amendment.

Mark also sells to Stern Produce, Twisted Stick, Peddler's Son Produce, Sun Produce Co-op, the school system, and ASU. "There are a dozen strong buyers in our market," he said. Yet he also wishes there would be "more transparency in the market, so growers know that is really going on."

Phoenix Pinnacle Farms

Owner: Janna Anderson
Locations: Laveen & Waddell

Janna Anderson operates four fields in two locations in the County. On Pinnacle Farms West, three plots totaling 50 acres near Waddell, she grows wheat, heritage grains and fresh produce. Among the varieties she grows there are White Sonoran Wheat, Chapalote corn, and Rio Bavispe pinto beans. She also farms Pinnacle Farms South, a 7-acre produce farm and fruit orchard in Laveen at the base of South Mountain. She said she visits each of her farms every day, despite the 40-minute one-way drive. She grows both conventionally and organically.

Janna took over the Laveen property in 2011, purchasing an abandoned 1934 adobe home that had been gutted by thieves, and restoring it to a modern dwelling that centers Pinnacle Farms South. Here she tends 1,200 trees including peaches, citrus, pomegranates, and rare Maktoom Dates brought from Iraq in 1910. “They were one of the few living things left [on the property] after the years of neglect,” she said.

Orchard at Pinnacle Farms South. Photo by Ken Meter.

Anderson said she began to farm when she was in nursing school. “I grew in my backyard and in the Scottsdale community garden. I had a mentor, Robert, who showed me what to grow. I was selling at the farmers’ markets, and I brought in produce from several other farms. I told the customers when it came from a different farm. But it just got too hard. I gave it up and changed my model. I decided to spend my money on equipment.” Since she is GAP-certified, she sells through local distributors, and also direct to several restaurants, and a County food buyer, but no longer sells at farmers’ markets. “I am a really good marketer, but I can’t market and grow at the same time. We were bringing in big sales, but it

was exhausting. I just want to farm." Now she opts for sales through larger channels. "I will sell anywhere." Janna also donates food to St. Mary's Food Bank.

Janna has participated in the Sun Produce Co-op as one of eight farmers selling to one school system that has committed to purchasing $1,000 of food each week from farms in the County. "It is the right thing for all of us," she said. "The schools don't know what we're all growing" unless they stay in contact with the Co-op.

In addition to farming, she has positioned a trailer on her property where she welcomes AirBnB guests for farm stays. She said the trailer is rented most of the time.

While she believes the new minimum wage laws are burdensome, Anderson added, "I have great staff now. I feel so lucky. They do a great job and they want to work."

Two other issues that concern her are land and water. "There is not enough land at the South Mountain farm to do what I want to do," she said. She has considered leasing land nearby, but there are very few parcels available. She also said that when she "purchased the land in the West Valley, it was a crappy purchase. It had no water. Now I have put in irrigation."

Blue Sky Organic Farms

Owner: David Vose
Location: Litchfield Park

Blue Sky Organic Farms. Photo by Ken Meter.

David Vose's path to farming started out when he was a chef in California and New York State. "As a chef I felt I needed to be grounded by what is being grown," he recalled. He had worked with a large number of small boutique farms that shipped their food into San Francisco and Manhattan, but he believed that a larger scale approach would also work well.

In 1994, Vose decided to grow at a larger scale. At the time, he said, "Land was reasonable. There was almost no organic production in the region." It seemed easy to establish a unique niche. At first his customers were gourmet restaurants in New York and Boston: "Everywhere but here." He hired 200 employees and managed 250 acres. Yet he only owned 19 of those acres, so his farm was very vulnerable to development pressure. Over time, he lost the land base.

He moved to Yuma in 2005, operating on land he now says was "marginal." Yet he said, "I hated farming there." He went to Maine to help launch a cooperative farm near the Atlantic coast. That became too difficult to combine with farming in Arizona, so he sold his share and took some time off. As he reflected on his farming experience, he said, "I decided I wanted to grow for the local market. We have just a handful of producers for the millions who live here." He found a 35-acre parcel of farmland in Litchfield Park. Seeking a reliable business partner, he went to Whole Foods and offered, "to grow anything California can grow but better."

He said that was a profitable relationship for about 2 years, but then procedures changed. The grocer began to pressure him to lower the prices he charged because larger farms could supply at lower prices. "Even though their buyers had given me their best rating, they would not give me a fair deal." At one point, they insisted he pay thousands of dollars just to be able to sell to the firm. He cut off the relationship.

Vose then launched a CSA operation. He found that consumers were not deeply informed. "CSA shares are different here than I have seen in other places. Many farmers here buy products to put into the shares they deliver. This would never happen in other communities. Yet people here accept the boxes without question." While traditional CSAs ask members to invest at the front end of the season and get repaid with produce as it is harvested, he found that Phoenix customers wanted to order only the vegetables they wanted to eat, not wanting to accept produce that the farmer knew was in season. "Half of my orders are customized now," Vose said. He added that he has 73 members currently but needs at least 250 to achieve maximum efficiency. One local manufacturer has arranged for Vose to sell a number of shares to its employees, which makes him hopeful.

To diversify his income streams, Vose began selling produce to a local grocer. "My criterion now is that I won't grow for you unless you tell me what you want me to grow." For household customers he expanded his farmers' market sales from 3 to 5 markets. Yet some of the farmers' markets allowed vendors to sell products they had not grown themselves. Vose opened up a farm stand at his farm so his immediate neighbors could purchase what he grows. Like other farmers we spoke to, he donates a "tremendous amount of food" to food banks.

More than anything else, Vose decried the lack of solid interest among consumers in purchasing the nutritionally dense foods he grows. "We have all the markets here, but a great lack of awareness about what food is." He adds that production is not the issue. "I can grow $50,000 of produce per acre on this land, if only I could sell it all."

Vose said his dream would be to put together an agriculture school that is wide open to the community. "It would be a place where you could gain farming and gardening experience, and there would be a beautiful restaurant in the middle. It would be open to working with school children. We have to start at that age." He adds that procuring the land would not be difficult. "If we put together 1,000 acres, we could feed a substantial number of people. There are landowners here who would make that much land available."

Steadfast Farms

Owner: Erich Schultz
Location: Queen Creek

Erich Schultz has established himself as one of the more prolific growers in the Phoenix metro area, winning praise from several of our interviewees as a rising star. This is in part because of his resilience. After a stint serving as the farmer at Agritopia, a suburban housing development, he decided he could do better on his own. Yet buying land was out of the question due to costs approaching $100,000 per acre. On the other hand, renting land was easy, if you did not mind a short-term arrangement, because developers own much of the land and are happy to collect agricultural tax benefits until they are ready to build.

So, Erich has designed his farm to be a mobile operation. Setting up a bank of high tunnels on mobile platforms, and moving two trailers onto the land to serve as washing, packing, and cooling sheds, he can rely upon a cool bot (a simple air conditioner that holds a constant temperature) to store his produce, and be ready to pick up the entire operation to relocate to new ground if the landowner terminates the lease. Currently, he has a 2.25-acre farm in Queen Creek, where he says he can average $150,000 to $200,000 of sales per acre.

His main crop is mixed greens, but he also raises many other vegetables, chickens for their eggs, and cut flowers. His crew — fueled by considerable volunteer labor — carries these products to three farmers' markets on Saturdays, devotes one day each week to delivering food directly to 15-20 restaurants and 18 CSA drop sites, and other commercial clients. "We do all of the delivery ourselves," Erich said, "I like the direct connection with the buyer. This business is primarily built on relationships. This is how I stay abreast of what my customers need." At one point, a distribution firm offered to carry food for him, and Erich said no.

Erich added that his end goal would be to get to a 5-acre farm, which he thinks would be an effective scale. He imagines he will be forced to move in two years to a different spot but will continue to refine his systems "to build efficiency and flow." After five years or so, he added, he hopes to purchase land and stay in one place.

Farming in a mobile manner has reduced his overhead considerably. Relying upon small equipment and hand labor, he said, he only purchased 25 gallons of gas to fuel his machinery in 2016. Schultz also devotes considerable attention to detail in packaging and displaying the farm's products, so "We can charge what it actually costs to produce food."

Steadfast Farms is designed to be mobile. Photo by Ken Meter.

Orchard Community Learning Center

Coordinator: John Wann
Location: South Phoenix

We met John Wann early in the morning at a 19-acre site that helps fulfill his desire to make education real. “Real things have to be in the curriculum,” Wann said, as he gazed over a 19-acre plot of land where several nonprofits are collaborating to make sure that new farmers get trained for urban agriculture.

Wann added that the placement of this tract of land makes it a unique site in the Phoenix area. Located close to three schools, one of which has both a commercial kitchen and a restaurant, it is easy to integrate educational experiences into the fabric of community life in a lower-income neighborhood of South Mountain. He also noted that the site was very likely a place where Hohokam farmers grew food millennia ago.

The site combines several operations on one parcel of land. On 9 acres stands an incubator farm where emerging farmers can gain practical experience in both growing and marketing. Another 1.5 acres are dedicated to community gardens, so that nearby residents have a place to raise food for themselves. Tiger Mountain Foundation also maintains an orchard here. The Healthy Roots Program’s Nopales Garden raises medicinal herbs, and the Desert Botanical Garden assists in teaching classes. The schools, Girl Scouts, and UA Extension are also partners in this collaboration that was convened through Cultivate South Phoenix.

Orchard Community Learning Center. Photo by Ken Meter.

As we spoke, amid the hot season of August, it was difficult to imagine what would be growing on this parched land in a few months. Then, an Iraqi immigrant named Hussein stepped onto a tractor, preparing a field for his barley crop. Wann showed me where Sudan grass would soon be planted to help nourish the soil. He named other growers who would be learning to farm here: Souhan, George, and Miguel, all part of a contingent of 6 growers who would be tending the land.

He also pointed out the corner where a market stand would soon be set up so nearby residents could purchase food raised on the farm. The building would include not only a farm stand, but also a washing and packing shed, restrooms, and an amphitheater for community gatherings.

Wann wants to ensure that the deals are fair to growers. “The farmers will sell their harvests to us. We will wash it and prepare it for sale,” Wann said. “The farmer will keep 60% of the sale price, while 20% will go to those who process, and 10% to the market itself.” In addition to the selling at the market stand, the farm will sell at the downtown and Uptown farmers’ markets through Community Exchange. It will also travel to a market at a health clinic in South Phoenix.

Since low-income residents often feel like their local school is the one institution they clearly belong to, since their children attend together, schools become strong community connection points. Leveraging that possibility drives these partners forward, Wann explained. He added, though, that to ensure people could work together with the greatest ease, “To come full circle on this, we need to be very transparent.”

Arizona Microgreens

Owner/Operator: Joseph Martinez
Location: Phoenix

Founded by brothers Joseph Martinez and David Redwood, Arizona Microgreens produces organically grown microgreens for restaurants, individuals, and schools throughout Arizona. Located within the greenhouse at the Brooks Community School in Roosevelt School District, Arizona Microgreens operates as a social enterprise that creates employment opportunities for the local community and contributes to the financial sustainability of the Community School. The operation was based upon feedback from chefs, who were looking for unique offerings with high quality. Local distributors are also drawn to unique product. In some cases, they could gain a comprehensive purchasing contract on the basis of these unique offerings. However, Martinez is largely inspired by growing food that contributes to people's well being.

Despite annual sales topping $400,000, Arizona Microgreens is currently unable to expand due to a lack of secure land and greenhouse options in the urban area. Being susceptible to development pressures makes planning for expansion difficult. Loss of farmland to housing is discouraging, Martinez said.

Hickman Family Farms

VP of Sales: Clint Hickman
Location: Multiple

Hickman's Egg Ranch started in 1944. By 1957, their little flock had grown to 500 laying hens, then to 3,500 hens in 1959, and 100,000 hens a decade later. The family added a processing plant and feed mills in the 1970s-1980s. Their current processing capacity for shell eggs is ¾ million eggs per hour. The family owns several farms with a total of 10 million hens, including 3 farms in Maricopa County and some in Pinal County; others are located in California and Colorado. Hickman says the family company is dedicated to supporting hunger relief efforts in all the communities their farms are located in.

David Brady

Owner: Bar-B Produce
(See Sun Produce Co-op, below)

Distributors

Community Exchange

Coordinator: Chip Satterlund
Location: Phoenix

This nonprofit food selling service was launched in the Spring of 2009 when the farmers' market manager for the Phoenix Public Market, Cindy Gentry, saw that there was a need for a place for backyard gardeners to sell their surplus produce without spending long hours at the market. She

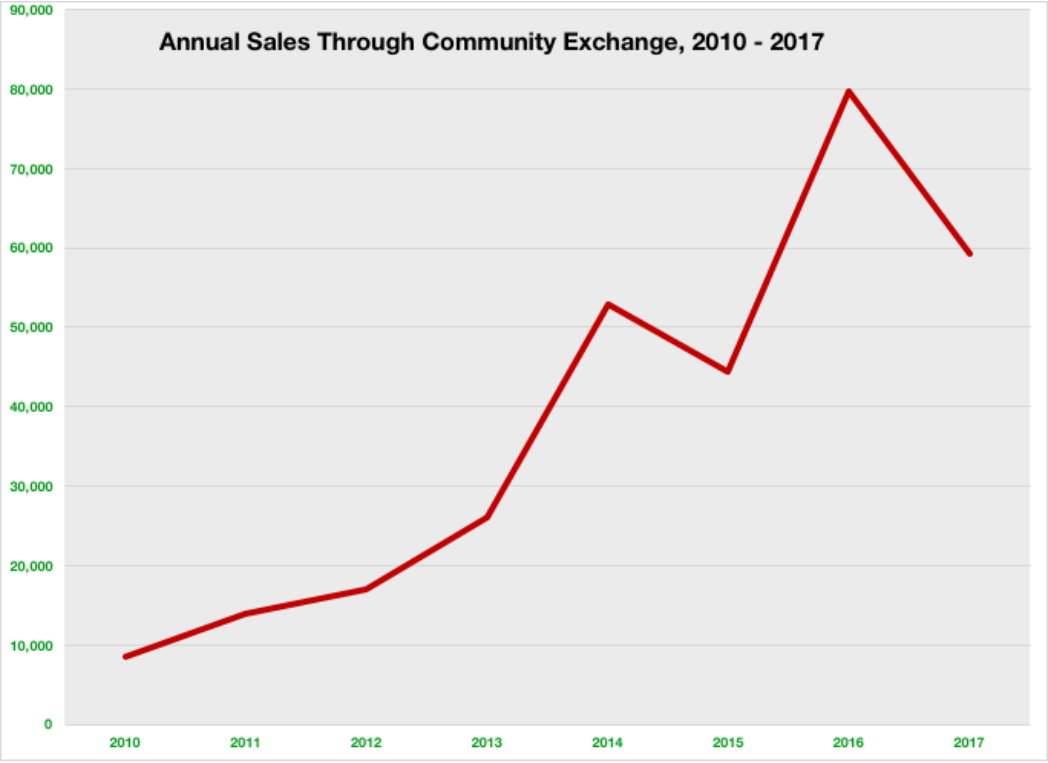
approached her partner, Chip Satterlund, and a nonprofit organization, Arizona Home Grown Solutions (AHGS), to see if they would consider managing a stall at the market for this purpose.

AHGS had managed a wide variety of services for gardeners, including a resource center, gardening classes, tool sharing, and seed exchange, so they readily agreed to serve as partners, while Satterlund offered to manage the operation. After internal discussions they settled on a pricing formula that was generous to the growers: the market would receive 10% of each sale, and the exchange service would keep another 10%. The rest of the sale price — 80% — would be kept by each grower. They also agreed that any unsold produce left at the end of each market day could be distributed as the table manager saw fit: either allowing the grower to retrieve unsold items, or declaring these food items community property that typically were donated to a food bank.

The Community Exchange is run entirely by volunteers. This keeps costs low, although the Exchange was required to purchase a $1 million liability policy in order to sell at farmers' markets. Over time, the AHGS merged with a larger organization, so the initiative formed its own nonprofit, called Community Exchange (CE).

By 2017, CE was selling at four markets in Phoenix: the Public Market, Ahwatukee, Capitol, and Uptown, as well as at the farmers' markets in Mesa and Tempe. A total of 74 growers sold products through the exchange in the past 2 years. Sales through CE had risen to $80,000 in 2016, although they eased to $59,000 in 2017. About half of these sales were in Phoenix.

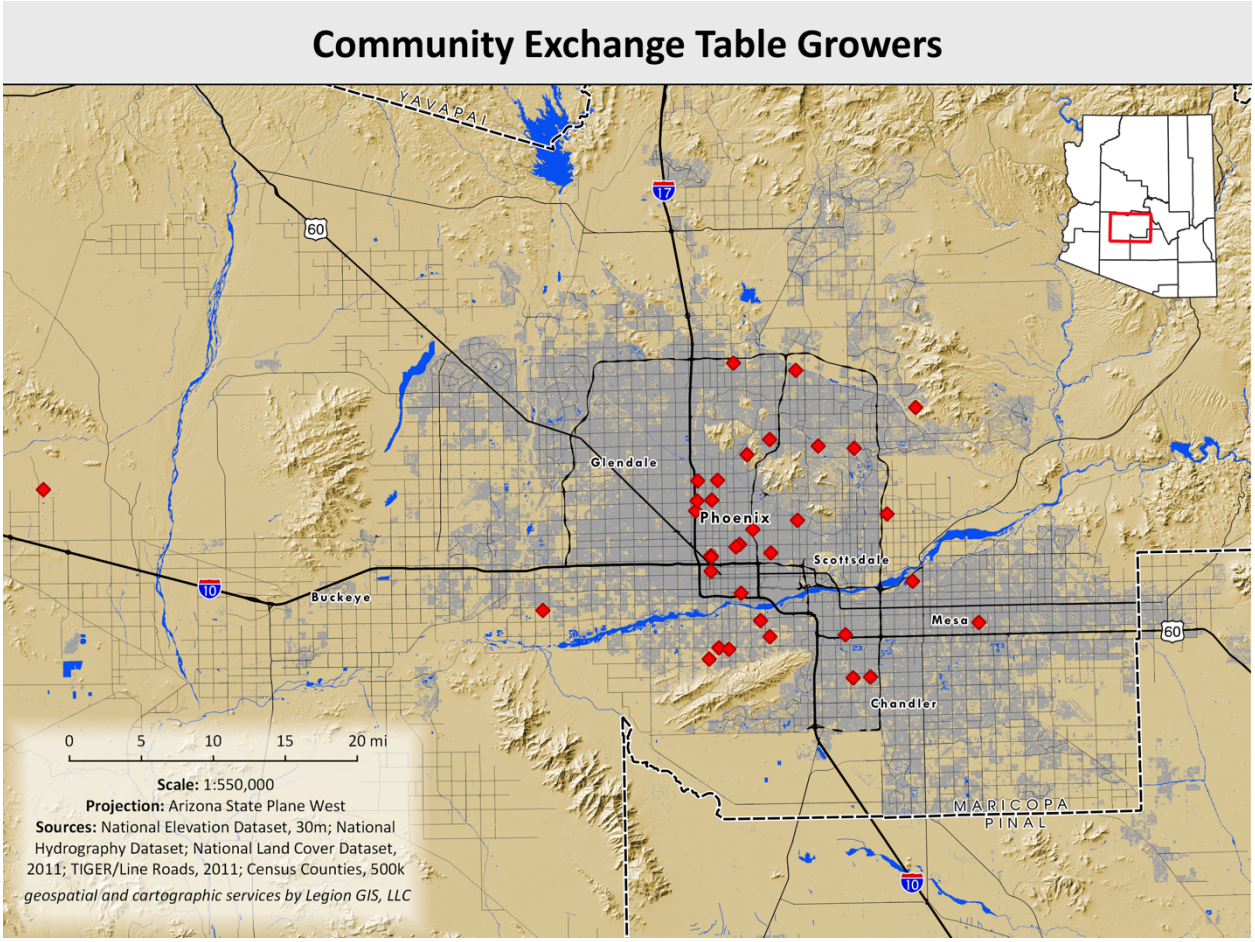
Chart 1: Annual Sales Through Community Exchange, 2010 - 2017



Source: Community Exchange, 2017.

Among the producers that take advantage of CE are Chad and Anthony Chase (See profile above), who said that the service was invaluable to them as they sell produce and eggs from their farm. One consumer also pointed out that one of the best items sold through CE are old-orchard oranges harvested by a forager who has mapped out the location of wild, ancient trees in the region.

Map 3: Community Exchange Growers



Source: Community Exchange. Map by Legion GIS.

Green on Purpose Food Hub

Managing Director: Paris Masek
Location: South Phoenix

An old chicken slaughter house in South Phoenix located where a Hohokam village once stood has been repurposed into a food distribution center by the Ruiz family serving a primarily Latino community whose residents spring from Colombia, Nicaragua, Peru, and other nations. The neighborhood was once all farmland, first tilled by Native American farmers who were then displaced by growers favored by the

power structure. As housing in turn displaced these farms, the neighborhood became dependent on outside food sources.

Green on Purpose Food Hub. Photo by Ken Meter.

