

A Lighthouse for Urban Agriculture

University, Community, and Redefining Expertise in the Food System

Abstract: This article advances the concept of the agroecological “lighthouse” as a civic space for learning and participating in the principles and practices of urban food production. As urbanization threatens to encourage the increased industrialization of agriculture, growing food in cities promises to alleviate this pressure while creating new opportunities for community empowerment and greater access to sustainable, healthy, and affordable food. This kind of transition, I argue, will demand social relations that bridge science, practice, and movement—and that cut in surprising ways across traditional boundaries between university and community. Drawing from a recent experience in an Urban Agroecology shortcourse in Berkeley, California, I illustrate what such relationships might look like, profiling the caretaker of one backyard garden in the Bay Area. This urban grower effuses what James Scott calls *metis*, moving fluidly

across institutional boundaries, experimenting with agroecological innovations, and offering his space as a lighthouse commons for participatory learning. Interestingly, he is not a PhD, but a retired postal worker. With the stakes mounting for progress in food security across the urban-rural divide, the agroecological lighthouse opens up potential for new researcher-farmer partnerships as well as a means for expanding what we consider legitimate knowledge-making communities. Advancing the notion of a “lighthouse extension model,” I challenge the discourse of mainstream cooperative extension, arguing that a more egalitarian food system will likely emerge from participation by those traditionally excluded from shaping it.

Keywords: agroecology, urbanization, food systems, participatory research, knowledge communities, land-grant universities.

The Urban Paradox

AS WE SHUFFLED INTO a small University of California, Berkeley classroom in late June, Professor Miguel Altieri welcomed us with some daunting statistics. In the past hundred years, the number of people living in cities has ballooned from just 15 percent to more than 50 percent of the total world population. By 2050, that number is expected to reach 70 percent—meaning an urban crowd almost as big as all of current humanity. How are we to face this paradoxical change in the food system, in which the number of food-eaters grows while the number of food-makers declines? The solution favored by many is conventional intensification of the countryside: through the intensive use of inorganic fertilizers, improved seeds, and agrochemicals, high monoculture yields will feed future cities, using less human labor. Another solution, known as sustainable intensification, suggests that fending against ecological collapse will require limiting production to existing farmlands with strategies that use water, land, and nutrients more efficiently—thus “sparing” uncultivated land for nature (Conway 1999; Foley et al. 2011; Royal Society 2009).

A third solution, however, challenges both conventional and sustainable intensification models. Rather than view nature and people as separate, prizing apart farming and

conservation, agroecology proposes that we integrate biodiversity into agriculture systems. Through creating landscape mosaics composed of wild habitat and “wildlife friendly” farms, and through core management practices to enhance soil health, nutrient cycling, and biological diversity at various scales, agroecology attempts to mimic nature and its regenerative processes. In so doing, it insists that nature can persist because of—rather than in spite of—human food needs (Fischer et al. 2011; Perfecto and Vandermeer 2010).

Altieri is among a growing number of ecologists, conservation biologists, agrifood researchers, and policymakers who promote such agroecological farming in rural settings.¹ But if rural-to-urban migration is largely inevitable, as many think it is, a serious solution for food security must also incorporate cities: in the Global South, helping displaced peasants continue to farm as they arrive in cities, and in the North, helping to transform longtime urban-dwellers into a new corps of urban agrarians. Agroecology, Altieri suggests, is a scientific practice supple enough to support both of these needs. It entwines the rural and urban, the Latin American peasant and the Berkeley farmer.

Ambitious claims such as these cannot help but inspire optimism. Yet they should also make us pause. On what empirical grounds can agroecology stake a claim to such

versatility? What are the political, economic, and cultural circumstances of would-be farmers in Berkeley or Oakland, California that might separate them from small farmers in Latin America and elsewhere? Can researchers like myself begin to assemble a coherent picture of these variables even as we work to change them?

California's Bay Area is, in many ways, an ideal setting in which to ask such questions for it sits at the nexus of three distinctive food histories. Galvanized by chef Alice Waters in the 1960s and carried on today by UC Berkeley faculty such as Michael Pollan, the "foodie movement" merged brilliant writing and haute cuisine to argue for a return to seasonalism, cooking, and re-embedding of food in social relations. A food justice movement harks back to mobilizations by the Black Panthers in the late 1960s to provide free breakfast programs for the urban poor (Patel 2011, 115). This movement, epitomized today by the Oakland-based Food First/Institute for Food and Development Policy and represented by dozens of NGOs in the Bay Area, focuses its efforts on structural racism, environmental politics, and distributional equity in the food system. Not least, there is the culture of science and research at the University of California. As the founding land-grant institution of the state, UC Berkeley served as a crucible for California agriculture – now the largest farm economy in the United States and a significant player on the world stage.

Thus, last spring, when I received an email announcing an Urban Agroecology shortcourse to be held in the Bay Area, I jumped at the chance. The structure of the course was immediately attractive. It would be open not just to university affiliates but to the broader public, thereby puncturing the foodie, food justice, and university divides. It would also be highly participatory: in collaboration with Food First director Eric Holt-Giménez, Altieri would not so much teach the course as convene an array of farmers, students, writers, and scholar-activists to lead participatory sessions. In this way, the course promised to be a microcosm of agroecology's precepts: the merger of social learning and interactive research.

I was also interested in the course as a form of resistance to conventional forms of pedagogy in sustainable food studies. As a third-year PhD student researching seeds and knowledge systems, part of my motivation was to explore whether unorthodox programs like these might help push education at UC Berkeley in a different direction. In the spring of 2013, the university had launched a new Berkeley Food Institute, whose mission is to "galvanize the transition to a more resilient and just food system" ("Berkeley Food Institute" 2013). But how would these transitions be initiated? Whom would we include (and exclude) from our incipient cross-disciplinary communities? Who would decide? In sum, the course promised to answer my incipient questions about

urban agroecology, while offering a study in itself about learning processes for food system change.

