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The Farmers' Plea to Environmentalists

Dennis T. Avery

Abstract: This paper critically examines linkages between alternative farming practices and environmental quality. Environmental impacts of high-yield farming are contrasted to those of low-yield farming. Traditional low-yield farming systems, while being promoted by environmental groups, have resulted in massive famine, higher cancer rates, soil erosion, and losses in wildlife habitat. Organic farming and other low-yield systems are land intensive and invade marginal farmland, thereby destroying wildlife habitat and biodiversity. Low-yield farming has not and cannot produce enough food to meet the food needs of the world's population. By contrast, high-yield farming minimizes land use for food production and increases the availability of land for wildlife habitat and biodiversity. High-yield farming has contributed to economic development and lower birth rates, thereby reducing population growth. The environmental risks from high-yield farming are considered low and have been declining. The benefits of high-yield farming can be maximized with agricultural research and free trade in farm products.

Key Words and Phrases: High-yield farming, Environmental quality, Wildlife habitat, Biodiversity, Population growth, Hunger, Free trade.

I bring today an urgent and heartfelt plea from America's farmers to this nation's conservationists: Please understand—before it is too late—that high-yield farming is not only mankind's victory over *hunger* but its greatest *environmental* triumph as well.

We fully agree with the environmental movement that humanity now has the capability, and thus the responsibility, for saving the wildlife still on this planet. We also understand that there is only one way to save it while there is still time—with high-yield farming, hybrid seeds, chemical fertilizers, pesticides and sprayers.

We cannot claim that high-yield farming's chemicals and systems represent zero risk to wildlife, but the risk is *nearly zero* and shrinking further by the day. Without high-yield farming, however, the world's wildlife will lose millions of square miles of habitat—the biggest loss of wildlife since the age of the dinosaurs ended.

The risks to people, if we pursue low-yield farming systems, will include massive famine, higher cancer rates, and the loss of most of our wildlife resources—for nothing.

Mankind is at the most critical moment in environmental history. What we do as people and societies in the next two decades will determine whether we bequeath a more populated but sustainable world to the future—or bring on the very apocalypse of famine and wildlife destruction that Greenpeace and Earth First! envision.

The most critical environmental decision we will make is how to get our food. It will govern how we use two-thirds of the earth's land surface, and thus the availability of wildlife habitat.

So far, we are making the wrong decisions, for the wrong reasons, based on the wrong information. The environmental movement was never more correct than when it coined the slogan, "Think globally and act locally." But on agriculture and wildlife, all sides have thought locally and acted irrationally.

The Farmers' Regrets

For the past several decades, farmers have watched with sorrow as the environmental movement used its communicative power to turn the high-yield farmer's reputation from a Nobel peace prize winner into a bogeyman that literally frightens little children.

Farmers shared conservationists' concerns as DDT and other early pesticides were indicted and banished in the court of public opinion. The farmers feared at first that their pesticides were as dangerous as Rachel Carson said they were. They fear now that it will not matter whether modern farming is dangerous or not; it has already been condemned in the court of public opinion.

Farmers have tried to be patient with the environmentalists. They realized that the environmental movement became a major force in the aftermath of *Silent Spring*; that it was effectively *born* as a backlash against pesticides. But they hoped, as conservation became more confident of its own value, conservationists themselves would come to realize the enormous importance of producing our food on as few acres as possible—so land would be left for nature.

Instead, American farmers have been astonished and disappointed. Low-yield traditional farming systems have received environmental praise—even as those low-yield farming systems dealt with rising populations by pushing out onto steeper slopes and into the habitat of the elephant

and the gorilla. Organic farming has been held up as the ideal, even though it could not feed the people.

Initially, the conservationists said organic farming would be enough. They would make the world vegetarian so little land would be needed to feed it. But the faint hope of a vegetarian world has long since passed. No society has ever voluntarily become vegetarian, and today the Third World is demonstrating a surging demand for meat and milk. Wild lands are already being sacrificed to produce them.

