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Farming for a Small Planet: Agroecology Now

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The primary obstacle to sustainable food security is an economic model and thought system, embodied in industrial agriculture, that views life in disassociated parts, obscuring the destructive impact this approach has on humans, natural resources, and the environment. Industrial agriculture is characterized by waste, pollution, and inefficiency, and is a significant contributor to climate change. Within so-called free market economics, enterprise is driven by the central goal of bringing the highest return to existing wealth. This logic leads inexorably to the concentration of wealth and power, making hunger and ecosystem disruption inevitable. The industrial system does not and cannot meet our food needs. An alternative, relational approach—agroecology—is emerging and has already shown promising success on the ground. By dispersing power and building on farmers' own knowledge, it offers a viable path to healthy, accessible food; environmental protection; and enhanced human dignity.

People yearn for alternatives to industrial agriculture, but they are worried. They see large-scale operations relying on corporate-supplied chemical inputs as the only high-productivity farming model. Another approach might be kinder to the environment and less risky for consumers, but, they assume, it would not be up to the task of providing all the food needed by our still-growing global population.

Contrary to such assumptions, there is ample evidence that an alternative approach—organic agriculture, or more broadly "agroecology"—is actually the *only* way to ensure that all people have access to sufficient, healthful food. Inefficiency and ecological destruction are built into the industrial model. But, beyond that, also that meeting the world's needs is only partially determined by what quantities are produced in fields, pastures, and waterways. Wider societal rules and norms ultimately shape whether any given quantity of food produced is actually used to meet humanity's needs. In many ways, how we grow food determines who can eat and who cannot—no matter how much we produce. Solving our multiple food crises thus requires a systems approach in which citizens around the world remake our understanding and practice of democracy.

Agroecology is the *only* way to ensure that all people have access to sufficient, healthful food.

Today, the world produces—mostly from low-input, smallholder farms—more than enough food: 2,900 calories, amounting to three to four pounds of food, per person per day. Per capita food availability has continued to expand despite ongoing population growth. This ample supply of food, moreover, comprises only what is left over after about half of all grain is either fed to livestock or used for industrial purposes, such as agrofuels.[1]

Despite this abundance, 800 million people worldwide suffer from long-term caloric deficiencies. One in four children under five is deemed stunted—a condition, often bringing lifelong health challenges, that results from poor nutrition and an inability to absorb nutrients. Two billion people are deficient in at least one nutrient essential for health, with iron deficiency alone implicated in one in five maternal deaths.[2]

The total *supply* of food alone actually says little about whether the world's people are able to meet their nutritional needs. We need to ask why the industrial model leaves so many behind, and then determine what questions we *should* be asking to lead us toward solutions to the global food crisis.

Hidden, Vast Inefficiencies

The industrial model of agriculture—defined here by its capital intensity and dependence on purchased inputs of seeds, fertilizer, and pesticides—creates multiple unappreciated sources of inefficiency. Economic forces are a major contributor

here: the industrial model operates within what are commonly called "free market economies," in which enterprise is driven by one central goal, namely, securing the highest immediate return to existing wealth. This leads inevitably to a greater concentration of wealth and, in turn, to greater concentration of the capacity to control market demand within the food system. The result? Demand by the better-off minority shifts production toward grain-fed animal foods, greatly diminishing the overall food supply because of the poor conversion rate of feed to food. The most extreme example is the feeding of grain to cattle. Of the calories in the feed that cattle consume, humans receive just 3 percent through beef. US agriculture, in large part because of its livestock focus, actually feeds fewer people per acre than that of India or China.[3]

This imbalance is exacerbated by other systemic inefficiencies within the industrial model. Of the synthetic nitrogen fertilizer added to the soil globally, at least half is never taken up by plants, but is instead washed or blown away. Moreover, economically and geographically concentrated production, requiring lengthy supply chains and involving the corporate culling of cosmetically blemished foods, leads to massive outright waste: more than 40 percent of food grown for human consumption in the United States never makes it into the mouths of its population.[4]

Industrial agriculture is unable to register its own self-destructive impacts.

A System Logic of Disassociated Parts

The underlying reason industrial agriculture cannot meet humanity's food needs is that its system logic is one of disassociated parts, not interacting elements. It is thus unable to register its own self-destructive impacts on nature's regenerative processes. Industrial agriculture, therefore, is a dead end.

