

Seeking What Works at What Scale*

Frederick Kirschenmann

Whether the purpose of science is to understand life or to pragmatically manipulate nature with predictable effects based on that understanding, it is clear that the intrinsic uncertainty of nature can stymie either endeavor.

---Kenneth M. Weiss and Anne V. Buchanan

Anticipating the Future

In his April 2011 newsletter Jeremy Grantham, one of the nation's most respected global investment managers, suggested that we have reached a "Time to Wake Up" because the "Days of abundant resources and falling prices are over forever." He summed up his analysis of our new future by reminding us that "The world is using up its natural resources at an alarming rate, and this has caused a permanent shift in their value. We all need to adjust our behavior to this new environment. It would help if we did it quickly." In his advice to investors he indicated that the long-term crisis which this resource-limitation-future poses is a situation that goes beyond "merely serious" to "dangerous."

Obviously, anticipating the effects of this new future is not only a matter of concern for investors, but for any of us living on planet earth, and, perhaps, especially for those of us engaged in food and health care enterprises.

Among the bullet points that Grantham used to summarize the future to which we must now "wake up," are:

- The rise of population, the ten-fold increase in wealth in developed countries and the current explosive growth in developing countries have eaten rapidly into our finite resources of hydrocarbons and metals, fertilizer, available land and water.
- Now, despite a massive increase in fertilizer use, the growth in crop yields per acre has declined from 3.5% in the 1960's to 1.2% today.
- The problems of compounding growth in the face of finite resources are not easily understood by optimistic, short-term-oriented, and relatively innumerate humans (especially the political variety).
- The fact is that no compound growth is sustainable. If we maintain our desperate focus on growth, we will run out of everything and crash. We must substitute qualitative growth for quantitative growth.
- From now on, price pressure and shortages of resources will be a permanent feature of our lives. This will increasingly slow down the growth rate of the developed and developing world and put a severe burden on poor countries. (Grantham, 2011)

In addition to these poignant bullet points Grantham also noted that "soil erosion is the biggest threat of all." To which I would only add, not just soil "erosion" but also our deteriorating soil *quality*. Healthy soil, fresh water, and robust biodiversity are the foundation resources to sustain a healthy biotic community, humans included.

As an investment manager Grantham, of course, calls attention to these dire changes primarily to urge investors to rethink their investment strategies. Grantham suggests that there may be short-term

investment opportunities to increase personal wealth in this new world, but only if investors make major changes in the way they manage their money.

Toward a Sustainable Business Model

Fair enough, but those of us interested in *long-term sustainability* will also need to imagine new, resilient systems that will sustain future generations---not only the future generations of the *human* species, but of the entire biotic community. The health of the biotic community is dependent on its capacity to renew itself. And, as Aldo Leopold reminded us, *enhancing* the capacity of the biotic community to renew itself is something we all *can*, and *must*, do. (Leopold, 1949)

Consequently, for those of us interested in resilient businesses, communities, and ecosystems, including agriculture and health care, it is important, among other things, to also pay attention to a **second** wake-up call issued by Michael Porter and Mark Kramer. (Porter, 2011)

Similar to Grantham, Porter and Kramer envision a radically different future world, but from a different business perspective. Porter and Kramer see an opportunity in these future challenges to “reinvent capitalism, and unleash a wave of innovation” that can, not only re-energize business but at the same time *revitalize communities and improve environmental quality*. They propose a new way of doing business based on the principle of “shared value” which “involves creating economic value in a way that also creates value for society by addressing its needs and challenges.”

This new business model recognizes two very important business realities, 1) that markets can be defined by *societal* and *ecological* needs as well as *economic* needs, and 2) that social and environmental harms very often end up creating “*internal costs*” and thereby undermine the very business interests that one may be trying to enhance by externalizing those social and environmental costs. There are, in other words two economic incentives to change our business behavior. Porter and Kramer argue, therefore, that, given our new world, it is now in the long-term business interest of companies to take advantage of opportunities to create shared value by incorporating ecological restoration and social revitalization into their future business plans. In other words, continuing the old business practices of commoditizing production and externalizing costs in the interest of short-term economic profits, is no longer in any company’s best business interests, given the new realities of our future world.

