

**FOOD PRODUCTION AND AVAILABILITY
IN THE MIDWESTERN UNITED STATES
A Severe Cultural and Spiritual Disconnect from the Land
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The need for every individual to have daily access to healthy food is not a need that can be satisfied by clever algorithms, demagoguery, central planners, or food czar scions of great universities. I believe it is far more granular and local than that. This need for good food in regular supply is related to nearly every aspect of daily life and the relationship people have with their local community and land under their custodianship. It is the nature of the soil, water, and geographic position on the earth that is the final arbiter of reality and it is to those features that we should be attentive in our worldly pursuits. While I certainly have no pretensions to any great ultimate wisdom, I would like believe that we could open the subject for discussion and involve a lot of practitioners and disciplines in the colloquium---to include political scientists who have a greater interest in the subject of critical resources than an interest in being “right,” powerful, or devotees of a particular political doctrine. Each region is likely to have different strategic, tactical, and operational approaches---perhaps even different doctrines---so, as a Midwesterner, I have focused on those issues in the Midwest that relate to soil, water, energy, economy, and public health.

The Midwest once was part of a great grassland biome. The native peoples of the grassland satisfied most of their nutritional needs by eating animals that had eaten perennial grass. A study done in 2007 by the USDA estimated that there were 127 million acres (nearly 200,000 square miles) in agriculture in the Midwest, most of which involved the industrial-scale production of annual crops; 75% of the acreage was in soybeans and corn, the latter mostly field corn for the feeding of livestock. A considerable portion of this industrial-scale production sustains only through federal subsidy and other governmental instruments of policy. The federal government and most state governments are operating with an ever-increasing load of debt. For this reason and many more, the contemporary state of our food production economy is patently fragile insofar as sustainability is concerned. Yet, the potential for the development of new enterprises in a sustainable business doctrine is fully as large as the contemporary doctrine is catastrophic. Certain related issues are inarguably troubling, particularly as they relate to soil, water, energy, public health, and economy.

SOIL

- **Depleted Soil.** Industrial-scale tillage practices have depleted our soil of its organic matter fractions, which cannot be replaced with manure or compost at that scale. The soil organic matter in most fields has dropped well below 2%.
- **Diminished Nutrient Quality.** The lack of nutrient quality in the industrial-scale production of corn and soybeans is well documented, including the quality of meat from livestock fed almost exclusively on field corn. One could drive from Rockford to Cairo in Illinois and never pass a field

of Sweet Corn. While the acquisition of nutrient from meat is 10 times less efficient than from the eating of vegetables directly, one has access only to the fixed carbon in an ear of corn. With today's drug-enhanced production this amounts to only about 200 bushels per year. In the grassland biomes, an acre of grassland can produce about 3 tons of fixed carbon in the form of grasses, which are only digestible by ungulate grazers.

- **Fibrous Root Mass Deficit.** Annuals of tillage crops such as corn and beans produce below-ground root-masses in amounts less than that which can keep up with the annual oxidation rate of soil organic matter. As soil loses its soil organic matter it can become compacted in fine-textured soil (*e.g.*, clay) or leachable in coarse-textured soils (*e.g.* sand, gravel). The former type exaggerates runoff, while the latter loses its nutrients to the groundwater.
- **Soil Moisture, Temperature Change, and Drought.** Healthy Midwestern soils with aboriginal amounts of soil organic matter are very "drought" resistant and temperature flux at the surface is gradual. Loss of soil organic matter can diminish soil moisture levels to the point that the soil loses its thermal connection to the region scarcely a meter below the surface, which sustains a stable temperature that approximates the average daily temperature for the region. Because of the specific heat of water, the surface soil thermally connected to that zone has a gradual, moderate temperature change throughout the year. A moisture disconnect from this zone can allow the root zone temperatures to change too quickly and cause exaggerated temperature fluxes, neither of which is congenial to ectothermic organisms such as plants and most critical soil organisms. This same loss of soil moisture exaggerates the need for irrigation.
- **Growing Season Vitality.** Growing seasons in the Midwest are mostly 5-7 months long, when an array of roots and organisms in healthy soil once carried on vital functions in the root zone. Most industrial-scale corn and bean crops live out their metabolic life cycle in 90-120 days, leaving vast tracts of the surface of the earth in the Midwest lifeless, without vital function, and the root zone unable to thermoregulate within natural ranges. One cannot help but wonder what impact such soil surfaces worldwide, sometimes too hot, sometimes too cold, might be having on climate fluxes generally.
- **Biocides.** The environmental impacts of herbicides and pesticides are difficult to quantify as are the impacts of those same aerially dispersed chemicals on human health.

