



Transitioning to Sustainable Agriculture Requires Growing and Sustaining an Ecologically Skilled Workforce

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In the face of rapidly advancing climate change, biodiversity loss, and water scarcity, it is clear that global agriculture must swiftly and decisively shift toward sustainability. Fortunately, farmers and researchers have developed a thoroughly studied pathway to this transition: agroecological farming systems that mimic natural ecosystems, creating tightly coupled cycles of energy, water, and nutrients. A critical and underappreciated feature of agroecological systems is that they replace fossil fuel- and chemical -intensive management with knowledge-intensive management. Hence, the greatest sustainability challenge for agriculture may well be that of replacing non-renewable resources with ecologically-skilled people, and doing so in ways that create and support desirable rural livelihoods. Yet over the past century, US agriculture has been trending in the opposite direction, rapidly replacing knowledgeable people with non-renewable resources and eroding rural economies in the process. Below, we suggest how US policy could pivot to enable and support the ecologically skilled workforce needed to achieve food security in the face of climate change.

Keywords: sustainable agriculture, agroecology, new entry farmers, agricultural policy, diversified farming systems

INTRODUCTION

In the face of rapidly advancing climate change, biodiversity loss, and water scarcity, it is clear that global agriculture must swiftly and decisively shift toward sustainability. Agriculture not only contributes to these environmental problems—accounting for approximately one quarter of global greenhouse gas emissions when land use change is included (Smith et al., 2014)—current practices also leave many communities vulnerable to climate-related disasters, as monocultures of input-dependent crops leave little room for adaptive resilience.

Fortunately, farmers and researchers have developed a thoroughly studied and tested pathway for sustainability transition in agriculture: agroecological farming systems. By shifting from large acreages of single crops to diversified cropping and livestock systems that mimic natural

ecosystems, farmers can create tightly coupled cycles of energy, water, and nutrients, greatly lessening both the environmental footprint of farms and their reliance on resource-intensive external inputs (Vandermeer, 2011; Kremen et al., 2012). Agroecology also gives farmers more flexibility for adapting to climate change and market fluctuations, and can provide more diverse, nutrient-dense, and culturally-appropriate diets while enhancing the environmental benefits of agriculture. Furthermore, as a science, practice, and a movement, agroecology considers both the biophysical and social sustainability of farming systems.

A critical and underappreciated feature of agroecological systems is that they replace fossil fuel- and chemical -intensive management with knowledge-intensive management. Agroecology requires farmers and farmworkers to learn how a landscape works as an ecosystem, combining farmers' observations, predictions, and experiments with ecological principles honed by scientists who study the complexities of working landscapes (Pimbert, 2011; Gliessman, 2014). To succeed, agroecological farmers must do the long-term, cumulative work of building place-based acumen: observing living soils, adapting seeds to shifting climatic and human needs, and establishing socially and ecologically resilient farming systems.

For decades, US policies, technologies, and economic pressures have tended instead to “deskill” rural labor (Carlisle et al., 2019), a trend that has been linked to labor under capitalism more generally (Braverman, 1974). Land concentration has been a factor in deskilling too: whereas the national census counted 6.5 million farms in the 1920s, just 2.04 million were left by 2017. With these shrinking farm numbers, production has shifted to larger farms that specialize in two to three crops or in livestock. Such ecologically simplified operations rely on repetitive tasks, heavy chemical and fertilizer applications, and large-scale “labor saving” machines (USDA ERS, 2018). At the same time, externalizing the environmental costs of production and tailoring farm safety net programs toward major commodity crops have left little incentive for farmers to adopt more sustainable practices (Ristino and Steier, 2016). Under a model that pursues productivity as the primary goal, neither food security nor sustainability has been achieved, and a critical resource—farmer knowledge—has been eroded. As a result, the single greatest sustainability challenge for agriculture may well be that of replacing non-renewable resources with agroecologically skilled people.

While it is often assumed that farmers are leaving agriculture because the work is undesirable or fewer people are necessary with modern technology, research tells another story: a suite of economic and policy barriers have conspired to make agriculture a decidedly unwelcoming profession—just at the moment we most need an influx of farmers (Lobao and Meyer, 2001; Carlisle et al., 2019). The sobering reality is that fewer than half of farmers reported positive income from their operations in 2018, with median farm income averaging out to a *negative* \$1,553 (USDA ERS, 2019). Most farming households need multiple off-farm jobs to make ends meet. This means that new farmers often begin their operations with big dreams of escaping the structural

pressures that have constrained their farming predecessors, and indeed the 2017 Census of Agriculture indicates that the number of primary producers with under 5 years of experience has grown in recent years. But farmers reporting 6–10 years in business declined seven percent over the same time period, indicating that while entry into agriculture poses huge barriers, remaining in agriculture may be harder still (Carlisle et al., 2019).