Worse, the traditional slash-and-burn farming of the undeveloped regions has become unsustainable as populations have increased due to improved medical care. Short and shorter fallows are costing up to half of the forests' biodiversity even where the forests are not cleared. This is happening because we use *too little* high-yield agriculture.

More recently, there has been the ugly implication that we could let the Third World starve for its sins of reproduction and keep the wildlife.

I personally came face to face with that train of thought a year ago, at a Senate hearing on the world food outlook. Lester Brown, who has been predicting massive world famines for twenty-five years (without "success") again predicted that the world was headed for massive famine. Chairman Dale Bumpers (D-AR) dubbed Brown a genius, and announced his own belief that the world could not sustainably feed more than two to three billion people.

When it came my turn, I told the Senators that we were probably not going to have the big famines. I noted that thanks to research, the world's crop yields continue to rise twice as fast as its human population. That is why we have been able to feed twice as many people since 1950—using no more cropland. But I warned the Senate panel that if we *did* get the massive famines, they would not occur until after the Third World's people had hunted down virtually all of the wildlife for the stewpot and plowed the wild habitats for additional crops to stave off hunger. I noted the ample evidence that the Third World cannot hire enough game wardens to protect the wildlife if the people are hungry. Fortunately, I concluded, with more research and higher-yield farming, we should be able to feed ten billion people in 2050 on less land than we crop today!

I thought I was bringing good news to Capitol Hill. But Senator Bumpers told me: "Mr. Avery, you make me regret that I convened this hearing." The Chairman of the Senate Agricultural Appropriations Committee not only did not think we *could* feed extra people, he did not want us to *try*!

Farmers have been slow to realize the key factor behind their loss of public approval in recent decades: People are now more worried about an

overcrowded planet than they are about famine in faraway places. Farmers are geared mentally and emotionally to meeting hunger needs; it has been tough for them to appreciate that the general public now thinks producing more food will simply mean more people, more famine and more wildlife losses in the long run.

Of course, the public has not *told* us that they wanted famine. That would not be nice. But in their hearts, a large proportion of the American public now seems to suffer from the "Daniel Boone syndrome." Daniel, you will recall, said that if you could see the smoke from your neighbor's cookfire, it was time to move on. Americans are feeling psychologically overcrowded.

There Is No Population Spiral

Fortunately, recent dramatic reductions in world birth rates are beginning to ease our irrational fright that the human population will simply keep growing itself to death. There has never been an affluent country with a continuing high birth rate, and the General Agreement on Tariffs and Trade is now helping virtually the whole Third World gain affluence. As a result, Third World population growth rate is declining radically. Births per woman in the Third World have already fallen from about 6.5 in 1965 to 3.2 today. Since the replacement rate is 2.1, the Third World has come three-fourths of the way to stability in one generation. Moreover, 38 percent of the world's population already lives in countries in which births per woman are below the replacement rate of 2.1.

A realistic projection of the world's population for 2050 shows eight to nine billion people, with human numbers declining thereafter into the foreseeable future.

High-yield farming has played a key role in reducing the birth rates. The countries with the highest gains in their crop yields have also made the biggest gains in reducing their birth rates. In India and Indonesia, yield gains have far out-paced population growth, and births per woman have been cut nearly in half. In Zimbabwe, where corn yields have only kept pace with population, the birth rate is down. In Ethiopia crop yields have not kept pace with population—and the birth rate has continued to rise!

Higher crop yields add wealth, which itself encourages lower birth rates. They also permit a shift to urban jobs, and urban birth rates are almost always much lower than rural ones.

(If Rwanda was a case of overcrowding and food insecurity bringing on violence, the world should feel shame and regret that it had no agricultural

experiment station there. Now, one million refugees are threatening 1,000 rare wild species in Rwanda's Virunga Wildlife Refuge).

More abundant food has helped *slow* population growth, not exacerbate it.

Saving Wildlife Habitat with High Yields

The earth's cities currently occupy only about 1.4 percent of the planet's land surface. By the year 2050, the cities will occupy about 3.5 percent of the land area. If tomorrow's citizens treat their sewage and invest in clean energy, what threat do they represent to wildlife? Not much—unless it takes too much land to grow their food and forest products.

