



The Need for a Food and Agriculture Platform in the Green New Deal

An Open Letter

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The Need for a Food and Agriculture Platform in the Green New Deal

Food and agriculture remain essential to the United States' economy and its people. How food systems are organized has tremendous implications not only for climate, but also for our access to clean air, clean water, healthy food, and livelihoods. Our current industrial agriculture and food system is not sustainable, nor does it respect our living planet and future generations of life on Earth.[1] We are writing this analysis and recommendations for a Green New Deal as scientists who work in various fields and disciplines related to agriculture and food and who support the need for fundamental change across our economy. We have sought input from several food and agriculture NGOs and social movements to help frame our recommendations.

The industrial agriculture and food system contributes greatly to climate change, mainly through the production of the potent greenhouse gases methane and nitrous oxide, and the release of carbon dioxide from soil, especially through deforestation. Globally, agriculture and related deforestation is responsible for about a quarter of greenhouse gas (GHG) emissions.[2] When food transportation and processing are included, the agriculture and food sector produces almost a third of global GHG emissions.[3] Even after fossil fuel use is eliminated in the near future, expanding meat production,[4] ongoing deforestation, and other 'business as usual' developments in this sector alone could still produce enough [5] GHG emissions to reach 2 0C global warming.[6] Therefore the agricultural sources of GHGs must be reduced.

At the same time, our current food system is highly dependent on fossil fuels to produce fertilizers and pesticides, to support transportation and to turn crops into a

variety of processed foods. Like the fossil fuels industry, it mines the earth and exhausts its basic, life-sustaining gifts of clean water fertile, living soil and biodiversity. This industrial agriculture and food system must fundamentally change to avoid unacceptable damage to the climate, harm to local environments, adverse human health effects, and destruction of rural communities and economies. We further outline details and scientific references on this dangerous status quo below, after our policy recommendations.

While corporate agribusiness claims that large scale industrialized agriculture is necessary to “feed the world,” the data suggests otherwise. US agribusiness exports almost entirely go to about 30 high- and middle-income countries with the dollars to pay for them, and in the US, much of our commodity production is diverted to animal feed, biofuels, and processed foods implicated in a global epidemic of chronic diseases and obesity.[7] Although this overproduction for export supposedly benefits our farmers, in reality it has not resulted in higher prices or greater prosperity for US farmers. The system has steadily hollowed out rural communities over the past 40 years, contributing to extreme farm consolidation, with a mere 3.2% of US farms accounting for 51% of the total value of the nation’s agricultural production.[8] Only 46% of growers in 2018 had positive income from their operations, and new USDA projections indicate that US median farm income will soon dip to its lowest point since 2002 – a *negative* \$1,548.[9]

While these large farms and firms have edged out smaller, diversified farming operations, they too are in a precarious trap of debt and dangerous chemicals. Just to stay ahead of low commodity prices, crop farmers must churn out excessive quantities of corn, soy, and wheat; their counterparts in the livestock and poultry

industry must do the same for Concentrated Animal Feeding Operations (CAFOs). But this treadmill of overproduction only contributes to the excessively low prices farmers receive for their crops. It threatens farming communities throughout the US and also erodes their natural resource base, undermining our nation's ability to produce healthy food in the future. Meanwhile, international trade agreements have intentionally perpetuated the industrial agricultural model for the benefit of corporate agribusiness at the expense of farmers worldwide, displacing peasant, Indigenous, and smallholder systems that sustain local communities and feed most of the world. As a major producer, exporter, and importer of agricultural commodities, the US significantly influences agricultural systems worldwide via its food, farming and trade policies.[10]

The Green New Deal is a bold pact to turn our country into an energy-efficient, carbon- capturing, full-employment, living-wage nation by 2030. **Transforming our industrial agriculture and food system which thrives on fossil fuels and contributes significantly to greenhouse gas emissions must be an essential plank in the Green New Deal and its just transition strategies.** We underline that in emphasizing the food and agriculture aspects of the Green New Deal we support decarbonization of all sectors of the economy, rural and urban.

None of these ambitious goals, moreover, will be possible without addressing the social and environmental injustices wrought by this system especially on historically marginalized or socially disadvantaged groups, including peoples of color, indigenous communities, farm and food workers, rural communities and especially small-scale farmers. A fair, healthy and sustainable agriculture and food system that is good for humans and the climate can be created only with and by these communities.