Reversing this trend will require better support for existing farmers, including support for transitions to agroecological management. At the same time, as we discuss in more detail below, new sustainable farmers¹ must be enabled, recruited, and trained to bolster this knowledge-able workforce.

BARRIERS TO BECOMING A SUSTAINABLE FARMER

The first step toward growing an agroecologically-skilled workforce involves reducing the initial barriers to entry into farming, which may be even more challenging for farmers hoping to embrace such practices. One of the biggest barriers faced by would-be farmers is acquiring or gaining access to land, particularly land with adequate access to water. As development pressures and policies favor “productive” purposes like housing and infrastructure, national farmland acreage nationwide has decreased, often irreversibly. A recent report on farmland loss estimates a reduction of 31 million acres between 1992 and 2012 (American Farmland Trust, 2018), with African American and Native American farmers disproportionately affected by land loss (Dunbar-Ortiz, 2014; Newkirk, 2019). In California alone, 1.4 million acres of farm and grazing land were lost between 1984 and 2014, a decrease of about 50,000 acres per year (California Department of Conservation, 2019). That trend appears to be accelerating still further: according to the new USDA Agricultural Census, between 2012 and 2017, California land in farms declined by an average of 209,240 acres per year. In parallel—and perhaps as a result—remaining US farmland has steadily increased in value, with croplands doubling in appreciation in the 2004–2014 period (USDA NASS, 2017).

The aging farm population would appear to present an opportunity for new farmers (including farm workers) to buy out retirees, but without robust land use policies, much of this farmland is instead being transferred to institutional investors, which means new farmers are more likely to be tenants than farmland owners (Calo and De Master, 2016). As tenants, farmers have less autonomy to make long-term management decisions—decisions which may pose a relatively

¹We define “new sustainable farmer” broadly, as any person interested in practicing low-input ecological agriculture, but not securely established in a farming career in the US (Carlisle et al., 2019). Farmers, ranchers, and agroforesters may describe their operations using terms like organic, permaculture, agroecology, ecological agriculture, or regenerative agriculture, distinguishing themselves from industrial farming systems heavily dependent on chemical and fossil-fuel inputs. We define “new farmer” as farmers who may range in age and experience with farming—from US-born teens with no agrarian background to middle-aged immigrants with decades of agricultural experience—which is why we do not use the terms “young” or “beginning” farmers. New farmers may have previously been farm workers.

greater challenge for farmers interested in pursuing agroecology. For example, tenant farmers may not be in a position to invest in perennial crops, conservation infrastructure, or soil health (Calo and De Master, 2016).

Land is not the only major asset for which new farmers require staggering amounts of up-front capital: equipment, operating costs, and proper storage and post-handling facilities can require millions of dollars before farmers harvest their first crop (Schiller, 2017). These costs may be even higher for biologically diversified farms, as they tend to require more diverse and appropriately scaled equipment that may be used only at certain times of the year or only for specific crops. These farms also need to make upfront investments in soil health and ecosystem function, such as soil-building cover crops, compost applications, and hedgerows. Over time, these investments can reduce input costs and production risk, while boosting fertility, carbon sequestration potential, and drought resilience. But their economic benefits may not be realized for years, while farmers can face initial production risks from switching to new practices. Moreover, new farmers have few options for financing such investments without incurring significant debt, and new farmers using ecologically-informed management are particularly poorly served by federal crop insurance subsidies, half of which go to farms in the top 10% of crop sales (Belasco, 2017) and many of which undervalue or even deter sustainable farming practices (Woodard and Verteramo-Chiu, 2017).