Consider the current use of water in agriculture. About 40 percent of the world's food depends on irrigation, which draws largely from stores of underground water, called aquifers, which make up 30 percent of the world's freshwater. Unfortunately, groundwater is being rapidly depleted worldwide. In the United States, the Ogallala Aquifer—one of the world's largest underground bodies of water—spans eight states in the High Plains and supplies almost one third of the groundwater used for irrigation in the entire country. Scientists warn that within the next thirty years, over one-third of the southern High Plains region will be unable to support irrigation. If today's trends continue, about 70 percent of the Ogallala groundwater in the state of Kansas could be depleted by the year 2060.[5]

Large amounts of groundwater and river flows are also drawn into highly inefficient livestock production. More than half of the water use in the Colorado River basin, spanning six states, is devoted to feeding cattle and horses. In drought-stricken California, nearly a fifth of irrigation water goes to one feed crop: alfalfa. Every year,

100 billion gallons of California water in the form of alfalfa go to China for meat production.[6]

Beyond water waste and rapid depletion of groundwater—which recharges slowly and thus, in practical terms, is nonrenewable—nutrient application via synthetic fertilizer in the industrial model is not only inefficient, but also highly destructive. Nitrogen runoff ends up in waterways, where it is destroying marine life, creating over 400 aquatic "dead zones" worldwide. Some scientists are now warning that we have disrupted the nitrogen cycle even more radically than the carbon cycle.[7]

Industrial agriculture also depends on massive phosphorus fertilizer application—another dead end on the horizon. Almost 75 percent of the world's reserve of phosphate rock, mined to supply industrial agriculture, is in a politically unstable area of northern Africa centered in Morocco and Western Sahara. Since the mid-twentieth century, humanity has extracted this "fossil" resource, processed it using climate-harming fossil fuels, spread four times more of it on the soil than occurs naturally, and then failed to recycle the excess. As with nitrogen, much of this phosphate escapes from farm fields, ending up in ocean sediment where it remains unavailable to humans. Within this century, the industrial trajectory will lead to "peak phosphorus"—the point at which extraction costs are so high, and prices out of reach for so many farmers, that global phosphorus production begins to decline.[8]

Industrial farming contributes more greenhouse gas emissions than the transportation sector.

Beyond depletion of specific nutrients, the loss of soil itself is another looming crisis for agriculture. Worldwide, soil is eroding at a rate ten to forty times faster than it is being formed. To put this in visual terms, each year, enough soil is washed and blown from fields globally to fill roughly four pickup trucks for every human being on earth.[9]

Climate Change Culprit

The industrial model of farming is not a viable path to meeting humanity's food needs for yet another reason: it contributes nearly 20 percent of all anthropogenic greenhouse gas emissions, even more than the transportation sector. The most significant emissions from agriculture are carbon dioxide, methane, and nitrous oxide. Carbon dioxide is released in deforestation and subsequent burning, mostly in order to grow feed, as well as from decaying plants. Methane is released by ruminant livestock, mainly via their flatulence and belching, as well as by manure and in rice paddy cultivation. Nitrous oxide is released largely by manure and manufactured fertilizers. Although carbon dioxide receives most of the attention, methane and nitrous oxide are also serious. Over a hundred-year period, methane is, molecule for molecule, 34 times more potent as a heat-trapping gas, and nitrous oxide about 300

times, than carbon dioxide.[10]

Our food system also increasingly involves transportation, processing, packaging, refrigeration, storage, wholesale and retail operations, and waste management—all of which emit greenhouses gases. Accounting for these impacts, the total food system's contribution to global greenhouse gas emissions, from land to landfill, could be as high as 29 percent. Most startlingly, emissions from food and agriculture are growing so fast that, if they continue to increase at the current rate, they alone could use up the safe budget for all greenhouse gas emissions by 2050.[11]

Livestock production is the primary contributor to climate change from the food system. It is not possible to pin down precisely how much of agriculture's contribution to the climate crisis stems from industrial versus traditional farming; however, because livestock lie at the heart of the industrial model, and the manufacture and distribution of synthetic inputs require fossil fuels, it is clear that industrial agriculture dominates the sector's contribution to climate change. Driven by the narrowly focused pressure to bring the highest return to ever-larger farm operations, corporate suppliers, and food processors, the industrial system disrupts nature's regenerative capacities, leading to the rapid depletion and destabilization of the complex systems that we need in order to grow food.