Those of us who have grown cynical about the businesses which have evolved in the past century, (a business world which seems to be focused solely on enhancing one’s own short-term bottom line by dominating and crushing one’s competition, while externalizing every cost possible), will, undoubtedly be tempted to dismiss this proposal for “creating shared value” as naïve rubbish. Proposing that in our new future, successful companies will be those that focus on “the right kinds of profits” – profits that *foster* social and ecological benefits rather than *diminishing* them, may indeed seem unbelievable.

However, I think the mere fact that a major asset investment manager and one of our most prominent economists are now both telling us that it is “time to wake up” to the realities of our new world, at least has implications for those of us trying to determine what will work at what scale as we attempt to become part of the transformation our new world will demand of us. The mere fact that it is now no longer just a group of weird environmentalists and “activist” farmer/philosophers calling attention to the transformations which this new world will require of us, is at least something we may want to celebrate.

It would seem that this new world of creating shared value applies especially to companies in the food business. The industrial business model of commoditizing production and exerting maximum bargaining power to drive down prices paid to labor and raw-materials-suppliers will become increasingly dysfunctional, given the depletion of fossil fuel, fertilizer and water resources, not to mention degraded soils. Staying on that path would not only jeopardize food security but also the business success of food companies.

Our old business model is now rapidly depleting the very resources on which business depends. It has now driven most farmers out of business and made it largely impossible for young farmers to get in. According to the 2007 Agricultural census data, seventy five percent of our total agricultural sales volume is now produced by just 192,442 farms and 30 percent of our farmers are over age 65 and only 6 percent are under age 35. (Duffy, 2011) It is hardly in anyone's business interest to continue down this path, especially since the agricultural transformation we now need to engage in, will require a new generation of the most creative farmers in the entire history of agriculture.

It seems like a good time, therefore, to imagine some new ways of using our most valuable treasures – fertile land, agricultural wisdom, and our best science – to explore new food production systems that will address the new challenges and explore new opportunities. Such a transformation can contribute to the creation of a new food system that promotes both human and ecological health.

The shared-value business concept that Porter and Kramer propose, together with some of the new production models being explored by farmers and researchers throughout the world, could become a source of innovation and investment that may make our future food system, one that not only produces healthy food, but healthy land, and healthy communities. So addressing the challenge of designing a sustainable food system for our new future may provide some clues for what might work at what scale for all of our human enterprises.

At the very least it would seem important to recognize that the old business model which is focused on simply intensifying our current system, will, as Grantham points out, simply “crash.” In a world of “peak everything” and saturated natural sinks, the assumption that the current system can be sustained by simply developing new technologies is illusory at best. It is, indeed, “time to wake up.”

What Might Work at What Scale?

At the outset, it is therefore important to recognize that the transformation we will need to make consists of a *paradigm shift* and not simply the development of better tools to “green up” the present system and keep it going.

With respect to our food system, anthropologist Ernest Schusky has characterized this paradigmatic shift in terms of the historical “eras” which have fed us: the hunter-gatherer era, then the Neolithic era, and then, he argues, we entered a new era in the early 20th century which he characterized as the “neocaloric era” since it is entirely based on “old calories.” He then argues that the neocaloric era will of necessity be a very short period in the time-line of human history since we are rapidly using up those old calories. (Schusky, 1989) So the transformative question facing us is how we will design the next era of feeding ourselves? Imagining such a new era will require some significant cultural shifts as well as design transformations. Here are a few:

1. Rethinking our relationship with nature. Wes Jackson has reminded us for some time that in our industrial era we have viewed nature as something to either be “subdued or ignored.” A key paradigm shift will require us to view nature as something to be embraced and revered. Our path to this new embrace of nature can be assisted by Aldo Leopold’s awareness that we are neither separate from nature nor its “conquerors”, but that we are, rather, simply “plain members and citizens.” Such a shift in our thinking would lead us to finally look to nature’s wisdom as a solution to the many challenges facing us in the “post neocaloric” era of agriculture. Sir Albert Howard had already observed the great deficit of ignoring that wisdom, seventy years ago when he observed that “Little or no consideration is paid in the literature of agriculture of the means by which nature manages land and conducts her water culture.” (Howard, 1940) We have allowed ourselves to ignore that sage wisdom for almost a century because we have had cheap, “old calorie” inputs to substitute for nature’s wisdom. Since that era is now rapidly coming to a close we will have a new opportunity to retrieve this wisdom from the past and marry it with the best science available today.
2. There are numerous examples of the emergence of a new science which is well suited to our task of rethinking our relationship with nature. The linear cause-effect science which informed the industrial era, is now giving way to a science of networks. “Law-like” science is being replaced by contextual probabilistic science. (Weiss, 2011) This shift is likely to engage the food sciences in learning *more* about how to “manage natural systems” and *less* in developing “single tactic, therapeutic intervention” technologies. (Lewis, 1997). The conclusions that Lewis and his colleagues came to with respect to pest management, namely that single tactic, therapeutic intervention strategies were not sustainable, has now been verified by subsequent research reported in *Nature* magazine (Crowder, 2010, and Turnbull, 2010). While single tactic, therapeutic intervention strategies are effective on the short term, they create situations that intensify the problems one is trying to solve in the long term. This is, incidentally true in health care and social work as well as agriculture.
3. There is a similar need to shift from an industrial mindset to an ecological perspective. Industrial economies all operate on the singular goal of maximum, efficient production for short term economic return. To achieve that goal industrial economies employ the techniques of specialization, simplification and economies of scale. In agriculture, those techniques are only viable so long as we have cheap energy, surplus water, adequate supplies of rock phosphate and potassium, stable climates and reserves of soil fertility and biodiversity, all of which are now in steep decline. Using an ecological model one is led to learn how systems can be managed as naturally as possible, using the free ecosystem services of wild nature. An industrial manager asks “how can I solve production problems?” An ecological manager asks “how can I manage natural systems so that the problems are less likely to arise in the first place?” Adaptive management replaces control management, thereby inviting knowledge-intensive solutions, rather than relying solely on single-tactic technological solutions.
4. There is a growing interest in transitioning from homogenized global systems to regional, locally adapted systems. The great benefit we have derived from the “local” foods movement is not about the distance food travels. The important transformation that the local food movement has initiated is the engagement of food customers in their own food communities as *food citizens*. As a result communities are now becoming much more engaged in their own “food shed” exercising a degree of “food sovereignty.” This new food

conversation can be a powerful force for developing a more sustainable food system in each food community. Consequently, some food advocates are now even envisioning a new food system evolving in the decades ahead that will be made up of regional food networks connected to each other through shared information and trade, but networks within which the first priority will be to produce as much of the food as possible *by* people in the food shed *for* people in the food shed, with exports and imports serving as the second priority. Some envision this future global food system consisting of networks of more diversified small to mid-sized farms, sharing resources and markets to achieve resilience and reduced transaction costs. Ivette Perfecto and her colleagues have envisioned a new food and agriculture system for the future that is grounded in the science of adaptive cycles. This model draws on case studies which link agriculture, conservation and food sovereignty. This innovation may well provide us with a model of resilient, productive, future food systems that operate on the basis of shared value. (Perfecto, 2010)