New farmers must also wrestle with the potentially high labor demand of their farms. Farming agroecologically may call for substantially more workers than is required for conventional industrial farms that use machines to replace human inputs. Scholars have expressed concern that farms with high labor needs are “subsidized by free, precarious, or underpaid labor through various schemes (such as volunteers movements, co-op farm shares, students in internships, or training programs), underpaid migrant labor, family labor, and off-farm income” (Meyfroidt et al., 2019; see also Getz et al., 2008). Other research, however, indicates that agroecology can enhance labor *quality*—as its practice defies monotony and farmers acquire valuable, dynamic knowledge through “meaningful work” (Timmermann and Félix, 2015; Dumont and Baret, 2017). But to avoid exploiting their workers, as well as themselves, new farmers must find a way to recompense people through fair pay. Farmers need to be open to possibly using scale-appropriate technologies that are compatible with agroecology and that can alleviate some of the repetitive and physically unhealthy tasks, freeing workers to focus on using their ecological skills. It is also the case that labor-intensive agriculture can translate into employment opportunities in de-populated rural areas (Timmermann and Félix, 2015; see also Carolan, 2012 and Goldschmidt, 1947).

Low Hanging Fruit: Existing Policy Support for New Farmers

Given the strong barriers confronting new farmers, particularly farmers using ecologically-informed practices, developing this workforce requires public investment.

Fortunately, the U.S. Congress has recently taken some important steps toward better supporting new farmers. The latest farm bill, passed in 2018 and currently being implemented, provides increased permanent funding for a new Farming Opportunities, Training, and Outreach Program that combines the Beginning Farmers and Ranchers Development Program and the 2501 Program, which serves farmers of color. Many other provisions of the new farm bill are not specifically focused on new farmers but address some of their most critical needs. For example, the bill includes funding for local food initiatives, small improvements to conservation programs, amendments that benefit African-American owners of heirs’ property, and strengthened programs for farmland protection. Significantly more progress along these lines is needed in future farm bills.

Some such progress is being made at state and local levels, where programs like California FarmLink are providing integrated support systems for new farmers—including limited-resource farmers who may not have experience accessing public programs. Assistance for accessing land, capital, water, equipment, training, and markets is often spread across multiple programs at the federal, state, and local levels of government, as well as in the non-profit and private sector. Navigating this complex landscape—and its associated applications for grants, crop insurance, or cost-share funds—is a skill in itself, and the burdens fall especially hard on women, immigrants, and people of color. Against this backdrop, user-friendly “one stop shops” provided by groups such as California FarmLink and the National Young Farmers Coalition, together with the USDA’s New Farmers website and its Discovery tool (which summarizes federal resources for new entry producers), are a step in the right direction.

But tools for connecting up piecemeal resources for new farmers can only go so far. Just as coal workers now need retraining to join the renewable energy economy, beginning farmers and conventional farmers transitioning to sustainable practices need access to an agroecological education. This calls, as well, for a new structural and policy foundation to provide such education and to assure that farmers can use what they learn for the long term.

Agroecological Skilling for and by New Farmers

Learning how to do agroecology comes in a multitude of forms, processes, and settings, formal and informal. In both the Global South and Global North, many peasant and indigenous communities practice agroecology with no formal training, while numerous apprenticeships, university degree programs, and NGO-led training opportunities exist. Just as agroecology itself is not a prescriptive recipe, but rather a set of locally adaptable principles, farmers become proficient at it through a variety of experiential learning pathways rather than through “skilling regimes” that rely on standardized techniques. Still, certain methods for learning have been shown to work effectively across diverse places and people.

One is farmer-to-farmer, or “campesino-a-campesino” exchanges, a methodology that goes back centuries among

peasant communities, but in its contemporary form was developed locally in Guatemala and spread through Mesoamerica beginning in the 1970s (Holt-Giménez, 2006). Farmer-to-farmer networks differ from conventional university extension programs in that farmers become protagonists in generating and sharing agroecological practices (Delgado, 2010). Rather than provide information to presumably inept farmers, the extensionist (or ‘promoter’) becomes a facilitator of co-equal knowledge exchange. A fundamental tenet of farmer-to-farmer, according to Rosset et al. (2011), is that “farmers are more likely to believe and emulate a fellow farmer who is successfully using a given alternative on their own farm than they are to take the word of an agronomist or possibly urban extraction. This is even more the case when they can visit the farm of their peer and see the alternative functioning with their own eyes.”

