Intensive crop culture for high population is unsustainable

Contributed by Peter Salonius
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Editor's note: The following essay by soil scientist Peter Salonius is Part One of his two-part series for Culture Change that bursts the delusion of agriculture's providing for a large human population long-term. If after reading it you have doubt, read the scientific basis for it: the second part in the series, "Unsustainable soil mining, past, present and future." (A version of the second part was published in the May/June,2007 issue of The Forestry Chronicle.) The author lives in New Brunswick, and he published in Culture Change in 2003 "Energy tax made easy: Modifying human excess with international non-renewable energy taxation." - JL

A growing number of media commentators, such as Allen Greer in The Australian, John Gray in the Guardian's Observer and Alan Weisman in his book "The World Without Us," have begun to suggest that a world with fewer people would be far better placed to deal with climate change and the exhaustion of the dirty fuels of the industrial past. Many of them appear to think that high technologies such as nuclear energy and Genetically Modified crops in combination with curbs on population would begin to dampen the environmental disruption that is becoming increasingly obvious.

However, the problem, as I have come to understand it, is even more serious than that visualized by these thoughtful individuals who are convinced that the neoclassical economic model of open-ended expansion and "so-called sustainable growth" is a recipe for disaster.

As we run up against all of the renewable and non-renewable resource depletions (Peak Oil, Peak Soil, Peak Minerals, etc.) that will characterize the foreseeable future, we require an entire rethink as to how we do business, due to the fact that the human enterprise has been living on borrowed time for millennia.

After 44 years of research and thinking about agricultural cultivation and silviculture, I have reluctantly been forced (I am a passionate farmer/gardener) to conclude that:

INTENSIVE CROP CULTURE IS UNSUSTAINABLE

Humanity has been in overshoot of the Earth's carrying capacity since it abandoned hunting and gathering in favor of crop cultivation (~ 8,000 BC) and it has been running up its ecological debt since then.

William Rees and Mathis Wackernagel originated the idea of the Ecological Footprint and they appear to believe (lots of publications) that the global human family overshot global carrying capacity sometime in the 20th century. Trying to get a perfect measure of overshoot is tantamount to "fiddling as Rome burns." We know we are in serious overshoot and we know that the total human footprint (whatever enormity it is) must get smaller.

I am convinced that we begin unsustainable resource depletion (overshoot) as soon as we use (and become dependent upon) the first unit of any non-renewable resource or renewable resource used unsustainably whose further use becomes essential to the functioning of society, such as:

THE FIRST TONNE OF COAL

THE FIRST LITRE OF OIL

THE FIRST KILOGRAM OF FISSIONABLE URANIUM

THE FIRST BARREL OF FOSSIL WATER FOR IRRIGATION -- and

THE FIRST HECTARE OF FORMERLY NUTRIENT CONSERVATIVE NATIVE FOREST or GRASSLAND/PRAIRIE PLOWED

This last category of unsustainable renewable resource depletion (excessive leaching/export of plant nutrients from arable soils associated with most agricultural practice, and more recently also with

harvesting of nutrient-rich forest biomass) has been looming over us, unseen, for 10,000 years. We can expect that it will catch up with us shortly because most of us are dependent on foodstuffs produced by unsustainable farming, and fiber produced by unsustainable forestry.

Recent visions, such as that put forward by the Post Carbon Institute's Relocalization program, of a fabric of local food and biofuel systems,
revitalization of local industry, and community cooperation are good
first steps that recognize global trade will wane as fossil fuel depletion gains momentum. They are also an attempt to wean humanity off industrial food production that treats soil as a medium for
fertilizer-dependent hydroponic agriculture, and simply a substrate to stand plants up in. These are people who are interested in popularizing organic agriculture, solar powered tractors etc. that will make local economies more self-sufficient.

HOWEVER, these alterations are still tied to AGRICULTURE as a food
production system -- as they must be in the short term.

All agriculture depends on the replacement of complex, species diverse, self-managing, nutrient conservative, natural grassland/prairie and forest ecosystems with monocultures or "near monocultures" of food crop plants that rely on intensive management. The simple shallow rooting habit of food crops and the requirement for bare soil cultivation produces soil erosion and plant nutrient loss far above the
levels that can be replaced by microbial nitrogen fixation, accumulation of volcanic dust, and the weathering of minerals (rocks and course fragments) into active soils and plant-available soluble nutrients such as potassium, phosphorus, calcium, and magnesium.

Under regimes dominated by complex, species-diverse, self-managing, nutrient-conservative, natural grassland/prairie and forest ecosystems, erosion rates of soil mass are minimal, and the diverse and deep structure of the below-ground rooting community, and its microbial associates, makes the escape of plant nutrients entrained in downward-moving drainage (leaching) water to the ocean very difficult.

Our ultimate goal, as we attempt to achieve a sustainable human culture
on Earth, must be to move toward the sustainable exploitation of complex, species-diverse, self-managing, nutrient-conservative, natural grassland/prairie and forest ecosystems at rates that do not cause the loss of physical soil mass or plant nutrient capital any faster than they can be replaced by biological and weathering processes.

Obviously, as we move back toward a solar-energy dependent natural economy, we will no longer be able to run the massive ecological deficits that temporary fossil and nuclear fuel availability have allowed.

Just as obviously the "solar-energy dependent economy" will not
support the human numbers that have been able to exponentially increase slowly as a result of agricultural mining of soil nutrient stores for the last 10,000 years, and rapidly because of the availability of non-renewable fossil and nuclear energy subsidies during the last 250 years.

In order to lower the human population to levels supportable by
sustainable exploitation of complex, species-diverse, self-managing, nutrient-conservative, natural grassland/prairie and forest ecosystems we must begin to reestablish these natural ecosystems on lands that have historically been increasingly devoted to intensive cultivation during our agricultural past.

The best suggestion so far to produce Rapid population Decline (RPD) is for the collective global human family to adopt a One Child Per Family (OCPF) "modus operandi/philosophy." Even with general acceptance of RPD and OCPF, the human population decrease that is necessary to achieve a
sustainable solar energy-dependent culture, will take several
centuries.

As human numbers are contracting/shrinking under a OCPF/RPD scenario,
the extant population will insist on being properly nourished -- and the only way we can produce enough food for them is by agricultural means that will further deplete the arable soils on the planet.

During the centuries of transition, as we move toward a solar-dependent culture that again sustainably exploits complex, species-diverse, self-managing, nutrient-conservative, natural grassland/prairie and forest ecosystems, we should be exercising as responsible an agriculture as possible on the shrinking arable land-base upon which it is still practiced. During this transition, the growing portion of the arable land base that is abandoned will rapidly revert toward natural grassland/prairie and forest ecosystems as soon as we cease cultivating it.

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Part Two in this series by Peter Salonius:
"Unsustainable soil mining, past, present and future"

culturechange.org/cms

Read Peter Salonius's idea for cutting back on fossil energy consumption, using what he calls a market alternative to rationing
Energy tax made easy: "Energy tax made easy: Modifying human excess with international non-renewable energy taxation"

culturechange.org/energy_tax.html