To create jobs, the Ruiz family renovated a kitchen on the property so that it is now certified to prepare 1,500 school meals a day. On vacant land across the street, the Pueblo Viejo fields, they hope to encourage small farms to supply some of the produce that goes into these lunches, creating additional employment, and cycling more money within the community. The program also aspires to engage adults with special needs to grow food and help in preparing and distributing food. This is all in addition to a running a food pantry that donates food to nearby residents and offers training in food preparation. Since the site also holds cold storage, it has become a hub for distributing food as well and will ultimately hold a farm stand selling fresh produce. Organic waste generated by the facility is recycled as compost for the gardens and fields.

Having this cluster of opportunities at one site is viewed as a key strength of the collaboration. Leaders imagine this is a potent way to ensure that residents can create paths of independence for themselves. In partnership with the City of Phoenix Brownfields to Health initiative this collaboration gained recognition in 2017, winning the Vitalyst Health Foundation Award for Healthy Communities.

Paris Masek, once owner of a small farm in Missouri, manages the cluster's farming and distribution activity. Now he has spent years networking with farmers in the Phoenix area so he could source locally raised produce to local businesses. Recently, he mobilized volunteers to plant an orchard of 55 fruit trees, and build raised beds for producing herbs and vegetables.

Masek says that the food hub is trying to identify niche markets it can fill that otherwise would go unserved. This strategy arises in large part from his awareness that the border at Nogales is "loaded"

with produce entering from farms in Mexico, so growers have to find ways to compete by offering unique products. As one example, he was able to coordinate volunteers to harvest edible flowers from wild cacti, or milling mesquite pods into flour, which he then sells as specialty items to local chefs. "I am trying to enable sales of what the little guys are producing." He currently arranges for about 17 farms to sell food to 40 clients. For several, he has offered training in Good Agricultural Practices (GAP) so they could sell to commercial customers.

Stern Produce

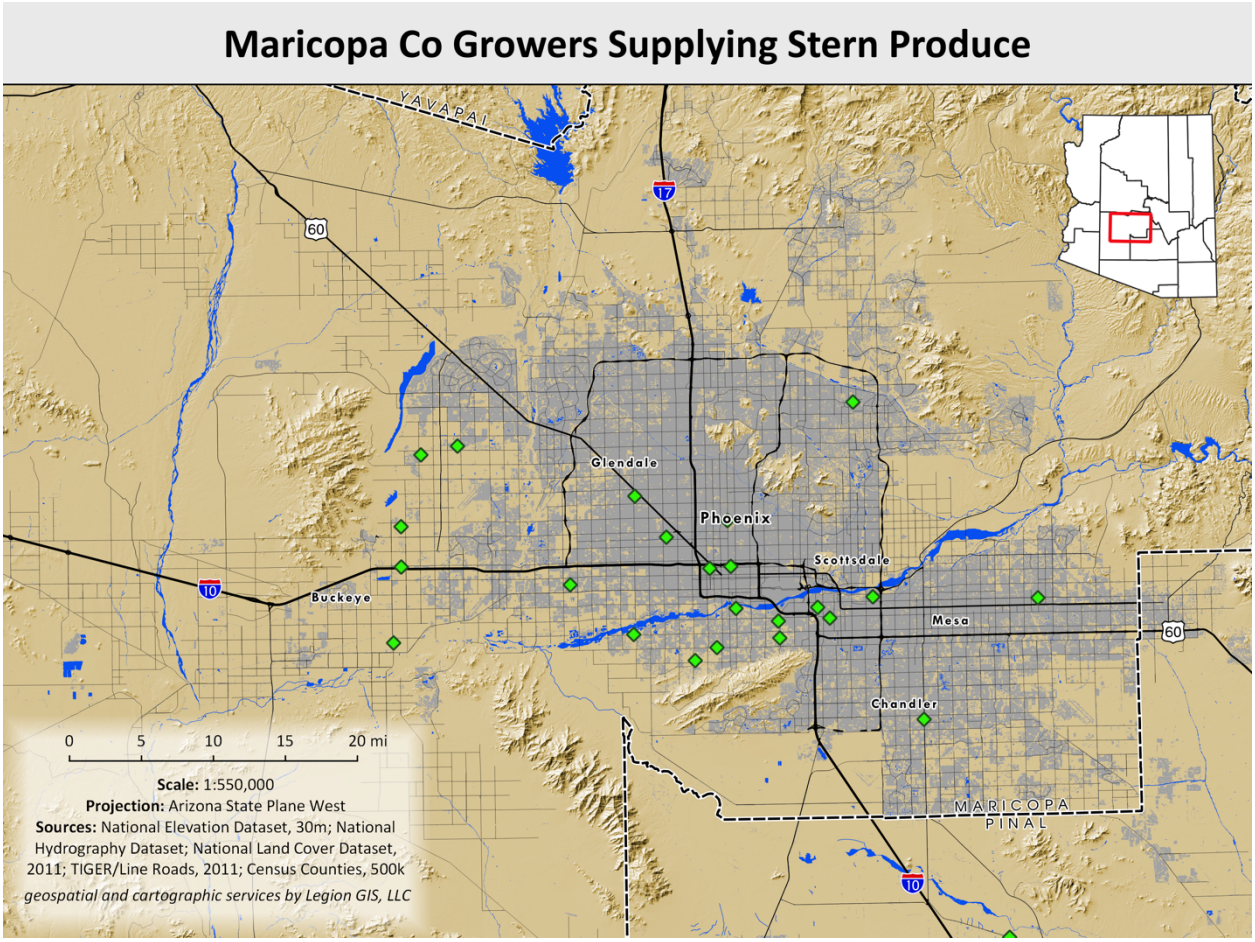
Sustainability Coordinator: Kristen Osgood
Location: Phoenix; delivers regionally

Stern Produce has taken exceptional steps to foster the local food trade. A locally owned firm with national reach through the PRO*ACT network of produce handlers, Stern plays an active role in building a system of local food trade. In 2016, the firm hired Kristen Osgood to serve as Sustainability Coordinator. Her portfolio includes directing strategic planning to make the firm more sustainable — and a large portion of that involves strengthening purchases from Arizona farms.

"I see myself mostly as a bridge between our buyers and the growers," Osgood said. When she was first hired in 2016, this was part of her mandate, so she devoted herself to meeting farmers at their farms to learn more about their operations and their needs. "We sold 150 cases of local food in the year I started," she added. "We were selling ourselves as the local distributor, but we were not doing the same with selling our local foods." Now Stern is. "This year [2017] we will sell 35,000 cases, including eggs and milk." She hopes to boost that to 68,000 cases statewide.

Meeting with growers had some complexity. "I spent my first year on this job convincing people we wanted to work with them." Some growers who had approached the firm earlier were skeptical. "None of the growers would commit to coming in for a meeting at our distribution center. I had to go out to their farms." She traveled to four farms before the ice began to melt. Even then, however, communications gaps erupted. "One grower who had agreed to grow for us pulled out 400 tomato plants and didn't tell us," leaving her in short supply. Others had to negotiate commercial prices with her. "A couple of farms had to lower their price points in order to sell to us," she added.

Map 4: Maricopa County Growers Supplying Stern Produce



Source: Stern Produce. Map by Legion GIS.

Yet Osgood also cautioned that transforming the company itself would take some time. In August of 2017, she said, "It will take us 2-3 more years to get fully dialed in." She acknowledged that a good share of the issue was to "improve our own internal skill set." The firm has also now dedicated an entire wing of its warehouse to Arizona-grown food offerings, developed SKU product codes for local products to make reporting more accurate, and hired buyers with a more specific charge of buying locally. The firm is opening up new lines of communications to keep her buyers abreast of what is available. "We're the only Phoenix firm with a special program dedicated to local foods," she added.

After initial meetings with the growers, Osgood convened 27 growers who are part of her "Arizona First Together" program in January 2017. Four more have joined since then. She told them she was "committed to making local trade work for all parties." She feels a sense of urgency in this because "We're going to have supply shocks with global warming," so she is trying to make sure the firm can address those changes proactively.

The largest gaps she sees involve "ensuring the consistency of availability," since buyers tend to assume that all products are available year-round, whatever local limitations of climate may be. Yet she also said

she is working with chefs to help them address seasonality as they draw up menus. "People are so far removed from their food," she lamented, that consumers do not ask for foods that are in season.

She also noted that the lack of community spirit in Phoenix makes her work harder. "We have a lot of business relationships, but we don't have partnerships. I am trying to move that."

Osgood also sees the importance of repositioning the firm through an outreach campaign. "How do you let people know you want to do business in a different way?" she asked. Her answer: "We're going to do special events with a local focus."

Peddler's Son Produce

Local & Organics Curator: RJ Johnson
Location: Phoenix; delivers state wide

Peddler's Son Produce & Provisions is a family owned wholesale produce distributor based out of Downtown Phoenix. RJ Johnson, the Local & Organics Curator, came to the company as a retired chef who was dismayed by the local food system in Phoenix, especially given Arizona's rich agricultural industry. In the nearly two years since Johnson has been at Peddler's Son, the company's spending with local farmers has increased 1,500% and includes approximately 20 area farms. Spending with organic farmers has now increased 7,000%.

One of the major issues that Johnson grapples with is how to define "local," especially when some mileage definitions include Mexico. He would like to consider "local" as local labor and local ownership, which often means "small." Johnson finds that these smaller farmers are also more flexible and willing to change products for a shifting consumer market. He approaches his work "one farm at a time" and "one buyer at a time," thinking that additional education across the entire supply chain would be helpful to moving his efforts forward.

Sun Produce Co-op

Board Chair: David Brady
Location: Phoenix
Dave Brady retired from a computer-based business in California and purchased land and a tractor in Pinal County. After several years farming at Bar-B Produce, he realized that he spent 40% of his working hours on preparing for and staffing farmers' markets. To reduce this time burden, he began to focus on selling direct to wholesale and intermediary markets, and distributing "farm boxes" at senior centers. In May 2017, he incorporated the Sun Produce Co-op with other farmers and board members, in an effort to collaborate to meet the demand from these intermediary markets. By September 2017, Sun Produce Co-op had gained a $50,000 contract with Litchfield Elementary School District (see below). It now hopes to supply Tempe Elementary School District (see below) through Stern Produce and Department of Defense (DoD) contracts.

Brady reports that consumers and purchasers have a strong interest in local and interesting foods such as rainbow carrots, heirloom melon varieties, and different types of cauliflower. However, he also sees that they are price sensitive. In particular, institutional purchasers don't have a lot of flexibility when it comes to raw produce, added that having a mechanism for processing items to be lunchroom ready would help.

Brady's primary vision for the local food system is one based on equitable distribution of fresh food (and profits) so that everyone gets what they need. This includes farmers growing and selling enough food at fair prices to provide their own kids with a college education and health benefits, and that farm laborers also have the same opportunities. Getting people enrolled in SNAP and food assistance programs is also an essential part of Brady's vision.

St. Mary's Food Bank Alliance

Community Engagement Manager: David Martinez
Location: Phoenix
(Since our interview, Mr. Martinez has moved to a new job managing community partnerships at Arizona State University).

A critically important food distributor in the Phoenix region is St. Mary's Food Bank. With 604,200 Maricopa County residents, or 15% of the population, considered food insecure (Feeding America, 2015), St. Mary's is a vital lifeline. With 173 full-time staff, 65 vehicles, and 474 agency partners (St. Mary's Food Bank Alliance, 2017), St. Mary's delivered 91 million pounds of food in 2017, Martinez said. He added that a considerable portion of this was fresh produce donated by many of the 200 produce firms at the Nogales border crossing. The food bank also operated at 53 mobile pantry sites, and graduated 68 participants in its community kitchen training in 2015-2016 (St. Mary's Food Bank Alliance, 2017).

Yet the needs are even greater. Former Community Engagement Manager David Martinez cited a Deloitte study recently commissioned by the food bank that concluded it would take a total of 125 million pounds of food to feed all of those who go hungry. Feeding America estimates that even providing a minimal 15 meals per month to those in need would cost an additional $321 million per year (Feeding America, 2015).

Knowing the depth of this hunger and knowing that handing out free food is crucial but does not solve poverty, St. Mary's Food Bank has built a community engagement model that focuses on forming partnerships with other agencies. Indeed, among the food and health-related firms that serve on the food bank board are Duncan Family Farms, Sun Orchard, Fry's Food Stores, Shamrock Foods Company, Inc., US Foods, Crescent Crown Distributing, and Phoenix Memorial Hospital. This places the food bank in a unique position to influence the wider food system, as well.

Under Martinez, St. Mary's explored "new institutional models." The food bank joined the Arizona Farm Bureau, and regularly solicits food donations from farmers. Martinez joined the state's Food and Agriculture Council, which helped sponsor a local foods summit in 2017. It also formally networks with other food banks in the state.

These partnerships allow the food bank to engage in considerable empowerment activity in addition to delivering food. Training SNAP (food stamp) recipients at its community kitchen is one potent way. Martinez added that St. Mary's has also trained Department of Defense (DoD) staff to enroll SNAP-eligible people for benefits.

Taking this broader view also encouraged Martinez to get active in legislative work. One of his top priorities when he served at St. Mary's was to secure state funding to double-up SNAP benefits, so that

low-income consumers could purchase $2 of fresh produce for each $1 of benefits they spend. Martinez and his policy partners also sought to double the state's investment in the Emergency Food Network to $1 million, and to expand a state tax incentive to include donations of animal protein.

Desert Mission Community Health Center & Food Bank (Honor Health)

Nutrition Outreach Coordinator: Anne Costa
Community Benefit Planning Coordinator: Amy Prestanski
Location: Sunnyslope (Phoenix)

Desert Mission Community Health Center was commemorating its 90th year of service to the Sunnyslope neighborhood when we interviewed Anne Costa and Amy Prestanski. The center was originally formed in response to respiratory issues, including tuberculosis, which plagued a community of largely migrants who settled here in tents as they labored to build irrigation canals. Gradually the Mission built a comprehensive engagement that expanded beyond health and address access to better housing and food.

Today, homelessness is still a critical issue for the neighborhood, despite the care that was extended to previous generations. Costa said issues "exploded" once the light rail opened, making it easier for people to travel to the area. Much, she said, is also related to drug use. She added that the clinic's approach is to "increase access [to food and health care] but increase education" at the same time so that clients learn how to take more matters into their own hands.

The neighborhood has moved a long way from its migrant roots. It now features multi-million-dollar homes that were placed for mountain views, not far from areas of deep poverty. Costa said that one of every three neighborhood residents earns less than $15,000 per year. A "typical" client, Prestanski and Costa said, was a single white male in his 40s, who might come in three times a year for food relief during a life crisis.

Their largest community program is a food bank serving 200-300 people per day. About 45,000 pounds of food is donated to low-income people each year through the program. It is a "market-style" food bank where clients can choose the foods they want to take home. Desert Mission partners with St. Mary's Food Bank, but has not joined the umbrella national organization, Feeding America.

Desert Mission offers a variety of other programs as well, including a childcare center for residents and employees, an adult day care center, neighborhood renewal initiatives, cooking classes and gardening education. The health center is also exploring the concept of launching a fruit and vegetable prescription program that would allow clients with food-related illnesses to gain easier access to foods that would help them stay as healthy as possible.

Farm Express

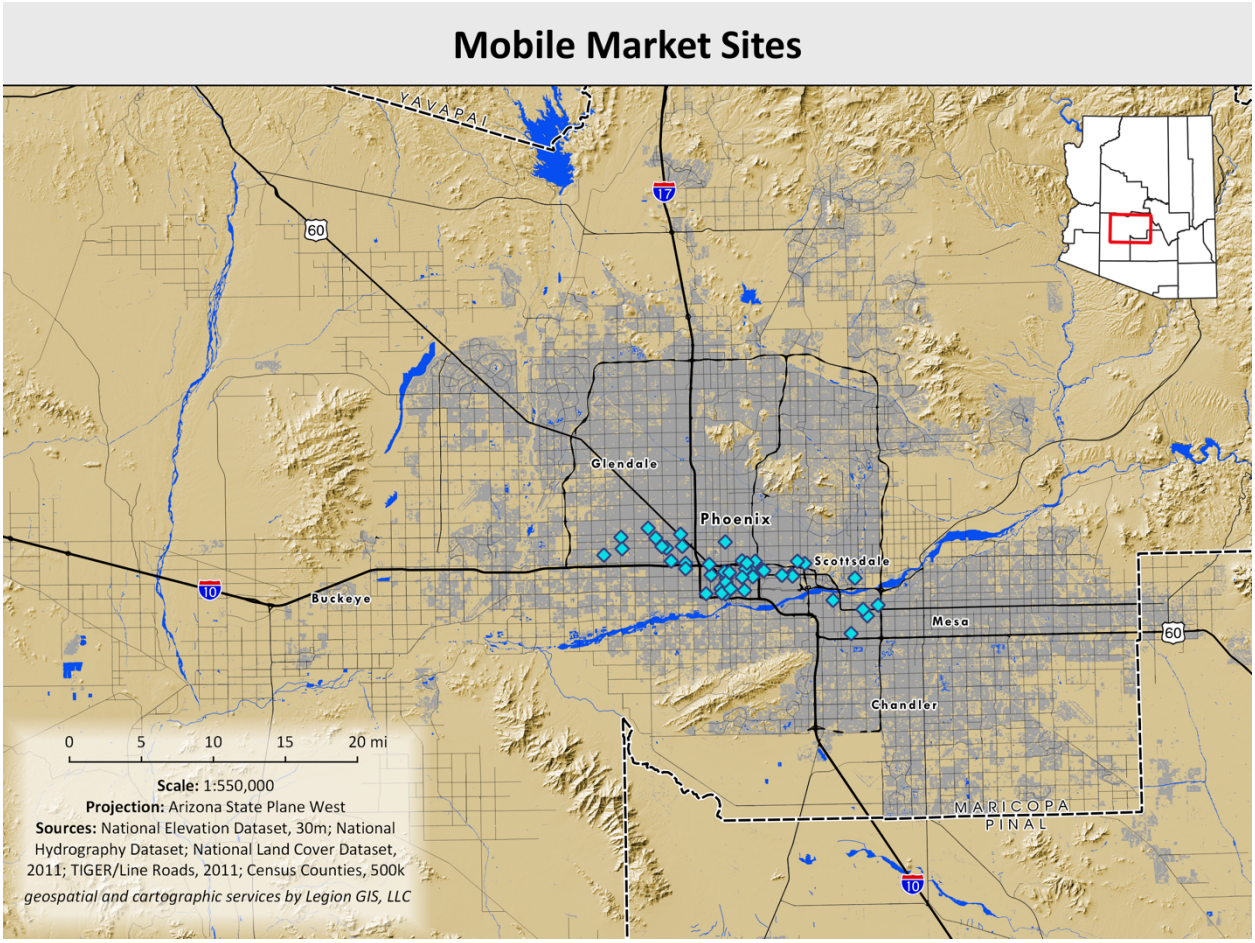
Executive Director: Elyse Guidas
Location: Multiple in Maricopa and Pinal Counties

Farm Express is a mobile produce market that provides access to high-quality, affordable produce to residents in food deserts in the Phoenix and Tempe regions. The re-purposed bus makes 20 stops a week in low-income, low-access neighborhoods. Their primary mission is to increase health outcomes through nutrition and health education, regardless of produce source. Yet whenever possible, they stock locally sourced items. Participating in the Double Up Food Bucks program makes their local sourcing possible.

In regards to the local food system, Guidas thinks the Maricopa County Food Coalition is a key asset since it draws attention to systemic gaps while also leveraging trust and credibility with additional stakeholders. She sees weakness in the production system, however, in that smaller farmers have difficulty accessing enough water and land in an ongoing and secure enough way to make a living.

Guidas' personal motivations include increasing community security and equity, promoting healthy lifestyles, combatting injustice, and creating opportunities. To this end, she advocates for the creation of a "Food Policy Director" position within City government. This position would primarily increase access to land and marketing opportunities while clarifying regulations and leveraging corner stores and neighborhood-based services to increase food access.

Map 5: Farm Express Mobile Market Sites



Source: Farm Express. Map by Legion GIS.

