

“Sustainable Food Systems for the 21<sup>st</sup> Century”  
Presentation to the Global Sustainability Conference  
June 10 – 11, 2006 ~ Seattle, Washington  
by E. Christopher Mare ~ Village Design Institute

Whenever attempting to comprehend a complex situation, it is useful to step back a bit and begin by examining the context – the background from which the phenomenon is emerging. In this way, larger patterns or cycles are revealed that can provide a certain reassuring sense of continuity, and can render proposed solutions as ‘self-evident’ or ‘self-explanatory.’

For instance, when attempting to understand a situation as complex as “sustainable food systems for the 21<sup>st</sup> century,” it is revealing to examine the history or background of food systems more generally.

For the vast majority of their existence, human beings were or have been what is called “hunter-gatherers” – and this is still the preferred mode of subsistence today for a few scattered marginal groups living on the ‘edge’ of civilization. A hunter-gatherer lifestyle saw human beings assembled together in relatively small, clan-size social units of 25 persons or so. These groups followed the migration of game animals, synchronized with the maturing or fruiting of desirable plant foods at successive times and/or elevations.

For example, Wm. Kotke, in his highly regarded book *The Final Empire*, describes the lives of the indigenous people of the Gila River valley, now covered by the sprawling suburban metropolis of Phoenix. In Summer, the people would migrate to the cooler higher country, gathering ripening native fruits as they climbed in elevation. Toward the end of the growing season, packing the abundance of the harvest, all the clans would gather together as a ‘tribe’ and have a big ‘hoe-down’ – a few weeks of fun and festivities that included trading, bartering, and diplomatic formalities, as well as searching for mates from other clans. Often, groups from outside the region would participate, bringing with them exotic foodstuffs, crafts, or minerals. Then, during the leaner times of Winter, the people would re-disperse into their more manageable clan-scale groupings at the lower elevations of the riparian zone.

Was this lifestyle sustainable? You bet it was! The lives of these people were intimately involved with the cycles and seasons, the ebbs and flows, of Nature. The people had a detailed, functional, encyclopedic knowledge of the flora and fauna of their home range. The geological formations were alive with mythic proportions (See Abrams’ *The Spell of the Sensuous*).

It's important to realize that these people weren't just mindless wanderers: they had purposeful direction and consciously enhanced the ecology of the places they passed through; they did indeed 'garden' as they went. For example, the Salish speaking peoples of the interior of this bioregion, Cascadia, would cultivate whole hillsides with camas. As they harvested a bulb they would break off a choice corm and replant it, placing some mulch on top to retain moisture. To the invading white people, conditioned to think of gardening in terms of highly rigid and controlled linear straight rows, it looked like the natives were wasting or mismanaging land, when in fact the hillsides were productive and diversified gardens.

As another example, the pathways through the Amazon jungle are lined with food, fiber, medicine, and craft materials – consciously planted by the indigenes as they move along.

Many groups used fire to increase fertility and to control the growth of unchosen species – usually called 'weeds.' This technique produced a luscious green understory when the rains came, useful for animal browse as well as people food.

If the so-called hunter-gatherer lifestyle is sustainable, it's also because it must be so enjoyable – so veritably naturally 'human.' Says Richard Leakey: "[The hunter-gatherer lifestyle] is an extremely efficient mode of subsistence, so that foragers can often collect in three or four hours sufficient food for the day...Hunter-gatherers are attuned to their physical environment in a way that is difficult for the urbanized Western mind to grasp" (1994, p. 61). Mr. Kotke is even more generous: "[A]nthropologists studying tribal foragers calculate that they had exceptional health and each person averaged 500 hours "work" annually to sustain themselves... Anthropologists who study agriculture-forager-hunter people worldwide say individuals of those cultures each average 1000 hours "work" per year and that their health is not as good as the forager-hunter" (1993, p. 91); and then he goes on to add, "Now people work 2000 hours annually and need constant medical attention. [Their] diet is refined and produced by mass industrial production" (p. 93).

Just think, if we could create foraging systems as productive and diversified as pre-conquest managed ecosystems, not only would our health improve – with more lively, nutritious, and varied food sources – we also would have much more fun and free time! How would **you** choose to invest that time?

But before going further into that, let's take a look at the so-called Agricultural Revolution, because that phenomenon, that massive shift in human lifeways – the entrance of *Homo sapiens* – is always portrayed as some kind of obvious improvement over the foraging lifestyle. The story usually goes something like this: "About 10,000 years ago, certain people discovered that if they planted seeds in the ground they could obtain a reliable yield, thus allowing for increased populations." Well, yea, no duh: it's

already been determined that the hunter-gatherers were *managing* their ecosystems with sophisticated knowledge of local Nature – including, we can presume, recognizing where little seedlings come from. With all that in mind, one must ask, “Why would people voluntarily choose a subsistence regime that required twice as much labor while providing less nutritional quality?” I think that the prevailing story must be backward: I believe that the population increase happened first, and that sedentary agriculture was an adaptive response to depleted ecosystems.

