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The Next Agriculture?

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This is a guest post by John Michael Greer, who blogs at The Archdruid Report. John is the Grand Archdruid of the Ancient Order of Druids in America (AODA) and has been active in the alternative spirituality movement for more than 25 years, and is the author of a dozen books, including "The Druidry Handbook" (Weiser, 2006). He lives in Ashland, Oregon.

Archdruids take breaks from time to time, but the peak oil debate does not, and during my recent vacation a lively discussion sprang up on The Oil Drum about the future of agriculture in a postpetroleum world. The point at issue was whether today's mechanized agriculture will remain in place, or be replaced by a new rural economy of small farms using human and animal labor, as the world skids down the far side of Hubbert's peak.

Summarizing a vigorous discussion of a complex topic in a few paragraphs is a risky proposition, so I'll focus here on the two essays that defined the debate, Stuart Staniford's The Fallacy of Reversibility and Sharon Astyk's Is Localization Doomed? Staniford argued that those who expected a nonmechanized, small-farm economy in the wake of peak oil were claiming that the history of agriculture over the last century would simply run in reverse, tracking the decline in fossil fuel availability in the same way it tracked the growth in fossil fuel production.

If this view was correct, he claimed, rising fuel prices would have already begun to push American agriculture in the direction of smaller, less energy-intensive farms, and this would show in currently available statistics about profitability, labor costs, farm size and the like. He then demonstrated that no such changes could be found in the statistics, and on this basis claimed that what he called the "reversalist" position had no merit.

Astyk, responding to Staniford, made two major points. First, she noted that nobody claimed that the transition from today's agribusiness to tomorrow's rural landscape of small farms would simply run history in reverse, and Staniford was therefore kicking a straw man. Second, she suggested that the emergence of a nonmechanized, small-farm economy in the postpetroleum future was not an inevitability, but a policy choice that Staniford's so-called "reversalists" considered the best option in the face of peak oil.

Like many readers of the debate, I found neither of these positions really satisfactory. By the time I finished reading the comments, though, it was getting late, and I decided to round out the evening by pouring myself a glass of scotch and reading a few pages of a Gary Larson Far Side anthology. Somewhere toward the bottom of the glass I dozed off; I must have been reading one of Larson's dinosaur cartoons in my last waking moments, because I slipped into a dream in which a conference of dinosaurs pondered the approaching end of the Mesozoic era.

Quite a few dinosaurs had already given speeches about the threat of global cooling. Several of them had mentioned that mammals, with their warm blood and furry coats, might be better off in a post-Mesozoic world. At this point in the debate, however, another dinosaur lumbered up to the podium to speak.

"This talk of mammals taking over the world is nonsense," it said. "It's true, of course, that the ancestors of mammals – the therapsids – ruled the earth back before dinosaurs came along, in the Permian period, before the earth's climate shifted to its long Mesozoic warm spell." This sparked a good deal of discussion among the audience, and the Tyrannosaurus rex who presided over the meeting had to display its foot-long teeth and growl to quiet things down.

"Nonetheless," the speaker went on, "this claim that evolution will run in reverse can readily be refuted. If that were true, the global cooling we've seen already would have made dinosaurs become smaller and furrier, and that hasn't happened. In fact" – at this point it nodded toward the Tyrannosaurus rex – "it's clear that we're getting larger and scalier all the time. There's every reason to think that as the climate cools, and selection pressures become more extreme, big scaly dinosaurs will have even greater competitive advantages than they do now."

At this point the buzz of conversation in the audience could not be restrained, even when the Tyrannosaurus rex killed and ate one of the loudest talkers. A few moments later, though, a bright light flashed through the sky. "Did you see that?" said the Triceratops sitting next to me, pointing toward the sky with the horn on his nose. "I've never seen a shooting star that big." A moment later I was jolted awake by what felt like the shockwave from an asteroid impact, but was actually the Gary Larson anthology sliding from my lap and hitting the floor.

The parallels between Staniford's argument and that of his saurian equivalent, as it happens, go well beyond the obvious. Both, strictly speaking, are quite correct in their core assertions. As the Mesozoic era drew toward its close, dinosaurs did not retrace the process that led up to the monster reptiles of the Cretaceous. In fact, important branches of the dinosaur clan – the carnosaurs that led to Tyrannosaurus rex, the ceratopsians that ended with Triceratops, and others – got progressively larger as the Cretaceous drew on.

These successful evolutionary lineages continued to follow their established trajectory as long as it remained viable. When it stopped being viable, they didn't shift into reverse and shrink back down to the size of their Permian ancestors; they died out, and other organisms better suited to the new conditions took over. In the same way, Staniford's assertion that today's industrial agriculture will not throw the gearshifts of its combines into reverse, and gradually retrace its tracks into the 19th century, is almost certainly correct.

Staniford is also correct to point out that in a world intent on pouring its food supply into its fuel tanks, rising energy prices mean that industrial farming is becoming more profitable, not less. As a member of the Grange, I've had the chance to watch this from an angle that may be rare in the peak oil scene. Where the rest of the media bemoans rising grain prices, the Grange News is full of satisfied comments by family farmers who can finally make ends meet, now that their grain sells for more than it cost to grow.

Yet Staniford's overall argument fails, for the same reason that his imaginary Mesozoic equivalent missed seeing the future in plain sight -- both rely on linear models to predict a nonlinear situation. In his essay, Staniford used the distinction between reversible and irreversible processes as a model for historical change in agriculture. The difference between linear and nonlinear change, however, is at least as relevant.