Uptown Farmers' Market

Owner: Bo Mostow
Location: North Phoenix Baptist Church, Phoenix

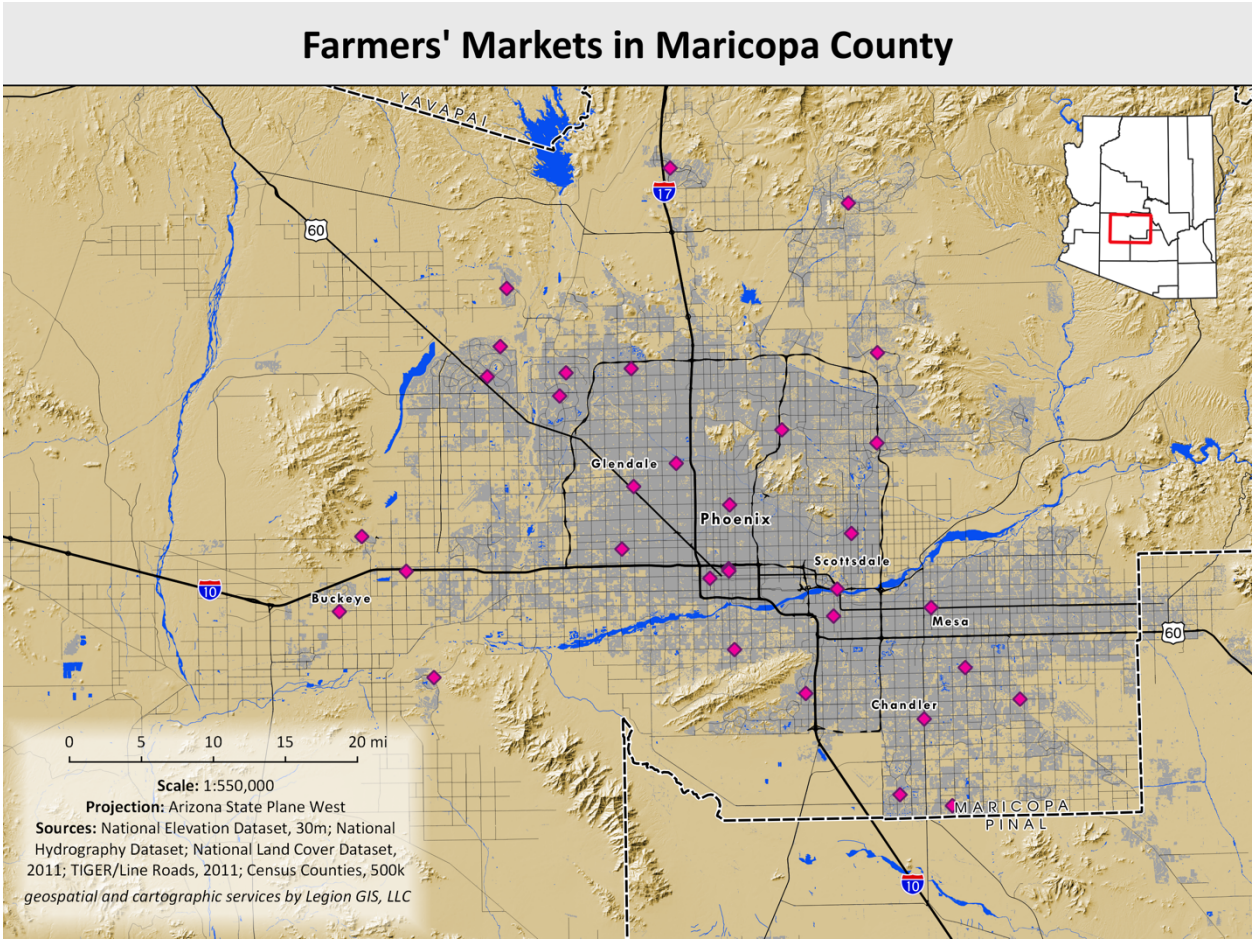
Bo Mostow said that her inspiration for helping build the community food system came while she was taking a year off of medical school. During her time off, she made contact with a former nutrition professor at ASU. After volunteering at the downtown farmers' market, she met Cindy Gentry, currently a Food Systems Coordinator the County, who became her mentor. Bo then began working with Frank Martin, coordinating CSA deliveries for Crooked Sky Farms. Over time she began to see that her calling was to run a market of her own.

It was not always a linear process, but today she owns and manages the Uptown Farmers' Market, located at North Phoenix Baptist Church at Bethany Home Road and North Central Avenue. On this 40-acre property, she has attracted 14 growers for a Saturday market, and 5 growers for a Wednesday market, who sell their wares along with some 160 other craft and service vendors. Bo said that the neighborhood is "mostly families, with lots who are high income, and lots who are low-income." She proudly pointed out that the Uptown market has one of the highest rates of SNAP (food stamp) redemption in the state of Arizona.

"The customers decide who stays [at the market]," she added, through their purchasing decisions. One of her largest concerns has been staffing, but she added that she has an exceptional market manager right now. She said that the "leisure economy" makes it difficult to find dedicated staff. "There is a huge group of moms out there who want to get into the workforce. But some of them are gone in 3-4 weeks," because they do not really need the income.

A more successful collaboration has been with the Certified Culinary Arts Program, which enlists its students to serve at Uptown on market days. Trained in food preparation, these students will prepare food for customers on demand. "A shopper can shop with any farmer they want, and take their produce to C-CAP, and the students will prep everything for them for a week of eating," Mostow said.

Map 6: Farmers' Markets in Maricopa County



Source: USDA Agricultural Marketing Service. Map by Legion GIS.

Other Key Stakeholders

Arizona Farm Bureau

Director of Outreach: Julie Murphree
Location: Phoenix; operates statewide

The Arizona Farm Bureau is Arizona's largest farm and ranch organization with a 24,000-person membership that represents production agriculture across the state. Farm Bureau is a 501(c)6, independent, non-governmental grassroots organization that lobbies and advocates on behalf of its farmer members on local, state, and national issues. The Maricopa County chapter has the largest membership base in Arizona, including the largest concentration of agriculture members. The average Maricopa County agriculture member has a 10-acre farm.

As Director of Outreach, Murphree aspires to representation from the entire continuum of agricultural producers from small market farms to large commodity producers. She lists Arizona's extended growing

season as a key strength to the industry and adds that this growing season provides a lot of opportunity for farmers to grow a diversity of products. Yet the changing face of farm ownership and changing dynamics of the agricultural industry have created a lot of friction between types of farms, she said. Furthermore, the multi-generational legacy of farming and land transfer is fading, making land and market security more fleeting. She is concerned that there are not enough farmers to serve local farmers' markets, which she sees as an essential component of combatting food deserts and areas of low food access. She also cited farm labor as a real challenge, across the spectrum of farms and members.

Local First Arizona

Director of Food Initiatives: Natalie Morris
Location: Phoenix; operates statewide

Founded in 2003, Local First Arizona (LFA) is a nonprofit organization that celebrates and supports independent, locally owned businesses through promotion and advocacy. LFA is now the largest locally owned business coalition in North America with nearly 3,000 business members and 1,000 individual members. The business directory gets searched uniquely more than 50,000 times per month on average, Morris said. LFA has nearly 20 full-time staff members in offices in Phoenix, Tucson, Cottonwood, and Flagstaff serving businesses across the state.

The Good Food Finder was created in 2011 as a research project by Natalie Morris and was acquired by LFA in 2014. Morris now leads all the food, farming, and restaurant initiatives for LFA, including the "Devour Phoenix Coalition". This coalition has the expressed goal of supporting the rise of Phoenix as a premier food city and the businesses that will make it such.

From Morris' perspective, a major strength of the Phoenix food system is that local food businesses are very well networked and connected. However, Morris feels that an independent grocery retailer with distribution infrastructure would further support the local system. In particular, a retail outlet that can access and educate area consumers would really facilitate the development of other local food businesses.

Mesa Community College's Sustainable Agriculture Production Program

Program Director: Peter Conden
Location: Mesa

In recent years, Mesa Community College transitioned its Associate of Applied Science Degree in Agribusiness to Sustainable Agriculture Production, due to changing student interests. The Sustainable Agriculture degree includes both the technical production and small business skills needed to manage or develop a small farm or agricultural business. The program is focused on small-scale and urban agriculture with an emphasis on natural practices and sustainability, and features local farmers as instructors.

This program has graduated 8-10 students to date with half now working on farms, and the other half pursuing homesteading and entrepreneurial activities. Conden largely credits the success of this new

program to changing consumer interests, partners at ASU and Roosevelt School District, and the great local experts that are willing to teach classes.

Arizona State University

School of Nutrition and Health Promotion
Interim Director: Christopher Wharton
Location: Tempe; operates statewide

Chris Wharton has been involved in building community-based food systems in different capacities in many Arizona communities. He led an effort to launch a statewide farmers' market coalition from the Flagstaff/Sedona/Prescott region, and he has partnered with farmers in Maricopa County on a variety of research projects. Currently he holds three main priorities, including directing a Food Systems Transformation Initiative at ASU, engaging in education and outreach activities including youth engagement, and also strengthening Native American food systems. At the time we spoke with him, he was also considering a new project focusing on describing the interactions among food system projects in the Maricopa County region.

Arizona Dept. of Education Farm to School Program

Farm to School Specialist: Ashley Schimke
Location: Phoenix; operates statewide

Arizona Farm to School Programs, based out of the Department of Education, work to ensure that children of all ages have access to fresh, healthy and locally grown food, across the entire state. Programs include funding for school gardens, local procurement assistance and resources, educational resources and curricula, and product profiles to support "Harvest of the Season" promotions. Coordinator Ashley Schimke estimated that their program supports 100 school gardens and 25 districts with food purchasing.

Some schools are interested in "highly local procurement" such as sourcing directly from nearby farmers while other schools prefer to work through their distributor, Schimke added. Stern Produce has been helpful and supportive to this end, as have other independent distributors. Although Maricopa County has a lot of smaller farms that could serve special promotions and activities at the schools, many of them don't have the requisite food safety certifications in place. Furthermore, Schimke reported a general "disconnect" between farmers and distributors, resulting in a lack of understanding that can frustrate all parties involved. One major challenge is that schools can't purchase products without having a pre-approved recipe and menu for that item. Planning ahead is paramount for all parties to be successful.

Litchfield Elementary School District

Food Service Director: David Schwake
Location: Litchfield
Litchfield Elementary School District is a K-8th district, consisting of 15 school buildings, each with their own kitchen. Schwake oversees purchasing and food programs for the whole district, and hopes to move towards a central kitchen with one menu.

With a 30% Free and Reduced Lunch rate, Litchfield offers its students all of the feeding programs — breakfast, lunch, dinner, and summer. Two of the schools also offer free produce and bread at Friday pick-up times for students to take home for the weekend. Schwake is on a personal mission bigger than serving kids lunch: he's also teaching community service and support by facilitating student volunteering at area food banks and community feeding sites, and offering feeding sites at school buildings. He feels like his deep commitment to the community and being consistently entrenched in feeding programs have made his school food programs so successful.

Furthermore, his deep knowledge of federal food programs has enabled him to free up funding to consistently spend $3,000 a week with area farmers. When Sun Produce Co-op incorporated, Schwake was the first institutional purchaser to sign up, committing to purchasing $50,000 in the first year. He reports that his staff see the difference in quality between local, organic produce and items from their broadline distributor, and the students do too. Though he's not sure he'll ever find a way to get kids to eat kale, he's happy to see them ask for rainbow carrots and rainbow cauliflower grown in the area.

Tempe Elementary School District

Director of Nutrition Services: Linda Rider
Location: Tempe

Tempe Elementary School District is a K-8 district with 21 school buildings. Three of the middle schools receive direct drop-off of food supplies, all schools receive direct drop-off of milk, and all the elementary buildings are served by a central warehouse and processing kitchen. Rider hopes to leverage this central warehouse and kitchen to provide "lunch line ready" foods to all the schools in her purview and to develop hummus, salsas, and sauces, to name a few, from scratch.

The key motivator for her work is providing a good example of good eating and good nutrition to the students at Tempe Elementary schools. As such, she said that two of the largest gaps in the current system are 1) gaining access to lunch-line ready foods; and 2) finding dieticians and nutritionists with kitchen and cooking skills for institutional meal service. Hiring and training the right people for this work, especially at prevailing wages, is difficult. Ultimately, she'd like more training opportunities and processing equipment to further her food mission. The willingness of local distributors, particularly Stern and Sun Produce Co-op, to source fresh, local foods has been a huge boon, she added.

Pinnacle Prevention

Executive Director: Adrienne Udarbe
Location: Phoenix

Pinnacle Prevention is a nonprofit organization dedicated to growing healthy families and communities. Its mission is to inspire and advance a healthy food system and opportunities for active living. Staff mostly consists of registered dietitians, researchers, and social scientists who believe all families should have access to healthy food and opportunities to develop healthy relationships with foods. Pinnacle Prevention facilitates the USDA Food Insecurity Nutrition Incentive (FINI) grant that supports Double Up Food Bucks programs at farmers' markets across the state, including many in Maricopa County. As Executive Director, Udarbe advocates for supportive policy action and works to bring together diverse stakeholders across the industry to increase systems level perspectives.

City of Phoenix

Food System Coordinator: Rosanne Albright
Location: Phoenix

Rosanne Albright wears many hats for the City of Phoenix. As Food Systems Program Manager she works half time to fulfill the City's vision that in a few years, "healthy food will be available for everyone." She also serves half time as brownfields and recycling coordinator, and as if that were not enough, is filling in as acting manager of Environmental Programs.

After collaborating with community stakeholders in the formation of the Maricopa County Food System Coalition, she shepherded a conversation that led to the City's adopting specific local food system goals in its latest Comprehensive Plan, as well as more detailed objectives in its environmental management plans. Over the past year she also convened staff from six different City departments to address "how we work with food." Late in 2017, that produced what Albright called a "loose draft" of a Food Action Plan. The plan has a strong focus on adding farmers' markets and increasing access to community gardens.

Albright said that some of the next steps to be taken include a thorough review of zoning ordinances and City codes pertaining to agriculture, residences, and commercial property. "What is clear is that you can have a greenhouse on your property in the City." Less clear, she added, are facilities such as aquaponics farms or storage containers, because no supportive policies were adopted in the past.

Albright added that "We do have the ear of our elected officials." Yet with several resigning from elected positions so they can run for higher office, there is still considerable uncertainty about who will serve as the City Council champions for local foods in the future.

Arizona Local Foods Summit

Coordinator for 2018: Dean Brennan
Location: Chandler & Phoenix

A former city planner who now directs the Project for Livable Communities, Dean Brennan has shouldered the responsibility for coordinating the second annual Arizona Local Food Summit, which will be held in August, 2018 with co-sponsorship by the Arizona Department of Agriculture. Brennan said his biggest concern is to maximize on the economic potential of agriculture for the metro region. "There has been a real shift in the mood over the past 5-6 years," Brennan said. "We now have a very strong opportunity for local agriculture to provide more food for our residents."

Brennan added that in recent years, for the first time, the City devoted specific attention in its comprehensive planning process to local food. "For the first time it was part of the discussion," he added. "We asked, what can the City do to encourage food to be produced in the City?" He is embarking upon a survey that he hopes will produce findings that useful to other municipalities in Maricopa County. One such possibility is for the City to provide City water to community gardeners, he said.

He added that there is definitely an "opportunity for the City to become more proactive — to identify parcels of land that are suitable for growing food, and to make an effort to connect property owners

with those who want to grow food." The City itself owns quite a bit of land; Brennan asked whether that could be made available.

SUMMARY OF FINDINGS

Key Strengths

Note: All quotations are drawn directly from interviews with key stakeholders. Since we promised those we interviewed confidentiality when speaking about their key partners and their analysis of community food systems, we quote our interviewees without naming them.

Growers are Capable

The agricultural industry in and around Maricopa County is well developed, with several strong cash crops (namely cattle, cotton, alfalfa, and citrus), and the region holds a long legacy of families farming land productively. Those who grow food for local markets are among the most talented in the US, taking advantage of a long growing season and bright sunshine to sell as much as $200,000 of produce per acre.

This is a region where "It is possible to have a year-round CSA here, and year-round farmers' markets," one of our respondents said. This can be foundational to cultivating a loyal consumer base instead of always worrying about "spring sign-ups" of members, and wondering which members will sign up for another year, issues that farmers in other parts of the US confront.

Furthermore, farmers have made excellent inroads into a wholesale market. Buyers told us that area farmers are willing to be flexible and grow custom crops "to order." Some are willing to work collaboratively to meet wholesale demand.

Despite the exponential growth and development of Phoenix and surrounding areas, we were told that rich farmlands with adequate water exist. However, this is primarily on a lease basis. One farmer reports being able to lease 20 acres for a total cost of $1,000, annually. Typical land rents range from $590 to $1,680 per acre, depending upon the locale (Maricopa County Assessor, 2018).

While water access issues are different in different areas, depending upon historical rights, the presence of functioning canals built long ago and the availability of groundwater contribute to most of those we interviewed having adequate water access (see below).

Independent Distributors are Engaged

Given Arizona's strong agricultural industry and its proximity to California and Mexico, several independently and locally owned distribution companies supply Phoenix wholesale markets. This means buyers have a lot of options. Competition is fierce and differentiation is important. Some distributors look for high-value, locally grown products to differentiate themselves from more broadline distributors whose strength is bringing products in from other markets. Stern Produce, Peddler's Sons Produce, the Sun Produce Co-op, and Green on Purpose were all named by our sources.

Consultants were deeply impressed by the role that Stern Produce plays in building awareness of Arizona-grown foods, and in working with growers to build a greater sense of collaboration, while increasing its own capacity to promote local food trade. Few regions of the US, in our experience, have such a private wholesaler who is so willing to go to great lengths to build community food trade.

Moreover, Stern Produce staff go about this work with a strong spirit of humility that serves their cause well. As noted above in the Kristen Osgood profile, the firm acknowledges that many of the difficulties they have encountered are internal to the corporation. Accordingly, the firm has invested in dedicating space to local food storage, adding special product codes (SKUs) that allow them to track local sales more efficiently, and in hiring staff to expand Arizona food trade.

Yet the firm also takes steps that are unusual in expanding the role of a private firm as it works with growers. It convenes the farmers who supply their warehouse in regular "Arizona Fresh Together" meetings that allow them to meet each other, and to participate in forward strategizing for building a more cohesive food system. The firm also asks specific growers to raise specific crops that are in demand.

Stern has also been supportive of smaller-scale efforts to convey food to local buyers, not only serving as partners, but also joining the board of directors of Sun Produce Cooperative, and trading collaboratively with Green on Purpose Food Hub.

For these and other reasons, Stern Produce was named by a number of our interviewees as a principal partner. Indeed, the firm is an important connection point in our network maps (see Appendix 1 below).

Food System Leaders are Strong

Local food-system leaders are deeply entrenched in the community, according to our interviewees. We were told they are reliable, consistent, and well connected. Both institutions and non-profits hold a great deal of local talent and expertise on staff, with considerable grant funding available. Passionate, diverse stakeholders are engaged across the community food system and they are starting to build momentum.

Their work is now paying off with greater civic attention from municipal leaders. Interviewees report that City government is starting to think more critically about sustainability issues. As one of our sources put it, "For the first time food has become part of the discussion in writing the general plan for the City. In the past, oranges and cattle played a major role here. This is the first time we've considered how to build an agriculture [sector] that actually feeds people."

Interviewees were also hopeful that the strength of this group of leaders will continue to grow and that government bodies will follow suit.

Consumer Markets are Strong & Diverse

The greater Phoenix area hosts an enormous and diverse consumer base that potentially could support a wide variety of food-based businesses. Currently, consumers purchase $12 billion in food each year (Meter, 2015). Our sources told us that consumers are now placing a higher value on purchasing fresh, local foods. As one interviewee said, "There has been a real shift in attitudes over the past 5-6 years.

People are starting to realize the opportunities for local agriculture to provide more food." Others noted that the "local food movement" is finally taking root in Phoenix.

Consumers support a total of 34 farmers' markets in Maricopa County (See Map 5). Farmers and consumers alike treasure the larger markets in the downtown area and select suburban areas. Offering farmers an opportunity to connect directly with their customers, while retaining most all of the value of cash receipts, farmers' markets are important places where food leaders can build networks of support. They are also essential venues for emerging growers who need to build visibility. These markets are also the sites where Community Exchange handles produce from small farms (See Map 2).

Interviewees also reported that several savvy restaurants are embracing local foods and changing their menus to do so. Institutional partners said they are doing the best they can in advancing local purchasing goals within the constraints they face (limited processing options, institutional budgets, etc.). Some have gone a long distance to help alleviate these constraints.

Key Weaknesses & Gaps

"We don't have a food system, we have food silos."

Farmers Feel Isolated

Our interviews showed that many farmers in Maricopa County who grow for local markets feel isolated, and at times hopeless. This is obviously a severe impediment to increasing community foods trade in metro Phoenix.

For some farmers, this isolation is welcome, and even intentional. Several growers pointed out that they chose farming precisely because it is a career that allows them considerable time alone, simply because they are introverted and enjoy reflecting on their daily experiences. Many chose farming for a slightly different reason: to assert one's independence, and to live in a realm in which personal decisions and ethics matter. The prospect of being able to shape a piece of land to their liking and to have influence over that property is a strong draw for many of the farmers we spoke with.

Other growers said that their isolation was more a matter of choosing between essential tasks. The competitive demands of marketing do not always allow any farmer to serve as both grower and marketer. While some growers love to sell at farmers' markets, enjoy learning what their customers want and adapting their farming accordingly, others simply say, I prefer to stay in the fields — let someone else do the marketing for me.

Yet others pointed out that the entire culture of farming in Phoenix has been eroded by a spirit of competitiveness. As one respondent said, "I know farmers who won't allow any other farmer to visit their place because they are concerned that someone will steal their ideas." "I don't know why we don't talk more [farmer-to-farmer]," one grower lamented. One interviewee added, "Farmers don't work together here." Another respondent went even further, saying there is an "incredibly adversarial relationship between growers."

Even those growers who enjoy networking with other farmers pointed out that the demands of farm work seldom leave much time to relax with others — especially when some farms are more than an hour's drive from each other.