In short, a Green New Deal requires us to infuse the original New Deal with ethical and ecological non-negotiables. If the New Deal was about ensuring that farmers were fairly compensated for their commodity production, the Green New Deal is about much more. In addition to ensuring that farmers, farm workers and other food system workers – and amongst them, especially women – are fairly compensated for producing, processing, and delivering healthy food in a sustainable way, the Green New Deal is about rebuilding resilient rural communities. It is about supporting localized, culturally appropriate, climate-resilient food systems across the United States. It is about moving past agriculture wedded to fossil fuels and GHG emissions.

The good news is that we don't have to look far for solutions. We can apply the principles of ecology to agriculture, developing **agroecological and regenerative practices** that rely on biodiversity and biological processes (rather than fossil fuels) for their key renewable 'inputs.' We can ground policy in the ethical frameworks of farm justice, food justice and food sovereignty. These frameworks emerged from social movements of farmers and consumers, and have since been studied, recognized and largely endorsed by a diversity of international scholars.[11] The three frameworks emphasize respectively: the rights and empowerment of farmers, the rights and empowerment of workers and low income communities, and the rights of peoples in general to have a democratic voice in how food is grown, traded, processed, sold, bought, and eaten.

We can also build on the experiences of New Deal successes, such as decentralized planning that brought rural communities and government experts together to improve resource-use efficiency, and supply management programs that avoided typical boom and bust cycles of farm prices.[12] As scientists, economists, and rural development

specialists, we know such changes are needed and possible. Ample research shows that supporting rural communities through better access to adequate infrastructure, public services, and New-Deal style supply control policy can help grow jobs in rural communities at living and dignified wages. Research also tells us that agroecological science and practice can dovetail with economic policy to build socially, ecologically and economically resilient rural communities.

Yet we underline that the solutions will not come from scientists alone. To be effective, the leadership for such changes must come from those knowledgeable about food and agriculture: farmers, farmworkers, and fishing communities who produce our food, food chain workers who bring food to the rest of us and rural people who deal firsthand with the economic, ecological and social impacts of our current industrial agriculture and food system.

Sustainable Solutions are Available that Reduce Climate Emissions and Support Farmers, Fishing Communities, Farm and Food Chain Workers, Rural Communities and the Environment

Agroecology is an established science of applying ecological concepts and principles to the design and management of sustainable food systems.[13] It encompasses various approaches to maximize biodiversity and stimulate interactions between different plants and species, as part of holistic strategies to build long-term fertility, healthy agroecosystems and secure livelihoods. The term ‘regenerative’, indicating farm practices that regenerate rather than degenerate natural systems, has come more into use recently and appeals to some producers and consumers. Because

agroecology has a longer pedigree and more substantial scientific basis, we use the term agroecology here, knowing that regenerative practices are implied in agroecology.

Farms that follow the principles of agroecology are those that mimic nature by sustaining or enhancing soil health, improving recycling of biomass and nutrients, increasing both managed and unmanaged biological diversity and beneficial interactions among species, and optimizing use of water, energy, nutrients, and genetic resources.[14] Such principles, based on advanced ecological science, also reflect farmers' knowledge and skill in adapting to complex environmental and social change. Indigenous and peasant farmers around the world can be credited with pioneering agroecology, just as grassroots movements led by farmers, pastoralists, and fishing communities continue to animate entwined movements for sustainable food systems, climate justice, and food justice/sovereignty today.[15]

Farms that follow the principles of agroecology have been shown to remove carbon dioxide from the atmosphere by sequestering carbon in the soil and in long-lived biomass such as trees.[16] It may also reduce climate GHG emissions.[17] Thus, agroecology can help to mitigate climate change. Agroecology and agroforestry, combined with several other societal changes are capable of dramatically reducing agriculture climate emissions by mid-century. These mutually compatible social changes include adopting diets based on healthy levels of meat and dairy consumption, afforestation and reforestation, with protection of existing forests through enhanced land rights for indigenous forest communities.[18] Agroecology also provides multiple environmental benefits beyond climate change mitigation and adaptation, multiple social benefits, and is highly productive.[19]

In recent years, agroecologists have expanded their understanding of what agroecology means. If agroecology was once applied mostly to farm-level practices, it has expanded to comprise the whole food system.[20] Recognizing that science, practice, and social movements go hand-in-hand, agroecologists are increasingly partnering with practitioners – including farmers, food workers, and Indigenous communities – in order to develop scientific, practical knowledge.