WATER

- **Runoff Temperature Increase and Degradation.** Rain falling on hot, compacted soils, 160-degree roofs and roads, and nutrient-enhanced lawns all flows into the Mississippi River. One cannot help but wonder what the impacts of hot, filthy waters from the great rivers of the world might be having on the temperatures and biodiversity of oceanic ecosystems. Sever runoff also occurs from woodland that, through fire suppression and mismanagement, have lost much of their growing season graminoid flora, and therefore their topsoil, so they also can no longer absorb rain water.
- **Depleted Aquifers.** Water lost to runoff is not available for the recharging of steadily depleting aquifers---now principal sources of irrigation---and necessitates the burgeoning of irrigation costs, even east of the 100th meridian, which includes all of the Midwest. The 100th meridian once signified a region where irrigation was not necessary---the annual rainfall amounts more or less equal to the evaporation rates.

ENERGY

- **Food Production Remote from Consumption.** Most food enjoyed by Americans comes from hundreds if not thousands of miles from where it is produced, which causes a disconnection between people and the substance and source of their diet. Fewer and fewer Midwesterners are employed in or involved in the production of food, their connection to this vital resource ever more remote. Consequently, food consumers are progressively unable to empathize with the soils, plants, and animals, upon which they depend, so large corporate and government interests are safe to operate without significant political opposition or accountability.
- **Transportation Costs.** Current logistical and “efficiency of scale” assumptions presume an inexhaustible supply of petroleum since trucks and trains cannot run wholly on wind or solar energy---new super batteries at least not immediately deployable---not to mention the embedded portion of fossil-based fuel required to build, expand, and maintain super highways. Large trucks are becoming progressively more incongruous as highway companions to much lighter passenger cars, a trend that is in full swing. For example, driver of smaller cars with lower clearances, designed to enhance fuel efficiency, are inclined to swerve reflexively when large tractor trailers throw off retreads during the hot months.
- **Highways Mismatched to Function.** Many of the section-line roads in the rural Midwest are now little more than miles-long driveways that serve very few houses. The inhabitants, no longer small-farm families, commute to service or manufacturing work in towns. The cost in fuel, oil, and mined minerals to maintain such driveways is a disproportionate *per capita* highway maintenance issue.
- **Packaging.** Because a high proportion of food is grown remote from the consumer, packaging has become extensive, expensive, and environmentally infelicitous. Significant volumes in landfills comprise packaging and much of packaging material is not biodegradable.

PUBLIC HEALTH

- **Impact of Low Diversity, High Corn-Oil Diet.** The impacts of one-size-fits-all, low diversity industrial-scale food products on human physical health and well-being are enormous and somewhat controversial, but it is widely agreed to be significant by nutritionists with no allegiance to agribusiness..
- **Food Deserts.** Many Americans are unaware of the importance of healthy food and live out their lives in what has been termed “food deserts.” The dearth of stores and local enterprises that provide fresh produce and other healthy food options is particularly difficult on populations where the families live on tight budgets in areas of low enterprise diversity. Rather, they are compelled to eat whatever the corporate system has made available to them through their “corner stores”---unconscious of the fact that much of it is laced with preservatives or is otherwise heavily processed. Such areas are marked by high levels of obesity, diabetes, and cardiovascular disease---not to mention a depauperate level of entrepreneurship and low need for a diversity of skills and talents.
- **Spiritual Depletion.** As we become disconnected from the plant and animal life that nurtures our bodies, there is a concomitant disavowance of the human soul to the vitality of creation and our role in nurturing and loving that which nurtures us. Food becomes little more than a banal or perhaps bacchanalian immersion than a blessing. Our contemporary infatuation with devices made by man and the magic of algorithms seduces us into thinking that virtual this and virtual