There is little question that we will have to triple the output of the world's food system again. Not only will we have to feed a population nearly twice as large, but we will have to feed them lots of high-quality protein. Humans seem to have a basic hunger for meat, milk and eggs, and it takes three to five times as many farming resources per calorie to produce such high-quality protein.

In Asia today, three billion people are averaging only 14 grams of animal protein per day. Americans eat 71 grams, and the Japanese now eat 55 grams. But lately China's annual meat consumption has been rising by 10 percent and four million tons per year. India's consumers are trying to buy an additional two million tons of milk per year. Indonesia's large poultry industry will grow by another 25 percent in 1995. It is virtually certain that by the year 2030, the food system will have to provide at least 55 grams of high-quality protein per day for four billion Asians.

High yields, however, have proven they can take the environmental sting out of population growth and high-protein diets. We are already feeding twice as many people today as we fed in 1950. We are feeding them a better diet, with lots more meat, milk and eggs. Yet the world is still cropping the same 5.8 million square miles of land that it used for crops in 1950. Only Africa is using significantly more land—because Africa is still not using the high-yield farming systems that have lately been developed for it.

If the world's farmers today got the yields they achieved in 1950, the world would need nearly three times as much cropland to produce today's food supply. A total of fifteen to sixteen million square miles is a reasonable estimate. That means we would have had to plow down wild lands equal to the land area of North America for more crops! If we pledge our-

selves to organic farming for the future, by the year 2050 we could expect to plow South America, North America, Europe and a big slice of Asia too.

Yet naturalists who fear losing wildlife species are worried first and foremost about losing habitat. (In contrast to the "environmental groups," they are not very fearful of farm chemicals). Without the higher yields, we might indeed lose millions of wild species over the next fifty years. With continued research investments in high-yield farming and forestry, we might not have to lose *any*. Pest-resistant soybeans, high-protein corn, cows that give birth to twin calves, rice that can grow in salty water, and super fish for farm ponds are all on the research agenda. Biotechnology seems likely to add enormous new momentum to turning high crop yields into still higher food yields.

The high-yield concept also applies to forestry. With cloned high-yield tree plantations, we should be able to produce the forest products for nine billion people from less than 5 percent of the current forest area.

The Best Land Has the Fewest Species

Further enhancing the value of high crop yields is the fact that the best cropland has the fewest wildlife species all over the world. The states of Ohio and Iowa, for example, have no unique, endemic plant species. The state of Georgia has only twenty-five. Florida, with all of its wetlands, has 385. America cleared 100,000 square miles of forest in Ohio and Indiana in the nineteenth century—and caused no species extinction. (We lost the passenger pigeon to market hunting).

The planet's real biodiversity resides in the rain forests, the swamps, the mountain microclimates. The rich farmlands have big populations of a few species, like the bison, antelope, wolves and prairie dogs of the Great Plains.

Ecologist Michael Huston, the author of the Cambridge University Press' new book, *Biological Diversity*, says there is no conflict between good farming and good conservation. In fact, he recently wrote an article for the *Bulletin of the Ecology Society of America*, reporting on the Hudson Institute's *Save the Planet* conference in Washington last February:

Conservative economists may be far ahead of the environmental community in their plans for a sustainable future that will save the Earth's biodiversity and environmental quality....The bottom line of the conference was that the only way to save wildlife and biodiversity from the increasing demands of the growing human popula-

tion is through increasing the food output from the Earth's existing farmlands....While this optimism about the power of technology contrasts with the philosophy of some environmentalists, speaker after speaker presented information or analyses that suggested that not only was this possible, but that it was already occurring....Modern agriculture is undergoing a technological revolution that may, for the first time in human history, make intensive agriculture environmentally sustainable. The three components of this revolution are: 1) zero-till farming; 2) precision farming; and 3) biotechnology....All ecologists who are concerned about a sustainable future should take these ideas seriously, regardless of their philosophical differences with the proponents, give them an unbiased evaluation, and consider how their own work and activities relate to this pragmatic framework for using and conserving the Earth's resources.