The seasonality of farming was also blamed for some of this competition. As one grower said, "We are all raising the same crops for the same buyers, which are harvested at the same time." While some find ways to differentiate by growing more unique crops and livestock, there is no getting around the fact that when a given crop is ripe, most every farmer in the County can offer it for sale. As long as consumer interest is limited and cooperative marketing is fragile, there is an endemic conflict to see who can position themselves best to meet that demand.

Efforts to sell collaboratively may further falter for reasons that are more about inequality of wealth than about competitiveness. One grower noted that different growers have different production costs. Someone who inherited land or wealth can afford to sell at a lower price, as can someone who has invested in mechanization. This means that if a group of growers tries to set a price that works for all, some are at least tempted to undercut the group by selling outside of their agreements.

Consultants noted that the entire Phoenix region upholds an individualist ethic that quite consistently fosters competition. As one respondent noted, "People do not get to know each other here." As one grower put it, "What I really need is buy-in from the community." Yet individualistic notions of liberty certainly make collaboration less likely. Such attitudes also threaten the very survival of farming and eating in Maricopa County.

There are Too Few Growers Serving Local Markets

While the farmers' market scene is fairly robust, with 34 markets in the County, growers cautioned that the number of farmers' markets far exceeds the capacity of farmers to offer produce. Several said there are too many markets already. Others focused on the imperative that new farmers must enter the business before any new markets can open up. One respondent noted, "Everyone wants to have as farmers' market but you have to prove there is enough trade to attract farmers — and you have to have farmers, too!"

Wholesale and institutional buyers similarly noted that there were too few farmers — especially too few who were devoted to growing large quantities suitable for bulk shipping.

Farming is Not Viewed as Appealing

With the decline of the historical communities that generated new farmers with each new generation, and the disappearance of input dealers and supportive services, farming is fragile. With stakeholders fearing that many competent farmers will be pushed out of the marketplace, it is difficult for newcomers to embrace farming as a career.

Several growers we spoke with said they were contemplating leaving the profession. One respondent noted that, "The farms that are best able to grow for local markets are ready to fold." Another added, "I know two farmers who are close to leaving the business." A third said, "Time is running out for me [as a farmer]." Even those who were not telegraphing an end to farming were often making contingency plans to farm somewhere else: perhaps somewhere where consumers were more assertive in demanding local foods, or some community where farmers were better supported by civic leaders.

One educator reported that a stigma has descended around agriculture as a viable career. While educational and professional development opportunities do exist for farmers and food businesses, they don't seem to be well attended or embraced. Two farmers rated YouTube as one of their principal places to obtain advice. Several growers have joined regional or national networks of growers who share information directly with each other.

Nor are career pathways in farming always encouraged by educational leaders and stakeholders. Certainly, the financial rewards of farming are not altogether clear since market forces have placed farms at such a disadvantage and public support for food systems development is sporadic. Limited availability of land one can purchase certainly frustrates many potential growers.

Issues of class and privilege also interfere. To some growers, training opportunities are not culturally relevant. Farmers also noted that they often feel they are considered expendable because their livelihood depends on physical work. "In general, there is not much respect for physical work [in Phoenix], and that means farmers are way down the list of honorable professions," one farmer pointed out.

Declining Margins & Skills Gaps Threaten Growth

Several food wholesalers pointed out that some growers need to improve their practices if they are going to succeed in wholesale markets. As one buyer noted, "Farmers are trying really hard, but they need to do better. I don't want what they didn't sell at market. It needs to be fresh." Another buyer noted that once, "I ordered 5 cases of carrots and only 3 arrived." In this case, the farmer appeared to have very little awareness of the impact this had on the buyers until difficult conversations were held.

Yet when farmers face diminishing financial returns they have difficulty embracing new marketing practices, food safety standards and certifications, or wholesale product standards.

At the same time, the services that do exist are often viewed by farmers as duplicative. Simply put, there is a more lucrative market for training farmers than there is for farming itself. Multiple organizations may offer professional development opportunities to a small core of growers who may not feel that such training is useful to them.

Consumer Interest is Limited

Of course, farmers are not totally independent operators. If they have no one to sell food to, they will not stay in the business very long. Precisely because farmers are such a threatened breed, it is difficult to attract the interest of consumers, too. One grower complained, "There is a great lack of awareness [in Phoenix] about what farming is." This starts with basic facts about local seasons. "People think you can grow everything here all year long," one farmer lamented.

Another added, "Building consumer awareness is key. Most people don't know any growers. They think everything is grown on big corporate farms with all Mexican labor. They don't know there are [smaller] farmers like us" right here in the County.

While some interviewees believe consumer preferences for local and fresh foods is expanding, others are much more pessimistic. Some farmers reported that about half of what they grow each year is never harvested because of limited demand; it is left in the fields to serve as compost for the next year's crops. Interviewees lamented that there are few consumers who even care about accessing higher quality food, or knowing who farmed the foods they eat. "Only a small number of people discern [in their food purchasing]," one grower said. Another said, "No one visits the farm here." Another lamented, "The parents don't even care what foods the schools serve." Without parents taking a more active role, it will be difficult to persuade school nutrition programs to purchase from nearby farms.

Some attribute the lack of consumer support and loyalty to the transient nature of the population. Many residents have moved to Phoenix for retirement and are not actively engaged in community building. The concept of building long-term economic resilience in the region does not cross their radar. A retirement population combined with a marginalized underclass also constitute a price-sensitive consumer base that often feels it cannot afford locally raised produce if it is more expensive than grocery stores make available.

Limited Dedication to "Local" Food

Others we interviewed noted that City and County government often hold a very limited concept of "local food." Civic leaders like to support creating new farmers' markets as an urban amenity to attract development, and community gardens because there is resident demand for places to grow food. Yet the discussion of how to build community food systems does not yet hold strong interest among civic leaders, we were told.

We also noticed that stakeholders hold diverse definitions of "local food." To some growers, "local food" means food sold within a half-hour of their farm. Others said that "local food" means food grown, processed, and consumed within Maricopa County. To some, local food means anything grown in Arizona. We noticed still others referring to foods grown in California or Mexico as "local."

One interviewee posed a question that suggested still other criteria: [When we use the term "local,"] "Do we really mean "small" or "local labor and local ownership?" As one example, some would consider eggs raised at Hickman's Farm "local," while others would not.

Consultants address this issue later (see page 56) where we discuss framing this issue as building community-based food systems, rather than as a quest for "local food."

Labor is Scarce and Minimum Wage Levels are Rising

Correlated with the transient nature of the area population is a widespread struggle with labor availability. Nearly every interviewee cited a labor issue as a main weakness or barrier in the food system. Their concerns ranged from farm labor to kitchen labor, finding enough people or the right people to hold jobs, training new hires to learn specific kitchen or farm skills, keeping trained people in their jobs, and paying rising minimum wages. Interviewees report both not being able to find enough help and not being able to afford enough help.

The rising minimum wage in particular has food business managers concerned. In 2016, the minimum wage was $8.05; at the time of this writing, the minimum wage is $10.50, and is expected to rise to

$12.00 by 2020. Yet, the consumer base is very price sensitive and institutional food service providers have rigid budgets with expenses that can't easily be passed on to consumers.

Access to Supportive Infrastructure and Resources are Limited

Despite the extended growing season and short-term availability of land, secure access is a significant concern for area farmers. Others report difficulties with water access (See page 54 below).

Beginning farmers reported that leasable lands available near urban consumers often require serious remediation. Yet farmers who lease land are justifiably reluctant to make improvements to the soil or the property. The decades-long decline in Maricopa County family farms that are passed down across generations only exacerbates these trends.

Other infrastructure needs revolve around physical facilities. Institutional purchasers in particular would like to see more light-processing infrastructure available with more options for purchasing locally processed food items through current distributors. This can include washed and cut carrots, broccoli florets, triple washed lettuce mixes, etc. Having such line-ready options makes it easier for food service programs to source locally. Yet equipment costs can be prohibitive for any one producer to pursue, especially at a small/local farms level, and are unlikely to be developed without collaborations.

Regulatory Barriers Cause Concern

As the prevailing food system has become large and impersonal, the more food safety concerns arise. Indeed, as consultants write this report, an *E. coli* bacterial infection has been traced by federal officials to romaine lettuce farms in Yuma County, and transmitted to 35 states.

Yet small-scale local growers reported to us that they face increasing pressure to conform to food safety regulations, at all levels of government, despite the fact that outbreaks continue to erupt on farms that have been verified as conforming to food safety guidelines. One experienced grower complained, "Food safety (FSMA) laws are "cutting people down at the knees. Their requirements seldom fit our business models." This farm is safety-certified, but the owner finds that "just 5%" of the protocols and processes are truly useful. One farmer complained that there is a consistent bias in favor of larger firms. "Laws are written to support the interests of larger farms, not to support small growers."

It is beyond the scope of this study to cover food safety in depth, but we do pass along comments we received during our interviews so that local food leaders can better address the concerns stakeholders raised. Obviously, having a safe food supply is a priority for all. Growers who wish to sell to wholesale markets are typically required to obtain Good Agricultural Practices (GAP) certification, and many have. Yet the question we encountered — perhaps shaped by the independent spirit of Maricopa County growers — was whether existing regulations do more to interfere with local food trade than they do to promote health and safety.

At the state level, one grower noted that although "State statutes prohibit municipalities from requiring permits for farming," some municipalities enforce such regulations. Another grower maintained that "Arizona food safety laws are sometimes more restrictive than USDA."

Other respondents wondered why it was important, under City regulations, to require proof that pickles, generally viewed as quite safe to make at home in other states, be made in a certified kitchen if offered

for sale at a farmers' market. Others balked at the need to register with the County for a food handlers' license in order to sell baked goods, or the State for a certificate to sell nest-run eggs.

Certainly the Maricopa County Food System Coalition is aware of these issues, and will continue to address them. The question for strengthening community foods networks is how to ensure that civic leaders will adopt a more proactive strategy of fostering community food trade in a manner that promotes public health and safety and reduces the likelihood that regulations will be used as a policy tool to restrict grower access to market unnecessarily.

Important Stakeholders are Not Represented

Respondents said that both strategic planning efforts and the coalitions that lead them should include more diverse representation, both racially and covering a broader range of stakeholders.

Other stakeholders report a latent racism and classism within the food system and in the greater Arizona community that compromises all their efforts. Not acknowledging and giving voice to a significant portion of the community is a disservice to everyone, not just the excluded populations.

Farmers are often missing from the table, but for that matter, farmers are not often temperamentally inclined to devote strong attention to policy endeavors. As one respondent told us, "Growers do not have a great deal of interest in connecting with local government, so they don't get involved with policy making."

Farmers Lack Organizational Representation

Many of the farmers' concerns could be mitigated if a strong farm organization represented farmers who sell to local markets. Yet none of the farmers growing for local markets that we spoke with felt that farm organizations play a strong role in advocating for their needs.

People did note that the Arizona Farm Bureau represents well the interests of those farmers who raise cotton, alfalfa, and cattle on large acreage, but less devoted to produce growers or others serving local markets. Several produce growers have become active in the Farm Bureau's Young Farmers and Ranchers group, and have found it a supportive learning experience — but not an advocacy force.

Several growers treasure the advice they can obtain from growers in Arizona through organizations such as the Phoenix Fruit Growers. Others have turned to informal networks of growers nationally who serve local markets near their own farms in other regions.

Civic Officials Hold Limited Interest

In addition, farmers do not think there is much interest in food at the highest levels of County government. This is despite the fact that one of the County's Food Systems Coordinators is one of the prime networkers in the region, and someone who has taken great lengths to foster local food activity and food security. This staff person, Cindy Gentry, also told us that her supervisors are exceptionally supportive of her work. Yet among community stakeholders we interviewed, we gained no impressions that leadership at the political level had entertained dedicating significant resources to community foods infrastructure or food-systems development.

Some stakeholders said that civic action was limited by the fact that few City or County civic leaders are acquainted with any farmers, or have any direct knowledge of agriculture. One person began our interview by stating baldly before we asked a single question, "City officials won't do anything." Another interviewee stated that "The City is very difficult to deal with [for farmers]."

Rather the interests of civic leaders appear to be dedicated to promoting more housing and commercial development. "Downtown Phoenix has been very underdeveloped for some time," one said. "There is now a huge push to develop it that has a lot to do with Arizona State University." Food does not seem to be on the radar. One of our respondents simply said, "In the County government, residential development has priority over farming." Another added, "The City spent millions to purchase desert for preservation, but no one has come forward to suggest buying agricultural lands for protection."

Strategic Planning and Coordination is Lacking

It was quite difficult for our consulting team to schedule interviews with several growers because they have grown weary of inaction. Several pointed out that they had been donating their time patiently to help paid consultants (like us) compile information on the food system, but had seen almost no benefit from their investment.

Across the entire spectrum of stakeholders, interviewees reported that there is neither cohesive public vision nor effort towards systems building among civic leaders. As one respondent stated, "There is no entity dedicated to bringing awareness to the community, whether inside or outside of the government. There is no real dialogue about the need to have farmland if we are going to eat. This needs to be done quickly."

High-level stakeholders report that they're still trying to figure out how to work together and haven't yet identified clear priorities. Existing efforts appear disjointed and initiatives are at times duplicative. High-level strategic planning for long-term solutions and mechanisms for accountability and evaluation are needed. As one respondent stated, "We currently have the luxury of duplicating energies," but added that those days are limited.

One of our interviewees also noted that there is an inherent difficulty with civic processes in which paid professionals attend meetings alongside farmers who volunteer their time and travel long distances to participate. As one respondent said, "Farmers have the least amount of time, and they need the most representation."

The current system relies heavily on distributors to act as mediators and facilitators between growers and buyers, we were told. Yet this ultimately leaves these two groups lacking both the skills and knowledge to be more effective partners. Relying primarily upon private business interests to facilitate the development of a food system leaves the system fragile and without proper policy support, since competitive pressures make it nearly impossible for private firms to devote themselves to building community capacities. Further, nutritionists and dieticians in charge of institutional menu planning who don't understand and/or accommodate seasonal availability will have great difficulty supporting local farms, regardless of the efforts of distributors.

Visions and Opportunities

All of the people we interviewed recognize that the work they do to promote community-based foods is swimming upstream against powerful currents. We met farmers who persist to grow food against great odds despite their sense of isolation and a belief that consumers and policy makers seldom value their contributions. We met businesspeople who try to build new connections among community members in an effort to help heal the individualist climate in Phoenix. We spoke with nonprofits that doggedly distribute healthy food to low-income people, not because it is financially rewarding, but because it needs to be done.

Performing effective work under such circumstances requires a strong vision. Some of the "visions" we heard were simply a desire to make the most money possible. For others, food work is a quest to build a stronger community in metro Phoenix. One respondent envisioned a "culture shift to a place where we value real, nutritious, good foods, and the people that produce them." Others aspired to see "cooperative learning among people from diverse backgrounds." Others look for a "fair and equitable distribution of fresh foods so everyone gets what they need."

Others saw the issue in more economic terms: "We should subsidize farmers so they can sell at a reasonable and accessible price and still be able to have health insurance, send their kids to college, and have a vacation." One thought more systemically: "We need locally owned and managed food-systems infrastructure that facilitates other local foods business development and stokes consumer demand."

Still another noted that their vision for the future was that "Power players [would] value small farms, farmers, waste stream mitigation, equity, and social cohesion."

Several stakeholders conveyed a spirit of optimism, arguing that it was precisely local foods work that would create a stronger sense of collaboration across the County, even spreading outside of the realm of food. One respondent ventured, "The local foods movement will be the tool that changes the whole system."

This may well be true, but is unlikely to occur until Maricopa County civic leaders build a stronger foundation of trust with the movement itself.

Opportunities

The clearest opportunities identified by our respondents involved **making sure that the skilled farmers the region now has continue to farm**. Several expressed deep concern that productive farmers would stop growing entirely or move elsewhere. It does seem certain that unless civic leaders step forward with clear measures of support, this sector could completely die. Market forces, by themselves, will continue to force farmers off the land. Such a loss would have profound personal, health, social, and economic consequences.

Yet our interviewees also noted that taking such a step is difficult because few civic leaders have any knowledge of agriculture or know any farmers. Even worse, our respondents felt that few leaders even cared about food or farming. One recommended the very pragmatic step of holding meetings that bring civic leaders in both City and County government together with farmers — meeting face-to-face to become personally acquainted, and to build working trust. Officials might be invited to visit each of the

farms that produce for local markets so they can understand the creative ways each addresses raising food for Maricopa County consumers.

One agitated and pragmatic voice stated, "Make all the bureaucrats field agents. Make them leave their offices and visit farms. Make them get out there and get stuff done, instead of planning events all the time." Another complained that training programs were often unnecessary and duplicative.
Still another took a long-term view; "Embed champions in the system. Make supporting local food a matter of habit and policy, regardless of who is in which position at any given time." Another pointed out that community foods need to be framed as an economic development opportunity.

Another respondent suggested that this could best be accomplished by designating one clear coordinator with effective power. "[There should be] "a Food Policy Director embedded in City government" with sufficient budget to invest in critical infrastructure and build collaborative networks in the County. Others looked to initiatives that would bring more diverse voices into the process: "Increase Latino and tribal representation on committees and coalitions."

One key infrastructure suggestion was that "Light processing is needed [to meet the needs of] institutional food services." Others suggested that the answer was more on-farm capacity: "shared infrastructure for washing and packing."

One respondent outlined specific steps the City could take to support growing food in the City, although perhaps focused more on community gardening than commercial agriculture: "The City could be more proactive — it could identify parcels of land that are suitable for growing food. The City also owns a lot of land and could make it available." Another asked, "Could we let community gardeners use City water?"

Several other respondents pointed out that the most significant step the City could take would be to rationalize City food regulations, to write them from the perspective of encouraging community food system development through fostering healthy food production and handling, rather than simply writing restrictive policies.

Closely related to proposals for keeping farmers farming were suggestions that **farmers work in collaboration.** One respondent convenes fellow farmers for a monthly beer. Others network through the Internet. One suggested that farm tours would be a useful tool for farmers themselves, "[Someone should] host tours so that all food system stakeholders get to know each other's operations." Another noted that farmers' markets might play a role in convening: "In another state I know, farmers' markets are working together in a coalition. They host events and get people together."

The other glaring need, if Maricopa County is to host agriculture in the future, is to **grow new farmers and farm laborers.** "The lack of personnel is huge," one farmer lamented. Several existing farmers, having few places to turn locally, gain significant part of their farming advice from YouTube videos. One farmer wants to start a training farm that would allow emerging farmers to gain practical experience that cannot be gained in academic settings. Another respondent called for more training opportunities at UA, including a beginning farmer course that is both "non-academic and non-collegiate."

Some called for **farmers and retailers to gain more marketing savvy**. "We eat with our eyes," one respondent said, pointing out that food displays need to be more attractive. Still another pointed out

this has ramifications beyond the sale itself: "You hook people through better taste, then connect this back to their values."

A strong thread through our discussions was the need to **ensure access for low-income residents**. One respondent said this was a matter of "democratizing the food system." One argued for more "Double Up Food Bucks" programs and determined efforts to increase SNAP participation rates. Most of the farmers we interviewed are already donating substantial quantities of produce toward food relief, but should not be expected to sustain the costs of this alone.

One respondent added that the key step was to **change civic attitudes** about low-income residents, seeing them as partners rather than clients: "People need to work alongside low-income residents, not 'to help' them."

Still others pointed to a need for **more effective state policy**. "We need state laws that support small growers," one respondent ventured. One suggested that a simple step for Arizona to take would be to share the costs of GAP certification to reduce the burden on smaller farms. One respondent called for a "multifunctional statewide food hub."

Water

Finally, while detailed coverage is outside of the scope of this particular study, we note that water was often raised as an intense concern. Metro Phoenix has good reason to scale back water use, even as civic leaders propose new housing and new industry. "We've been told we have to cut our water use because the snow cover on the mountains is declining," one respondent said. Thousands of acres of water rights have been sold to developers, removed from agricultural uses permanently. This may indeed have been encouraged by the knowledge that large-scale commodity agriculture uses water intensively. Yet such decisions have economic and health consequences of their own.

Surface and groundwater rights for the metro area are owned and managed by numerous persons and entities. Several policy groups are working to frame better water policies, while others argue that no new legislation could improve on what is already in place, if only because political agreement is so difficult to reach in this era.

Following is a brief overview of the water situation as told by the Arizona Water Atlas (2010). According to Volume 8, five groundwater basins make up the central planning area that runs from Prescott to Santa Cruz. Of total water use in these five management areas during the years 2001-2005, 43% came from groundwater supplies, 32% was allocated through the Central Arizona Project diversion from the Colorado River, 21% drew upon surface waters, and 4% involved reclaimed or effluent water.

During the same period of time, agriculture was the main user of water, accounting for 59% of demand. Municipal uses averaged about 35% of demand and 6% was devoted to industrial uses. These ratios are likely to have changed since the report was written, since farmland has been taken out of production.

Groundwater in the Phoenix AMA

The Phoenix Active Management Area (AMA) is the largest of the five. It is drained by five major rivers including the Agua Fria, Gila, Hassayampa, Salt, and Verde. The Salt and Verde watersheds are the two most productive in Arizona, and converge in the Phoenix AMA, and thus are critical to water use in the metro area.