According to Steve Gliessman, a leading US agroecologist, “Agroecology is the integration of research, education, action and change that brings sustainability to all parts of the food system: ecological, economic, and social. It’s transdisciplinary in that it values all forms of knowledge and experience in food system change. It’s participatory in that it requires the involvement of all stakeholders from the farm to the table and everyone in between. And it is action-oriented because it confronts the economic and political power structures of the current industrial food system with alternative social structures and policy action. The approach is grounded in ecological thinking where a holistic, systems-level understanding of food system sustainability is required.”[21]

This indicates that the social-change aspect of agroecology cannot be overlooked. Agroecological science not only seeks changes that will lead to food security for all, but also seeks knowledge of the means by which these changes can be activated and sustained. Hence, both natural and social science aspects of agroecology are critical for just transition, and their integration forms the crucial scientific framework for food system transformation.

Better for the Environment, Rural Communities and Healthful Foods

Agroecological practices, including diversified organic farming and regenerative agriculture, allow farmers and communities to better adapt to climate change.[22] By increasing the soil's capacity to absorb and retain water and nutrients, agroecological practices help farmers cope with drought and flooding and other extreme weather events exacerbated by climate change.[23] Continuous crop cover and inclusion of perennials like pasture and trees, in contrast to industrialized monocultures, dramatically reduce soil erosion and build soil fertility.[24] Healthier soils with cover crops, and stronger root systems in turn, are better able to rapidly absorb precipitation, reducing the threat from flash floods and hurricanes. Increasing organic soil content allows healthy soil to act like a sponge, slowly releasing water and nutrients, helping crops survive droughts.

Extensive research in the US, Europe, and across the global South has shown that agroecology, built on diversified farming systems, can be as or more productive than conventional, industrial agriculture,[25] while reducing climate emissions and conserving biodiversity and other ecosystem benefits. Such systems rely much less on harmful pesticides and synthetic fertilizers than industrial agriculture. Similarly, organic agriculture based on these ecological principles is already nearly as productive as industrial agriculture[26] while providing significant food and environmental benefits. [27] The gap could be bridged with government and academic investment in applied research, including development of seeds suitable to organic farming conditions, and appropriately scaled equipment that allow farmers to focus on working with the ecology and microclimate of their farms.[28]

Farms relying on agroecology often require more labor than mechanized farms in developed countries – but the latter farms rely on expensive heavy machinery and harmful pesticides that oblige farmers to incur heavy upfront costs and operational costs.[29] As a result, net profits from agroecological farms can be as high or higher than for input-intensive industrial farms.[30] This can also mean more money remaining in local communities, contributing to their economic viability and reducing out-migration of people to urban areas in pursuit of jobs. Neoliberal economists have touted an ever-smaller farming labor force as desirable because of efficiency gains from mechanization and synthetic chemicals.[31] In fact, much sociological research has shown that by many measures – including socioeconomic and environmental health conditions— smaller, non-industrial farms are associated with healthier rural communities[32], when controlled for other factors.

Agroecological principles recognize that productivity and environmental health are achieved through protecting the biological and genetic diversity of crops, livestock, and the uncultivated environment.[33] This diversity must also be adapted to local or regional environments in the form of locally appropriate seeds and breeds, crops, and livestock combinations to attain the best possible resilience. Biological and genetic diversity is also facilitated by cultural diversity, which contributes to evolution and use of different crops, animals and farming practices.[34] Such agroecologically appropriate adaptation is best supported by building or reviving localized food systems that uphold the role of communities in determining what and how they grow, process, trade, and eat food. This approach is the opposite of the one-size-fits-all model of industrial monoculture where these decisions are forced on farmers and other food producers. For these reasons, agroecology and food sovereignty are two sides of the same coin.