that can supplant reality. A religion that cleaves to virtual attributes and imagines or fantasizes that artificial intelligence can replace the vital attributes of humanity is a grotesque miscalculation of human energy and spirit---unless one believes that the annihilation of humanity itself is worthy solution to cultural misdeeds and foibles. All things made and conceived by man rust, crumble, or eventually must be reconceived; none of them can make themselves anew. Life thrives through generations of recombined DNA that enables the slow but inexorable capacity of populations to respond to the subtle, inexorable changes that characterize a changing earth. Human life must feed on natural life and nurture the natural life that feeds it. Pretensions toward virtual attributes or scales of food production at mechanical or industrial scale is a soulless, dangerous epistemological context within which to nurture subsequent generations of humans with souls.

- **Loss of Beauty.** To the extent that we default the growth of our nourishment to industrial-scale providers in ever more remote districts, the world around us become one progressively more man-made with little to evoke the ineffable beauties of nature. As food, soil, love, and beauty are progressively considered more as extras, unnecessary, inefficient, costly, we become progressively more content with faux food, depleted soil and inured to lovelessness, and ugliness. The extent to which the artisan and craftsmen skills, were once vital aspects of local communities. They were distinctly human attributes of humanity to which the young could aspire, the middle aged perfect and modify, and the elders teach. The extent to which beauty is voided from our culture and replaced with factory made everything, including food, is the extent to which the gifts of each human are forsaken and the beauty of their crafts and efforts, the beauty of struggling to become accomplished, the beauty of achieving artifacts unique among all others is replaced by sterility and efficiency.

ECONOMY

- **Family Farms Cannot Compete.** Most industrial-scale “Big Ag” food production is subsidized to the point that small-farm enterprises cannot compete given the subsidy profit margins that redound only to very large land owners.
- **Profit Considerations not Keyed Solely to Production.** Current agricultural business models that are based in contemporary industrial agricultural doctrine often are organized around the idea that investors---most of whom know nothing of agriculture nor could care less---will receive a quarterly dividend irrespective either of actual business performance or the impact of production on soil, air, water, and public health
- **Languishing Small Towns.** Many small towns in the Midwest, once rich in farm experience, jobs, and farm implement maintenance, are languishing from a loss of their principal reason for existence: food production. Many of their young people, seeing little future in local economic opportunities have fled to cities where they hope to find a job that has not been shifted offshore or taken over by automated production, but entails a service industry that produces neither food nor any other necessity of life.
- **Most Costs are not Internalized.** We have not internalized the economic costs of flooding and water pollution due to the depleted soils’ incapacity to absorb rainwater. It is estimated in a 2007-study by the USDA that a flood like that recorded along the Mississippi in 1927 would cost about \$150 billion in damages in today’s dollars. The impact of fertilizers on both groundwater

and surface water runoff and their broader environmental impact, while often acute downstream, is not reducible to site-specific responsibility.

- **Federal Subsidy.** Even as the federal government plunges headlong into deeper debt, industrial-scale agriculture and its multiplicity of appendices are subsidized to the tune of about 100 billion dollars per year, or at least that was the approximate number reported in the Farm Bill that was passed into law in 2014. The Farm Bill has a comfortable-sounding name, but it is a huge program that has a dizzying array of subprograms, all of which have compassionate-sounding subtitles and accommodate a matching array of special interests. I am no expert on the administration and policy, but its Byzantine funding and fund management must be incomprehensible to any one person. Some of the Farm Bill programs are aimed at mitigated the damage done by agricultural practices far too out-of-scale with reality to include the husbanding of soil and water. I believe that the federal subsidies, conceived in the programmatic doctrine of highly mechanized agriculture, sought in part at least to forestall serious food shortages during hard times in the future. Ironically this centralized federal policy has become so fragile that we all may well suffer serious food shortages when the inevitable collapse occurs.