The Water Atlas states that the three central AMAs in Arizona, the Phoenix, Pinal, and Tucson, are all in an overdraft condition, meaning that more groundwater is pumped than would be safe, based on the volume of groundwater that enters each area. Prescott is also in an overdraft condition.

There are seven sub-basins inside the Phoenix AMA. These include the Carefree, Fountain Hills, Hassayampa, Lake Pleasant, Rainbow Valley, and the East and West Salt River Valleys. Pumping of water has already disrupted the historic flow of subterranean water from the East Salt River Valley basin to that of the West Salt River Valley, as a result of a groundwater depression that formed east of the White Tank Mountains around 1964. Twenty years later, agricultural pumping had produced additional groundwater depressions throughout the AMA. By 1993, it was documented that the connection between the East and West sub-basins had been completely broken, with a groundwater divide having formed underneath Tempe.

Near Apache Junction, Queen Creek, and North Scottsdale, fissures have appeared in the earth and water tables have subsided due to pumping. The Atlas notes that "over time, groundwater declines can lead to increased pumping costs, declining water quality, riparian damage, land subsidence, land fissuring and permanent compaction of the aquifer, all of which have occurred in the planning area."

Researchers documented that the level of the groundwater tables had lowered in an area covering downtown Phoenix to Glendale to Goodyear, while rising from Litchfield west and from Tempe Southeast, between the years 1991-1992 and 2002-2003. The Atlas further reported that wells are yielding high volumes throughout the AMA. The main sources of water recharge for groundwater supplies in Phoenix are runoff from mountains and recharge from streams that feed the watershed.

While the Atlas notes that "groundwater quality is generally suitable for most uses," 68 contamination sites, primarily attributed to industrial uses, have been identified in the Phoenix AMA. Volatile Organic Compounds are the primary contaminant. Moreover, over 1,500 measurements have documented pollutant concentrations that exceed drinking water standards, with the most common pollutants being nitrate, fluoride, arsenic, and organic compounds. While much of this water is treated before use in drinking water, some appears to be present in irrigation water.

Non-Groundwater Sources

All the same, the Phoenix AMA also relies heavily on non-groundwater sources, which supply 64% of water demand. These come primarily through the Central Arizona Project (CAP) that diverts water from Lake Havasu, on the Colorado River far to the northwest of Phoenix. This water travels through a variety of canals and pumping stations as it travels 336 miles through the City to just south of Tucson. We were told that these are now under the jurisdiction of Tribal nations,[6] and the Atlas reports that "Almost all non-Indian agricultural subcontracts have been declined or terminated." However, the Tribes have issued permits allowing users to deliver "renewable" water supplies by using water and then treating it for use by the Tribes.

[6] In the Phoenix area, the Gila River Indian Communities, the Salt River Pima Maricopa Indian Reservation, and the Fort McDowell Yavapai Indian Reservation.

River Water

The Phoenix AMA is also supplied by surface water from the Gila, Salt, and Verde Rivers, aided by seven dams constructed as part of the 1903 Salt River Project, diverting river water through 131 miles of canals. Historically this water was used by farms, but increasingly has been channeled to urban uses. Roosevelt Lake is the primary water storage facility.

Surface water rights are allocated on a "first in time, first in right" basis in which those who made the earliest uses of water have priority rights. Over time access has also been shaped by several legal decisions. This includes the 2004 Arizona Water Settlements Act that allocated 653,000 acre-feet of water to the Gila River Indian Communities, which have in turn exchanged or leased water usage to several municipalities.

Many of the growers we spoke with said that they have ample water access at the current time, if only because they farm on land owned by a developer who holds water rights or selected land with adequate supplies. Yet one respondent noted that "Water access is different in each area [it depends upon historical rights, the presence and functioning of canals, the availability of groundwater or surface water]." One grower complained that "I installed an irrigation system, but my neighbors have priority access to the water." Some farmers did report taking extra production steps to deal with minerals or contaminants they find in their water. It is also not clear how many of the farmers we interviewed have examined the broader trends of water use in the region, or are aware of overdrafts.

Moreover, agricultural water use will change as new farmers instill new practices. Farms that have installed drip irrigation lines consume far less water per acre than those that broadcast water through sprinkler systems. Those who build organic matter in their soil also increase the water retention capacity of their fields. It is quite possible that if metro Phoenix embraces new generations of farmers, farming will prove to be a less intensive water use than it was in the past.

Defining "Local Food" and Moving Towards "Community Food"

In practice, definitions of the term "local food" are inherently local in nature. This means there are multiple working definitions of "local food," varying widely by place and institutional purview. The USDA's official definition of 400 miles or within the state of production is useful for federal policymaking, but has been met with much resistance from community practitioners, given that for many regions this distance includes areas most people would not identify as their local foodshed. In some communities the term "local" might signify very close quarters, such as "within my valley," or "within my county." Many local food leaders in more densely settled areas consider "local" to be within a 30-minute drive, or within a 50-mile radius. Arizona's Gary Nabhan used a 220-mile radius in his book, *Coming Home to Eat*, to highlight that in a sparsely populated desert area, widely scattered local options might range from edible cactus, to rangeland livestock, to Mexican seafood (Nabhan, 2009).

National scans of food hubs reflect a variety of regional definitions, largely ranging from 50-mile to 500-mile radii for supply regions, and market regions being considerably smaller: 50-mile to 150-mile radii. This reflects common food distribution models where products are aggregated from outlying production areas and distributed to denser, more urban areas.

The consumer economics literature suggests that it is not so much a geographic location or distance that consumers are concerned with, but instead they are concerned with fresh, healthy, and safe food, and community well-being (Snyder, Smith, Meter, Goldenberg, Miller, & Amsterdam, 2014). However, the

goals of farm-to-institution purchasing are often, but not always, economic development, increased healthy food access, community building, and environmental stewardship, none of which are intrinsically dependent on locale or region (Born & Purcell, 2006; Jackson & Perrett, 2014). Given this, it is nearly impossible to define "local food" in a way that accurately communicates to consumers the intrinsic and extrinsic value of a product. As a result new emphasis is being placed on "community-based" food systems that are evaluated based on connectivity and social capital, and that healthy food access and economic development are also eventual outcomes.

The driving force (and indeed the competitive advantage) in community-based food systems is relational trading, that is, commerce based on mutual loyalties (community supported agriculture models that reduce risk, slow money investments that reduce expectations of return, the strong desire among farmers and consumers to connect with each other, the possibility of building differentiation and branding based upon personal, regional, mode of production (e.g., fair trade, organic, or sustainable), cooperative ownership, or other loyalties). Such "sticky" transactions are not accounted for by conventional economic modeling, which assume consumers are isolated and determined to increase individual utility.

Economically speaking, the productive benefits of social capital are enormous. Research attributes reductions in transaction costs (Putnam, 2000; Rydin & Holman, 2004; Sabatini, 2009), career success, product innovation, reduced turnover rates, entrepreneurship, and learning (Adler & Kwon, 2002), and reduced high school dropout rates (Coleman, 1998) to social capital. An individual or firm's place within a network can predict rate of innovation (Powell, Koput, & Smith-Doerr, 1996), financial success (Shipilov & Li, 2008), better jobs and faster promotions (Burt, 1992), and overall power and influence (Brass, 1984).

At a community development level, civic engagement is strongly correlated with economic development. In fact, Putman argues, in his study of Italy, that civic engagement is not a function of wealth, but instead, economic development and effective government are consequences of social connectivity and capital (1993). One would expect that the stronger the sense of community connectedness, the greater the likelihood is that financial transactions will cycle money among community members (Meter, 2011).

This suggests that local economic development is correlated with community development and social connectivity (social capital). It is therefore possible to make a case for using a social network analysis approach to estimating economic impacts, particularly in regards to local food systems development, where so much of the economic activity is predicated on social connections. Social Network Analysis (SNA) has frequently been used to assess the strength and extent of relationships in a network.

Recommendations

Farmers in Maricopa County appear to be among the most productive vegetable growers in the US, yet they may very well be the most isolated farmers, too. This is both due to a lack of trust among growers, but also a lack of connection with civic leaders.

This is debilitating to the Phoenix region on many levels. On the simple level of economics, Maricopa County consumers spend at least $10 billion each year purchasing food sourced outside of the County, while neighboring farmers struggle to make a living. Moreover, City and County officials appear committed to a development strategy that will further erode financial resources by allowing new housing development that is likely to consume more in public services than it brings in property tax revenue. All of this plays out in a context in which water availability is uncertain, and the medical costs of diabetes — largely attributed to faulty diet and exercise — total $4.8 billion per year for the state of Arizona (American Diabetes Association, 2012). Meanwhile, Maricopa County depends on $900 million of federal aid each year to provide food relief to low-income residents — roughly the same amount of money that farmers earn selling alfalfa, cotton, vegetables, and grains for export. This is a community heading to a crisis.

Yet the lack of connectivity in Maricopa County is also deeply problematic for social reasons. In a region that upholds a staunch individualist and libertarian ethic, it is very difficult to be resilient in the face of changing conditions that are increasingly more chaotic. Our sources told us that the region is polarized, with one interviewee naming the biggest threat as the "Lack of knowledge on the part of decision makers about food and agriculture." Further, some respondents told us that the greatest promise for healing social wounds that was to build community-based food systems.

Our report focuses on the ways in which community foods organizing has built connections among residents over the past several decades. By mapping out the networks that farmers have built around themselves, we learned more about their social and commercial isolation. We learned that farmers' organizations help to build support, but only in minimal ways for those farmers who are dedicated to growing for local markets. Both food businesses and nonprofits broaden and deepen that support — leading to opportunities to collaborate, weaving a fabric of community, and significantly, laying the foundation for a stronger local economy with higher multipliers.

One stakeholder observed that Phoenix has "food silos" rather than a "food system." This appears totally apt. Addressing this isolation is our foremost recommendation. Four action priorities (which we hope will be taken in collaboration with local partners such as the Maricopa County Food System Coalition, Local First AZ, Sun Produce Co-op, Green on Purpose, and farmers' market organizations) are:

1. **In collaboration with local partners, convene informal meetings in which diverse farmers build trust among each other and with diverse civic leaders.**

2. **Mount outreach and education campaigns that persuade Maricopa County residents to buy food from farms in the County.**

3. **Launch a long-term effort to grow new farmers in Maricopa County.**

4. **Collaborate with Tribal Nations to ensure long-term water access.**

Other strategic steps, such as building infrastructure projects, establishing food hubs or other aggregation initiatives, increasing school purchasing, and fostering community gardening are all critical to implement — yet unless these efforts help build the social connectivity of residents in the region, and contribute to building trust among farmers and other stakeholders, they will be premature.

More detailed comments on each action priority follow.

1. **Convene informal meetings in which farmers build trust among each other and with diverse civic leaders.**
    a. A racially diverse group of farmers, civic leaders (elected City and County officials as well as key staff), and others should be convened to guide this process.
    b. City and County leaders must assert strong leadership by making a specific promise to engage in a forward-looking and pragmatic process of building community-based food systems in the region including a comprehensive review and revision of urban agriculture zoning and land use regulations, public investment in supportive infrastructure, and transparency. This commitment must be conveyed to growers as one of the first steps of the process.
    c. City and County leaders should commit to holding at least 10 face-to-face meetings over the next year with the dozen or so farmers who grow most of the food for local buyers. These meetings would be hosted in collaboration with the Maricopa County Food System Coalition.
    d. The first session should be a general introductory session at one farm or government office. People should become acquainted with each other, perhaps through exercises such as "speed-dating," but also through sharing stories about their backgrounds, visions, and work plans with each other.
    e. Following this meeting, all participants should tour each other's farms and workplaces to gain a stronger sense of how food is grown, harvested, prepared, and delivered to local markets.
    f. Once a strong personal foundation has been laid, this group should develop a common long-term vision for community-based food. It is important, as our report shows, to move beyond the concept of "local foods."
    g. Participants should then build strategic plans around this vision. Essential elements include:
        - Public and private investments in infrastructure that build efficiencies in community foods trade
        - Ensured access to land, water, and clean air for growers
        - Dedicated land for agricultural use for the long term
        - An economic development strategy that embraces farming and food businesses
        - Outreach and education campaigns promoting community foods
        - Long-term initiatives to grow new farmers
        - Incentives for housing developments that incorporate agriculture either directly or through land preservation for agricultural use
        - Ensured food access for low-income residents
        - More responsive food safety regulation at local and state levels
        - Comprehensive review and revision of urban agriculture zoning and land use regulations that facilitate smaller-scale farm production and sales so they work to growers' benefit and do not conflict with state statutes.
        - Adequate staffing to coordinate this activity
        - Long-term monitoring of success including mechanisms to guarantee accountability

2. **Mount outreach and education campaigns that persuade Maricopa County residents to buy food from farms in the County.**

a. If every Maricopa County resident purchased $5 of food each week from some farm in the County (and if such farms existed), County farmers would earn an additional $1.1 billion annually— more than the combined income of all Maricopa County farms today.
b. This should be the basis of a concerted "Buy $5" Campaign to be mounted as a collaboration across the County. Alaska ran such a campaign in 2017, and found it highly successful. The Alaska Farm Bureau was a partner in this with the Department of Agriculture. The South Carolina Farm Bureau, the Department of Commerce, and the Department of Agriculture also proposed a similar campaign with other partners in that state.
c. Such a campaign would include:
    - Grocery store displays featuring locally produced items
    - Photos of Maricopa County farmers
    - Incentives for using SNAP benefits to buy food from local farms
    - Social media campaigns
    - Electronic media campaigns
    - Farm tours
    - Special meals
    - Events at local restaurants
    - And more

3. Launch a long-term effort to grow new farmers

a. The Maricopa County Food Systems Coalition, in partnership with farmers and civic leaders engaged in the above networking activities, should formalize a comprehensive plan for ensuring that enough new farmers are established in business each year to meet a good portion of the County's food demand.
b. This effort should begin with K-12 education. One of the critical reasons that **farm-to-school initiatives and local food production** are important is so every Maricopa County resident knows (i) how food is grown and processed, (ii) where much of their food is grown and processed, (iii) how to safely handle food, (iv) how to properly prepare savory meals using healthy ingredients, and (v) how to eat in a healthy manner.
c. Technical colleges may be the colleges most adept at training people to remain in the County to farm because students typically grow up and remain in the region.
d. Universities can play a supportive role through participatory research, extension activities, and with technical assistance.
e. On-farm training is the best training. Several training programs already exist. One farmer is interested in launching a training program and thinks he has land lined up. These require long-term support. Other initiatives should also be considered.

4. Collaborate with Tribal Nations and other stakeholders to ensure long-term water access.

a. Water rights in Maricopa County are owned by multiple stakeholders including four tribal entities: The Fort McDowell Yavapai Nation; the Pascua Yaqui; the Salt River Pima Maricopa Indian Community; and the Ak-Chin Indian Community.
b. This means these Tribes have a fundamental role to play in water conservation and access planning.
c. Given the polarization of political discourse and structures in Phoenix, Arizona, and the US, the Tribes may be the entities most adept at framing more successful and long-term water policies.

References

Adler, P.S., & Kwon, S. (2002). Social capital: prospects for a new concept. *Academy of Management Review 27,* 17-40.

American Diabetes Association (2013). Economic Costs of Diabetes in the United States. Diabetes Care, March 6.

Arizona Water Atlas (2010). Volume 8: Active Management Areas Water Atlas. Available at http://www.azwater.gov/azdwr/StatewidePlanning/WaterAtlas/

Borgatti, S.P., Everett, M.G. and Freeman. L.C. Ucinet6 for Windows: Software for Social Network Analysis.

Borgatti, S.P. 2002. Netdraw Network Visualization. Analytic Technologies: Harvard, MA.

Born, B., & Purcell, M. (2006). Avoiding the Local Trap: Scale and Food Systems in Planning Research . *Journal of Planning Education and Research, 26*, 195-207.

Bureau of Economic Analysis, Regional Income Accounts. http://www.bea.gov/

Burt, B.S. (1992). Structural Holes: The Social Structure of Competition. Harvard University Press, Cambridge, MA.

Brass, D.J. (1984). Being in the right place: A structural analysis of individual influence in an organization. *Administrative Science Quarterly,* 29, 518-539.

Coleman, J.S. (1988). Social capital in the creation of human capital. *American Journal of Sociology 94,* 95-121.

Duval, D; Bickel, A.K; Frisvold, G; Wu, X; Hu, C. (2018). Contribution of Agriculture to the Maricopa County and Gila River Indian Community Economies. The University of Arizona Department of Agricultural and Resource Economics, Cooperative Extension, January.

Farmland Information Center (2016). *Cost of Community Services Studies.* American Farmland Trust.

Jackson, C., & Perrett, A. (2014, March 26). At What Cost? Food Hubs, Walmart, and Local Food. *ASAP Connections*.

Maricopa County Assessor (2018). 2019 Agricultural District Values. Viewed April 27, 2018 at https://mcassessor.maricopa.gov/static/docs/2019-Agricultural-Acreage-Rates.pdf

Meter K. (2015). Calculation by co-author using data from Bureau of Labor Statistics Consumer Expenditure Survey.

Meter, K. (2011). Learning how to multiply. *Journal of Agriculture, Food Systems, and Community Development*, 1(2): 9–12.

Feeding America (2015). Closing the Meal Gap web site. Viewed April 20, 2018 at http://map.feedingamerica.org/county/2015/overall/arizona/county/maricopa

Nabhan, G. P. (2009). *Coming Home to Eat: The Pleasures and Politics of Local Food.* W. W. Norton & Company.

Powell, W., Koput, K., and Smith-Doerr, L. (1996) Interorganizational Collaboration and the Locus of Innovation: Networks of Learning in Biotechnology. *Administrative Science Quarterly,* 41, 116-145 (1996).

Putnam, R.D. (2000). Bowling alone: the collapse and revival of American community. New York, NY: Simon & Schuster Paperbacks.

Putnam, R.D. (1993). The Prosperous Community: Social Capital and Public Life. The American Prospect. July 23, 2013. Website: http://www.prospect.org/cs/articles?article=the_prosperous_community

Rydin, Y., & Holman, N. (2004). Re-evaluating the contribution of social capital in achieving sustainable development. *Local Environment 9(2),* 117-133.Sacks, J. (2002). *The Money Trail: Measuring your impact on the local economy using LM3.* London: New Economics Foundation. Available at http://www.neweconomics.org

Sabatini, F. (2009). Social capital as social networks: a new framework for measurement and empirical analysis of its determinants and consequences. *The Journal of Socio-Economics 38,* 429-442.

Shipilov, A.V. and S.X. Li. (2008). Can you have your cake and eat it too? Structural holes' influence on status accumulation and market performance in collaborative networks. *Administrative Science Quarterly,* 53, 73 (2008).

Snyder, B., Smith, L., Meter, K., Goldenberg, M., Miller, S., & Amsterdam, R. (2014). *The Real Deal: How Do We Define Local in a Meaningful and Measurable Way.* Pittsburgh, PA: Pennsylvania Association for Sustainable Agriculture.

St. Mary's Food Bank Alliance (2017). Annual Report for 2015-2016. Available at https://www.firstfoodbank.org/wp-content/uploads/2017/12/FINAL-annual-report-15-16.pdf

US Federal Census, American Fact Finder, five-year data covering 2012-2016.

US Census of Agriculture 1920, Reports by States with Statistics from Counties, p. 65. Available at http://usda.mannlib.cornell.edu/usda/AgCensusImages/1910/

USDA NASS Census of Agriculture, 2012. Viewed April 25, 2018 at https://www.agcensus.usda.gov/

APPENDIX 1: NETWORK MAPS

Credit for Software Generating Network Maps: (Borgatti, et al; & Borgatti, 2002)

The consulting team compiled data from our interviews to learn more about the networks that local food system leaders have built to support community foods activity in Maricopa County.

In order to get the most accurate data possible, we promised those we interviewed that we would keep all names they offered us in the strictest confidence. Therefore, the maps shown below show the networks that people said they participated in, but omit any names or distinguishing features.

Our mapping expert for this phase of the work was Paula Ross, retired from the University of Toledo, who has applied Social Network Analysis (SNA) in a variety of settings, including to help build community foods networks in the Toledo, Ohio region.

To be placed on these network maps, a person had to have either been someone we interviewed, or had to have been named as a "principal partner" by someone we interviewed. We asked each interviewee to list 5 such principal partners, although some named fewer, or more, partners. Once each partner was named, we asked each respondent to describe the nature of their partnership: (a) with whom did they share information? (b) who would they seek to gain advice when they felt challenged? (c) with whom did they engage in financial trade (including barter)?

Since this was an initial study with limited resources, our data has limited validity. In a larger study, we would have then interviewed all of those who were named by our respondents, to see which networks they felt were most important to them and to identify ways in which they are connected to each other. We also interviewed only a small number of local foods leaders. Since we only asked for five principal partners, there are many people who are in fact connected to each other who do not show up as connected in our network diagrams because they did not fall within the top five partners. For the purposes of this mapping, we did not differentiate between the three ways of being connected. If someone said they were connected, we listed them as connected. Further use of this data could be made if desired to produce more nuanced analysis.