How Do We Get There? Recommendations for Policymakers

Agriculture and food systems must put agroecological and regenerative practices at their core, instead of industrialized agriculture. They must address the inequities and injustices of our current society, especially those that disadvantage people of color, indigenous communities, small farmers, and women. At the same time, structural changes must address the existential crisis facing medium-sized farmers in the US who are being driven out of agriculture or forced to consolidate their operations. These groups of farmers, farm workers and food chain workers — not agribusiness — must be in the lead when developing and implementing solutions in policy and practice. Similarly, mass movements in civil society are needed to ensure that political leaders have support and encouragement to make the needed changes.

The following are some specific policy measures on agriculture that should be adopted as part of the Green New Deal, based largely on the existing proposals of social movements of food producers, eaters, and scientists.

1. We must re-orient current trade and economic policies to work for sustainable agriculture and rural communities, and to mitigate and adapt to climate change.

The current agricultural and food system is controlled by a handful of vertically integrated agribusinesses that specialize in seeds, agrochemicals, fertilizers, antibiotics, hormones, feed inputs, heavy machinery, and data-driven infrastructure. Multinational grain processors and traders channel agricultural inputs and products to markets worldwide, and giant retailers play an increasingly important role in depressing global prices while underpaying their own workers to increase corporate

profit margins. These very large corporations receive a disproportionate share of current subsidies, insurance, and research support, while benefiting the most from lack of anti-trust enforcement, exemption from minimum wage provisions, unfair contract systems, and other means of squeezing food producers and workers. We must eliminate policies that favor large, industrialized agriculture operations and CAFOs which have large climate impacts. Instead, we need policies, laws and regulations that strip away the market power of vertically integrated agribusiness conglomerates, and put control back in the hands of farmers and communities across the country. These approaches include:

- **A better designed crop and animal agriculture support system:** instead of favoring a few commodity crops and animals through various mechanisms (subsidies, conservation programs, research and extension), the Farm Bill and related laws must be overhauled to give priority to diversified, agroecological, regenerative food and agriculture throughout the country.
- **A reinvigorated anti-trust law regime:** existing laws must be stringently enforced and enhanced, such that mere market prices are no longer the dominant measure of unfair competition. The degree of market consolidation and power must be the key measure. The Federal Competition Commission, Department of Justice, and Federal Trade Commission must accordingly change their prevailing approach to enforcing anti-trust laws since the 1970s. New laws must be passed to block agricultural mergers so that farmers and consumers have more options for fair and sustainable markets.

- **A revived supply management system:** the ‘old’ New Deal used many tools that were proven to work between the 1930s and 1950s to secure farmer livelihoods and reduce over-supply of food. These include price floors, grain reserves, and guaranteed parity pricing. Price floors allow farmers to have a predictable minimum income during times of market volatility. National grain reserves that can last for at least a year not only assure the country’s food security but enable farmers to gain government support. They also help limit oversupply in the market that can reduce prices to unsustainable levels. Since the 1980s, the US grain reserve has been allowed to dwindle. Parity pricing allows farmers to receive prices that are at least on a par with the costs of inputs, and should be reinstated for all crops. Livestock and dairy production should be managed so as to ensure prosperity and economic security for farmers by guaranteeing a fair price through managing supply and applying import/export controls. We must update these innovations for our contemporary needs with an eye to the ecological and ethical imperatives of this time.
- **The ability to develop farm programs that respond to the needs of our nation’s farmers and consumers must be reinstated** through adoption of provisions such as Section 22 of the Agricultural Adjustment Act, which allows a limitation on imports of a specific commodity if that level disrupts the fair domestic market price for our nation’s farmers.

2. A Green New Deal food and agriculture system must enable *all* farmers to make a viable living and to put agroecology and regenerative agriculture into practice. Farmers in the US are trapped by the high costs of agricultural inputs (such as seed, machinery, and chemicals) and have little bargaining power against food

processors, distributors and retailers. Small-scale farmers have trouble staying afloat in markets flooded with cheap food. Even large-scale farmers are locked into current practices by harmful and frequent periods of low prices caused by oversupply, international trade agreements, misplaced subsidies and loan policies, debt, high land prices, and lack of support and incentives to change agricultural practices. We must overhaul policies and incentives that support over-supply of cheap food, feed, and fuel, and move instead towards a regulated market system that values food at a fair price for all farmers.