My experience in one condensed week of urban farming, coupled with a longer period of background research, leads me to believe that agroecology's food security claims do indeed stand up under scrutiny. What we are lacking now, I suggest, is not more and better science. Rather it is new, subversive spaces for social learning – urban farming "lighthouses" – in which the farmer, the foodie, and the academic can come together as coequals. Under the current model of university-farmer engagement, called "cooperative extension," farmers are treated as passive recipients of expert scientific knowledge. A lighthouse model invites reciprocal learning among those who study agriculture, those who practice it, and those who advocate for food system change. The shortcourse pointed me to the prototype for just such an idea.

In a tiny backyard on Haste Street in Berkeley, I discovered a garden-cum-experiment station, whose riot of organic growth revealed not only the potential for scientist-farmer research partnerships, but also for building and circulating knowledge throughout the community. Effusing what James Scott (1998) calls *metis*, its proprietor moves fluidly across institutional boundaries, experimenting with climatic adaptations and microbiological processes, while offering his space as a learning commons. In and around this garden, I encountered a vibrant network of people who are primed to make the lighthouse vision a reality. Already they are forging new knowledge communities across geographic and institutional boundaries. Cross-fertilizing activism and scholarship, tradition and innovation, the urban and the rural, their work suggests that a participatory model for studying, growing, and distributing food will begin to answer "How to feed the world?" in a new way: by helping the people of the world feed themselves.

Agroecology as a Science, Practice, and Social Movement

Agroecology has been defined in numerous ways across the decades: as the science of ecological interactions on working lands, as a set of practices for low-input farm management, and as a social movement based in peasants' struggles to control the means of their own livelihoods.² A recent review of the field by Alexander Wezel and colleagues (2011) mapped these different schools to specific geographies and scientific lineages. Soon after, however, members of the so-called Latin-American school rejected the framing of this project, arguing that it cast agroecology as "a confusion" of terms rather than



a field of knowledge with distinct ideological perspectives (Mendez, Bacon, and Cohen 2013, 5). In sum, agroecology is a contested term, creating the widespread sense that there is not one agroecology but many agroecologies.

It seems to me, however, that if agroecology appears fragmented, it is largely because of the high modernist alternatives to which it is explicitly or implicitly compared. Against an industrial logic that takes the production of science, the management of farms, and the negotiation of politics to be discrete processes, agroecology insists on the connection and coevolution of these spheres of life. Described lucidly by James Scott in *Seeing Like a State* (1998), modernist approaches to agriculture seek to standardize and simplify the heterogeneities of place and space. By contrast, agroecological knowledge emerges through these very differences; universalizing models are subordinated to contingency and context, where the farmer is at the center. Thus, instead of parsing among science, practice, and social movement, I suggest, it may be more apt to view agroecology as a site of their interweaving.

This perspective, according to a recent history of agroecology by Steven Gliessman (2013), could be seen early on in the writings of US tropical ecologist Daniel Janzen. Unlike many others taken with productionism in the 1970s, Janzen believed agriculture should be “grounded in local ecological knowledge, locally adapted, limited by local environments

FIGURE 1: Miguel Altieri, recently nominated by Michael Pollan for the “alternative World Food Prize,” gives shortcourse participants a tour of Urban Adamah Farms.

PHOTOGRAPH BY MAYWA MONTENEGRO DE WIT © 2013

and culture, and designed to meet local needs first rather than respond to the demands of export markets for single commodity crops” (Gliessman 2013, 22). Janzen’s insights were mirrored in multiple emergences of agroecology across Central and South America in the 1970s and 1980s. Gliessman notes the particular contributions of agronomist and ethnobotanist Efraím Hernández Xolocotzi, who understood Mexico’s extraordinary agrobiodiversity to be the result of indigenous knowledge in constant interplay with landscape and climate. Hernández Xolocotzi insisted that all studies should include the full participation of farmers and their communities – especially those being rapidly marginalized by the high modernist Green Revolution. Practitioners, then, have long been recognized as agroecology’s true innovators. The challenge today, as ecologists John Vandermeer and Ivette Perfecto aptly put it, is how to resolve the so-called Levins paradox – that is, “traditional knowledge is deep but local, while modern ecological knowledge is general but shallow” (Vandermeer and Perfecto 2013, 77; Perfecto, Vandermeer, and Wright 2009).

Equally pressing is the shape and direction of agroecology as a social movement. From its roots in resistance to the Green Revolution, to the ferments of transnational peasant organizations today (Wittman 2009), agroecology has long had a normative streak. At the time of Hernández Xolocotzi's writing, agriculture in Mexico had already changed profoundly due to the high-yielding maize and wheat varieties introduced by Green Revolution science. In a project led by the US and Mexican governments and the Rockefeller Foundation,³ Mexico became the test pilot for sweeping reforms to third-world agrarian economies. Large-scale, input-intensive farming would reorganize food systems around commodity exports and imports, undermining the basis of local self-sufficiency. Though perhaps successful on its own terms – stemming the spread of communist influence and dramatically increasing yield – the Green Revolution is now widely understood to have created widespread ecological damage and deep rifts in rural society, as the technologies overwhelmingly favored larger, wealthier farmers over smaller ones. The fact that farmers account for the majority of the 1 billion hungry people in the world today partly stems from the lingering effects of the Green Revolution.⁴

It comes as little surprise, then, that the world's largest peasant organization, La Vía Campesina (LVC), has rallied against the "Second Green Revolution" now being promoted by an alliance including the G8, the Bill & Melinda Gates Foundation, Monsanto, and several other transnational agri-food corporations. To counter what they view as the ongoing concentration of resources and power in the food system, LVC has adopted a framework of agroecology and food sovereignty – the rights of local peoples to define their own agricultural and food systems.⁵ Though these tenets are hardly confined to LVC, the organization's numbers – some 200 million farmers globally – speak to the way in which a soil science has become wrapped into a worldwide movement for social and environmental justice.

To date, this agroecological movement has mostly focused on rural societies and ecosystems. But as the number of displaced farmers worldwide continues to grow, the planet's expanding cities are now sites for some of the movement's most dynamic work. And this takes us back to Berkeley, where Altieri, whom farmers in the South have dubbed *papá agroecología*, is eager to expand agroecology into a new civic space.