For our purposes in this study, which was to show the ways in which community foods initiatives have built connections among people who farm and eat in Maricopa County, we will focus on the networks that support farmers. This also reflects the physical reality that if Maricopa County consumers are to eat food grown on a Maricopa County farm, some farmer must grow it. Consequently, the better the support structures around County farmers, the more resilient will be community food systems, and the greater will be local economic multipliers.

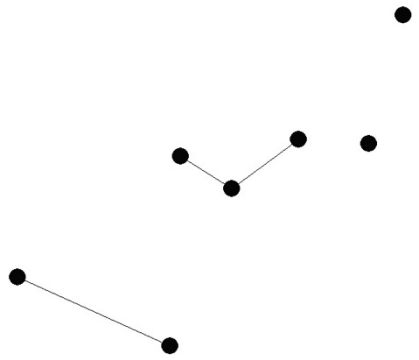
In these maps, each person who was identified as part of the "network of principal partners" is represented here by a symbol, as shown following Figure 3 below. The lines between each symbol show the connections that each person identified as principal to their food systems work. In general, the more connections each person has built, the stronger their participation in the network. The fewer steps between any two people, the faster information will travel between them even if they do not consider each other primary connections. The more that the network is dominated by a few highly connected people, the more fragile it is, while the more decentralized the connections, it is likely that the network itself is more resilient since more people share leadership.

In our first map of principal partners (Figure 3), we show the farmers we interviewed. A circle standing by itself signifies that this farmer listed no other farmer as a key partner. This, of course, does not mean that such a farmer is completely disconnected from other farmers — it simply means they did not consider any other farmer to be one of their closest colleagues. When a line connects two farmers, it means that at least one farmer of the pair considered the other a principal partner.

This map confirms what our interviews showed us — that farmers are largely isolated from each other. Few rely deeply on other metro region farmers for information or advice. Two farmers identified no farmers as principal partners. The other 5 farmers fall into two separate clusters, separated both geographically and professionally. There is no single farmer that is largely respected by most other farmers as a key connector or leader. A few pairs of farmers meet with each other in important ways, and farmers may know each other through channels that are not shown here, but the group overall is quite dispersed — and very vulnerable to outside forces.

This lack of connection is even more poignant, given that the farmers we interviewed were ranked by local food system leaders as among the most innovative, or most effective in building local food trade, in the County. If this group of leading farmers is not well connected, this has consequences for the entire cohort of farmers in Maricopa County as well.

Figure 3: Principal Partners among Maricopa County Farmers We Interviewed



Farmers by themselves are quite isolated, with two farmers naming no other farmers as principal partners. One cluster connects three farmers, but two of these farmers connect primarily through the third, so this map essentially shows three pairs of farmers that share information, advice, or commerce.

See next page for a key to the symbols used on these maps. Note that the distance between two symbols shown here does not reflect how closely people are connected. Further, some County farmers raising food for local consumers are not shown on this map because they were not available for an interview when our team was in the area.

Table 1: Key to Symbols Used on Network Maps

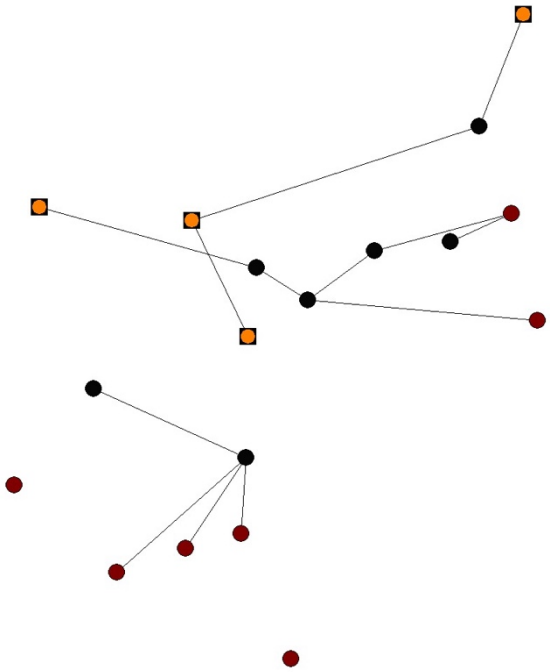
- Farmers Interviewed = Black Circle
- Farmers Named as Principal Partners = Maroon Circle
- Farm Organizations = Maroon Square with Orange Circle Inside
- Food Buyers = Pink Rounded Square
- Food Distributors = Red Squares with Cross
- Nonprofits = Light Green Triangle (up)
- Public Agencies = Yellow Diamond
- Others = Light Blue Triangle (down)

Note: The network maps shown in this report cover only the networks described by people we interviewed, based on who each named as principal partners, and who was available for interviews. None of these maps depict the actual community food system in Maricopa County in its entirety. Important connections are likely to exist among people who are not shown as connected here.

Farmers, of course, do not exist in isolation. Figure 4 below shows how connectivity is improved once we add farmer partners and farm organizations to the above diagram. The maroon circles on these maps show the farmers who were named as a principal partner by someone in the network of food system leaders, but who were not among the farmers we interviewed. Two of these farmer partners are not directly connected to any other Maricopa County farmers as principal partners. Yet this expanded group of farmers shows greater coordination among County farmers than in the previous map.

While farm organizations add a bit of this connectivity, they do not play a key role, particularly since farmers do not sell produce through farm organizations, nor have these organizations focused strong attention to local food trade. Farmers connect mostly with each other, while farm organizations also connect with each other separate from farmer members. Still, farmers are slightly more networked through the presence of these farm organizations. Significantly, the presence of farm organizations does not create close connections between the two separate clusters of farmers identified in Figure 3.

Figure 4: Principal Partners Among Maricopa County Farmers and Farm Organizations



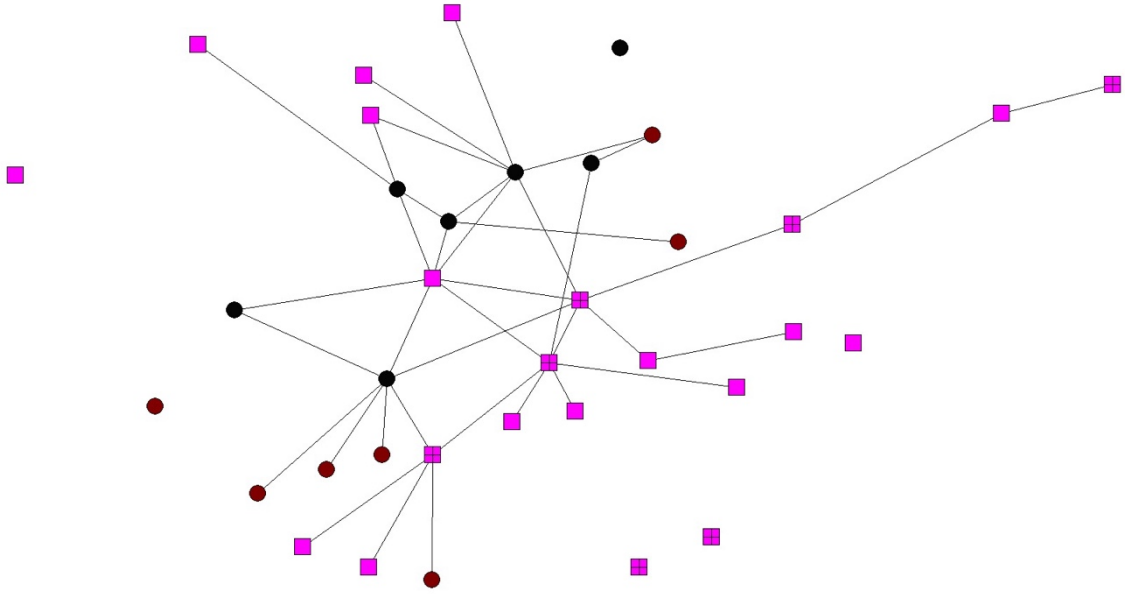
Once key farm partners are added to the network map, farmers are slightly more connected. Farm organizations help to connect farmers but marginally, and more farmers report connections to other farmers than to farm organizations. The farm organizations do not clearly build strong connections among farmers, and may indeed connect more with each other as organizational partners. Two farm partners are relatively isolated from area farms. The two separate farmer clusters are still disconnected from each other. Note that these maps primarily show farms focused on growing food for local markets, and do not cover commodity farmers in the County.

Figure 5 below shows the network of relationships between the farmers we interviewed, their farmer partners, and food buyers. Here food buyers are categorized both as "buyers" and "larger distributors." Four of these buyers are connected to several farmers, playing a key role in building financial support for those farms. Indeed, it appears that farmers we interviewed are slightly more connected to food buyers than to other farmers.

Surprisingly, 15 of the buyers and distributors named as principal partners are not directly connected to farmers as a primary source of information, advice, or commerce. Some of the food buyers network more with each other than with farmers themselves. Four of the food buyers show no key connections to farm partners.

Two farmer partners lack primary connections on this map, either to other farmers or to buyers. Yet overall, selling food builds more connections than belonging to a farm organization. And now the two clusters of farmers who showed up as separate groupings in Figures 3 and 4 have become better networked.

Figure 5: Principal Partners Among Maricopa County Farmers and Food Buyers

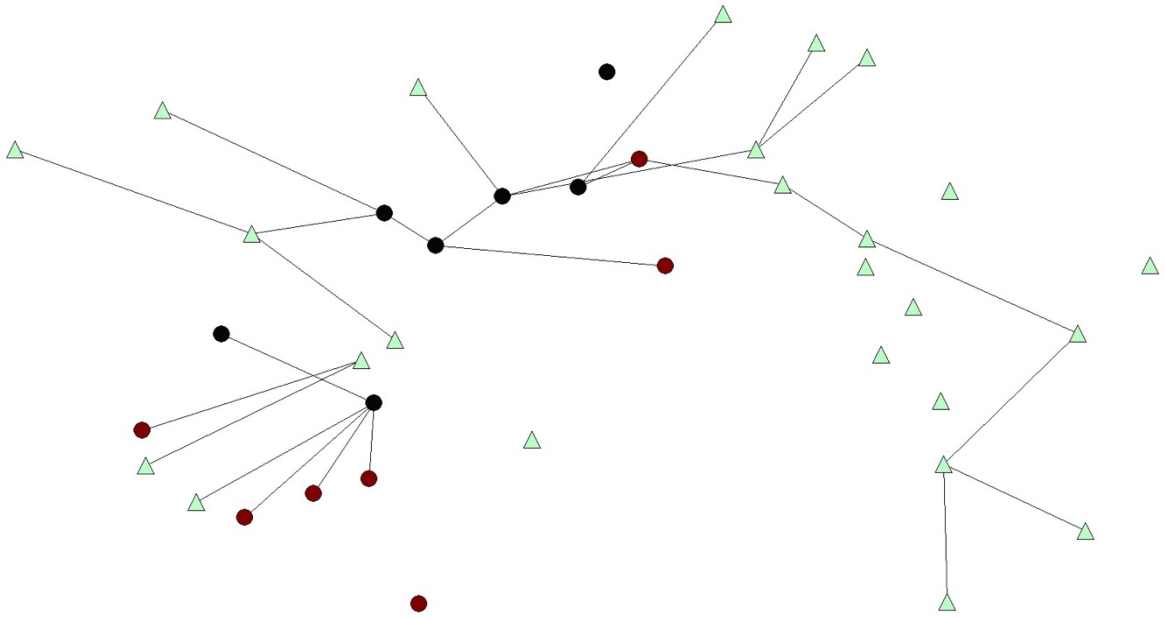


Farmers also gain supportive networks by selling food to buyers. The above map shows that farmers are often more connected to their buyers than to each other, although some buyers devote considerable energy to helping farmers network with each other. Surprisingly, 15 food buyers and distributors are not closely connected to farmers — while several distributors are more networked with each other than with farmers. Two farmers lack primary connections to buyers. Farmer organizations are not shown on this map, because they do not typically get directly involved with commerce. Overall, selling food builds more connections than belonging to a farm organization.

Next (Figure 6) we look at the networks that farmers have built with nonprofit organizations active in food systems work. This map shows different forms of connectivity than the previous maps. Nonprofits play a key role in building networks of support for Maricopa County farms, providing services that for-profits cannot offer. These support structures may well be more important than commercial connections farmers make, especially in conveying information, building trust, and forging market connections that cannot be created through competitive commercial transactions. These nonprofit connections certainly complement commercial connections nicely.

Two Maricopa County farmers have effectively networked with nonprofits as principal partners, Yet there are still players who are isolated from each other, with 2 farmers who are relatively isolated, and 17 food system nonprofits that are not closely networked with farmers. A total of 7 nonprofits have no close partners in this map.

Figure 6: Principal Partners Among Maricopa County Farmers and Nonprofits

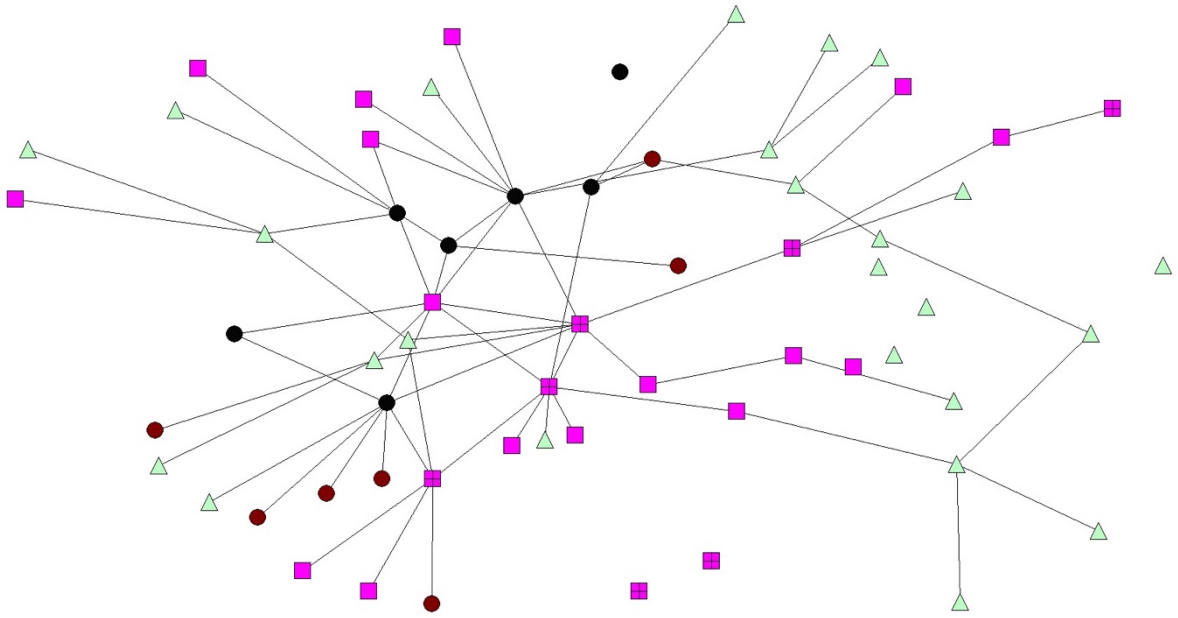


Food system nonprofits also play a key role in connecting farmers to other residents and businesses. They build different connections with farmers than farmer organizations do. Yet 2 farmers are still relatively separate from the rest of the network, and farmers are often more connected to each other than to nonprofits. A total of 17 food system nonprofits did not report any of these farmers as principal partners. On this map, 7 nonprofits show up without principal partners.

A more integrated network becomes visible once food buyers and food system nonprofits are combined on the network map (See Figure 7). Although one farmer partner still shows up as relatively isolated, most farmers are effectively networked through either farmer-to-farmer, commercial, or nonprofit connections. Information may travel through a variety of channels to most every participant in the network.

Yet four nonprofits and one farm are still relatively isolated from the network, as are two food buyers.

Figure 7: Food Buyers, Farmers and Nonprofits in Maricopa County



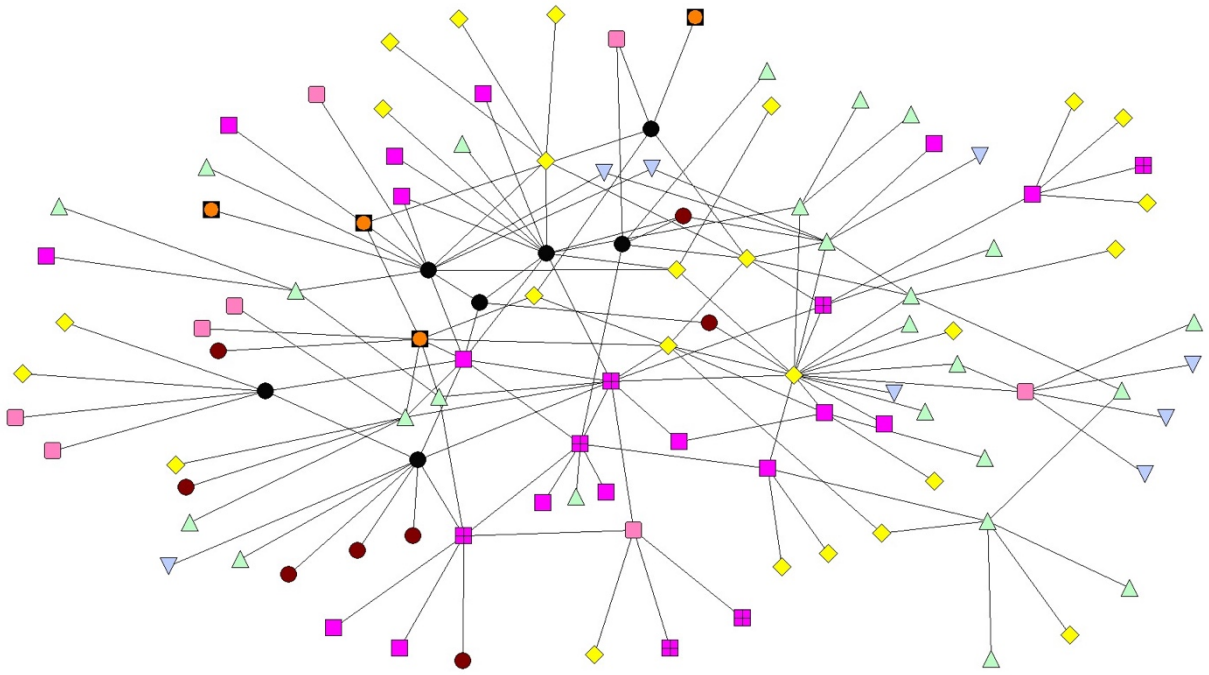
When the commercial connections established by farmers with food buyers are added to the connections made through nonprofit food organizations, the Maricopa County network appears to be more cohesive, although still one farm, two buyers, and four nonprofits remain isolated.

Finally, Figure 8 shows the entire network of connections described by those we interviewed. We repeat the caution that this map only shows those stakeholders who reported a primary connection to someone else in the Maricopa County food system. Many other connections have been formed that are not considered primary to those we interviewed. Also, of course, we did not interview all of those who are active in community food system initiatives, so this "whole network" does not form a complete picture.

This network map shows that public agencies and other stakeholders also pay important roles in building connectivity among Maricopa County food system stakeholders. While no one is completely isolated (since this map shows the universe of all those who were named as principal partners, everyone shows up as connected), some have built more diverse networks than others. Some appear as more marginal to the network.

The two main connectors in forming this network are a public agency staff person and the staff of a food distributor. One other food buyer and one farmer also play interesting roles by building a number of connections, but the two primary connectors have built the greatest connectivity.