3. We must eradicate the historic discrimination in government policies and agency practices against socially disadvantaged farmers that has indelibly marked present day agriculture. Land grabs from Indigenous peoples, Jim Crow policies, discriminatory lending practices and other forms of discrimination against African American, Latino, Indigenous, immigrant and women farmers have all contributed to the exclusion of socially disadvantaged farmers. To undo this legacy, Green New Deal policies must introduce (or strengthen) credit lending, land access rights, and equipment aid aimed at socially disadvantaged farmers. There should be land reparations for Indigenous communities and people of color who have been denied the opportunity to purchase land to produce their own food and fiber. Many such policies have been fought for at the national level by farmer and farm worker-led advocacy organizations. Indeed some previous policy wins require strengthening, such as Section 2501 of the Food, Agriculture, Conservation, and Trade Act of 1990 which originally defined “socially disadvantaged” groups, allowing government programs to specifically aid producers from those groups. That pioneering effort has been followed at state level, as in the California Farmer Equity Act of 2017, which requires the California Department of Food and Agriculture to ensure inclusion of socially

disadvantaged farmers and ranchers “in the development, adoption, implementation, and enforcement of food and agriculture laws, regulations, and policies and programs”. The Green New Deal can build on these precedents and strengthen their requirements into a kind of ‘bill of rights’ for socially disadvantaged farmers.

4. We must make it easier, attractive, and viable for new, sustainable farmers to enter the food and agriculture system. The US farmer population has been aging (and shrinking in numbers) for the past few decades. Yet new farmers struggle to build enough assets (including land, water, equipment, and markets) to thrive in a world where tremendous pressures exist for farms to grow much bigger in size, reduce production costs, and specialize in a very few crops or animals. The obstacles are even higher for those wishing to establish operations based on agroecology and regenerative agriculture. Many promising policies and civil society initiatives have blossomed across the country, signaling greater awareness of the need to better support new farmers. Nonetheless, these developments are frequently fragmented, ill-resourced, and subject to local and state neglect. Green New Deal policies must work to secure nationwide access to land, credit, equipment, renewable energy, markets, and know-how, and help meet marketing challenges faced by small farms in particular and rural communities in general. This policy stance aligns with the idea of enabling energy workers (e.g. coal miners and oil industry employees) to make a just transition into the renewable energy sector.

5. Fair and redesigned immigration policies can help bring new farmers and workers into the food and agriculture system by welcoming currently undocumented immigrants into legal status. These people already contribute a large share of labor in farm fields, processing plants, supermarkets, and restaurants –

yet are largely invisible and subjected to widespread exploitation. With the crack-down on undocumented labor in recent years, many farmers and food factories are struggling to find workers. Developing a clear pathway to legal status as part of the Green New Deal will acknowledge their vital role in the food and agriculture system. This must be accompanied with policies that support opportunities for improving immigrants' economic status, such as programs for transition into farming and food businesses.

6. We must focus on building a new economy through initiatives that offer living-wage jobs and pathways to dignified employment for every member of society.

Low wages, poor working conditions (e.g. erratic shift hours, harassment, and lack of rest) and strong legal barriers to forming unions and enforcing labor rights also hurt farm workers and food chain workers, making them much more dependent on SNAP (food stamps), and often unable to enjoy food security and healthy diets. One important step the Green New Deal could make would be including farm workers in the National Labor Relations Act, which has hitherto excluded these people. Policies ensuring mandatory higher living and dignified wages for workers in *all* sectors would put money back into communities across the country. It would also reward food workers for helping produce and supply healthy and environmentally friendly food that lowers climate and other environmental impacts. Policies that allow food workers to organize into unions and to have a mandated set of basic working condition rights will give them greater power vis-à-vis food corporations. The NLRA must also be strengthened to facilitate union representation and organizing.

7. Corporate interests must be held accountable for their negative externalities in industrial agriculture and food systems, including through strict enforcement and

updating of existing federal environmental laws such as the Clean Water Act and the Clean Air Act, Federal Insecticide, Fungicide, and Rodenticide Act, and the Endangered Species Act. These industries must be required to pay the environmental and social costs of industrial farms and CAFOs, which have contributed to climate change, biodiversity loss, and water and air pollution. True cost accounting of such negative externalities must inform policies that strongly deter polluting practices, so as to protect the environment and the public, and nurture agricultural practices that protect the environment and climate.