An Agroecological Lighthouse

On day one of the urban shortcourse, I gained early insight into the likely composition of a community that links science,

practice, and social movement. The course had clearly attracted a polycultural crew: We were African American community organizers, white retirees from Berkeley garden clubs, and Latino social justice workers. We were tenured professors, PhD students, and self-proclaimed "students of life." A few of us had traveled all the way from Mexico in order to share and cross-pollinate ideas on agroecological research. Another few of us were on the way to Peru as part of an international exchange in which US participants live with Peruvian farm families, while members of those families travel to the United States for agroecology training.

Battered work gloves and coffee mugs in hand, we gathered each day for morning lectures on topics ranging from food sovereignty to green manures. These theory sessions informed afternoons of field practice – in the Berkeley student organic garden, for example, where we honed our skills in soil-pH testing and polyculture crop planning. We also made fieldtrips to local farms and gardens to get a glimpse of working community projects: vertical farms, urban aquaculture programs, and hybrid ventures that combine leadership training, organic farming, and environmental literacy. But it was a visit to "Rene's garden," a tiny plot just three blocks from my own apartment, that left a particularly deep impression.

Rene Zazueta and I had crossed paths numerous times on the Berkeley campus. Because he rarely uttered a word in meetings we both attended, I imagined him the "silent sidekick" of Altieri, who was recently nominated by Michael Pollan for the "alternative World Food Prize" (Bittman 2013). But it turns out that Zazueta has a lot to say when transplanted to a vegetable patch. In his backyard on Haste Street, on land that was once a parking lot, Zazueta has designed what Altieri likes to call an "agroecological lighthouse."⁶ This term, coined by Altieri to describe demonstration farms in Chile, describes a place that exemplifies the principles and practices of agroecology. More than that, however, it depicts a process for participatory learning – where researchers and the public can gather, urban farming techniques can be developed, and people can return to their own communities, schools, and homes to share the fruits of this collaborative work.

Zazueta's lighthouse was a civic project from the start. After the infamous Loma Prieta earthquake of 1989, his backyard was a disaster. Several tons of sheet metal lay in a heap where a carport had collapsed onto the vehicles. In addition, crushed glass, chemicals, and toxic metals had been ground into the soil beneath. Rather than rebuild the carport, Zazueta was inspired to try something different. He corralled neighbors and friends who came with pickup trucks and even a small bulldozer to haul away the scrap metal, cement, and



contaminated dirt. After weeks of heavy soil remediation, the plot was set for an experimental garden.

Now when one enters Zazueta's backyard, the view is of a planned Mediterranean jungle. Like many Mediterranean regions, Northern California's climate is characteristically mild, with dry summers and wet winters. In addition, the Bay Area sees low-hanging clouds and summertime fog due to the frigid Pacific coastal waters. The work of the Berkeley urban farmer, then, is deeply patterned by peculiarities of sun, temperature, and moisture. Zazueta pointed our attention to a fencerow lined with fruiting trees of all types: avocados, citrus, persimmons, plums, pears, mulberries, cherimoyas, and apples – an array that would bear fruit across the year. In the middle of the garden, he showed us raised beds brimming with a temperate-tropical mix of leafy greens, root and cruciferous vegetables, melons, and berries. Typifying agroecological pest management, each row had been meticulously intercropped with beans to provide nitrogen, and flowering plants such as buckwheat to attract beneficial insects.

Experiments run, mycelium-like, through Zazueta's garden. In modular planters of assorted shapes, Zazueta is working on designs for "pop-up" vegetable gardens that can be fashioned from low-cost supplies like wood pallets, hay, and

FIGURE 2: Rene Zazueta's backyard in 1989, after the Loma Prieta earthquake. Instead of rebuilding the carport, he decided to grow a garden.

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chicken wire. Climate change is an ever looming concern for farmers, and Zazueta has responded with a plan for zero-water tomatoes. Rigged up under the protective canopy of his fruiting trees, a trellis of "Early Girl" tomatoes has never been watered, yet so far look none the worse for the neglect. Zazueta has apparently figured out that the combination of minimal morning sun and tree shade prevents enough evaporation from the tomato plants' leaves that extra water is unnecessary. Waste is also another growing concern of Zazueta's, especially amid mounting evidence of massive worldwide food waste. His rejoinder is a compost system that transforms every scrap of household food waste into worm food; these "red wigglers" in turn release their wastes into the soil, feeding the microbes that make his garden so fertile. A 'compost tea' – a blend of worm castings, goat manure, and molasses – circulates through the garden. This unlikely cocktail, Zazueta told us, probably accounts for his vegetables' uncommon proportions. It was easy enough to believe, as he shook a vine heavy with squash the size of footballs.



FIGURE 3: Farmer-researcher Zazueta describes polyculture planting in his urban backyard, which he has transformed into a “lighthouse” for agroecological learning.

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These experiments speak to why Altieri has come to call this place a paragon for agroecology: Rene’s garden thrives on the synergies of a biologically interconnected system. But it is the social connections fostered by, and within, this garden that have elevated it from agroecology archetype to agroecology lighthouse. Such relationships begin with a gardener who quietly traverses the university-community boundary on a regular basis, poking at conventional wisdom about who should participate in research, where scientific knowledge should be produced, and who should benefit.

For example, studies conducted with the help of UC Berkeley professor Céline Pallud have revealed that aeration is vital to control the growth of *coliform* bacteria in the compost tea. Without this aeration, it would be too risky to eat crops fertilized with compost tea right off the vine (health guidelines suggest not spraying foliage for at least two weeks). But this danger, they have found, can be allayed for the price of a cheap aquarium pump. With Altieri, Zazueta’s collaborations are more sociopolitical in bent. For the past several years, the two have been building backyard gardens for low-income families in Berkeley, and encouraging students in Altieri’s undergraduate Urban Agriculture seminar to get involved. Teaching people how to grow food agroecologically, Altieri says, can bring reciprocal gains, as students become firsthand witnesses to the social benefits of advancing urban agriculture.