5. These innovations may well lead us to rethink the concept of scale. As we all know economies of scale can reduce transaction costs as well as environmental costs. But in our industrial economies we have defined scale almost entirely in terms of complex, tightly-coupled systems. While such systems have demonstrated certain efficiencies in the short-term, it is now becoming clear that they come with many costs and risks, and these are becoming obvious in our food system. Charles Perrow, Professor of Sociology at Yale University has eloquently addressed the fundamentals of this issue with respect to our many high risk technologies. (Perrow, 1999) His insights also apply to one of the scale problems in our current food system. Perrow argues that we can never eliminate accidents from complex, tightly-coupled systems since system complexity makes failures inevitable – it is the reason he calls accidents in such systems “normal.” Perrow’s analysis provides a compelling case for rethinking the infrastructure of our food system. Most of the recent horrendous food recalls could have been avoided if the food in question had been processed in decoupled community processing facilities. This makes a case for future food systems – farms as well as processing facilities – which are designed as decoupled networks rather than complex tightly-coupled entities. Perrow later provides evidence which suggests that such decoupled systems can actually be more economically efficient than complex, tightly-coupled ones. (Perrow, 2007)
6. Rethinking soil and biodiversity. Reclaiming the wisdom of Sir Albert Howard, Hans Jenny and William Albrecht as well as other similar 20th century soil scientists will be essential to accomplishing the transformations we need to achieve. Managing for soil health instead of the exclusive focus on “crop bulk” can restore the living vitality of the soil with all of its capacity to store fertility, (reducing the need for fertilizer inputs) absorbing and retaining moisture (reducing the need for irrigation water) and producing food of superior taste and health-promoting features. Perennializing as much of our agricultural production as possible will make a major contribution to this goal of soil health restoration along with the other ecosystem services that nature’s perennials provide. The restoration of as much of our biodiversity and genetic diversity as possible will be equally important. The critical need to restore the biodiversity and genetic diversity of our seeds and breeds to achieving a resilient food system in the face of our future challenges was made eloquently by Gary Nabhan. (Nabhan, 2009)

7. Ultimately the above transformations will depend on achieving a more comprehensive cultural shift---a shift from our “dominator” culture to a “partnership” culture. Riane Eisler has written eloquently about this issue and numerous environmentalists (e.g. David Orr, Dianne Dumanoski) have concluded that such a shift will be essential to dealing with our climate change crisis and therefore to the survival of the human species. Eisler has pointed out that the dominator culture – a culture which she symbolizes with the “blade” – is increasingly becoming dysfunctional economically as well as socially and ecologically. Our dominator culture uses technologies and strategies to dominate both other humans and the rest of the biotic community. Eisler’s professional assessment indicates that the changes already beginning to take place in our social as well as our economic enterprises suggest that such a transformation, while difficult, may not be impossible. As Porter and Kramer have pointed out our culture is ripe for making a transition to creating shared value, a “partnership” culture which Eisler symbolizes with the “chalice.” (Eisler, 1987, 2007)

Where to From Here?

So how do those of us who are part of the Friends of Charlie engage in the new future articulated so well by so many, including many in our own circle? We all know it is not easy, but let me offer a few clues.

1. I think it is important to make a clear distinction between optimism and pessimism on the one hand and hope on the other. Vaclav Havel once pointed out that neither optimism nor pessimism help us much when faced with difficult situations. An optimist generally believes that things will eventually turn out OK, consequently he/she will seldom participate in helping to address the problem. A pessimist, on the other hand, generally believes that it is all going to hell anyway, so there is nothing he/she can do about it, and consequently also seldom participate in helping to address the problem. Havel, consequently advised that what we need is hope. Being hopeful generally leads us to become engaged in addressing the problems even if we don’t know how things will turn out, but we do it simply because it is the right thing to do. This is a phenomenon Wendell Berry has referred to as “difficult hope.” And if history is any guide, when people engage in doing the right thing, even when prospects of solving problems seem dismal, certain convergence of events can bring about dramatic changes in a relatively short period of time.
2. A second important observation brought to my attention by Paul Roberts is the important difference between trying to change things and *preparing* for the changes that sometimes inevitably come. In the Prologue to his book, *The End of Oil*, Roberts points out that given the depletion of our stored concentrated energy sources “. . . the real question, for anyone truly concerned about our future, is not *whether* change is going to come, but whether the shift will be peaceful and orderly or chaotic and violent because we waited too long to begin planning for it.” (Roberts, 2004) So perhaps we should not worry so much about how to bring about changes and put more of our energy into preparing for the changes that will surely come.
3. A third really important issue for us to consider is one raised by Bill Rees in his thoughtful paper, “Are Humans Unsustainable by Nature?” Bill points out the distinction between “genes” and “memes” first articulated by Richard Dawkins in 1976. As Rees points out a gene “represents a unit of genetic information encoded in DNA that is passed from parent to offspring and that interacts with ‘the environment’ to help determine the physical and behavioral phenotype (the ‘appearance’) of the individual.” A ‘meme’ on the other hand “is a unit of cultural information that, like a gene, can be passed between generations and that influences the ‘phenotype’ of the culture.” All of this I think is terribly important to our conversation, but is clearly out of my