8. We must challenge international trade agreements that hold out foreign markets as the solution to our country's oversupply of cheap food, fuel, and feed. Such trade agreements pit farmer against farmer globally as well as against the environment. The priority when making trade agreements should be put on satisfying local markets, whether in the US or abroad, with production by local farmers to ensure economic prosperity and culturally appropriate local food. Otherwise, domestic supply measures will be undercut by global commodity crop markets.

9. Publicly funded research institutions must be mandated to focus on the work of transforming our food system to mitigate agricultural climate emissions, and to become climate resilient, biodiverse and healthy. They must reverse their historic bias toward industrial agriculture and food systems. All research dealing with food and agriculture, both science and social science, should emphasize ecological, economic and social methods adapted to local conditions and cultural preferences, and with meaningful participation of local farmers and communities. This research can be grounded in the original mandate of the land-grant university systems, which was to support research, extension, and education 'in the public interest.' Public interest

research means supporting public institutions with sufficient federal funding so that they do not depend so heavily on licensing their intellectual property to the private sector. It means stemming the flow of taxpayer funded research now being made proprietary. It means strengthening public access to knowledge and material resources – from libraries to crop varieties – that universities should be developing with the participation of local communities to suit agroecological conditions of farms across the country.

10. Public agriculture extension services aimed at supporting agroecology and regenerative agriculture should be reinvigorated, so that farmers have access to technical information other than from self-interested agribusinesses that now dominate extension services. This requires increasing the familiarity and capacity of agricultural extension services with transitioning to diversified, agroecological farming systems, along with increasing public funding to provide farmers with technical support, especially through facilitating farmer-to farmer exchanges with special attention to justice concerns. Extension services should include farmer-to-farmer education and demonstration programs, since farmers who are successful in using agroecological methods are usually the most knowledgeable, credible, and trustworthy teachers for other farmers.

11. To allow the food and agricultural system to put agroecology and regenerative agriculture at its core, the Green New Deal should devote a large share of its public investment and market shaping work into developing regional clusters of agroecological communities. In the renewable energy arena, the Green New Deal is calling for massive investments into renewable energy technologies and manufacturing industries. Many Green New Deal advocates are calling for community-

owned renewable energy facilities to give communities across the country greater ownership over their own energy systems. These facilities are meant to generate local jobs and development. Similarly, the Green New Deal should include policies that support communities that want to build local food systems and collectively held food infrastructures (in which farming, processing, and marketing facilities are financed, owned, and run by cooperatives for the community's benefit). The Green New Deal should directly support community-based financial cooperatives to help make this possible. It should resurrect public employment as happened in the 'old' New Deal through the Works Progress Administration and Civilian Conservation Corps. The Green New Deal should also set up regional networks (as also happened in the 'old' New Deal) to allow communities to help decide how to spend federal government funds and to carry out transitions to agroecology.

Final Thoughts

We call on Congress, state and local legislatures, social movements, and other advocates of the Green New Deal to put sustainable food and agriculture on an equal footing with renewable energy in plans for a just transition to a decarbonized economy. In finding ways to do so, we will gather even broader public support for this bold policy agenda. We will create even more jobs and assure that many more regions across the country can benefit – not only these regions with ample renewable energy resources or manufacturing sites.

We caution that the Green New Deal cannot rely on technological fixes (e.g. unproven carbon capture and storage technologies or biofuels that have already caused dramatic ecological devastation worldwide) or market-based solutions to achieve its

goals of decarbonizing and transforming the U.S. economy, and stopping the climate crisis. Nor can the Green New Deal hope to make just transition by narrowly adopting carbon-centric solutions like stimulating only carbon sequestration in soils and carbon trading in agriculture, or by facilitating the automation of agriculture. Rather, **the Green New Deal will only succeed if it helps rapidly eliminate the fossil-fuel economy, and transforms industrialized agriculture into agroecological, regenerative agriculture, with special attention to rural communities and inclusion of historically marginalized, and socially disadvantaged groups.** This demands an array of social and community initiatives that change the ways in which we currently farm and make food, fuel, fiber, and feed.