Figure 8: Principal Partners Among Maricopa County Food Leaders: Whole Network



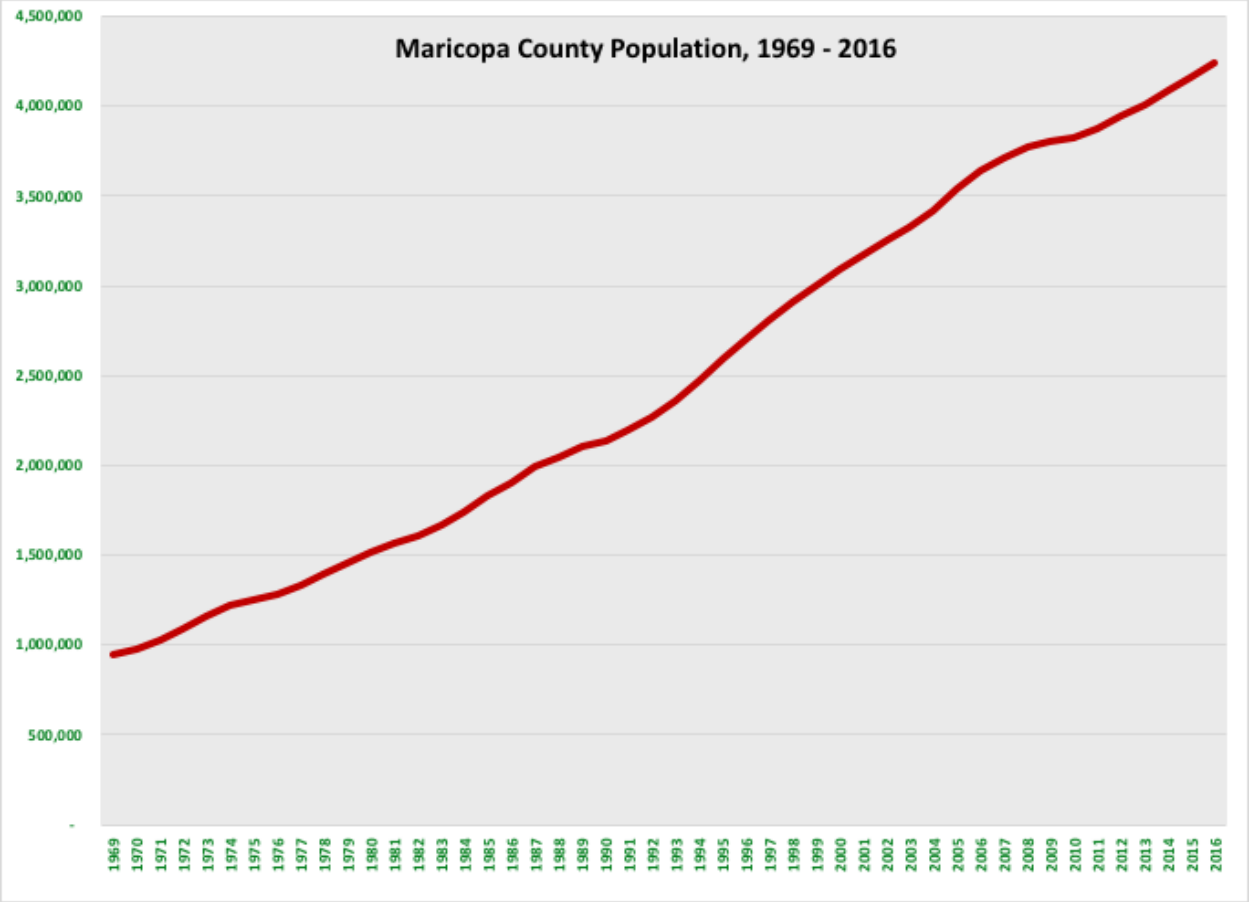
Once all of the partners are shown on a single diagram, it becomes clear that the network as a whole has considerable connectivity. Farmers may gain primary support from another farmer, or from a food buyer, from a nonprofit organization, an educator, or a civic leader. The broader network builds connections that are critical for fostering a resilient economy. In fact, economic multipliers are essentially constructed through such social and commercial connections, leading to greater economic resilience for the region.

Interestingly, the two main hubs in this food system are staff of a food distributor and a public agency. One farmer and one other food buyer play secondary roles as important connectors.

Economic resilience in Maricopa County is built precisely through such social and commercial connections. These network maps show that all stakeholders in the County can play significant roles in strengthening this network, in building stronger local economic multipliers, and in providing support to Maricopa County farmers who raise food for their neighbors.

Appendix 2: Economic Data

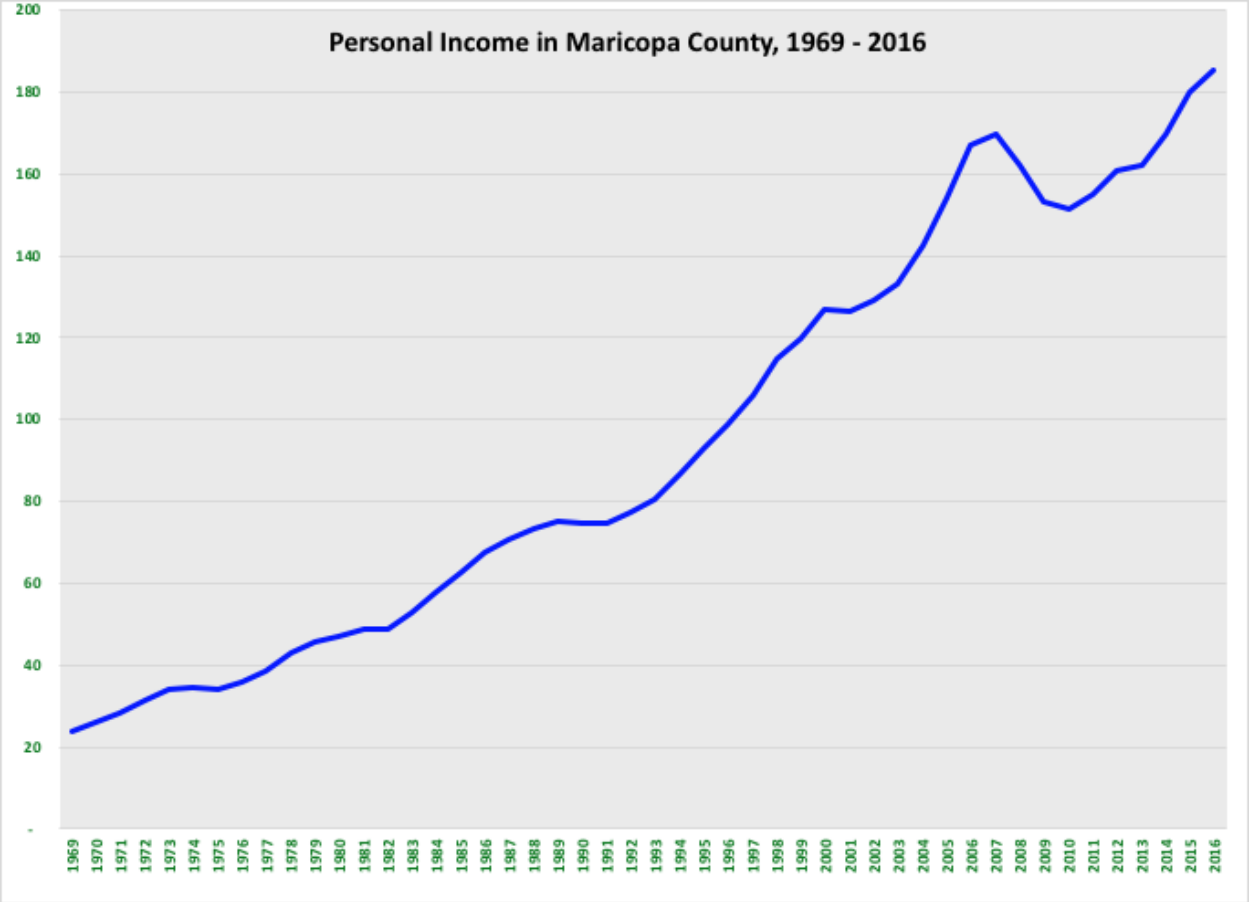
Chart 2: Maricopa County Population, 1969 - 2016



Source: Bureau of Economic Analysis

Population in Maricopa County increased 350% from 1969 to 2016. This is slightly faster growth than for the state of Arizona as a whole.

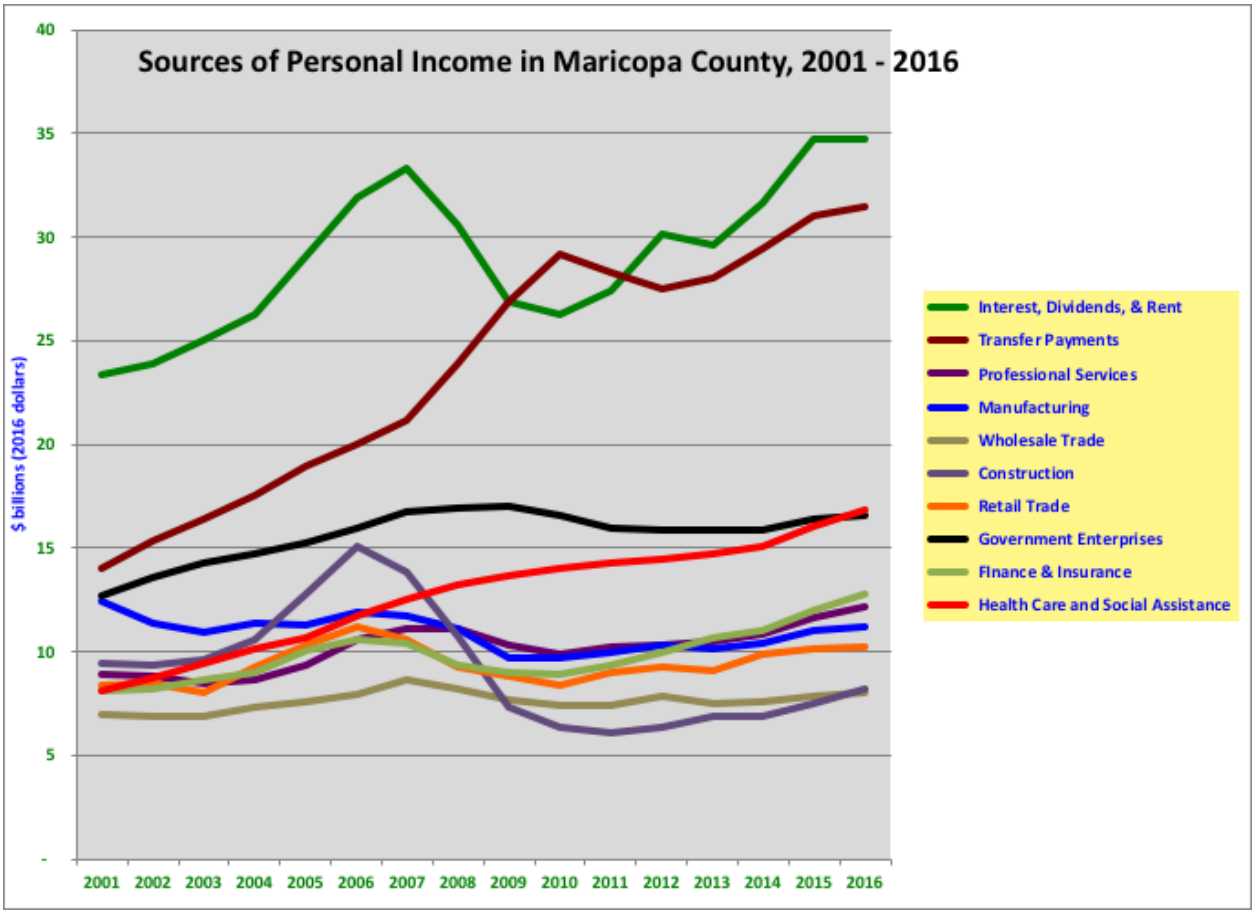
Chart 3: Personal Income in Maricopa County, 1969 - 2016



Source: Bureau of Economic Analysis

Personal Income for Maricopa County residents increased 672% from 1969 to 2016, slightly faster than growth for the state of Arizona. Note that income experienced a significant bubble during the build-up to the global housing finance collapse, and has recovered growth since then.

Chart 4: Sources of Personal Income in Maricopa County, 2001 - 2016



Source: Bureau of Economic Analysis

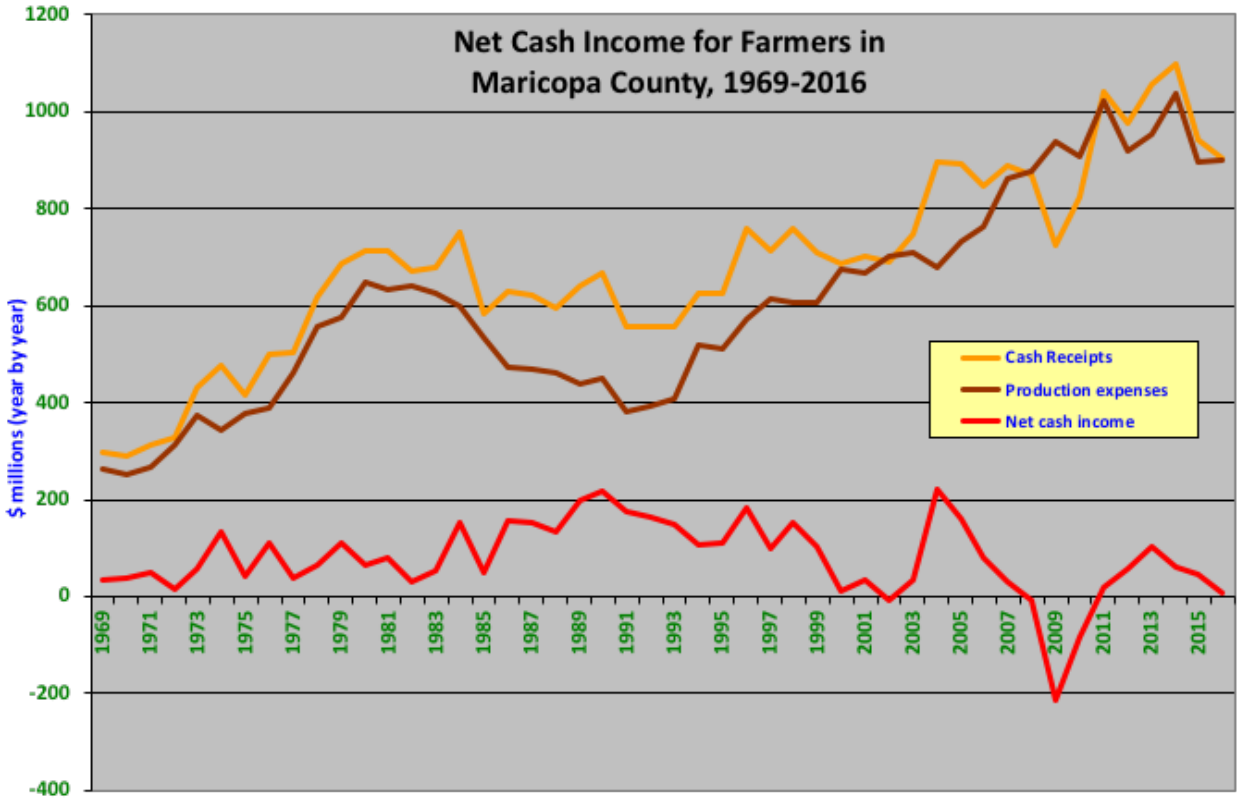
Note that the fastest rising source of income in the County is transfer payments (public programs such as retirement benefits and unemployment insurance). These are now the second-largest source of income at $32 billion. The largest source of income is capital income from interest, dividends, and rents, at $34 billion. This is an indication that capitalism has benefited many people in the County.

Health care workers' income also rose steadily to $17 billion. Government jobs are the fourth-largest source of income in Maricopa County. This sector, including university staff and other educators, earned $17 billion in 2016.

Note that when government jobs and transfer payments are combined, public programs account for $48 billion — 31% of all income earned by County residents.

Construction worker income peaked in 2006 at $15 billion, but fell dramatically to $6 billion by 2011, and has risen slowly since.

Chart 5: Net Cash Income for Farmers in Maricopa County, 1969 - 2016

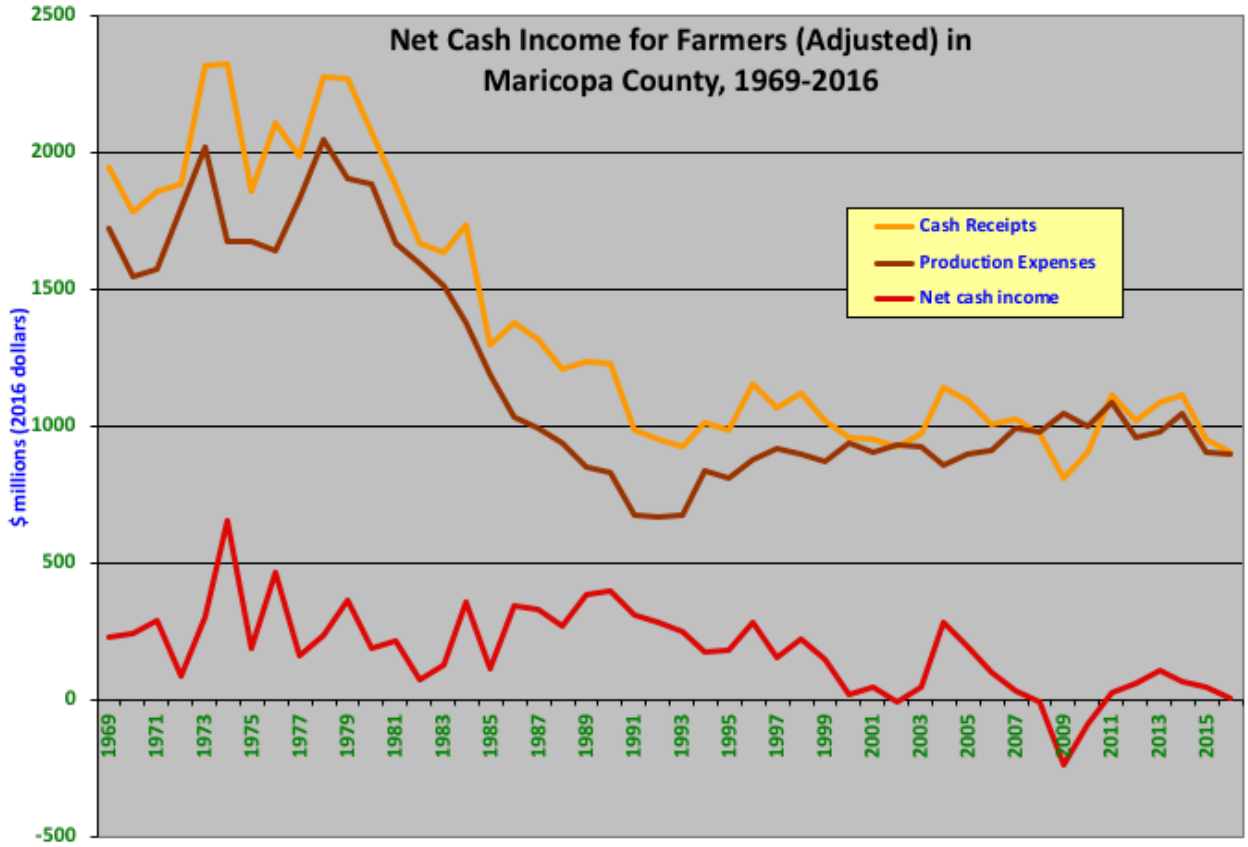


Source: Bureau of Economic Analysis

Note that although the number of farms has declined under development pressure, cash receipts continue to rise. However, production costs rose even faster. Net cash income for County farmers was only $6 million in 2016.

Once the data in Chart 5 above are adjusted for inflation using 2016 dollars, however, trends in farm income look more ominous (See Chart 6 below).

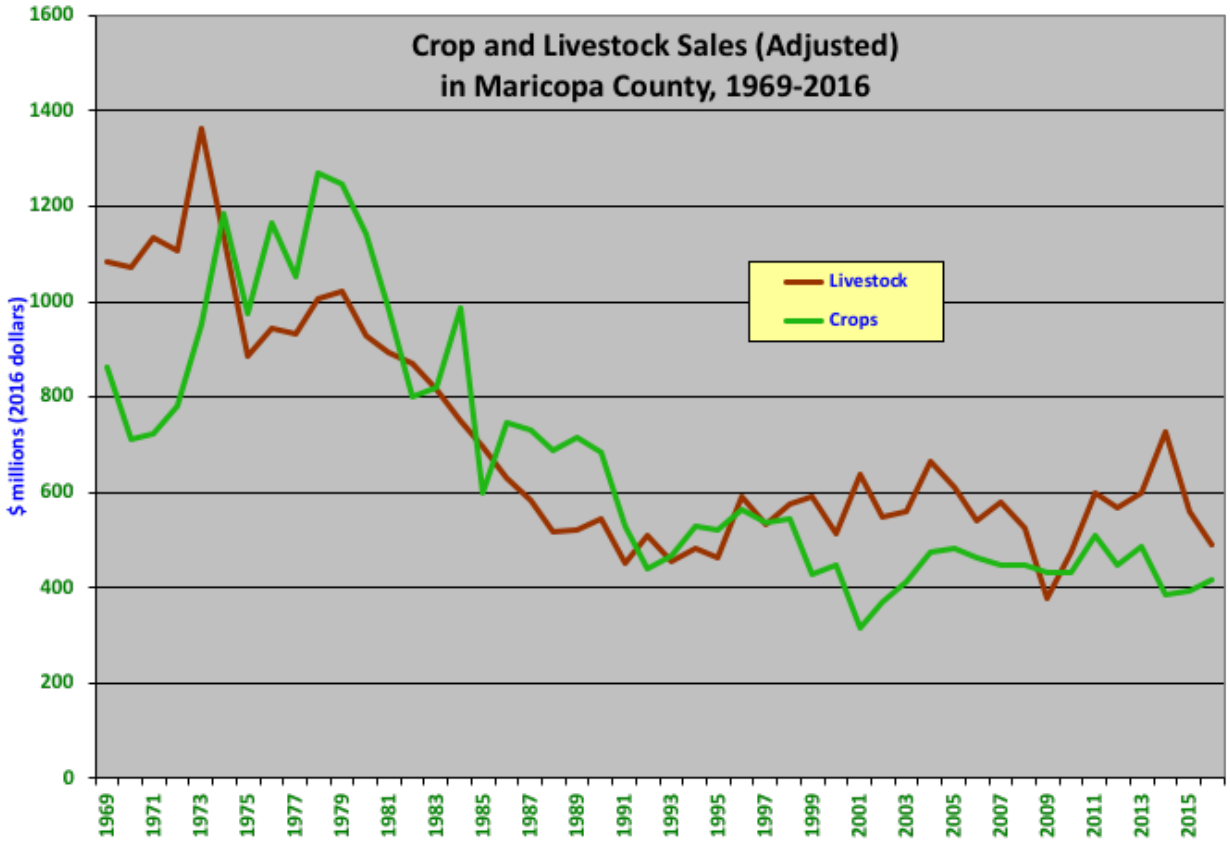
Chart 6: Adjusted Net Cash Income for Farmers in Maricopa County, 1969 - 2016



Source: Bureau of Economic Analysis. Adjusted for inflation using Consumer Purchasing Index to express quantities in 2016 dollars.