In places like Honduras, Nicaragua, and Cuba, farmer-to-farmer networks have contributed greatly to the take-up of agroecological skills, partly due to the greater organization and mobilization of grassroots communities and partly due to reinforcing policies by governments. Cuba’s farmer-to-farmer movement, for example, is credited with increasing national food production, making the economy more resilient to economic and climate shocks, and has worked to increase the number of agroecological farmers in Cuba from 200 in 1999 to 110,000 in 2009, which is a third of the small-scale farmers in this country (Biovision and Global Alliance for the Future of Food, 2019).

Could such methods work in the US, where organized peasant movements hardly exist? Yes, we argue, since informal farmer-to-farmer exchanges have long happened in locations across the country, as farmers observe what their neighbors are doing, whether it be using cover crops or adopting the latest agricultural technology (Bird et al., 1995; Hassanein, 1999; Carlisle, 2015). In some regions, universities and farmer groups have long been attempting to create platforms and networks that support farmer exchanges for agroecological learning. In California, for example, agro-environmental partnerships between growers, grower associations, pest control advisers, and University of California scientists emerged during the 1990s to manage organophosphate pollution in some permanent crop industries, such as almonds, prunes, and wine grapes (Warner, 2006, 2007). These partnerships involved local management teams, a process of grower outreach, and a shared goal of reducing agrochemical use by adopting agroecology, with initial success. The Community Alliance with Family Farmers (CAFF) pushed for a state-wide remaking of extension services as partnerships. Since then, these partnerships have decayed for want of continuing commitment and funding. Another example is the Practical Farmers of Iowa, a group that has worked since the 1980s to stimulate agroecological practice (Bell, 2010).

What has been missing in recent decades are policies to scale “horizontally,” bringing agroecological skilling to more farmers in communities of shared learning and practice, as well as to scale “vertically” through institutional linkages to national and transnational governing bodies and to social

movements (Brescia, 2017; see also Ferguson et al., 2019). Here, looking to Latin America can offer helpful lessons in training, supporting, and enabling a knowledgeable population of farmers to expand in the US. For example, in Honduras, farmers and NGOs worked to build model teaching farms called Centers for Teaching Sustainable Agriculture, which grew into a network of 30 connected schools (Escoto and Brescia, 2017). They started a national association for the promotion of ecological agriculture now comprised of 20,000 farm families. The Honduran experience illustrates that farmer-to-farmer learning strengthened the basis for targeted policy interventions and grassroots connections to global agrarian movements—both of which fed back to support the material viability and legitimacy of a highly skilled agroecological workforce (Holt-Giménez, 2006).

Making Stable Livelihoods for New Farmers

In order to recruit—and *retain*—the agroecologically skilled workforce needed to achieve food security in the face of climate change, we must offer new farmers something that most current US farmers do not enjoy: an enabling environment for a secure and remunerative career. Creating this enabling environment demands a legislative framework that restructures the laws, resources, and governance mechanisms underpinning the access barriers of land, capital, and markets. Because these access challenges straddle sites of legislative, departmental, and planning authorities—with programs fragmented across state, federal, public, and private sectors — we need a broad, multi-sectoral policy framework (Carlisle et al., 2019).

One example of a comprehensive policy framework that could help new sustainable farmers both enter and remain in agriculture may be a draft resolution proposing a “Green New Deal.” At first glance, this initiative did not appear to have much to do with agriculture. Drafted by Representative Alexandria Ocasio-Cortez and Senator Edward Markey in late 2018, this resolution puts forth a bold plan to use federal investments to decarbonize the US economy, repair and upgrade infrastructure, and create millions of “good, high-wage jobs” (U.S. Congress, 2019). Since then, many groups and leaders, including US presidential candidates, have seized on this idea as the backbone for a policy vision that integrates agriculture, climate, and clean energy legislation (Chrisman, 2019; Kurtzleben, 2019). Conceptual innovations such as a Green New Deal or similar initiatives could provide a foundation to achieve several critical things for new sustainable farmers. Integrated policies based on such initiatives could, for example, restructure economic incentives to constrain overproduction, decentralize agrarian governance toward putting decision making back into the hands of rural communities, and make a foundational commitment to justice that would guide allocating resources, affirming rights, and prioritizing the agricultural needs of historically marginalized groups.