To sign this letter, and to see who a list of
signatories, visit:

agroecologyresearchaction.org/green-new-deal

Further Details and Research on Problems with Industrial Agriculture and Food Systems

Bad for the Environment

Globally, agriculture and related loss of forests is responsible for about a quarter of greenhouse gas (GHG) emissions,[35] and is an important producer of GHGs in the U.S. It also the largest user of land and fresh water.[36] Our industrial agriculture and food system, dependent on agro-chemicals and engineered seeds, is also one of the biggest contributors to the ongoing epochal loss of biodiversity,[37] and a major cause of water pollution such as expanding “dead zones,”[38] increasing toxic algae blooms,[39] and red tides. It contributes to soil erosion and loss of soil fertility,[40] as well as air pollution.[41] It is also the biggest cause of tropical deforestation,[42]resulting in loss of biodiversity, harm to indigenous cultures[43] and large GHG emissions.

Even after fossil fuel use is eliminated in the near future, agriculture alone, especially overproduction and overconsumption of livestock products and related deforestation, could produce enough GHG emissions by mid-century to reach 2 0C global warming.[45] Therefore agricultural sources of GHGs must be reduced, in particular, industrial meat production, which offers among the most dangerous jobs and toxic pollution in the US.

Precipitous loss of biodiversity due to pesticides and loss of habitat is a bellwether for the biological dysfunction of industrialized agriculture. The worldwide expansion of Industrial agriculture and food systems is among the largest causes of biodiversity loss, which is contributing to the largest mass extinction in millions of years.[46]This includes the 90% reduction in the iconic monarch butterfly,[47]and large impacts on

pollinators like honey bees and wild bees[48]that are needed to produce much of our fruits, vegetables, and nuts, and helpful organisms that control pests naturally. Recent research shows huge losses of insects of 75% or more,[49] likely due largely to industrial agriculture and food systems, including its use of agrochemicals. We are decimating the very biological safety net we need to produce our food fiber, and other plant-based products we use.

The negative externalities costs caused by industrial agriculture and food systems—from climate change to biodiversity loss, to water and air pollution—are paid by the society at large both in terms of environmental pollution and health problems; lack of costs to industries that are responsible for these problems allows industrial farms and CAFOs to harm the environment and the public without penalty, and at the same time undercutting the farmers who protect the environment and climate.

Bad for Health, Rural Economies, Workers, Immigrants, and Rural Life

Industrial agriculture and food systems are not serving the needs of society. Over 40 million Americans are food insecure,[50] meaning that folks in both rural and urban areas often do not have access to sufficient quantities of affordable healthy food. Corporate money that biases our scientific research and policy priorities seem to be hurting rather than helping, as the lion's share of R&D goes to support the production of high-calorie, low nutrient foods, inefficient biofuels, and livestock feed for Confined Animal Feeding Operations (CAFOs). Such a system, that is skewed in favor of corporate agribusiness harms communities in cities and towns across the country, and has disproportionate impacts on the poor and people of color.

Structurally, industrial agriculture and food systems rely on poverty wages and dangerous working conditions for farmers and workers across the supply chain. [51] These workers and community residents are exposed to harmful pesticides, CAFO-produced antibiotic-resistant pathogens, and meat processing plants with increasing line speeds, and other unacceptable working environments.[52] Where contract farming still enables smaller farms to coexist with large vertically integrated agribusiness, unfair coercive contracts [53] place most of the risk and burdens on farmers, while funneling excessive profits to corporate headquarters.[54] CAFOs often employ migrant workers who fear deportation, and therefore are vulnerable to exploitation.