THE FAMILY FARM

Americans who remember the illustrations in the Saturday Evening Post and the folksy family farm TV shows think of the farmer as a hard-working father, up before dawn to repair the tractor while the daughter milks the cow, the son slopes the hogs, and the mother cooks breakfast. At dawn the kids walk off to school with a sack lunch and return to do chores after school. The scene among the younger among us now ironically evokes the children coming home from their sojourn at the state university to help dad farm more efficiently with modern GPS devices that can stretch commodity production per acre, but the myth of the bucolic family farm still persists. Some people, younger yet, just think that food comes from the store in exchange for government dispensed food stamps. Anyone who would challenge the Farm Bill as a facilitator of agribusiness risks accusations of being a hard-hearted, uncompassionate, knuckle dragger bent on destroying America, its farmers and its food infrastructure. I am afraid the family farm no longer exists as an important integer in either our economy, food production, or the character-building of our children.

CLIMATE CHANGE

While many argue strenuously that climate is changing, many also argue that it is not changing or at least that, if it is, it is nothing that has not gone on before and that we as an organism have little to do with it. Both sides have articulate well-educated spokesmen. Climate change is generally described by measurements of temperature changes in the air and seas, along with measurements of sea level rises. For other evidence of climate change, many point to wild fires and floods, drought, and ostensibly outsized meteorological events. The principal experts consulted on these matters are climatologists, meteorologists, and atmospheric physicists.

How climate changes at the global scale affect regional landscape issues is hard to nail down, but, at the regional scale no one can argue that our cultural relationship with the land is having no effect on the soil, air, water, and biodiversity. No one can argue that:

- A tract of land tilled to the point where it can no longer thermoregulate its surface temperature or infiltrate rainwater is a tract that can no longer function as a healthy factor in the landscape and all areas to where it degraded waters flow and pollution-ridden airs blow.
- Hot roofs and pavements in summer do transmit hot, pollution-ridden waters downstream and that their particular interface between the earth and the air has been cooled by plants transpiring cool water.
- Regularly mowed lawns with poorly integrated with the soil beneath are not passing polluted water to the streams.
- Highly complex, biodiverse, natural remnants are obliterated or highly depauperized cannot simply grow back if one waits long enough.
- Landscapes that no longer infiltrate rainwater, can no long sustain the aquifers or that their catastrophic runoff is not the cause of extreme growing-season floods.
- Landscapes that evolved through millennia with regular, dormant-season fires, are highly vulnerable to catastrophic, uncontrolled fires if their fuels are allowed to accumulate and they combust with high winds and low humidity.

No one can assert that these direct cultural relationships with the living world are not man-caused, nor can one assert that they are wholly the result carbon dioxide level increase and the vagaries of temperature changes in the atmosphere and the oceans. So long as our vehemence and passion are spent tearing ourselves apart in the arena of politics, coaxed by corporate agendas, not much will be possible in the way of addressing serious issues regarding soil, water, energy, public health, and economy at the human scale, much less be able to tease out the deleterious impacts of the oxidation of fossil fuels.

We cannot continue to build and maintain a food production economy around untenable physics, chemistry, biological, ecological, and business assumptions any more than an airplane pilot can survive flight if he ignores the stall speed; an ungraceful landing is inevitable if such natural laws are eschewed. The down side to unsustainable behavior is that it cannot be sustained. Concern over unstable practices is not just a faddish agenda promulgated by political anarchists and activists. Broken natural laws are actually broken. Our heedless attention to the realities involving food production cannot continue to be excused by presumed advances in science or by the assumption of an endless influx of allochthonous capital. Food begins where carbon dioxide is, with sunlight energy and water, through the seemingly miraculous process of photosynthesis, fixed into a carbohydrate by a plant growing in a healthy root environment in an actual place on the earth's surface; a culture no longer attentive to the health of those places has fallen below the stall speed.