Metis in the Garden

In *Seeing Like a State*, Scott describes a concept called *metis* – ways of thinking, behaving, and acting that, in contrast to the simplifying and rationalizing maneuvers of the state, move in complex space and time, encourage flexibility, and adapt to specificities of place and culture (Scott 1998). Perhaps it was because Scott was still atop my nightstand when we visited the garden, but the entire scene – and Zazueta himself – struck me as a lively example of *metis*. When eager members of our group pulled out notebooks to record compost ratios and cropping designs, Zazueta exclaimed, “You shouldn’t copy me! I will tell you what I did, but then you should play around and see what works for you.” Those in search of precise measures would have been frustrated anyway. Zazueta demonstrated the process of making compost tea using the exacting science of “handfuls,” and disrupted his own cropping design to extract a bug-infested seedling.

Listening to Zazueta over the course of the week, it struck me that Scott could scarcely have invented a better



FIGURE 4: Planted under the protective canopy of fruiting trees, these “no-water tomatoes” anticipate future effects of climate change.

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illustration of *metis* – this organic grower with little patience for rigid rules and formulas. In Zazueta’s world, it’s all about rules of thumb, improvisation, and constant adaptations to the many unknowns of growing living things. I also came away with the clear impression that the best way to learn to farm *is by farming*. This is the practical knowledge of *metis*, where experience counts for more than abstract knowledge, more like bicycle riding than ergonomic theory. So I was surprised to learn that Zazueta has been delivering mail for most of his life, not coming to agroecology until fairly recently. A native of Guadalajara, Mexico, he emigrated to the United States in 1975 and took a job with the US Postal Service, where he worked for twenty-five years before returning to earn his bachelor’s degree at UC Berkeley. Since that time, he has continued working on various projects with UC

Berkeley professors Pallud, Altieri, and Ignacio (“Nacho”) Chapela. From long-running experiments in soil quality to a new project that will investigate making compost from aquaculture, Zazueta works with the academy on a give-and-take basis. Publishing, he told me, is not in his bones; it’s the agroecological *doing* that keeps him happily circulating to and from home, greenhouse, laboratory, and community.

This migratory research also contributes to another great pleasure Zazueta derives from agroecology: cooking and sharing the delicious products of farming. Food sovereignty, he told us, does not end in the garden but runs all the way to the table; it also does not stop with agency over food, but implies greater control over the use of energy, water, and technology. “This Patsari Cookstove,” he said, pointing to a contraption nestled in a corner of the garden, “is what I mean by a larger sense of sovereignty.” An outdoor brick oven designed by the Interdisciplinary Group of Rural and Appropriate Technology (GIRA) in Mexico, the oven is an attempt to offer affordable cooking technology for rural Mexican families. It uses 50 percent less fuel energy than an open wood fire, and improves air quality by reducing particulate matter and carbon monoxide emissions (“Patsari” 2013).

Eager to see this model adapted to other cultures and climates, Zazueta has recently joined a Patsari cooperative network that connects cookstove builders, like himself, to local families in need. Further, Zazueta explained, each time a new cookstove is built, GIRA provides funding for five more, a business model that seems to suit him perfectly. “It is a self-feeding process, and no money ever changes hands!” Still, true to his *metis* spirit, Zazueta is already experimenting to improve the standard cookstove design. When we visited in June, he was preparing to fly down to Mexico to build an oven in a university lab, merging his DIY skills with the researchers’ controlled study to measure efficiency and output. The Patsari model we saw in his garden was no longer the classical all-brick version but instead had been outfitted with a smooth silver cylinder at the core. “A beer keg one of you Berkeley students left for me on the sidewalk,” he told us. “It was perfect for my oven.”

From One Backyard to the World

Though he is a consummate record keeper, Zazueta does not keep firm track of crop yield. But he knows that his backyard regularly produces a bumper harvest, and calculations by Altieri and others suggest that urban systems can grow food in quantities that are far from trivial. Consider Oakland, says

Altieri, where 500 hectares of land could feasibly be brought into production. “Assuming a productivity of 5 kilos per square meter – one quarter of Cuban productivity – we could make 25 million kilos of food. That’s enough to feed 125,000 people.” Meanwhile, the stakes for scaling up urban food production climb ever higher, with China planning to uproot and urbanize 250 million peasants over the next fifteen years.⁷ How these cities will subsist – on factory farming and increased food imports, or via decentralized urban agroecology – will have tremendous implications for landscapes and people, not just in China but worldwide.

It is worth emphasizing, however, that “How can we feed the world?” is not a question that resonates with the ethos of agroecology. The term suggests a “world population” that it would be possible to feed given enough total food production on a global scale. Framed in this manner, it seems that further intensification is the best way forward, toward ever larger scales of production to feed this world unit. But if we spatially disaggregate food production to local and regional levels, it becomes apparent that some places, like the Cornbelt, clearly oversupply food (though not, ironically, to local populations), whereas others, including much of sub-Saharan Africa, remain underproductive and could improve their yields. In other words, the production problem must be recast in terms of particular locations, each with particular social-ecological processes at play, not in a general globalized form.

Moreover, if it were the case that feeding the world was contingent on yield, the fact that global food production already amounts to 2,800 kilocalories per person per year would seem to beg the hunger question.⁸ This gap between production and access is what prompts Zazueta, Altieri, and like-minded folk across the agroecology movement to insist that yield is “necessary but insufficient.” Far more important are the rights of local people to make decisions about what they grow and eat, where, when, and how. When communities have greater control over their agriculture and food policies, can organize production and consumption to meet local needs, and can secure access to land, water, and seed – that, says Altieri, is what we call food sovereignty. The term “paradigm shift” has fallen out of style, but in this case, there is no better term.