“According to carbon dating, wheat and barley were domesticated in the Middle East in the 8<sup>th</sup> millennium BC” (Malkina-Pykh and Pykh, 2003, p. 9). This is where it all began: in the foothills between the Zagros mountains and the Tigris and Euphrates river valleys in present day western Iran. Agriculture began in the foothills because there was adequate enough rainfall to practice dryland farming techniques; and yet, for some odd reason – once again, most likely increasing population – the people began moving down into the uninviting, scorching hot desert river valleys where the practice of agriculture required heavy labor digging and maintaining networks of irrigation. The next thing you know, by the 3<sup>rd</sup> millennium BC, ‘civilization’ (the culture of cities) appeared, right there in present day southern Iraq. Attendant with civilization, among other things, were rigid social hierarchies headed by a self-designated ruling class, the relentless centralization of arbitrary power, highly specialized economic roles, and virtually continuous warfare with the people packed together behind fortified walls. Once again, as with agriculture, civilization is always portrayed as some kind of obvious improvement over Nature; yet, I must ask, would the people have chosen this way of life had options remained? As before, I believe the population pressure occurred first, and forced people into cities as an adaptive response. There, in a compromised situation, the people fell prey to those among them who would seize power by the use of violence – and this bizarre insidious phenomenon continues unto the present day.

Population pressure – agriculture – civilization – despotism: these phenomena are deeply intertwined; in fact, they come together as a package.

Of course, it is the culmination of the 5000 year march of civilization that we are witnessing today, with the rise of the tenuous global economy, highlighted by the unbelievable (some might say prophetic) events surrounding the occupation of Iraq – the former land of Sumer, the cradle of civilization, the provenance of agriculture (see Mare, 2004).

And what is the state of agriculture in these, the days of the Final Empire? Well, anyone who has been paying attention knows that the situation is not so rosy. Here is the conclusion to a 2003 book *Sustainable Food & Agriculture* by two Russian agronomists sponsored by UC Davis:

Indeed, if our planet were a bank, disbursing loans of natural resources, agriculture would be among its biggest debtors. Each year, agricultural practices erode mountains worth of topsoil, drain continents of their groundwater reserves, and eliminate plant genetic material in what is essentially colossal resource borrowing from future generations. Because today's farming uses many renewable resources at well beyond their rate of replenishment, and because little effort is made to replace them, agricultural resource debts continue to mount. The borrowing, however, cannot continue indefinitely. As this century commences, clear signs of lender fatigue are evident: five decades of resource over-exploitation have drained reserves of natural capital in many regions, and have limited agriculture's opportunities for future growth and resource borrowing.

Today's accelerating resource depletion comes as production – despite its strong showing between 1950 and 1984 – is stuttering and food demand is surging. Grain output that easily outpaced population growth for more than 30 years now lags well behind. Yields of rice barely inched up in the 1990s, while wheat yields showed no gain. Carryover stocks of grain, a key indicator of global food security, have shrunk each of the past three years, and now languish at their lowest levels ever. This sluggish performance comes on the eve of history's largest increase in food demand. Global population, at some [7] billion people today, is projected to top 8 billion by 2020; nearly all the increase will come in the developing world, where constraints to increased production are especially daunting. The rise in population will be accompanied by an increase in urbanization and incomes, both of which further boost food demand. In all, experts anticipate food demand increases of some 64% globally, and almost 100% in developing nations, over the next 25 years (Malkina-Pykh and Pykh, p. 301).

Yes, there seems to be cause for much concern; yet the authors of this sobering report did not mention the serious implications of the profligate use of *nonrenewable* resources in industrial agricultural production. Of course, I am speaking here about absolute dependence on fossil fuels at all stages of the process: petroleum is the base for pesticides and herbicides, natural gas is the source of nitrogenized fertilizers, gasoline is used to fuel the behemoth farm machinery and the massive trucking distribution systems; then there is all the packaging material and factory operations and research facilities. It is estimated that it now takes 10 calories of energy to produce 1

calorie of food – a 10:1 deficit that is hardly sustainable. Compare this with forager systems where more food energy was obtained than physical energy expended – a net energy *surplus*.