Watch a frozen lake melt and you have a seasonally timely example of nonlinear change. The transition from ice to liquid water doesn't happen gradually as temperature rises; it happens at a specific point in the temperature spectrum, 32°F, and only then once the ice has absorbed enough energy to overcome its thermal inertia and provide the heat of fusion. A five-degree warming can be irrelevant to the process, if it's from 15°F to 20°F, or for that matter from 40°F to 45°F. The same rise between 30°F and 35°F, on the other hand, can cause drastic change.

Nonlinear change happens most often in systems that have negative feedback loops which balance out pressures for change. In the case of the frozen lake, the main sources of negative feedback are the stability of water's solid state and its capacity as a heat sink. Only when enough heat has entered the situation to overcome these factors does change happen, and when it does, the lake shifts from one relatively stable state to another.

The modern agricultural economy is a classic candidate for nonlinear change. The feedback loops resisting agricultural change in the modern world are at least as potent as the ones that keep a lake from melting at 20°F. The food production and distribution system is oriented toward business as usual, and the psychology of previous investment and the very real costs of retooling to fit a different model both raise obstacles to change. Monopolistic practices and the government subsidies and price supports that make most of today's "capitalist" agriculture a case study in corporate socialism also give the status quo impressive inertia.

At the same time, if something is unsustainable, it's a given that sooner or later it won't be sustained. Today's industrial agriculture, with its far-flung supply and distribution chains, its dependence on huge inputs of nonrenewable resources, and its severe impact on topsoil, water quality, and environmental health, is a case in point. As transport costs rise, fossil fuel and mineral reserves deplete, and the burden of coping with ecological damage climbs, industrial agriculture will sooner or later reach the point of negative returns – and as Joseph Tainter pointed out in a different context, that's the point at which collapse becomes the most likely outcome.

Staniford has argued elsewhere that the energy crisis caused by the end of cheap oil will be temporary. He proposes that nuclear power and other technologies will sooner or later make energy cheap and abundant again. If he's right, it's possible that new energy sources will come on line soon enough to keep industrial agriculture from hitting the wall. None of the theorists he critiques in his essay agree that the approaching crisis will be temporary, though, and this latter assessment gives their argument compelling force: as energy supplies dwindle and a social fabric predicated on cheap energy comes apart, the pressures on the agricultural status quo will eventually reach a level high enough to force nonlinear change.

This is where the second half of Sharon Astyk's argument comes in. She points out that many of the writers critiqued in Staniford's essay see a nonmechanized small-farm agricultural economy not as the inevitable result of economic forces, but as a deliberate policy choice. If our existing agriculture could fold out from under us, they suggest, getting plan B in place is a good idea.

Now this may well be true, but history teaches that when ideology collides with economics, it's inevitably ideology that comes off worst. The same trap that has blocked most proposals for lifeboat communities so far – how do you make them economically viable in the world we inhabit today? – lies in wait for schemes to relocalize agriculture that don't take the actual economics of farming in today's world into account.

Fortunately, there's reason to think that economic factors will favor the rise of a nonmechanized

small-farm economy in the industrial world in the decades to come. The best evidence for this suggestion comes, ironically enough, from Stuart Staniford. In posts about the agricultural side of peak oil – notably Fermenting the Food Supply – Staniford pointed out that the use of grain as a feedstock for ethanol is likely to drive up the price of basic foodstuffs so far that many people will no longer be able to afford to eat.

This is potentially a serious crisis, but it also represents an opportunity. Sharp increases in the price of food mean that food production methods that may not be economical under current conditions could well pass the breakeven point and begin turning a profit. To thrive in the economic climate of the near future, of course, such methods would have to meet certain requirements, but most of these can be anticipated easily enough.

These alternative farming projects would have to use minimal fossil fuel inputs, since fuel costs will likely be very high by past standards for much of the foreseeable future. They would need to focus on local distribution, since those same fuel costs will put long-distance transport out of reach. They would have to focus on intensive production from very small plots, since acreage large enough for industrial farming will likely increase in price. They would also benefit greatly by relying on human labor with hand tools, since the economic consequences of peak oil will likely send unemployment rates soaring while making capital hard to come by.

All of these criteria are met, as it happens, by the small organic farms and truck gardens that many relocalization theorists hold up as models for future agriculture. Already an economic success, especially around West Coast cities, these agricultural alternatives have evolved their own distribution system, relying on farmers markets, co-op groceries, local restauranteurs and community-supported agriculture schemes to carry out an end run around food distribution systems geared toward corporate monopolies.

As more grains and other fermentable bulk commodities get turned into ethanol, and food prices rise in response, such arrangements may well become a significant source of food for a sizeable fraction of Americans – and in the process, of course, the economics of small-scale alternative farms are likely to improve a great deal. The result may well resemble nothing so much as the agricultural system of the former Soviet Union in its last years, featuring vast farms that had become almost irrelevant to the national food supply, while little market gardens in backyards produced most of the food people actually ate.

If Staniford is correct and the postpeak energy crisis turns out to be a passing phase, that bimodal system might endure for quite some time, as it did in the Soviet Union. If more pessimistic assessments of our energy future are closer to the mark, as I suspect they are, the industrial half of the system can be counted on to collapse at some point down the road once energy and resource availability drop to levels insufficient to sustain a continental economy. If this turns out to be the case, the small intensive farms around the urban fringes – mammals amid agribusiness dinosaurs – may well become the nucleus of the next agriculture.