Certain other aspects related to food production could stimulate enterprises attractive to entrepreneurs, render wholesome, locally singular products to the consumer and be facilitators of local economies.

- **About ~2000 Kilocalories Per Day Per Person are Required.** Every Midwesterner, irrespective of economic class or cost-of-living context needs, on the average, about 2000 Cals. of nutrient-rich and fiber-rich food each day, so there is an ongoing product demand---not necessarily, however, a "growing" demand.

- **Default, often High-Maintenance Landscapes.** Most towns and subdivisions have significant acreages that currently are defaulted to lawns or low-diversity weedy areas. The lawn, if maintained as a short, monocultural weft, can be quite expensive to sustain and can demand significant inputs of water, nutrients, and fossil fuel---particularly if it must endure 26 mowings per year. Such landscapes, particularly in settlements that were mass-graded during construction or have been mowed regularly for many years, can be sources of severe pollution to down-stream waters. For more on this one may wish to read “The Ecology and Culture of Water” by J. Patchett & G. Wilhelm; see conservationresearchinstitute.org.
- **Perennial Grassland.** The more sustainable vegetation cover over much of the Midwest is perennial grass or sedge, which usually produces about 3-tons of dry fixed carbon per acre per year when properly managed. In most areas of the Midwest, these perennial grasses produce below-ground root mass in net annual amounts, which is to say that more carbon is fixed than is oxidized in our temperate grassland biome. Because their root mass is fibrous and can die and turn over completely in three years, such grasslands can result in stable or even surfeit fractions of soil organic matter---a net carbon sink.
- **Healthy Soil Moisture and Temperature.** Soil organic matter, when husbanded in the soil, can sustain soil moisture, ameliorate soil surface temperature fluxes, facilitate a vital root zone for soil organisms, eliminate the need for irrigation, and obviate concerns of storm runoff.

If we were to be attentive to the physical and ecological realities of the Midwest and its local variations, there are many opportunities for small business development and enhanced local economies. Such economies could take advantage of contemporary circumstances with regard to land use and food production. Business plans can be developed that would facilitate the following possibilities.

- **Profitable Land Use Changes.** A high diversity of annual vegetable cultivar production can be integrated into landscapes now are otherwise bereft of healthy soil---often areas of financial liability---particularly in neighborhoods where the principal consumers live within walking or biking distance.
- **Small Grain Production.** The production of grains in agricultural lands that lie in the immediate purlieus of towns and cities can be sustained so long as they can be replenished with organic matter annually, without the use of fossil fuel---the source most likely manure produced by animals or compost and deliverable at the local farm scale.
- **Grassland Pasture Development.** The vast tracts of land currently in industrial-scale crop production can be converted to perennial grassland, which when properly paddocked and rotated can accommodate a significant production of grass-fed meat, such as can be provided by cattle, elk, or bison. We cannot digest grass, and even though it is ten times less “efficient” than eating a vegetable to obtain sustenance from meat, an ungulate provides us with access to energy in the millions of acres of the grass in pastures---so far more people can be provided food.
- **Related Enterprises.** Canning or food preservation enterprises can extend a diversity of tasty, nutrient-rich foods for use throughout the dormant season. Other enterprises, such as rendering and distribution facilities, would be necessary to support grass-fed ungulate production. A community that sustains its own food needs is likely to have numerous supportive businesses that will need a much greater diversity of skills than currently is the case in communities

dependent on far-away, industrial-scale food producers. Many Midwestern communities, particularly in and around cities are struggling to refit themselves to locally-based food production, but competition with highly subsidized commodities can impede such struggles to produce healthy local food for local markets.