As the consequences of Peak Oil become increasingly imperative realities – especially as they debilitate a fossil fuel dependent agriculture; as climate change introduces new and unpredictable dynamics into the system; *while concurrently global birth rates continue to rise* – contemplating all this – I am left with the regrettable yet reasoned conclusion that *Homo sapiens* itself has reached a culmination: I would not be surprised to see global population levels fall precipitously and permanently over the next century. Authors Daily, Ehrlich and Ehrlich legitimize this conclusion by proposing an “optimum” population size:

[D]etermination of an “optimum” world population size involves social decisions about the life styles to be lived and the distribution of those life styles among individuals in the population. To us it seems reasonable to assume that, until cultures and technology change radically, the optimum number of people to exist simultaneously is in the vicinity of 1.5 to 2 billion people. That number, if achieved reasonably soon, would also likely permit the maximum number of *Homo sapiens* to live a good life over the long run.

Research population biologists David and Marcia Pimentel, from Cornell University, narrow this optimum population discussion by postulating: “If, however, the US population wishes to continue its current high level of energy use and standard of living and prosperity, then its ideal population should be targeted at 40-100 million people.” One-hundred million is about a third of current US population levels and equivalent to estimates of the indigenous population at the time of contact. Significantly, these authors also assume in their calculation the transition to a solar-based economy.

There, then, is the context – the greater overarching circumstances in which this topic “sustainable food systems for the 21<sup>st</sup> century” finds itself. What patterns or cycles can be deduced that will provide self-evident or self-explanatory solutions?

The first thing to notice (and this may appear at first a little controversial) is that agriculture itself is not sustainable – never has been, never will be. No? Well then maybe it’s more accurate to say that the full package that agriculture comes with – including population pressure, civilization, and despotism – is not sustainable. Ample evidence for this assertion comes from the classic book *Topsoil and Civilization*, by

Carter and Dale (1974), who trace the demise of civilizations as a consequence of the depletion of their topsoil bases. North Africa, for example, used to be the 'breadbasket' of Rome, and the Greek islands were once forested. Ancient Sumer is now a wasteland of blowing sand, oil wells, and depleted uranium.

The worst possible situation is when a fertile land base is exploited – mined as it were – to support the power ambitions of a distant centralized source, for this source will show absolutely no commitment to the enduring health of the place. Isn't this the essence and purpose of industrial 'agribusiness' as practiced today by transnational corporations? Haven't these corporations, in effect, 'colonized' the breadbasket of North America?

Food as commodity; food for export; food on futures markets; food for profit in the absence of a cultural context: this is formulae for disaster. How many tons of topsoil gets washed away each year to be deposited onto the expanding delta of the Mississippi River? How quickly is the Ogallala aquifer being drained for short-term profit? How many heirloom species will be 'extincted' this year, bought up by transnationals only to be destroyed in the perverted logic of market mechanisms? Soon after its beginning – by its very association with population pressure, civilization, and despotism – agriculture exceeded a human scale, a *community* scale, and so its unsustainable destination was inevitable, predictable.

At first glance, based on the context provided in this report, it may appear that I am advocating a return to a hunter-gatherer lifestyle as the ultimate basis for sustainable food systems; but this is not so, however appealing the prospect may be. There is not an ecosystem in the world that has not deteriorated to the point of being unable to sustain this type of existence. (There are, of course, foragers who subsist off the excess and waste to be found in large cities: see *Permaculture* Issue 47, "Zones 4 U.") Industrialized, fossil-fueled, profit-driven, socially oppressive, monoculture agribusiness is the opposite pole to foraging.

There are, however, and have been, many examples of sustainable food systems lying toward the middle of this spectrum. I am speaking here primarily of self-reliant, *village*-scale systems: the terraced paddies of Bali, the pastoral mountain valleys of Switzerland or the hills of northern Italy, the monasteries of Medieval Europe, the flood irrigated nomos of ancient Egypt, the tribal village networks of the people of the Salish Sea, etc. Simply put: village-based economies endure; they are able to be continued into the indefinite future.

And what are some of the characteristics that make village-based food systems so sustainable?

First, the production of food is integrated into the total cultural system of the community, not relegated to a few specialists, as in the US today where only some 3% of

the population is farmers. In this total cultural system, everyone contributes in some way to food production, processing, or distribution, thus circumventing the need for social hierarchies. There are village-wide rituals and ceremonies to celebrate and mark the vital turns of the seasons; thus, the lifeways of the community as a whole are intimately integrated into the cycles of Nature.

Second, it would not be quite accurate to call the village-based food production systems 'agriculture,' in the sense of large-scale mono-cropping intended for exportable surplus. Sustainable food systems are more aptly termed 'horticulture,' in the sense of small-scale, diversified systems intended for a wide range of uses and outputs *locally*, or for distribution within the region. Even the growing of staple grains – wheat, rice, barley, quinoa, etc. – which require larger fields, generally will be intercropped with other species, or lined by hedgerows, and will be part of a larger rotational system involving animals and fallow periods planted with nitrogen fixing legumes.