Endangering Species with Farm Chemicals?

If environmentalists are willing to risk losing millions of square miles of wild lands to have chemical-free agriculture, the farm chemicals must be truly devastating to wild creatures.

However, I have not been able to find the devastation. In fact, my home state of Virginia recently banned what it considered the most dangerous farm chemical for wildlife—a soil insecticide called Furadan 15G. This chemical had caused at least hundreds and perhaps thousands of bird deaths over a period of years. (Birds sometimes mistook the granules for seeds and ate them). Fortunately, this was only one pesticide, and we could give it up with no major yield loss.

But if we had to ban all the pesticides, and accept a 50 percent cut in yields, Virginia might have to plow another two million acres of wild lands to make up the production loss. How many birds live in two million acres of Virginia wild lands?

Today, of course, we do not use DDT or the other persistent pesticides. We use compounds that target pests more narrowly, need far less volume, break down more quickly, and are thoroughly tested to ensure both human and environmental safety. The latest chemicals are less toxic than aspirin, need only a few ounces per acre, and break down in a few days. But we do not yet have enough of these ultra-modern chemicals. We still occasionally need even the relatively nasty ones to ensure that our crop

yields will not suffer. And we still need to encourage more pesticide research.

How many million acres of wildlife habitat are the activists willing to give up to be pesticide free?

Causing Cancer in People?

Farm chemicals do not hurt consumers either. In fact, pesticides play a major role in *preventing* human cancer and heart disease.

First of all, fungicides and other pesticides help ensure that our grains and soil seeds are not infested with natural toxins due to fungus in our fields and storehouses. (Pesticides also ensure that insect and rodent damage do not let the fungus into the seed heads).

More important, pesticides help deliver mankind's most potent weapon against cancer—fruits and vegetables. Eating five servings of produce per day cuts cancer risks in half. But only 9 percent of Americans are eating that many. How many would eat five a day if the fruits and vegetables cost twice as much and had worm holes?

On that basis, it is fair to call organic produce a potential threat to public health.

Understand what this means: The top cancer experts and the Environmental Protection Agency (EPA) agree that all environmental factors (such as asbestos, dioxin, benzene and pesticide residues) cause less than 3 percent of all cancers. We have one hundred massive studies showing that the one-fourth of the population that eats the most fruits and vegetables has half the risk from cancer of the one-fourth that eats the least. There is not a single study that has found that eating organic produce cuts cancer risks more effectively than the produce in your supermarket.

But our rat tests have proved that some pesticides are potential carcinogens. How do we know the pesticides are not giving cancer to our kids? The same high-dose rat tests also prove that the pesticide residues are less toxic than mustard and pickles. Or chlorinated drinking water. The same high-dose rat tests prove that the limonene in your orange juice and the caffeic acid in our green vegetables and beverages are "carcinogens." In fact, we eat 10,000 times as much cancer risk (by weight) in natural carcinogens as we do pesticide residues. The problem is not the pesticides; it is the rat tests, which mislead us into seeing danger in the wrong things. We know now that "the dose makes the poison" in cancer as in everything else.

As with wildlife we cannot prove zero risk from pesticides to people—but we can demonstrate an enormous gain in their well-being!

The impact of the current EPA campaign to mash down the volume of chemicals used on farms is predicated on the idea that farm chemicals are a health threat. But the likely outcome of that campaign will be to bring on more cancer and generate more soil erosion. The impact of driving the “old” pesticides off the market will be mainly to eliminate key small-volume pesticides that help produce those economical and attractive fruits and vegetables. Banning triazine chemicals (like atrazine) will mainly reduce the cost-effectiveness of conservation tillage, leading to more soil erosion with no offsetting health gains.