Zazueta and other urban farmers recognize that socioeconomic circumstances in the Bay Area vary widely, charting a landscape of highly differentiated access to healthy, sustainable food. At one end, we find the “gourmet ghetto” of North Berkeley, where the restaurant Chez Panisse stands as a landmark of the foodie movement. In the nearby not-so-gourmet ghettos of Oakland, chains of 7–11s and Jack-in-the-Box’s provide cheap food at a drive-thru pace.⁹ This

arrangement ostensibly suits the fast-paced lives of modern working families. But as multiple scholars have argued (Powell, Chaloupka, and Bao 2007; Galvez et al. 2008; Gottlieb and Joshi 2010; Alkon and Agyeman 2011) it is a system that subsists on labor inequities (working multiple jobs limits time for cooking and eating), disproportionate investments by the fast food industry in poor, racially segregated areas, and gender role norms under which women shoulder the burden of food responsibilities.

Zazueta’s partial answer to this is radically anticapitalist: he gives his surplus food away, encouraging neighbors and friends to stop by after work or school, and harvest their own suppers. When he and Altieri revisit the low-income families whose gardens they helped establish, they often find the same neighborhood sharing model has been taken up. Yet a not-for-profit larder is clearly inadequate to support widespread and consistent access to agroecologically grown food. Farmers’ markets and CSAs have long been popular in the Bay Area, yet as in many communities across the United States, they largely serve the affluent population, constraining farmers like Zazueta from reaching less advantaged groups. The network of California Food Policy Councils has begun to investigate means of providing more equitable food access, but the infrastructure (packaging, processing, transportation), regulations (food safety standards, zoning laws), and institutional supports (grants, technical advice) to foster community-run distribution channels are far from in place.

To help make these channels possible, Zazueta, Altieri, and other scholar-activists are developing ways to build new social networks and relationships between neighborhoods and researchers. Food First director Eric Holt-Giménez, for example, was instrumental in organizing a recent conference at Yale University to bolster the theoretical underpinnings of food sovereignty. Altieri’s partner, Clara Nicholls, is the standing president of Latin American Scientific Society for Agroecology (SOCLA), which aims to scale up agroecology research and practice to national levels in the more congenial political setting of our neighbors to the South. Here in the United States, Altieri, Holt-Giménez, and Zazueta have been focusing their efforts on agroecology in urban contexts, hoping to align extant social food movements in the Bay Area with researchers in the University of California network. California universities such as UC Berkeley have a long history of ties to agribusiness (Buttel 2005; Walker 2005) – a legacy that stretches back to the founding of Berkeley as the state’s first agricultural college. As such, there are deeply rooted entanglements between public research and the industrialized food system. Whether these relations can be refashioned to a different purpose – to benefit people



equitably and to work with, rather than against, nature – is the question now facing scholar-activists, practitioners, and others who align themselves with the twin pillars of agroecology and food sovereignty.

From Technology Transfer to Mutual Knowledge-Making

In their migrations across North-South divides, members of the Latin American School of agroecology are, in many ways, reversing the technology transfers of the Green Revolution. If the diffusions of seed-agrochemical packages from the United States to developing countries once helped erode the fabric of self-sufficient agrarian societies, it is then possible that moving agroecological skills and knowledge in the other direction will transform the Green Revolution doer (if not the deed). Building resilience and biological diversity into the US agricultural base, fostering local and regional food economies, and encouraging democratic decision-making could bring mutual benefits to Northern and Southern food systems – structural readjustment on a world scale. That, anyway, is the big idea underpinning a much humbler project taking shape in the Bay Area, where Zazueta, Altieri, and Holt-Giménez have managed to jumpstart an informal economy of

FIGURE 5: *Whereas conventional cooperative extension takes a top-down approach to supplying farmers with scientific knowledge, a lighthouse model builds expertise through practice – and mutual work.*

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knowledge-sharing – between the lab of a renowned agroecologist, and communities of many racial, socioeconomic, and ethnic stripes who align in wanting to farm.

Moving research out of the ivory tower and into the hands of farmers is nothing new, of course. “Cooperative extension” was formalized in 1914 when Congress passed the Smith-Lever Act, establishing partnerships between agricultural colleges and the USDA to provide farmers with “practical applications of research knowledge” and offer “instruction and practical demonstrations of existing or improved practices or technologies in agriculture.”¹⁰ The University of California, which established its land-grant university at Berkeley in 1868, quickly grew to house one of the nation’s largest and most robust cooperative extension services.

The trouble with cooperative extension, from the standpoint of agroecology, points to its historical role in the shaping of American agriculture, and the social divisions of labor and knowledge that extension swept in. As Keith Warner (2008) has described, prior to the advent of the extension system, many farmer communities had self-organized in

order to recruit help from scientific experts. But with the rise of extension, a more pronounced “expert scientist/lay farmer” dynamic emerged, in which the experts were active producers of knowledge and the laypersons were its passive recipients. By World War II, agricultural science had begun to set the foundations for industrial agriculture, developing chemicals, hybridization, and chemical technologies for use by farmers (Kloppenborg 2004 [1988]). It fell to publicly funded extension agents to move these technologies out into the countryside. Not surprisingly, they began to describe their work as “technology transfer” – which at the time included modern marvels such as DDT.

Far more than a buzzword for grant applications, technology transfer provided a powerful model for expanding the uptake of industrial agriculture. In what is best described as a knowledge pipeline, the cooperative extension model promoted a linear, one-way flow, in which knowledge produced by the scientist is conveyed (in the form of technology and farming methods) by extension agents to growers, who then use or apply it. In addition, the individual, not the community, was the primary locus of attention for extension outreach and development efforts (Kay 1986). As Warner rightly points out, the reality of cooperative relationships are far more nuanced than such a individualistic pipeline would suggest; his studies of agro-environmental partnerships in California indicate the rise of promising alternatives (Warner 2006). Yet with a few notable exceptions, cooperative extension remains largely entrenched in this conventional model.¹¹ Moreover, there is strikingly little institutional awareness of a need for change, not to mention support for it. The persistent ethos of top-down science can be seen in the language with which the UC Division of Agriculture and Natural Resources presents its mission to the public:

ANR works hand in hand with industry to enhance agricultural markets, help the balance of trade, address environmental concerns, protect plant health, and provide farmers with scientifically tested production techniques and Californians with increased food safety. . . . ANR’s advisors, specialists and faculty bring practical, science-based answers to Californians.¹²

Against this backdrop, I suggest that urban agroecology – indeed agricultural research and extension at-large – will need to be based on a profoundly different model of knowledge making and sharing, beginning with three basic ideas. First, in stark contrast to technology transfer, which assumes that expert scientists are training nonexpert farmers, this model will need to acknowledge food growers as knowledge makers in their own right. Learning, then, becomes not about transferring “answers” from the one to the other, but about mutual and reciprocal building of knowledge over time.