Third, sustainable food systems are based on *perennial crops*, most notably tree species and their varied accompanying understories. The perennial crops most often will be indigenous, and will be found to be arranged in distinctly vernacular 'guilds' – or beneficial associations of plants and animals unique to a micro-bioregion. These guilds can be found dispersed throughout the habitation system and are not merely confined to fields on the edge; thus, they form a type of edible landscaping – a *foraging* system of sorts. In sustainable, village-based food systems, then, the entire landscape can be managed for food production without the need for large-scale machinery.

Finally, sustainable food systems begin within the household. Each family or family system can be found providing for much of their basic food needs in the area immediately surrounding the home. There tends to be an intensity of cultivation denser around the home and then radiating out in concentric circles toward lesser density on the periphery, which is, of course, the edge of the village where the fields of staple crops are grown. In this type of arrangement, there is no room for large, resource intensive lawns rimmed with purely ornamentals, where all the food is grown at distant centers scattered about the globe. It could be said that food growing is basic to a human ecology; so then why isn't it being taught in the grade schools?

Sustainable food systems for the 21<sup>st</sup> century, then, require a return to human-scale, community-based – what I have termed *village-scale* – production systems. The introduction of cheap fossil fuels in profuse quantities into the second half of the 20<sup>th</sup> century generated food production systems that are not the least bit sustainable – they are most definitely unable to be continued into the indefinite future. This massive influx of nonrenewable energy sources resulted in an exponential increase in human population to levels which also are not sustainable. If we are wise, acting from an educated position, then we will begin now downsizing our operations, re-localizing, and

returning the responsibility of food growing – this most basic of human needs – to the intimate human-scale of the community. In this way, we will be fulfilling our human ecology and re-aligning with our natural heritage.

#### References:

- Abram, David (1996) *The Spell of the Sensuous*. Vintage Books; New York
- Carter, Vernon Gill and Tom Dale (1974) *Topsoil and Civilization*. University of Oklahoma Press; Norman
- Daily, Gretchen C., Anne H. Ehrlich and Paul R. Ehrlich (no date given) “Optimum Human Population Size.” Found at <http://dieoff.org/page99.htm>
- Kotke, William H. (1993) *The Final Empire: The Collapse of Civilization: The Seed of the Future*. Arrow Point Press; Portland, Oregon
- Leakey, Richard (1994) *The Origin of Humankind*. Basic Books; New York
- Litherland, Ru (2006) “Zones 4 U.” *Permaculture*, Issue 47, pp. 9-11. Permanent Publications; East Meon, Hampshire, England
- Malkina-Pykh, I.G. and Y.A. Pykh (2003) *Sustainable Food and Agriculture*. WIT Press; Southampton, UK
- Mare, E.C. (2004) *Apocalypse: Prelude to Enlightenment*. Village Design Institute; Bellingham, Washington
- Pimentel, David and Marcia Pimentel (no date given) “Land, Energy, Water: The Constraints Governing Ideal US Population Size.” Found at <http://dieoff.org/page136.htm>

#### Addendum:

From a Human Ecology perspective we can ask, “What do human beings need to live successfully, as organisms in the environment?” The answer, of course, is the first tier of the Maslowian hierarchy: fresh air, clean water, nutritious food, protective shelter. These are the fundamentals, the basics: all else is derivative; and for far too many, even the provision of these basics is not secure. It is only after these fundamental, first level needs are reliably fulfilled for an extended period that one can aspire to higher level fulfillments – such as “self-realization” or “maximizing human potential.”

Therefore, a “sustainable” situation – one that can be continued into the indefinite future, one that can be considered self-reliant and reproducible – will attend to these primary needs first. In this paper, I will be looking at sustainable food systems.

And what is food? It is an energy source. Food for the amoeba is certainly different than food for the human being, yet for both, food provides the energy for metabolism, as complex carbon molecules are broken down, oxidized, and then converted into waste materials, these waste materials subsequently becoming food for the next level down on the trophic chain. At the bottom of this chain, or rather cycle, the waste material of multitudes of micro-organisms in the soil becomes food for the plants that in turn grow to become food for the higher level heterotrophs.

This review of basic ecology is meant to emphasize one essential point: The viability of any food system, the criteria upon which its “sustainability” is to be assessed, revolves around the long-term fecundity of its soil base. It follows, then – and this is no stretch of the imagination – that the most valuable, productive, long-term utilitarian activity in which human beings can engage themselves – not only for the so-called “sustainability” of any given social unit but also for the evolutionary potential of the Biosphere as a whole – is to consciously increase and augment the fertility of the soil.

You could say that creating topsoil is a very spiritual activity.

You could say that a sustainable society literally grows out of the fertility of its soil.