In addition to agricultural workers, rural communities are also routinely exposed to hazardous pesticides that drift into homes, schools, playgrounds and worksites, and that contaminate surface water, groundwater, and foods – all harming health. These pesticides can cause severe acute effects ranging from dizziness to nausea and death. Many pesticides have also been associated with increased risks of cancer, neurological, endocrine and reproductive disorders, Parkinson’s disease and autism spectrum disorder.[55]

Overproduction and prolonged periods of low prices for crops, dairy, and meat – often below the cost of production – with net farm incomes the lowest it has been since 2002,[56] are direct effects of the influence of vertically integrated agribusiness on trade agreements and domestic economic policies. Such policies have intentionally created an ever-growing export market dependent on low prices paid to farmers and continued overproduction, while successfully pitting farmers and workers in different parts of the world against each other in a global race to the bottom. Multinationals

take advantage of international trade agreements to source from where labor is cheapest, and where policies are weakest – on livable wages, safe working conditions, healthcare, housing, and environmental protections. This system puts economic pressure even on many large farms, CAFOs, and dairies. Meanwhile, the small and medium-sized farms, as well as organic farms that have long been the backbone of healthy food production, are often forced out of business.[57]

Those who are benefiting, it should not surprise us, are the ‘squeezers’ on both sides of farmers. On the input side, we find billion-dollar makers of pesticides, seeds, livestock, and machinery, all of whom charge farmers dearly for their products.[58] On the output side, we find grain traders, processing companies, and vertically integrated meat, dairy, and grain operations. We also find the huge supermarket chains that can eliminate town small businesses in a bid for “everyday low prices,” destroying local economies in the process. All of these retailers and middlemen attempt to pay as little as they can to farmers, letting the US government mop up the damage with subsidy payments.[59] Those subsidies are necessary to help keep farmers ahead of sinking prices, but they do not fix the problem of prices below the cost of production, nor are they enough to steady farmers in precarious times, even as the lion’s share of these subsidies go to vertically integrated agribusinesses, sometimes even to foreign corporations owning businesses.[60] The result, in the past 20 years, has been waves of farm foreclosures, increasing concentration of land ownership with more vertically integrated agribusinesses. Staggeringly inhumane working conditions for farmworkers and food chain workers in these agribusiness operations is yet another problem that needs addressing in the Green New Deal.

Farmers that do survive are often faced with the punishing choice heralded by Secretary of Agriculture Earl Butz back in the 1970s: “Get big or get out.” Faced with slim-to-nonexistent profit margins, many small-scale and family farms resort to scaling up production, depressing farmworker wages, and increasing their use of “labor-saving” chemicals and genetically modified crops.[61] As a result, many farmers become locked into chemical and technological dependencies from which they cannot easily escape, even if they were formerly engaging in less harmful agricultural practices.[62] Debt from high costs and low commodity prices one year can be compounded by climate-induced flooding or drought the next, as is happening now across states like Iowa and Missouri.

Small and medium-sized farms find they cannot compete in this exploitative and extractive economic environment. As with the rest of the economy, this is largely due to corporations capturing much of the profits created by hard-working farmers, farmworkers, fisherfolk, and food chain workers. This economic model is unsustainable for both farm-workers and farmers with its low wages, and the oft-present cost-price squeeze—when cost of inputs increases while price of outputs decrease—that is not offset by productivity increases.

The Role of a Compromised Science Research Sector

The agriculture research sector is not supporting the need for ecologically-based, sustainable agriculture and food systems. Our major agriculture research institutes, especially land grant universities, face stagnating public investment while publicly-funded research in other areas of science have increased substantially in recent decades. At the same time, private sector agriculture research has increased dramatically in the past three decades,[63] while universities rely increasingly on

intellectual property revenue and corporate largesse for support. This stagnation in public funding has further enhanced the lopsided growth in private sector research and in public-private partnerships dedicated to data-driven, mechanized, and biotechnological approaches to agriculture. While lauded by some,[64]this arrangement provides leverage to skew research toward agribusiness objectives, and away from agroecology. This focus prioritizes technologies that can be monetized by large corporate interests at the expense of ‘lower hanging fruits’ including R&D into diversified farming systems, agroecology, participatory research, farmer-to-farmer learning and education, and plant breeding for open-pollinated and non-patented seed. One recent study found that the USDA spends less than 2% of its budget on agroecological research annually,[65] while a follow up study quantified the support for extramural funding in “transformative agroecology” (including a social dimension) to a paltry \$12 million per year.[66]

This means that the needs of small and ecologically-based farms are not met, making it even harder for framers to transition to agroecology and regenerative methods. And it makes it even harder for organic and agroecological farms to survive.

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