Second, the model must carve a wider berth for knowledge making, in which it is not only farmers, scientists, and extensionists cooking up innovations in agriculture, but an entire constellation of individuals, organizations, and institutions – across cultures of science, economics, civil society, and the state – that are recognized as knowledge producers in the food system. Each of these cultures, while highly interdependent, “possesses its own distinctive resources for producing and validating knowledge” (Jasanoff and Wynne 1998, 74).¹³ Such a view is very helpful in moving beyond the technology transfer model, as it directs our attention beyond only researchers and farmers to the full range of actors in the food system, what their goals are, and how they influence processes and mobilize resources at different scales in order to achieve those goals. Here, we need to revisit the contributions of pioneers such as Robert Chambers, who in formulating the “farmers’ first” concept, challenged the privileged place of scientists over farmers and the cookie-cutter transfer of technologies irrespective of local conditions (Chambers, Pacey, and Thrupp 1989; Chambers 1990).¹⁴

Third, knowledge must be seen as joined at the hip with social institutions and with systems of economics, culture, and politics. The idea that the epistemic and the structural shape each other in contingent and dynamic ways – called “co-production” in social theory circles – helps us see the interconnected forces in agricultural change. Advances in science and technology, for example, have clear repercussions for changes in law, culture, and political economy: the dawn of hybrid seeds ushered in new intellectual property regimes; preservation technologies opened bold frontiers in transporting, marketing, and selling of food. But agricultural science and technology have also been shaped by the business models of the chemical and seed industries, by regulations influencing how land-grant institutions are funded, and more recently, by growing societal concerns for sustainable food. In other words, co-production gives us a way of apprehending the interdependencies of the food system, how it evolves, and how we even know about and measure change.

At present, many critics of agroecology dismiss agroecology as overtly political, and therefore, partial or unscientific. Yet when we take the constructivist view, it becomes clearer that agricultural science never simply reflects nature, as if produced in “a self-contained matrix of scientific discovery” (Jasanoff and Wynne 1998, 16). Rather, scientific knowledge comes into being through complex engagements between scientific communities and multiple actor groups: farmers, eaters, and policymakers; academic institutions, funding agencies, and journals; NGOs, philanthropies, and global

R&D organizations, to name but a few. Doing science is very much a social process.

These dynamics suggest that what counts as legitimate science depends to a great degree on who comprises our knowledge communities. Research questions do not emerge – Athena-like – from the heads of “experts.” Rather, the scope and character of scientific findings are embedded in a socio-political context that adjudicates all claims to truth. That “alternative” sciences such as agroecology and organic agriculture have struggled to gain credence both within the scientific community and with the public at-large must be understood against the backdrop of history: in which research for conventional farming has received more than 98 percent of federal funding over the past hundred years,¹⁵ in which departments at universities across the United States have shed their applied agricultural faculty in favor of patent-relevant molecular biologists, and in which the private sector now claims the center of gravity in agricultural work (Buttel 2005). Reductive agricultural sciences have succeeded, then, not as lighthouses, but as the proverbial streetlights under which people are compelled to search because it is where they have the best tools for seeing. From land-grant colleges to the USDA to the United Nations, scientific legitimacy has become unequally held, yet this unevenness is self-reinforcing since access to resources tends to beget the very gains – grant awards, for example – through which scientific legitimacy grows.

Through this lens, we can better ascertain why sciences such as agroecology might struggle for traction, or conversely gain validity in the eyes of the public. In practical terms, it helps us understand why Rene Zazueta could alternately be viewed as a hippie poking around in his backyard, or as the vanguard of participatory research.

The Lighthouse Extension Model

My vision for a lighthouse extension model grows from this approach to the construction of knowledge.

Inspired by others advancing such thinking in areas from food systems education (Galt et al. 2013)¹⁶ to natural pest control (Warner 2007), to community nutrition and health (Wight 2013), it asks that we challenge expert/lay divides – and not just by including “nonexperts” in participatory research, but by reconfiguring whom we consider experts and what we count as expertise. It asks that we upend the notion of farmer-as-passive-recipient, and recognize the agency of farmers – indeed, the agency of all actors in the food system – as makers of knowledge. It proposes a hard look at the historical and cultural contingencies of what we take for granted as normal

science today, and an even harder look at how that science co-produces the modern food economy. Finally, it asks us to contemplate the central role of communities in the food system.

Urban agroecology, I suggest, will significantly advance by coalescing members of far-flung knowledge cultures who find community in shared values and beliefs, shared notions of validity, and common convictions about the set of problems to be tackled. Such “epistemic communities” were originally described in political science as consisting of professionals from different disciplines “with an authoritative claim to policy-relevant knowledge within their realms of expertise” (Haas 1992, in Jasanoff and Wynne 1998, 51). But STS scholars Sheila Jasanoff and Brian Wynne took a different tack, suggesting that the potential role of these communities requires an understanding of social and cultural commitments. What makes such communities coalesce in the first place? What makes them cohere as political actors? Epistemic communities, they insisted, must be understood within a framework of *social solidarity*. They also challenged the political science rendering of professional claims to expertise. Instead, epistemic communities “could become an institutional vehicle for expressing alternative knowledges and value commitments that may have been systematically excluded by the formal knowledge-making and knowledge-utilizing machinery of modern nation states” (Jasanoff and Wynne 1998, 16). In this, they wedged the door wide open to include, and validate, the alternative knowledge-makers of agroecology.