Organic Farming Cannot Save the Planet

The bitter truth for true conservationists is that low-yield farming can't save the people *or* the wildlife. Organic yields are just too low, about half of the yields from the good mainstream farms. Worse, the world has only perhaps 20 percent of the organic nitrogen needed to support current world food production—let alone tripling output for the future.

This is a huge problem. It is so big that if all the urban sewage sludge in America were dedicated to our crop fields (heavy metals and transport costs notwithstanding) it would make up for only 2 percent of the chemical nitrogen we currently apply!

The only practicable way for the world to get huge increases in organic nitrogen would be to grow millions of square miles of additional legume crops—and each additional square mile of clover and alfalfa would be one less square mile for wildlife.

What about low-input sustainable farming? Well, if the chemicals are not dangerous to people or wildlife, then why are we spending research money to find *lower-yield* farming systems? Higher yields are better, in and of themselves, unless we can prove some of the negatives that have been suggested. And I mean *prove*, with peer-reviewed scientific consensus, not just with one paper carefully cheered on by close colleagues—and published under a scary headline in a magazine.

Stopping Soil Erosion

Organic farming's other big problem is soil erosion. And soil erosion, of course, is one of the key long-term threats that farming represents to the environment.

When we triple the yields on the best and safest land, as we have done in the past thirty years with high-yield farming, we slash soil erosion per ton of food by two-thirds because we do not open as much land to wind and water. If high yields also eliminate the need to push crops onto a steep or fragile acre, then we cut soil erosion even more.

Today, herbicides (chemical weed killers) are letting us stop soil erosion virtually in its tracks. Having already cut soil erosion per ton of food by two-thirds, we are now using conservation tillage and no-till farming to cut erosion another 65 to 98 percent! The chemical weed killers let us control the weeds without the moldboard plow, the steel cultivator shank, and the other "bare earth" farming systems.

Nor do the weed killers represent much of a threat to people and wildlife. The most famous and widely-used is atrazine. Greenpeace wants us to believe that atrazine is a breast cancer risk—but the EPA itself has just raised atrazine's safety rating seven-fold. (EPA has so far refused to raise the water contamination limits accordingly). Moreover, a recent survey of women in farming and forestry (where atrazine has been used for thirty years) shows they have only 85 percent as much breast cancer as the average American woman.

In fact, just to get above the "no effect" level on atrazine, an urban woman drinking from a river-fed water system would now have to drink 154,000 gallons of water per day. And do not forget that the atrazine traces are only in the water for a few weeks in the spring, so for nine months of the year, she would have to buy her *own* atrazine and add it to the drinking water.

Conserving with Cows

Even the noble cow, which converts grass humans cannot digest into high-quality healthful protein, has now been charged as an environmental villain. However, it is hard to see what the world would gain by letting its grasslands grow tall and ungrazed—and then watching them turn into instant carbon dioxide with the first lightning storm of the fall.

If we are going to graze the grass, it makes little sense to let the wolves have the meat in a world that keeps threatening to clear tropical forest for meat production.

Finally, if we are going to raise meat animals, I can tell you from experience that it is easier to deal with placid 900-pound cows than with hostile two-ton bison.

(With high-yielding pasture grasses and concentrated feeds, there should be no need to clear forest for pasture. The Amazon is being burned because of a government subsidy, not a beef shortage).

Those Confusing Subsidies

Both the farmers and the environmental movement have been confused by the farm subsidies.

The environmentalists note, quite correctly, that farm subsidies have plowed steep and draughty soils that should not have been farmed. They point out the fifteen million acres of American wetlands that have been drained since 1950—mainly for crops that were already in “surplus.”

The farmers look at the surplus and think there is no viable market for their products. In 1933, that may even have been true.

But the world today has no surplus, of grain or good farmland. America's set-aside land represents *two years' worth* of the increase in food production that the planet must achieve in *each of the next forty years*. And the set-aside cropland can only be brought back once.

The Conservation Reserve may look like good conservation on paper. But it is not diverting even the most fragile land in America, let alone in the world. As we speak, Indonesia is clearing over one million acres of tropical forest to grow low-yielding soybeans for chicken feed on highly erodible land while America diverts good cropland in Georgia and Iowa.