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Perversely Aligned with Nature

These dire drawbacks are mere symptoms. They flow from the internal logic of the model itself. The reason that industrial agriculture cannot meet the world's needs is that the structural forces driving it are misaligned with nature, including human nature.

Social history offers clear evidence that concentrated power tends to elicit the worst in human behavior. Whether for bullies in the playground, autocrats in government, or human subjects in psychological studies such as the famous Stanford Prison Experiment, concentrated power is associated with callousness and even brutality *not in a few of us, but in most of us*.[12] The system logic of industrial agriculture, which concentrates social power, is thus itself a huge risk for human well-being. At every stage, the big become bigger, and farmers become ever-more dependent on ever-fewer suppliers, losing power and the ability to direct their own lives.

The seed market, for example, has moved from a competitive arena of small, family-owned firms to an oligopoly in which just three companies—Monsanto, DuPont, and Syngenta—control over half of the global proprietary seed market. Worldwide, from 1996 to 2008, a handful of corporations absorbed more than two hundred smaller

independent companies, driving the price of seeds and other inputs higher to the point where their costs for poor farmers in southern India now make up almost half of production costs.[13] And the cost in real terms per acre for users of bio-engineered crops dominated by one corporation, Monsanto, tripled between 1996 and 2013.

Not only does the industrial model direct resources into inefficient and destructive uses, but it also feeds the very root of hunger itself: the concentration of social power. This results in the sad irony that small-scale farmers—those with fewer than five acres—control 84 percent of the world's farms and produce most of the food by value, yet control just 12 percent of the farmland and make up the majority of the world's hungry.[14]

With its assumption of disassociated parts, the industrial model also fails to address the relationship between food production and human nutrition. Driven to seek the highest possible immediate financial returns, farmers and agricultural companies are increasingly moving toward monocultures of low-nutrition crops such as corn—the dominant US crop—that are often processed into empty-calorie "food products." As a result, from 1990 to 2010, growth in unhealthy eating patterns outpaced dietary improvements in most parts of the world, including the poorer regions. Most of the key causes of non-communicable diseases are now diet-related, and by 2020, such diseases are predicted to account for nearly 75 percent of all deaths worldwide.[15]

The new model reflects a shift from a disassociated to a relational way of thinking arising across many fields.

A Better Alternative

What model of farming can end nutritional deprivation while restoring and conserving food-growing resources for our progeny? The answer lies in the emergent model of agroecology, often called "organic" or ecological agriculture. Hearing these terms, many people imagine simply a set of farming practices that forgo purchased inputs, relying instead on beneficial biological interactions among plants, microbes, and other organisms. However, agrocecology is much more than that. The term as it is used here suggests a model of farming based on the assumption that within any dimension of life, the organization of relationships within the whole system determines the outcomes. The model reflects a shift from a disassociated to a relational way of thinking arising across many fields within both the physical and social sciences. This approach to farming is coming to life in the ever-growing numbers of farmers and agricultural scientists worldwide who reject the narrow productivist view embodied in the industrial model as they create highly effective relational approaches.

Recent studies have dispelled the fear that an ecological alternative to the industrial model would fail to produce the volume of food for which the industrial model is prized. In 2006, a seminal study in the Global South compared yields in 198 projects

in 55 countries and found that ecologically attuned farming increased crop yields by an average of almost 80 percent. A 2007 University of Michigan global study concluded that organic farming could support the current human population, and expected increases without expanding farmed land. Then, in 2009, came a striking endorsement of ecological farming by fifty-nine governments and agencies, including the World Bank, in a report painstakingly prepared over four years by four hundred scientists urging support for "biological substitutes for industrial chemicals or fossil fuels."[16] Such findings should ease concerns that ecologically aligned farming cannot produce sufficient food, especially given its potential productivity in the Global South, where such farming practices are most common.

Democratizing Farming

Ecological agriculture, unlike the industrial model, does not inherently concentrate power. Instead, as an evolving practice of growing food within communities, it disperses and creates power, and can enhance the dignity, knowledge, and the capacities of all involved. Agroecology can thereby address the powerlessness that lies at the root of hunger.