I leave you, then, with a call for lighthouse extension in which gardens like Zazueta’s become organizing grounds for epistemic communities, and sites for bridging knowledge and practice. Composed of would-be farmers, university researchers, and members of the rapidly growing social food movement, these communities will cohere – albeit often in tension – under the solidarity framework of agroecology and food sovereignty. Lighthouse leaders such as Zazueta will mirror the role of campesino-a-campesino *promotores* (Holt-Giménez 2006), circulating through the community, teaching agroecological techniques, disseminating literature and learning materials, and not least, helping with the arduous task of transforming concrete urban lots into working land. The lighthouses themselves will take a variety of forms, from backyard and rooftop gardens to edible schoolyards and community-run farms. They will serve as models for food production, but more importantly as nodes of knowledge circulation. Through the gates of these lighthouses will flow a steady stream of people, openly invited to participate in research, learn agroecological skills, and gain experience in troubleshooting with biodiversity. In returning to their own

places and spaces, these new urban agrarians will continue the learning process in adapting the lighthouse knowledge to their own environments and needs. Some may use it to start a windowsill herb box, others a community farm or garden. Some may even become leaders of their own lighthouses, creating an ever-expanding network of civic expertise.

Institutions such as the University of California now have a potent opportunity to jumpstart a nationwide movement for lighthouse agriculture. Seeds, soil, basic farm equipment, and even public land could be secured at a relative pittance compared with current outlays for R&D to support industrialized agriculture. The University of California would not be alone in this marshalling: a number of other universities around the country are beginning to recognize that sustainable agriculture cannot be confined to the countryside.¹⁷ Yet knowledge sharing among these institutions remains disconnected. With networked relationships, we could share resources such as agroecological teaching materials; empirical studies of distribution and access could be developed and deployed at scale. Urban agroecology workshops such as ours could be made mobile, traveling to campuses across the country, or held in public spaces for wider accessibility. Internationally, we might imagine fellowships to study existing lighthouses abroad, North-South participatory farm projects, and policies to help foster urban agroecology in both hemispheres.

These things will not change the food system in a day, a month, not even a lifetime. But they could begin to graft what I learned in the shortcourse into a larger semblance of lighthouse learning: how we as scholars can contribute to social change, and whether a more egalitarian food system might emerge by including those traditionally excluded from shaping it. In sum, what I have suggested here is merely a starting point – just like the old maritime beacons, my purpose is partly to prevent us from crashing on the rocks, and partly about illuminating a way forward.

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NOTES

1. Research on diversified farming systems has advanced significantly in the past decade. A few notable publications include: Jeffrey A. McNeely and Sara J. Scherr, *Ecoagriculture: Strategies to Feed the World and Save Wild Biodiversity* (Washington, DC: Island Press, 2003); “A Social-Ecological Analysis of Diversified Farming Systems,” special issue, *Ecology and Society* (March 2013), at <http://www.ecologyandsociety.org/issues/view.php/feature/71>; and “Agroecology and the Transformation of Agri-Food Systems,” special issue, *Agroecology and Sustainable Food Systems* 37, no. 1 (2013): 2168–3565. At international policy levels, agroecology has been endorsed by the United Nations Special Rapporteur on the Right to Food (see Olivier De Schutter, *Agroecology and the Right to Food* [New York: United Nations Human Right Council, 2010]) and by the IAASTD global assessment of agricultural knowledge (see Beverly D. McIntyre, Hans R. Herren, Judi Wakhungu, and Robert T. Watson, eds., *International Assessment of Agricultural Knowledge, Science and Technology for Development: Synthesis Report* [Washington, DC: Island Press, 2009]).
2. For a sense of the diversity of approaches to agroecology, the lab of Louise E. Jackson at UC Davis focuses on crop systems ecology, “with emphasis on soil quality and nitrogen retention in organic production systems.” At the University of Göttingen in Germany, Teja Tjshcharntke’s Agroecology group is similarly grounded in the natural sciences; the training program provides “interdisciplinary education” in plant and animal communities, food web interactions, and conservation biology in temperate as well as tropical agricultural landscape and agroecosystems. Identifying their work as “transdisciplinary” as well as “action-oriented” are researchers such as Miguel Altieri of UC Berkeley, Steve Gliessman of UC Santa Cruz, V. Ernesto Mendez of the University of Vermont, and John Vandermeer and Ivette Perfecto of the University of Michigan. Ethnobiology, political economy, sociology, and development studies inform their approaches to agroecology.
3. Although it is commonly accepted that the Mexican Agricultural Program (MAP) began as a joint venture between the Rockefeller Foundation and the Mexican government, comments from Warren Weaver, Director of Natural Sciences at the Foundation, suggest that the Mexican state was largely ignorant of the Foundation’s goals: “We customarily refer to this program as a collaboration . . . it must be realistically admitted that they had little or no idea as to what we were talking about, or what we intended to do.” Bruce H. Jennings, *Foundations of International Agricultural Research* (Boulder, CO: Westview Press, 1988), 58–59.
4. While the dominant narrative of the Green Revolution continues to be positive (see Gaud 1968; Borlaug 1970; Alcantara 1973; Glaeser 1987; Conway 1997; Borlaug 2000; Davies 2003; Evenson and Gollin 2003 – full citations in Patel 2013, this note), an extensive body of research has found evidence to the contrary, at scales ranging from household to community to nation, and encompassing environmental, socioeconomic, and cultural factors (see Paddock 1970; Griffin 1979; Chambers 1984; Harriss 1988; Jennings 1988; Sobha 2007; Bernstein 2010 – full citations in Patel 2013, this note). This gap between empirics and dominant discourse, Raj Patel argues in “The Long Green Revolution,” *Journal of Peasant Studies* 40, no. 1 (2013): 1–63, stems in part from managed distortion of the Green Revolution historical narrative by organizations such as the Gates Foundation and World Bank. A similar argument is made by Philip McMichael, “Banking on Agriculture: A Review of the World Development Report 2008,” *Journal of Agrarian Change* 9, no. 22 (2009): 235–46.
5. The concept of food sovereignty, first proposed by La Vía Campesina in 1996 at an international conference in Tlaxcala, Mexico, was coined to recognize the political-economic dimensions inherent to food production and consumption. Broadly