- **Producer Accountability.** Food production produced by a diversity of local businesses are much more intimate with the consumer and will be more easily held accountable for product quality and affordable prices. Industrial-scale producers do not facilitate healthy local competition and lead to the estrangement of people with their food---once one of their most critical and beloved of life's necessities.
- **Many Local Jobs Outdoors.** Healthy food and increased opportunities for outdoor work will obviate concerns over many of the medical maladies that bedevil our people and our healthcare system.
- **Runoff and Pollution Reduction.** All lands enhanced by sustained levels of soil organic matter, whether in annual or perennial production, can go a long way toward attenuating soil erosion, nutrient loss to leaching or runoff, infiltration of rainwater, and the relief of the Gulf of Mexico from hot, nutrient-rich debouches from the hinterland.
- **Redirection of Flood Insurance Costs.** Healthy soils can absorb nearly all the rain that falls on them, but under current soil doctrine it is inevitable that a flood from Midwestern rainfall will again cause a catastrophic flood on the order of those recorded in 1927 and 1993. The expected \$150 billion in damages could be redeployed beforehand to diminish serious flooding along the Mississippi. At the current contractor rate, 1 acre of perennial grassland can be installed for \$5,000 over a five-year period, including 3 burns; each farmer could be awarded \$100 per acre for 10 years to develop a more local food-production business. Such funds could finance 25 million acres of pasture and small-farm development---about 20% of the land currently in unsustainable, industrial-scale food production in the Midwest.
- **Interagency Cooperation and Research.** If healthy food production, flood and pollution attenuation, and local economic opportunity development were truly the goal of government and corporate food production, honest experts at FEMA, the Departments of Agriculture, Interior, Health, and Labor would pool resources and experience to reform food production doctrine to address many of the environmental, health, and economic issues and opportunities laid out in this essay. It would mean, however, allowing local communities the autonomy to create local business and enterprises. They could be relieved of the taxes and regulatory policies that flow to the advantages industrial-scale competitors.
- **Resurrection of Local Family Farms.** While a future family farm need not look exactly like it did prior to World War II, the attention to diverse food production at the human scale, necessarily requires a decoupling from centrally planned, corporate-controlled industrial-scale production. Attributes that redound to the family as the key organizational unit in any culture can be rediscovered and redeveloped.

The marketing advantages for businesses that can provide nutrient-rich foods that are not befouled through genetically modified technologies or fixed with potentially carcinogenic preservatives could be quite compelling, particularly if consumers were invited to enlarge the portions of their diet that are healthful, produced by local labor, and characterized by greater diversity and local brand than currently is available.

Such enterprises, where their business plans are demonstrably profitable, can be franchised or modelled to accommodate locally unique opportunities. A society, currently threatened by the collapse of food production and the economy as a whole, can obviate the catastrophe by having business interests well positioned to fill impending shortages of healthy food, develop diversified skills and job opportunities, and position itself for sustained local economy---progressively less dependent on central government and its corporate husbands. Although people today are more independent and less likely to engage with a community, having neither the time nor the interest, “common values” are becoming progressively more elusive. The restoration of a connection to the land and common community values is likely to wax as local business and public health prosper.

Having laid out a polemic that tries to describe some of the issues that threaten the fabric of our culture, we think it is important to bring together a colloquium of individuals from a rather broad array of disciplines to help us engage the problem and develop a model or models that could articulate practical solutions and paths of activity that could lead to progress in this regard. We need not all be like-minded other than to agree that the issues outlined above are worthy of study and probably cannot be addressed in isolation. The weaning of dependency from the central planners, government, and large corporate influences might be seen by many as a positive development if it meant healthier food, cleaner rivers, cleaner air, reduced health costs, a diversification of jobs, the renewal of vitality to rural towns, and lower taxes. This is probably a pipe dream and could never become real in an ever more virtual world. But, we cannot eat virtual food, survive in a virtual world, or prosper in a virtual economy. At some point we must begin to challenge ourselves to put the flight simulator aside and learn how to fly.