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Applying such a systems approach to farming unites ecological science with time-tested traditional wisdom rooted in farmers' ongoing experiences. Agroecology also includes a social and politically engaged movement of farmers, growing from and rooted in distinct cultures worldwide. As such, it cannot be reduced to a specific formula, but rather represents a range of integrated practices, adapted and developed in response to each farm's specific ecological niche. It weaves together traditional knowledge and ongoing scientific breakthroughs based on the integrative science of ecology. By progressively eliminating all or most chemical fertilizers and pesticides, agroecological farmers free themselves—and, therefore, all of us—from reliance on climate-disrupting, finite fossil fuels, as well as from other purchased inputs that pose environmental and health hazards.

Organic farming, commonly understood as farming with no synthetic pesticides and fertilizers, is a key dimension of agroecology. Globally, organically farmed land more than doubled in the decade before 2011, and in India, it grew almost eightfold. Two million farmers—most of whom are small farmers in the Global South—are now certified organic, while many more use organic practices.[17] Worldwide, officially recognized organic farmland still makes up only about 1 percent of the total; however, it is widely appreciated that many farmers using organic practices are too poor to afford the certification process.[18]

In another positive social ripple, agroecology is especially beneficial to women

farmers. In many areas, particularly in Africa, nearly half or more of farmers are women, but too often they lack access to credit.[19] Agroecology—which eliminates the need for credit to buy synthetic inputs—can make a significant difference for them.

Agroecological practices also enhance local economies as profits on farmers' purchases no longer seep away to corporate centers elsewhere. After switching to practices that do not rely on purchased chemical inputs, farmers in the Global South commonly make natural pesticides using local ingredients—mixtures of neem tree extract, chili, and garlic in southern India, for example. Local farmers purchase women's homemade alternatives and keep the money circulating within their community, benefiting all.[20]

Besides these quantifiable gains, farmers' confidence and dignity are also enhanced through agroecology. Its practices rely on farmers' judgments based on their expanding knowledge of their land and its potential. Success depends on farmers' solving their own problems, not on following instructions from commercial fertilizer, pesticide, and seed companies. Developing better farming methods via continual learning, farmers also discover the value of collaborative working relationships. Freed from dependency on purchased inputs, they are more apt to turn to neighbors—sharing seed varieties and experiences of what works and what does not for practices like composting or natural pest control. These relationships encourage further experimentation for ongoing improvement. Sometimes, they foster collaboration beyond the fields as well—such as in launching marketing and processing cooperatives that keep more of the financial returns in the hands of farmers.

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Going beyond such localized collaboration, agroecological farmers are also building a global movement. La Via Campesina, whose member organizations represent 200 million farmers, fights for "food sovereignty," which its participants define as the "right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods." This approach puts those who produce, distribute, and consume food—rather than markets and corporations—at the heart of food systems and policies, and defends the interests and inclusion of the next generation.

Lessons from Tigray, Ethiopia

Case studies in some of the world's hungriest regions can illuminate the potential of agroecology to meet global needs. The experience of Tigray, Ethiopia, an extremely cash-poor region of almost five million people with degraded soils and poor crop yields, offers one promising example. In part because of the region's low rainfall, the "hunger season" for the poorest farmers has typically lasted more than half the year, and climate change has intensified such hardships. In 1996, national and regional agencies took action. Working with the Institute for Sustainable Development, they

launched a transformational strategy with the goal of restoring soil fertility as well as developing community-environmental governance.[21]

The Tigray Project worked with farmers to infuse a few basic agroecological practices, like composting, into their work. Unlike chemical fertilizers, which require application every year, good compost can increase and maintain soil fertility for up to four years. Thanks to healthier soil, farmers began achieving higher yields, with fewer challenging weeds, and their crops became more resistant to disease and pests. Stopping the uncontrolled grazing of livestock allowed for the revegetation of degraded lands, including steep slopes and gullies not suitable for agricultural production. This previously "useless" land now provides biomass for livestock feed or compost, thereby returning nutrients to the soil. In just five years, from 2000 to 2005, farmers doubled yields of cereals grown on compost-treated soil. The project incorporated other innovations as well, such as the creation of small trenches along the bunds (low earthen ridges) between fields to catch rain and soil runoff, and tree planting and the nurturing of tree regrowth.

Tigray's positive experience is reflected in the results of many similar initiatives throughout the world.