defined, food sovereignty asserts “the rights of nations and peoples to control their own food systems, including their own markets, production modes, and food cultures and environments.” According to Hannah Wittman and colleagues, the peasant and farm leaders gathered in Tlaxcala originally framed food sovereignty in a direct response to “food security,” which focused on access yet without attention to how, where, and by whom food is produced. In the past decade and a half, food sovereignty has developed into an articulated framework, supported by People’s Food Sovereignty Network and advocated by numerous local, national, and international social movements and NGOs. See Hannah Wittman, Annette Aurélie Desmarais, and Nettie Weibe, eds., *Food Sovereignty: Reconnecting Food, Nature and Community* (Halifax: Fernwood, 2010).

6. Altieri tells me that he coined this term “to illustrate the *centrales demostrativas* (model demonstration farms) that some NGOs established in Chile and other countries for training of farmers.”

7. I. Johnson, “China’s Great Uprooting,” *New York Times*, June 15, 2013, at <http://www.nytimes.com/2013/06/16/world/asia/chinas-great-uprooting-moving-250-million-into-cities.html> (verified July 23, 2013).

8. The most recent available data for world food supply is available through the FAO’s new interactive portal, FAOSTAT. World food supply (kcal/capita/day) was calculated for 2009 (most recent data), resulting in more than 2,800 kcal, per capita, per person annually. See <http://faostat3.fao.org/home/index.html#DOWNLOAD> (accessed July 27, 2013).

9. I am not, however, suggesting that Oakland is a “food desert” – a term invoked by some researchers to describe urban areas with limited food retail and/or those lacking in supermarkets often thought to provide healthy food. Contravening the food desert hypothesis, research by Short et al. (2007) has shown that East Oakland is home to an extensive network of small grocery stores. Raja et al. (2008) found similar networks in Erie, New York. Even so, these neighborhoods are extremely challenged when it comes to food security, as these small markets are unevenly distributed, often target particular clientele, and are unable to address food affordability in an absolute sense. See Anne Short, Julie Guthman, and Samuel Raskin, “Food Deserts, Oases, or Mirages?” *Journal of Planning Education and Research* 26, no. 3 (2007): 352–64; Samina Raja, Changxing Ma, and Pavan Yadav, “Beyond Food Deserts: Measuring and Mapping Racial Disparities in Neighborhood Food Environments,” *Journal of Planning Education and Research* 27, no. 4 (2008): 469–82.

10. “History of Extension.” National Institute of Food and Agriculture, United States Department of Agriculture, at <http://www.csrees.usda.gov/qlinks/extension.html> (verified July 26, 2013).

11. Thomas Lyson notes that “the role of the USDA’s Cooperative Extension Service, which is still the primary educational outreach organization for farmers, has been to supply producers with the knowledge, skills, and information necessary to make the best decisions within the parameters of their own farms. . . . Farmers who ‘failed’ to make a profit and subsequently went out of business, whether or not they followed the prescriptions of the Cooperative Extension Service, were deemed ‘bad managers.’” See “Agriculture of the Middle: Lessons Learned from Civic Agriculture” in *Food and the Mid-Level Farm: Renewing an Agriculture of the Middle*, ed. Tom Lyson, Steve Stevenson, and Rick Welsh (Cambridge, MA: MIT Press, 2008), 167.

12. “We Are UC ANR,” University of California Agriculture and Natural Resources, at http://ucanr.edu/About_ANR/What_is_ANR/ (verified July 27, 2013)

13. Sheila Jasanoff and Brian Wynne, “Science and Decisionmaking,” in *Human Choice and Climate Change: The*

Societal Framework, vol. 1, ed. E. Malone and S. Rayner (Columbus, OH: Batelle Press, 1998), 1–77.

14. In addition to work by Chambers and colleagues, participatory extension has been explored in the Global South by researchers including Norman Uphoff, ed., *Agroecological Innovations: Increasing Food Production with Participatory Development* (Earthscan, 2002); Jules N. Pretty, “Participatory Learning for Sustainable Agriculture,” *World Development* 23, no. 8 (1995): 1247–63; and Ian Scoones and John Thompson, *Beyond Farmer First: Rural People’s Knowledge, Agricultural Research and Extension Practice* (London: Intermediate Technology, 1994). Less work on participatory agriculture has been done in advanced industrialized nations, but Wageningen Agricultural University in The Netherlands is an important exception. See Niels G. Roling and Maria Annemarie Elisabeth Wagemakers, eds., *Facilitating Sustainable Agriculture: Participatory Learning and Adaptive Management in Times of Environmental Uncertainty* (Cambridge: Cambridge University Press, 2000).

15. Conventional systems have been the primary focus of publicly and privately sponsored research since the early twentieth century. Liz Carlisle and Albie Miles recently analyzed data from the USDA budget for agricultural R&D and found that only 1.65% of funds are directed towards organic farming systems. See “Closing the Knowledge Gap: How the USDA Could Tap the Potential of Biologically Diversified Farming Systems,” *Journal of Agriculture, Food Systems, and Community Development* 4, no. 4 (2013): 219–25.

16. For an international perspective, see also Ryan E. Galt, Damian Parr, and Janaki Jagannath, “Facilitating Competency Development in Sustainable Agriculture and Food Systems Education: A Self-Assessment Approach,” *International Journal of Agricultural Sustainability* 11, no. 1 (2013): 69–88.

17. A few prominent examples include M. Jahl Chappell’s work at Washington State University (<http://agroecopeople.wordpress.com/>), Sarah Lovell’s work at University of Illinois (<http://www.multifunctionallandscape.com/>), and Nathan McClintock’s work at Portland State University (<http://www.urbanfood.org/>).

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