area of expertise so I will leave it to others in the conversation, who have that expertise, to determine its implications for helping us understand what works at what scale. But it raises the question of whether or not we are capable, as a species, to make significant changes in a short period of time – the kind required of us at this moment in our history. From my personal perspective it brings me back to the need to act out of hope with confidence that a certain convergence of events (there will certainly be a lot of changes taking place) can bring about the kind of cultural (meme) change that we need.

I find some encouragement in Weiss and Buchanan's observation that no matter which view of science we take, "the intrinsic uncertainty of nature can stymie either endeavor," which is another way of saying that "nature bats last." I take some solace in that since it reminds me again that we are not in charge and that nature could as easily create a convergence of events that turn our limited efforts in a renewing direction as well as a more destructive (from our perspective) direction.

And I take some solace in the fact that the assignment I was given was "seeking" what works at what scale – not "producing" it. I invite everyone in the Mountain Sky circle to join the search!

References

William A. Albrecht, 1947. "Soil Fertility as a Pattern of Possible Deficiencies," *Journal of the American Academy of Applied Nutrition*," Re-published in *The Albrecht Papers*, Acres USA, 1975.

David Crowder, Tobin D. Northfield, Michael R. Strand & William E Snyder, 2010. "Organic Agriculture Promotes Evenness and Natural Pest Control," *Nature*, July 1, Vol 466, 109-112.

Michael Duffy, 2011. E-mail communication.

Riane Eisler, 1987. *The Chalice and the Blade: our History, Our Future*. HarperSanFrancisco.

Rianne Eisler, 2007. *The Real Wealth of Nations*. San Francisco: Berrett-Koehler Publishers.

Jeremy Grantham, 2011. "Time to Wake Up: Days of Abundant Resources and Falling Prices are Over Forever," *GMO Quarterly Letter*, April.

Sir Albert Howard, 1940. *An Agricultural Testament*. New York, Oxford University Press.

Wes Jackson, 2011. "Between Soil and Soil," *The Progressive*, December 2010/ January 2011. 34-35.

Aldo Leopold, 1949. *A Sand County Almanac*. New York: Oxford University Press.

W.J. Lewis, J.C. van Lenteren, Sharad C. Phatak, & J.H. Tumlinson, III, 1997. "A Total System Approach to Sustainable Pest Management," *Proceedings of the National Academy of Sciences*, Vo 94, 12243 – 12248, November.

Gary Paul Nabhan, 2009. *Where Our Food Comes From*, Washington, DC: Island Press.

Ivette Perfecto, John Vandermeer & Angus Wright, 2010. *Nature's Matrix: Linking Agriculture, Conservation and Food Sovereignty*. Washington D.C.: Earthscan.

Charles Perrow, 1999. *Normal Accidents*, Princeton: Princeton University Press.

Charles Perrow, 2007. *The Next Catastrophe: Reducing Our Vulnerabilities to natural, Industrial and Terrorist Disasters*. Princeton: Princeton University Press.

Michael E. Porter and Mark R. Kramer, 2011. "Creating Shared Value," *Harvard Business Review*, January/February.

Paul Roberts, 2004. *The End of Oil*. Boston: Houghton Mifflin Company.

Ernest L. Schusky, 1989. *Culture and Agriculture: An Ecological Introduction to Traditional and Modern Farming Systems*. New York: Bergin & Garvey Publishers.

Lindsay A. Turnbull & A. Hector, 2010. "How to Get Even with Pests," *Nature*. July 1, Vol 466, 36-37.

Kenneth M Weiss and Anne V. Buchanan, 2011. "Is Life Law-Like?" *Genetics*, Vol 188, 761-771, August.

* This paper was prepared for a presentation to the Friends of Charlie gathering at Mountain Sky, Montana on September 25, 2011.