Once adjusted for inflation, we find that that cash receipts peaked at $2.3 billion in 1973 and 1974 (in 2016 dollars), when grain prices were artificially high during the OPEC energy crisis. They fell dramatically from 1979 to 1993, and have held steady ever since. However, production expenses increased more rapidly from 1993 to 2016. After adjusting for inflation, farmers earned $219 million less in 2016 than they had earned in 1969.

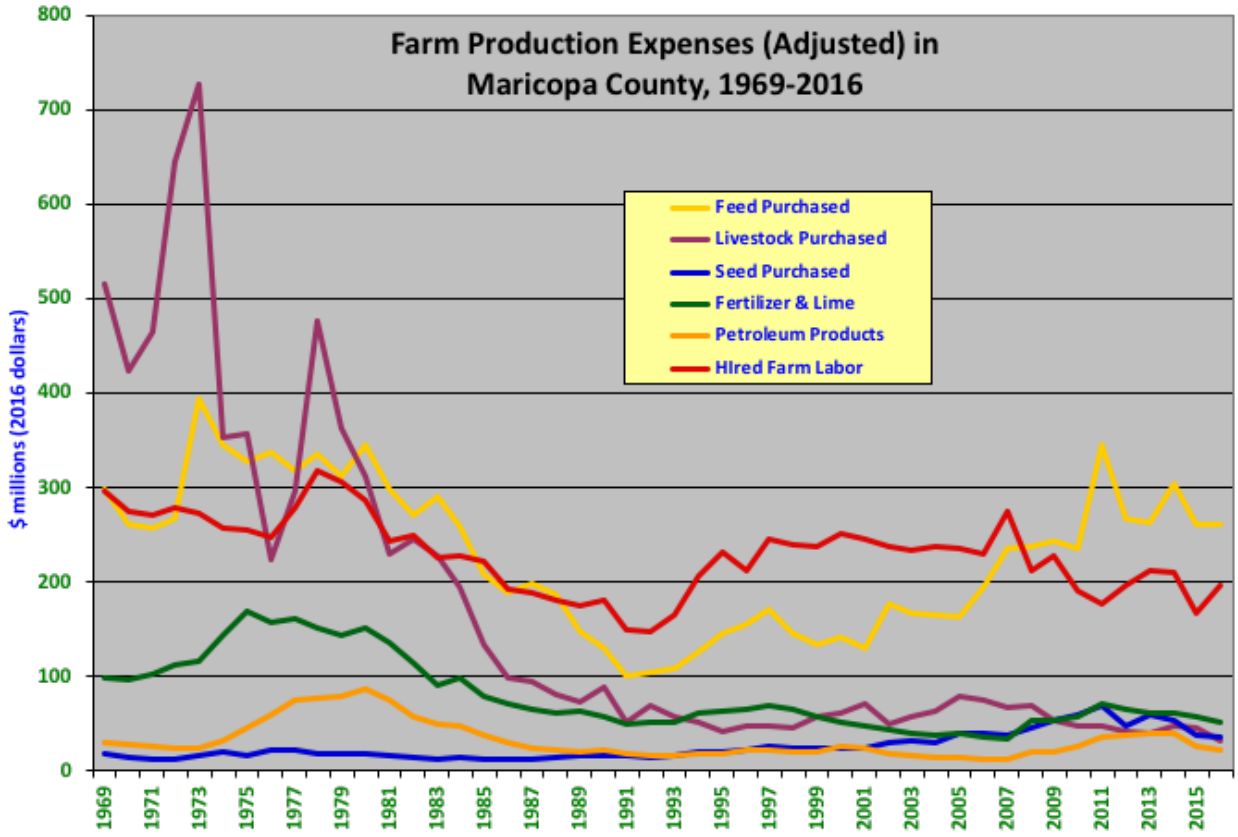
Chart 7: Adjusted Crop and Livestock Sales by Farmers in Maricopa County, 1969 - 2016



Source: Bureau of Economic Analysis. Adjusted for inflation using Consumer Purchasing Index to express quantities in 2016 dollars.

Sales have diminished for both crop farmers and livestock farmers, and are essentially at the same level as in 1991, due to a decline in the number of farms as well as unfavorable economic conditions for farmers.

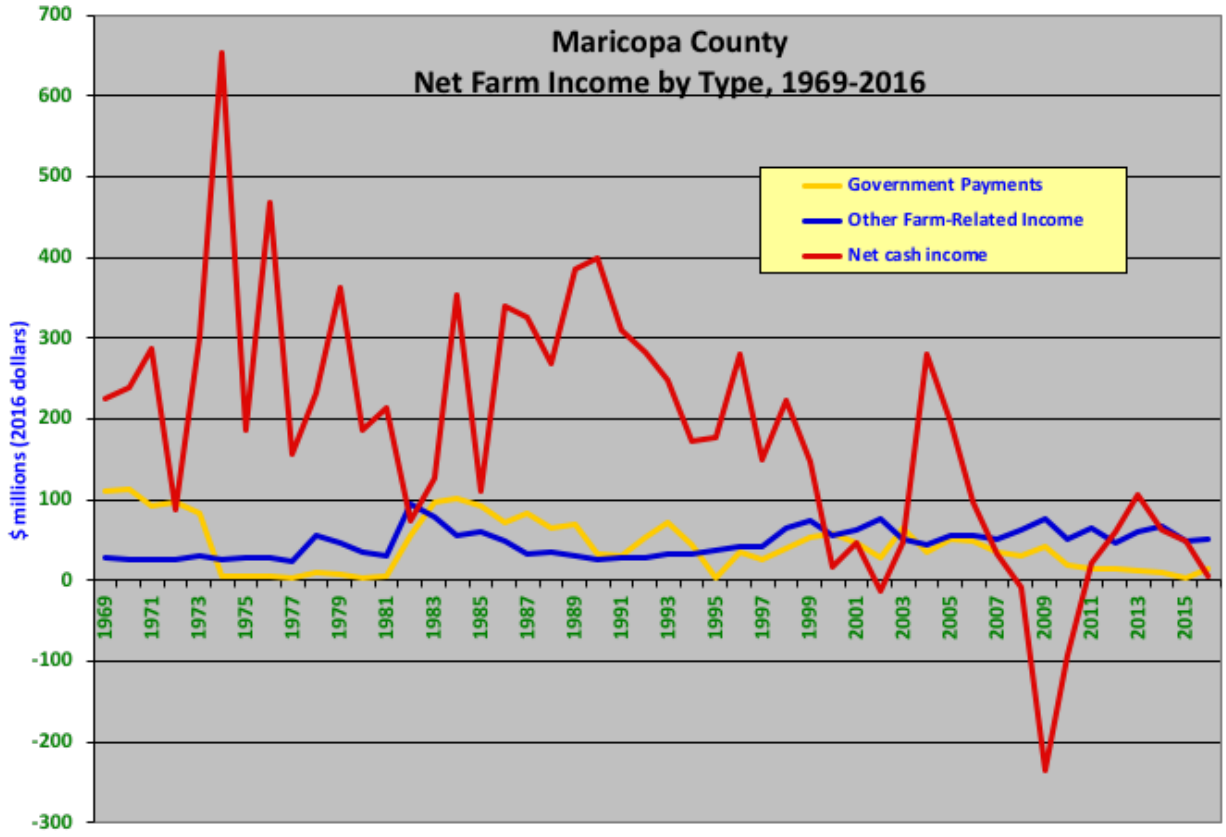
Chart 8: Farm Production Expenses (Adjusted) in Maricopa County, 1969 - 2016



Source: Bureau of Economic Analysis. Adjusted for inflation using Consumer Purchasing Index to express quantities in 2016 dollars.

Curiously, although the number of farms has decreased, and cash receipts have at best held steady, production costs rose from 1991 to 2016, led by increased in feed purchases. Labor costs have declined in recent years, which suggests that fewer farms are hiring labor.

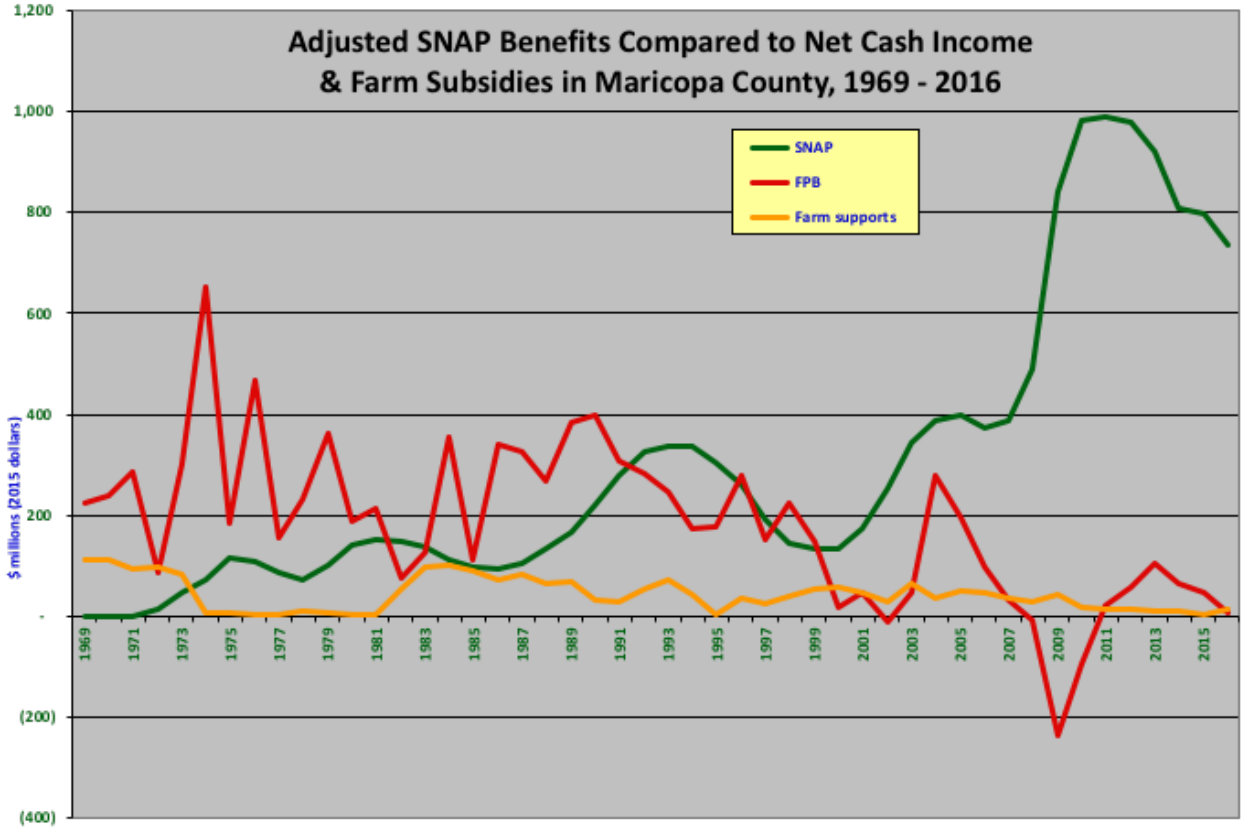
Chart 9: Maricopa County Farm Income by Type, 1969 - 2016



Source: Bureau of Economic Analysis. Adjusted for inflation using Consumer Purchasing Index to express quantities in 2016 dollars.

While net returns from producing crops and livestock have fallen steadily, income from renting out land ("farm-related income") has held steady. In fact, the best way to make a living from farmland today is renting out land rather than farming. Note that federal subsidies are a relatively minor income source for Maricopa County farmers.

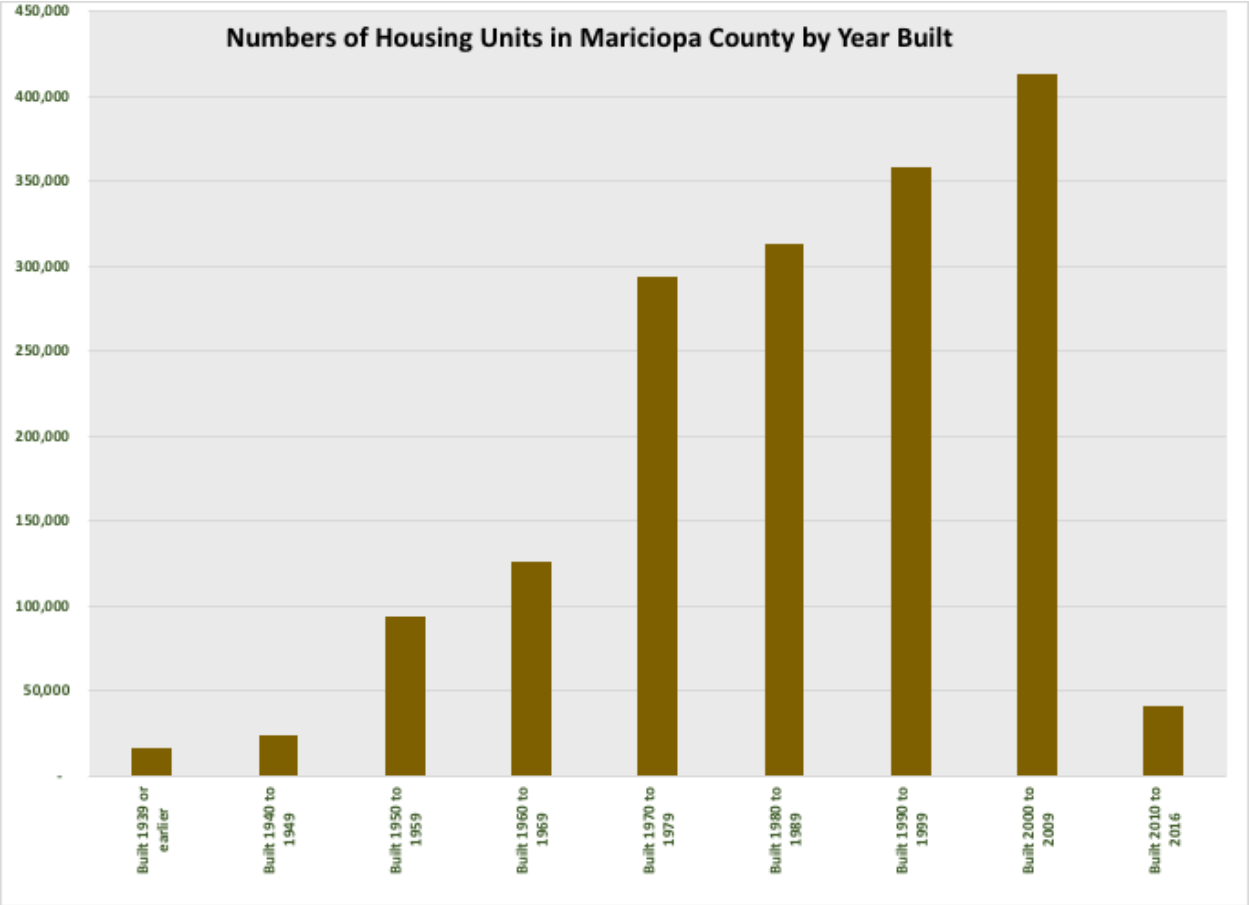
Chart 10: Adjusted SNAP Benefits Compared to Net Cash Income and Farm Subsidies in Maricopa County, 1969 - 2016



Source: Bureau of Economic Analysis. Adjusted for inflation using Consumer Purchasing Index to express quantities in 2016 dollars.

Note that in 2000, SNAP benefits became a more important source of food income than farming itself. SNAP benefits peaked at $1 billion in 2011 during the global finance crisis, and now stand at $737 million. For comparison, total cash receipts for Maricopa County farmers were $900 million.

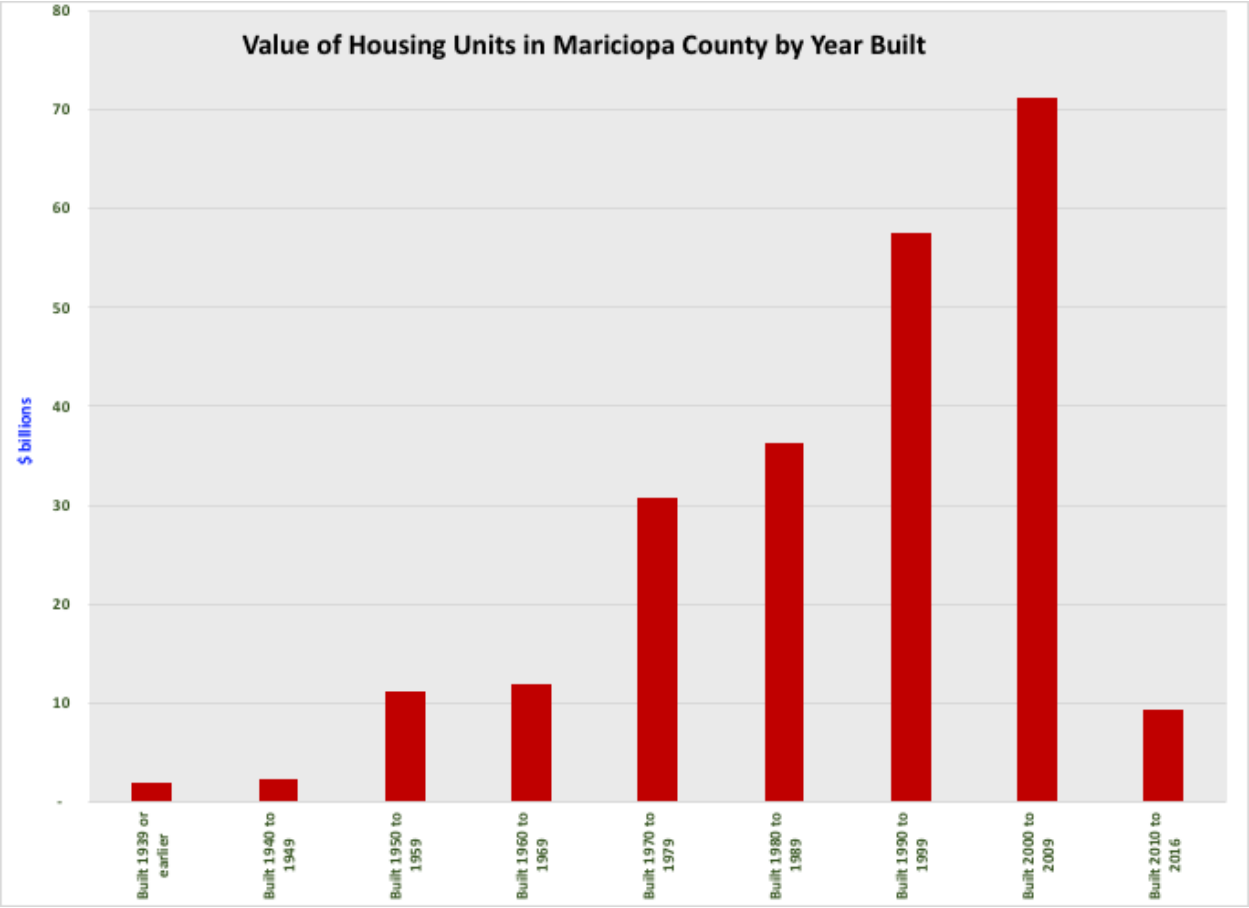
Chart 11: Number of Housing Units in Maricopa County by Year Built



Source: Federal Census American Community Survey, five-year averages 2012-2016. Note that while most columns show data by decade, the right-hand most column covers only 7 years.

Housing built in Maricopa County has fallen dramatically since 2009.

Chart 12: Value of Housing Units Built in Maricopa County by Year Built



Source: Federal Census American Community Survey, five-year averages 2012-2016. Note that while most columns show data by decade, the right-hand most column covers only 7 years.

Aggregate housing values in Maricopa County have fallen dramatically since 2009.

Data from the Farmland Information Center, a national program sponsored by the American Farmland Trust and the USDA Natural Resources Conservation Service, show that residential developments, even in dense subdivisions, require more public services than they generate in tax revenue (Table 2). Both commercial/industrial uses and farms and forestlands return far more tax revenue than they require in public services. This calculation says nothing about the intrinsic value some communities place on their rural land uses, such as open space viewing, wildlife habitat, recreation, etc.

Table 2: Median Cost of Community Services Provided Per Dollar of Tax Revenue Raised, US, 2016

	Cost/Revenue
Business/Commercial/Industrial Use	$0.30
Agriculture/Forestry/Working Lands	$0.37
Residential	$1.16

Source: Farmland Information Center, 2016