The Indonesians are also planning to drain two million acres of inland wetlands to grow low-yielding rice rather than buy the rice from existing cropland in neighboring Thailand.

In a world with urgent needs for more farm output, this is not conservation. It is protectionism, in direct violation of the environmental creed, “Think globally and act locally.”

The Conservation Reserve is not even creating permanent wildlife habitat. It is only creating annual meadows that will be whisked away at the drop of a contract.

The farm conservation plans were a wonderful idea for which the environmental movement deserves full credit. But the farm conservation plans would never have been needed if the subsidies had not already drawn in too much marginal cropland.

Farming's *big* conservation gains have been driven by technology, not federal farm programs. Conservation tillage is sweeping American agriculture without government regulations because it saves soil and cuts costs. It was not the Conservation Reserve that put my hilly Shenandoah

Valley back permanently in grass; it was competition from Corn Belt land with higher yields.

Absent government subsidies, economics and conservation work wonderfully well together in agriculture. And the more broadly we let the competition work, the better it will work.

The Environmental Need for Free Trade in Farm Products

High yields will not be enough by themselves. We will also need to use the world's best and safest farmland to achieve the tripling of world food output. That means free trade in farm products.

The world's farming resources are poorly distributed for the twenty-first century. Asia will have nine times as many people per acre of farmland as North America. Moreover, Asia has already planted most of its good cropland using high-yield technology. Further food increases will be costly in money and environmental resources—or the price will be paid in eroded soils and lost plant species. That is why Indonesia is risking species extinction to clear more cropland. Most of the world's under-used cropland is in less densely populated places like the United States, Argentina, Brazil, France and Zaire.

But with further research gains and free trade, the world in 2050 should not need any more cropland than we have cleared today.

By Their Yields Ye Shall Know Them

The Bible talks about morally righteous people and says, "By their deeds ye shall know them." When it comes to agriculture, I think we can offer a new guideline for identifying the environment-sustaining farmers: "By their high and sustainable *yields* ye shall know them."

We are not talking about putting *any* good farmers out of business, we are talking about tripling their output! We are talking about where we invest for expansion and turning low-yield farmers into environment-sustaining, high-yield farmers.

I know the environmental movement has this vision of a fifteenth-century peasant village as the ideal for human society. Eco-activists fear that big, mechanized American farmers might drive peasant farmers out of business and out of their villages.

There are a few problems with the vision, however. First, hardly anyone wants to live in the peasant village anymore unless it has commu-

nity TV sets, running water, vaccinations to keep the kids alive, and a good school. Once they have the school, then some of the kids want jobs that do not involve stooping in a rice paddy.

Even more important, Asia's peasant villages cannot fill that huge food demand gap without plowing down what is left of Asia's wild lands and building lots of big dams for irrigation. China is already working on a huge dam that will displace one million people. India is going to dam the Narmada River to irrigate the sandy soils of Gujarat state. The Mekong Delta is scheduled to get more than fifty dams. India is feeding the extra dairy cattle on crop biomass stolen from its fields—and setting up soil erosion problems for the future.

We have always known that we depended on agriculture for our food. In recent years, we have come to think of agriculture as a place to stash low-skilled labor; sort of a living museum. Sorry, but agriculture is now too important to be a peasant museum. Farming no longer has room for many low-skill farmers or much low-yield farming. In tomorrow's world, high-yield agriculture and forestry have to feed more people *and* save our wildlife. That is responsibility enough for one industry.

Put the museum somewhere else - somewhere less critically important to the environment.

Notes

Dennis T. Avery is Director of Global Food Issues for the Hudson Institute, Indianapolis. Formerly the senior agricultural analyst for the U.S. Department of State, his latest book is entitled Saving the Planet with Pesticides and Plastic: The Environmental Triumph of High-Yield Agriculture. This paper was presented as the 1995 J.W. Fanning Lecture, University of Georgia, Athens, GA, November 9, 1995.

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