The project clarifies the social dimension of addressing hunger. From its beginning, villagers have assumed leadership via local associations with elected representatives. The associations create and enforce community by-laws, and, through these associations, villagers make a series of public commitments on issues like water conservation. Some commitments are very specific, such as how many acres of land a person commits to plant with trees and the number of days of service he or she will contribute labor to soil and water conservation projects that benefit everyone.

Using these practices, Tigray farmers now produce enough food to maintain a full year's reserve, and their farms' greater crop diversity enhances resiliency. By 2008, 86 percent of the nearly seven hundred thousand farmers in the region were using natural fertilizer on nearly half a million acres. Chemical fertilizer use fell 40 percent by weight between 1998 and 2005, while grain production climbed more than 80 percent. Some farmers even produce a surplus that they can sell, raising their incomes more than tenfold, to roughly $700 a year. The ripples from this project have continued, as the Ethiopian government is spreading many of the Tigray-tested ecological practices, which have reached about a quarter of the country's rural districts so far.[22] Tigray's positive experience is reflected in the results of many similar initiatives throughout the world.[23]

A Viable Vision?

Despite the many strengths of the ecological farming model, objections still arise. Many who discount agroecology as a scalable solution note that in the Global North, it now contributes a very small share of total production. Moreover, in the Global

South, small farms lack the knowledge and decision-making power to convert to successful ecological methods. Of course, these concerns refer not to shortcomings of the model itself, but instead raise questions about whether humanity can make the *political* choices necessary for the shift of direction essential to embrace it. The answer will depend largely on how widely and deeply people appreciate the failure of the industrial model and the availability of a viable alternative. Disseminating information such as that reported here is therefore vital to fostering broad-based understanding and popular mobilization for change.

Once citizens come to appreciate that the industrial agriculture model is a dead end, the challenge becomes strengthening democratic accountability in order to shift public resources away from it. Today, those subsidies are huge. By one estimate, almost half a trillion tax dollars in OECD countries, plus Brazil, China, Indonesia, Kazakhstan, Russia, South Africa, and Ukraine.[24] Imagine the transformative impact if a significant share of those subsidies began helping farmers' transition to agroecological farming.

Agroecology's core principle of aligning with nature's regenerative processes is the direction all human systems must take.

Making Nutrient Cycling Practical

Even those aware of the evidence of agroecology's already proven yields, as well as projections about its potential, suggest that the soil nutrient cycling required to replace synthetic fertilizers on a grand scale is impractical in an increasingly urbanized world. But agroecology's core principle of aligning with nature's regenerative processes is the direction *all* human systems must take if humanity is to thrive, or even survive. As resources are shifted toward regenerative farming practices, we will no doubt learn ever-better ways to cycle soil nutrients.

The shift is already beginning. In 2012, the European Union called on members to reuse virtually 100 percent of phosphorus by 2020, and Sweden already requires 40 percent of phosphorus in sewage to be recycled back into the soil.[25] However, in the United States, cycling nutrients through what are called "biosolids"—fertilizers produced from treated solid waste separated from municipal sewage—has attracted many critics who note the difficulty of removing heavy metals and other contaminants from sewage sludge, which includes waste from industrial sources, and safely applying it to fields.

Solutions, however, are emerging. One promising example is a process called "nutrient recovery." Since most of the nitrogen and phosphorus is in wastewater, this technique focuses there, extracting only these nutrients, not the toxics. In a process called "struvite precipitation," phosphorus crystallizes with other elements and is withdrawn from the wastewater to become fertilizer. In this crystalline form, the phosphorus is virtually insoluble in water, and therefore does not leach into waterways. Plants can activate the phosphorus as they grow, but only when they need it, helping to reduce the current vast waste of phosphorus.[26]

The part of the human waste stream richest in both nitrogen and phosphorus is, in fact, urine. Urine is essentially sterile, and for centuries, humans have found simple ways to return it, with these key nutrients, to the soil. Today, it remains a largely untapped source of plant nutrition, although deriving fertilizer from urine is catching on in countries like the Netherlands. In 2014, Amsterdam's public water utility invited male residents to use urinals specially designed to collect urine to fertilize rooftop gardens, playfully calling it "peecycling." In West Africa, seven hundred families in eight Niger villages are cycling all the nutrients in their own waste back to their fields using waterless toilets and simple urinals—low-energy and low-cost—and enjoying yields equal to or better than those obtained with chemical fertilizers.[27]