Green New Dealers and other policy leaders can begin on well-trod ground: by reinstating parity and supply management policies to assure that farmers, new and old, can maintain their

income without succumbing to the trap of overproduction and low market prices. The principle of parity, simply put, means that farmers receive a fair price for their production. Parity allows farmers to better support the needs of their families (food, housing, education), to cover the significant costs of running a farm operation (farm labor, seeds, equipment, insurance), and to retire securely, without being forced to go into debt, exploit themselves, their land, or their workers, or forego necessities such as health care. Importantly, these conditions have been achieved in the US before—with compelling success. The Agriculture Adjustment Act of 1933 granted Congress the authority to set commodity prices where farmers would have purchasing power comparable to the years between 1909 and 1914—the most recent period, according to the Secretary of Agriculture, “when the economic conditions, as a whole, were in a state of dynamic equilibrium” (Engelbert, 2013). Deep into the 1950s, this equitable relation between farm prices and production costs meant farmers were able to stay on their lands during difficult times.

Parity was not just achieved through price controls. The “old” New Deal also introduced a supply management regime that capped the production of grains, oilseeds, dairy, and meat when needed to restrict surplus. In return for government payments, farmers were required to leave some fields unsown or ungrazed and to undertake soil-improving conservation measures. A federal loans program enabled farmers to hold onto their crops or animals until they could sell at a fair price (at which point they repaid the government with some of their profits). The government eventually created a national grain reserve to absorb surplus production. In times of drought or skyrocketing food prices, this grain could be sold, thus stabilizing the market and averting food shortages. Collectively, these policy interventions helped insulate farmers from a potentially volatile marketplace. Farmers did not face coercion to over-produce in order to sell crops at lower prices and thereby remain in the market.

Starting in the 1950s, agribusiness began lobbying Congress to dismantle parity and supply management. Corporations including Archer Daniels Midland and Cargill were instrumental in replacing New Deal-era loan programs and land-idling arrangements with direct subsidies that supported low prices for commodity purchasers. As Ayazi and Elsheikh (2015, p. 24) put it: “The winners and losers were clear under such policies: corporate buyers could acquire commodity crops for record low prices that were subsidized by the federal government while farmers continued to lose their lands and their income.” By the 1980s, these parity programs had effectively vanished—though were not forgotten by farmer organizations calling for a return to parity today (National Family Farm Coalition, 2016; Wisconsin Farm Bureau Federation, 2018).

The Green New Deal framework could also do much to decentralize agrarian governance and shift power back to rural communities across the US. It could initiate transformative change by building the infrastructure necessary for collaboration and coordination at and across many locations, much as our colleagues have described the global “scaling up” of agroecology

(Ferguson et al., 2019). Whereas food system governance is now strongly reliant on a handful of large corporations with close ties to the federal government, agroecological farming systems require more decentralized governance that promotes adaptive management at local levels, with a focus on regional food security and landscape-scale ecological stewardship.

Here too, policymakers need not start from scratch. Historian Gilbert (2015) recently unearthed many little-known aspects of the old New Deal in agriculture. More than 2,200 rural counties and 200,000 local farms were involved in land use planning, including local councils that first set priorities for environmental management efforts—then concentrated on controlling Dust Bowl soil erosion. Those councils decided how to spend federal money to solve the problems most pressing in their areas, while companion New Deal programs put scientists in daily contact with farmers to co-develop solutions to environmental problems. Farmer-scientist collaborations like these resonated with the original mandate of the Land Grant University system—research, extension, and education “in the public interest”—which has become increasingly perverted under the influence of agribusiness (Warner et al., 2011). Although significant debate persists over the effectiveness of conventional agricultural extension systems for promoting agroecology (as opposed to Green Revolution practices), recent efforts to promote “a progressive land grant mission” (Goldstein et al., 2019) show the potential synergies between overcoming racism institutionalized in the LGU system (Williams and Williamson, 1988; Harper et al., 2009) and diversifying who can access agroecological skilling.

Such decentralized governance must be combined with using the federal government’s power to restrict agribusiness control over the food system. We can be very sure that the same industry interests that began dismantling supply management in the 1950s will aggressively challenge these policies today. CAFOs, for example, can be expected to resist any shift away from low commodity prices that currently make their feedstocks so cheap. Grain traders like ADM, big food manufacturers like Nestle, Tyson, and General Mills, and retailers such as Walmart can similarly be expected to push back against a return to parity and supply control. For decades, agribusiness has depended on lax antitrust and pollution law enforcement, incessant over-production to keep food cheaper than its actual costs of production, and federal subsidies to keep farmers (just barely) afloat. Both Senators Warren’s and Sanders’ agricultural plans include a number of means to push back against corporate power, such as strengthening antitrust protections, imposing penalties for pollution, and opposing vertical integration in agribusiness. Sanders has also called for a trade policy that does not use US overproduction to undermine the food systems of other countries.

Finally, a framework such as the Green New Deal could put a commitment to “just transition” at the center of remaking US agriculture. The Just Transition Alliance explains that “a healthy economy and a clean environment can and should co-exist. The process for achieving this vision should be a fair one that should not cost workers or community residents their

health, environment, jobs, or economic assets” (Just Transition Alliance, 2019). Conventional farmers should not have to choose between hanging onto the industrial food regime and losing their livelihoods in a sustainability transition. Substantial public resources must be put into creating an infrastructure that can support *all* farmers to acquire agroecological skills, instead of leaving them without resources at a time when farming systems are under legitimate pressure to reduce chemical and energy use, replenish soil, and cut greenhouse gases. Both existing and new farmers could benefit from a just transition in which policies to overcome barriers to land, capital, and markets do not merely “capitalize the poor,” but begin to restructure the system from which unequal barriers grow. Governments can invest in cooperatives and commons to share and redistribute resources, such as land, food, equipment, research facilities and personnel, and training programs (Carolan, 2018; Bollier and Helfrich, 2019).

The old New Deal agrarian framework often excluded African-American, Native American, and women farmers from its provisions. For example, when implementing various loan and land management programs, USDA staff did much to undermine the secure access of these farmers to land, by forcing them into debt or by denying them assistance (Newkirk, 2019). Similarly, where the Agricultural Adjustment Act reduced crop production, it meant less land under production for non-property-owning tenant farmers, many of whom were people of color (Patel and Goodman, 2019). The Green New Deal resolution introduced into Congress in 2019 aims to redress “deeply entrenched racial, regional and gender-based inequalities in income and wealth (including, without limitation, ensuring that federal and other investment will be equitably distributed to historically impoverished, low income, deindustrialized, or other marginalized communities).” Realizing this just transition in agriculture would mean prioritizing the Indigenous, Black, Latinx, immigrant, and migrant agrarians who have given so much to the US food system but been given little in return. Land on which to practice agroecological skilling could be a start. Legal rights of farmers to acquire or lease land for their productive work could be affirmed—as is happening under Scotland’s new human rights-based land regime (Shields, 2018)—and historically dispossessed communities could get priority. Such land reparations would also serve a cultural process of healing, by explicitly recognizing the government’s role in creating persistent inequality.

Toward a New Agroecological Workforce

While US agriculture has survived over the past several decades due to the extraordinary sacrifices of increasingly strapped, fewer farmers, supporting the next generation of farmers in

achieving new levels of environmental stewardship and healthy food provisioning will require investing both in agroecology and in the people who are critical to its success. We have a brief window to decarbonize our food systems, enhance their delivery of ecosystem services, and buffer farmers and farming from the impacts of climate change.

Although transformative change across the food and agricultural system is required for full success, we propose that enabling an agroecologically skilled workforce is a crucial and substantial step that policy-makers, NGOs, researchers, and practitioners often overlook. Knowledge-intensive agriculture can reduce the environmental footprint of fossil fuel-based, chemical-intensive agriculture while providing good jobs in rural places. But agroecological education requires empowering would-be farmers to become active agents in generating and sharing agroecological learning. It demands the institutional supports to nurture local, place-based ecological skilling—and political education so that farmers can become protagonists in organizing and advocating for policy change. This workforce will know that no farmers survive long-term unless economic policy and governance can be restructured to provide all farmers, new and old, with safe and stable livelihoods.

Even if a Green New Deal or similar framework does not materialize, much can be done at all levels of science, government, and society to provide resources and coordinating platforms for decentralized food systems governance, while also strengthening existing new farmer policies and research on agroecological transitions. In previous times of national need, the US government purposefully cultivated new workforces to meet essential societal needs, recruiting artists (the New Deal), nuclear scientists (the Cold War), and speakers of indigenous languages (the Navajo Code Talkers of World War II). Facing today’s challenge of climate change, we must now do all we can to boldly re-envision the policy environment that can help new farmers survive to be “old” ones.

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LC and MM: co-first authors and project administration. LC, MM, and MD writing: original draft. All authors: conceptualization, investigation, and writing—review and editing.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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