A big factor in making nutrient cycling practical is reducing the distance between where food is grown and where it is consumed. Because three-quarters of food is still eaten in the country in which it is grown, and because most countries are not as vast as the United States, this reconnection may be less daunting than it seems. Many governments in Latin America and the Caribbean have specific policies to promote urban and periurban farming. In Cuba, 40 percent of households grow some of their own food; in Guatemala and Saint Lucia, 20 percent do. Cuba also helps farmers move soil nutrient sources, such as compost, to where they are needed. Agroecological urban farming in Cuba, in turn, helped to lift the country's average caloric availability from less than 2,000 calories per capita per day in the 1990s to more than 3,000 by 2005.[28]

If humanity can master space travel, surely we can tackle the logistical challenges of nutrient cycling.

If humanity can master space travel and decode the genome, surely we can grasp the laws of biology and tackle the logistical challenges of nutrient cycling. Worldwide, less than 1 percent of agricultural research focuses on advancing the knowledge and practice of organic farming.[29] If we shifted course, the potential for agroecological farming could be realized on a global scale.

Reversing the Pressure to Leave Farming

Skeptics of agroecology doubt that sufficient human labor could be mobilized to supply what would be required to take it to scale. Even if they had the opportunity, these skeptics say, too few people would actually choose to remain in such arduous work in rural environments with fewer amenities than cities offer.

Evidence, however, suggests otherwise. True, urban centers are swelling, and half of us now live in cities. But is the force behind this shift a pull to attractive urban life or largely a push by unfair returns to farmers, as well as by land hoarders and grabbers who are effectively evicting agrarian populations?

Today, more than a third of humanity depends directly on agriculture for their livelihood, and many want to remain where they are because of deep cultural and

family roots—*as long as they can also enjoy the rewards*. In fact, many rural people want to stay on their farms so much that they risk their lives resisting land grabs by foreign interests. The colonial seizures of land in the nineteenth century continued into the twentieth. And today, China, Saudi Arabia, Kuwait, Qatar, and South Korea, among others, are buying up or leasing vast tracts to provide food—not for local people, but for their own consumers—and produce crops for fuel. Land grabs in Africa since 2000 alone total an area as large as Kenya.[30]

Such pressure is, of course, only one reason for migration to cities. More widespread is simply the inability to earn enough from farming, along with such hardships as lack of public investment in rural market roads, schools, clinics, and agricultural extension. The disadvantages of rural life result from choices made by elite-controlled governments, unrelated to the inherent potential appeal of rural life. Relatively small investments and improvements, however, may be able to turn the tide. In the central plateau of Burkina Faso in West Africa, outmigration stopped when life in the villages was improved through water and soil conservation practices along with the integration of trees and crops. One village, which had lost a quarter of its population in the ten years before the new practices began, did not lose a single family once ecological farming increased crop yields and led to improved food security.[31]

The essential questions about whether humanity can feed itself well are political.

Finally, any accurate appraisal of the viability of a more ecologically attuned agriculture must also let go of the idea that the food system is already so globalized and corporate-dominated that it is too late to scale up a relational, power-dispersing model of farming. As noted earlier, more than three-quarters of all food grown does not cross borders. Instead, in the Global South, the number of small farms is growing, and small farmers produce 80 percent of what is consumed in Asia and Sub-Saharan Africa.[32]

The Right Path

When we address the question of how to feed the world, we need to think relationally—linking current modes of production with our future capacities to produce, and linking farm output with the ability of all people to meet their need to have nutritious food and to live in dignity. Agroecology, understood as a set of farming practices aligned with nature and embedded in more balanced power relationships, from the village level upward, is thus superior to the industrial model. This emergent relational model offers the promise of an ample supply of nutritious food needed now and in the future, and more equitable access to it.

Reframing concerns about inadequate supply is only the first step toward necessary change. The essential questions about whether humanity can feed itself well are

social—or, more precisely, political. Can we remake our understanding and practice of democracy so that citizens realize and assume their capacity for self-governance, beginning with the removal of the influence of concentrated wealth on our political systems?

Democratic governance—accountable to citizens, not to private wealth—makes possible the public debate and rule-making necessary to re-embed market mechanisms within democratic values and sound science. Only with this foundation can societies explore how best to protect food-producing resources—soil, nutrients, water—that the industrial model is now destroying. Only then can societies decide how nutritious food, distributed largely as a market commodity, can also be protected as a basic human right.

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